April 13, 2018 | Michigan State University

UURAF

UNDERGRADUATE RESEARCH & ARTS FORUM

20th Anniversary

WELCOME

Welcome to the 20th annual University Undergraduate Research and Arts Forum at Michigan State University. Throughout the day, undergraduate students from diverse academic disciplines will present their outstanding research and creative endeavors. This forum is the largest in the event's history, with over 900 students from 14 different colleges participating today. These students were mentored by more than 600 faculty members.

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

Many have contributed to make this growing event a success. We offer special thanks to the UURAF Team, Aliya Beavers, Amanda Flores, and Jessica Diaz from the Undergraduate Research Office, for assisting with the coordination of this event and to the many staff members from across campus who volunteered their time. The cover art was designed by Malarie French, who recently earned degrees in Graphic Design and Packaging from MSU. Malarie was a member of the AIGA Detroit MSU student group.

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

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

MICHIGAN STATE
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AWARDS CEREMONY – April 18, 2018

Please join us on Wednesday, April 18th at 3:30 PM for the awards ceremony in the Ballroom of the Union during which the prize winners in the various categories will be announced. We encourage all participants to join us for the awards ceremony and to invite their families, friends, mentors, and faculty members to attend.

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

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

APUE-Education Abroad Undergraduate Research Scholarship

The Office of the Associate Provost for Undergraduate Education (APUE) and the Office for Education Abroad offer twelve $500 scholarships for MSU undergraduate students participating in approved study abroad programs that have an undergraduate research component. Applicants must have a cumulative GPA of 2.75 or higher at the time of application and have applied for a research study abroad program.

2017-18 Recipients

Katie Edwards
Ingrid Flaspohler
Jade Greear
Uliks Lulo
Haley Gmutza
Kaylee Montney
Trevor Powell
Katelan Saunders
Kennedy Sawiki
Sarah Thomas

Congratulations to this year's scholarship recipients. Visit urca.msu.edu/funding for more information and to download an application.

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SCHEDULE OF EVENTS

All events take place in the MSU Union

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

ORAL PRESENTATION SCHEDULE

8:30 AM – 3:30 PM

CATEGORY	SECTION	TIME	LOCATION
Agriculture & Animal Science	1	8:30 AM – 10:00 AM	Lake Ontario Room
Agriculture & Animal Science	2	1:30 PM – 3:00 PM	Lake Ontario Room
Anthropology	1	11:00 AM – 12:00 PM	Room 30
Biochemistry & Molecular Biology	1	11:00 AM – 12:30 PM	Lake Ontario Room
Business	1	8:30 AM – 10:15 AM	Lake Michigan Room
Business	2	1:30 PM – 3:00 PM	Lake Michigan Room
Cell Biology, Genetics, & Genomics	1	11:00 AM – 1:00 PM	Room 40
Digital Media	1	8:30 AM – 10:00 AM	Lake Erie Room
Digital Media	2	11:00 AM – 12:15 PM	Lake Erie Room
Education	1	11:00 AM – 12:15 PM	Lake Michigan Room
Engineering, Computer Science, & Mathematics	1	1:30 PM – 3:00 PM	Room 30
Environmental Science & Natural Resources	1	1:30 PM – 2:45 PM	Room 36
Food Science & Human Nutrition	1	8:30 AM – 9:15 AM	Room 30
Global & Area Studies	1	8:30 AM – 10:30 AM	Lake Superior Room
History, Political Science, & Economics	1	11:00 AM – 12:45 PM	Lake Superior Room
History, Political Science, & Economics	2	1:30 PM – 3:15 PM	Lake Superior Room
Humanities & Performing Arts	1	11:00 AM – 12:45 PM	MSU Room
Humanities & Performing Arts	2	1:30 PM – 3:00 PM	MSU Room
Kinesiology	1	8:30 AM – 9:30 AM	Room 40
Linguistics, Languages, & Speech	1	9:45 AM – 10:30 AM	Room 30
Microbiology, Immunology, & Infectious Disease	1	1:30 PM – 3:15 PM	Lake Erie Room
Physical Sciences	1	8:30 AM – 10:00 AM	Room 36
Physical Sciences	2	1:30 PM – 2:45 PM	Room 40
Social Science: General	1	8:30 AM – 10:15 AM	MSU Room
Social Science: General	2	11:00 AM – 12:30 PM	Room 36

POSTER PRESENTATION SCHEDULE

Session A: 9:00 AM – 10:30 AM

CATEGORY	SECTION	LOCATION
Agriculture & Animal Science	1	Lake Huron Room
Anthropology	1	Lake Huron Room
Biochemistry & Molecular Biology	1 & 2	Lake Huron Room
Cell Biology, Genetics, & Genomics	1	Lake Huron Room
Communication Arts & Sciences	1	Ballroom
Education	1	Ballroom
Engineering, Computer Science, & Mathematics	1	Ballroom
Environmental Science & Natural Resources	1	Lake Huron Room
Epidemiology & Public Health	1	Ballroom
Humanities & Performing Arts	1	2nd Floor Art Gallery
Integrative & Organismal Biology	1	Ballroom
Kinesiology	1	Ballroom
Microbiology, Immunology, & Infectious Disease	1 & 2	Ballroom
Neuroscience	1	Lake Huron Room
Physical Sciences	1	Ballroom
Plant Sciences	1	2nd Floor Art Gallery
Psychology	1	Ballroom
Social Sciences: General	1, 2, & 3	Ballroom

Session B: 11:00 AM – 12:30 PM

CATEGORY	SECTION	LOCATION
Agriculture & Animal Science	2	Lake Huron Room
Biochemistry & Molecular Biology	3	Lake Huron Room
Business	1	Lake Huron Room
Cell Biology, Genetics, & Genomics	2	Lake Huron Room
Communication Arts & Sciences	2 & 3	Ballroom
Engineering, Computer Science, & Mathematics	2 & 3	Ballroom
Environmental Science & Natural Resources	2	Lake Huron Room
Food Science & Human Nutrition	1	Ballroom
History, Political Science, & Economics	1	Ballroom
Integrative & Organismal Biology	2	Ballroom
Kinesiology	2	Ballroom
Linguistics, Languages, & Speech	1	Lake Huron Room
Microbiology, Immunology, & Infectious Disease	3 & 4	Ballroom
Neuroscience	2 & 3	Ballroom
Pharmacology & Toxicology	1	Lake Huron Room
Physical Sciences	2	Ballroom
Psychology	2	2nd Floor Art Gallery
Social Work	1	2nd Floor Art Gallery

POSTER PRESENTATION SCHEDULE

Session C: 1:00 PM – 2:30 PM

CATEGORY	SECTION	LOCATION
Agriculture & Animal Science	3 & 4	Lake Huron Room
Biochemistry & Molecular Biology	4	Lake Huron Room
Cell Biology, Genetics, & Genomics	3	Lake Huron Room
Education	2 & 3	Ballroom
Engineering, Computer Science, & Mathematics	4	Ballroom
Environmental Science & Natural Resources	3	Lake Huron Room
History, Political Science, & Economics	2 & 3	Ballroom
Kinesiology	3	Ballroom
Linguistics, Languages & Speech	2	Lake Huron Room
Microbiology, Immunology, & Infectious Disease	5	Ballroom
Pharmacology & Toxicology	2	Lake Huron Room
Physical Sciences	3 & 4	Ballroom
Plant Sciences	2	2nd Floor Art Gallery
Psychology	3, 4, & 5	Ballroom
Social Sciences: General	4	2nd Floor Art Gallery

Session D: 3:00 PM – 4:30 PM

CATEGORY	SECTION	LOCATION
Agriculture & Animal Science	5 & 6	Lake Huron Room
Anthropology	2	Lake Huron Room
Biochemistry & Molecular Biology	5	Lake Huron Room
Business	2	Lake Huron Room
Cell Biology, Genetics, & Genomics	4 & 5	Lake Huron Room
Communication Arts & Sciences	4	Ballroom
Education	4	Ballroom
Engineering, Computer Science, & Mathematics	5 & 6	Ballroom
Environmental Science & Natural Resources	4	Ballroom
Epidemiology & Public Health	2	Ballroom
Food Science & Human Nutrition	2	Ballroom
Integrative & Organismal Biology	3	Ballroom
Microbiology, Immunology, & Infectious Disease	6	Ballroom
Neuroscience	4	Ballroom
Physical Sciences	5	Ballroom
Psychology	6	Ballroom
Social Work	2	2nd Floor Art Gallery

PRESENTATION SCHEDULE

Presentations are organized by category and then by presentation time or poster number within each category. Oral presentations are listed first, followed by poster presentations. A PDF version of the book is posted on our website at https://urca.msu.edu/uuraf.

AGRICULTURE & ANIMAL SCIENCE

ORAL PRESENTATIONS, SECTION 1
LAKE ONTARIO ROOM, 8:30 – 10:00 AM

IS INCREASED AGGRESSIVE BEHAVIOR IN FINISHER PIGS POST-MIXING A RELIABLE PREDICTOR OF DECREASED LONG TERM PEN STABILITY?
Anna Bosgraaf
Time: 8:30 AM
Mentor(s): Carly O'Malley (Animal Science), Janice Siegford (Animal Science), Kaitlin Wurtz (Animal Science)

In pork production systems, it is common for unfamiliar pigs to be mixed together at various times. Mixing leads to periods of intense fighting during the first 24 hours as a new social hierarchy is formed. Previous research suggests that pens with more aggression post-mixing have less aggression later allowing the group to become stable. Our study analyzed the duration in seconds of total damaging aggressive behaviors (reciprocal fighting, attacks, fight withdrawals, and rest during fighting) and total aggressive behaviors (including head-knocking, bites, inverse and parallel pressing) in 24 single sex pens (half were gilts, half were barrows) of 12-15 pigs (318 total). These behaviors were observed for 9 hours post-mixing and for 4 additional hours 3 weeks later in stable groups. General linear models were fit accounting for number of pigs per pen, sex, and weight. Damaging aggression at mix and damaging aggression in the stable group did not appear related (P=0.892). Similarly, when total aggression post-mix and total stable aggression were compared, no relationship was observed (P=0.279). These results suggest that our population did not demonstrate the inverse relationship between aggression in a newly mixed pen and aggression in a stable pen as was demonstrated in other populations. More research is needed to decipher whether different populations or breeds of pigs show different hierarchical behavior as this has implications for mitigating pen aggression in finisher pigs.

IDENTIFICATION AND CHARACTERIZATION OF ROOT ROT PATHOGENS IN CRANBERRY DRY BEAN
Jessica Bunner
Time: 8:45 AM
Mentor(s): Martin Chilvers (Plant, Soil, & Microbial Sciences), Janette Jacobs (Plant, Soil, & Microbial Sciences), Hyunkyu Sang (Plant, Soil, & Microbial Sciences)

Michigan is currently the second largest producer of dry beans in the United States. Cranberry beans, are large seeded, and part of the Andean gene pool, which is susceptible to root rot. The purpose of this study is to identify whether root rot organisms are responsible for reduced yield in cranberry dry bean fields. 5 replications of 6 dry beans were planted into high versus low disease pressure soils. A baiting growth chamber experiment was conducted on dry beans treated with the following GroWest Premium Western Seed Treatments: Maxim, Apron XL, Dynasty, Rancona, Vibrance, and Cruiser, as well as untreated dry beans. Plants were grown at 20˚C for two weeks and measured for height and dry root and shoot weights. Selective medium was used to isolate oomycetes and fungi from the symptomatic root tissue and were identified by sequencing of the internal transcribed spacer region (ITS) of rDNA. Seedling pathogenicity assays will be used to assess the disease severity of each oomycete organism isolated.These isolates will also be evaluated for their fungicide sensitivity to mefenoxam. The results from this study will aid in the understanding of the role of oomycetes on dry bean stand establishment and yield, as well as the efficacy of mefenoxam as a seed treatment for the management of oomycetes.

SURVEY OF ANTIBIOTIC RESISTANT ENTERIC PATHOGENS AT THE MSU DAIRY

Katherine Koebel

Time: 9:00 AM

Mentor(s): Andrew Huff (Large Animal Clinical Sciences)

Incidence of antibiotic resistance among significant zoonotic pathogens has been increasing at alarming rates. This study aims to visualize the diversity and distribution of resistant bacteria, and analyze the severity of antibiotic resistance of enteric pathogens at the MSU Dairy Teaching and Research Center. Using a geographic information system, a map of the farm's land cover was created and used to generate spatially random points. These points, in addition to high-risk areas (rat traps, manure, bird and rodent nests, etc.) within the structures, were swabbed and cultured for E. coli, K. pneumoniae, Salmonella, S. aureus, and P. aeruginosa. Pure isolates were then subjected to antibiotic susceptibility testing using NARMS plates, including tetracycline, penicillin, sulfisoxazole, and ampicillin. Out of the 96 environmental samples, 22 total isolates of E. coli and K. pneumoniae were recovered. The susceptibility testing revealed widespread resistance to tetracycline, a common feed additive, and ampicillin, classified by the WHO as a critically important antibacterial, and several other antibiotics. Rat traps and bird feces were also found to be carriers of resistant strains of bacteria, implicating on-farm pest species in the transmission and ecology of these strains. The results of this study highlight the importance of judicious antibiotic use as well as the importance of excellent hygiene, pest management, and biosecurity on farms.

IMPACT OF EXERCISE FREQUENCY ON GAIT DEVELOPMENT

Jonathan Decker

Time: 9:15 AM

Mentor(s): Brian Nielsen (Animal Science)

Exercise can impact the body in many ways. Research examining the role exercise frequency plays on stride length and rate is limited. In this project, bull calves were used to investigate whether being exercised once a week, three times a week, or five times a week produces detectable alterations in gait. Prior to the start of the study, all calves were raised similarly in calf stalls at the MSU Dairy Teaching and Research Center and were grouped according to birth date. As they reached 9 weeks of age, calves were transported to the MSU Beef Farm, and from each group, calves were randomly assigned to each of the frequency treatments. Calves were housed in metabolism stalls and were provided ad libitum access to calf starter and water. Depending upon their frequency treatment, they were led at a walk to the end of an alley way, were released, and were encouraged to sprint back towards the barn containing their stalls. Sprints were 71 meters in length and were done either once, three, or five times per week according to their treatment for the duration of the six-week study with data collection once a week. Gait analysis was done by videoing 21.5 m of the sprint and studying data from an accelerometer attached to the calves' front left leg. Stride frequency was counted from the videos and confirmed with the accelerometer information. Stride length was then calculated using stride frequency and a portion of the sprint distance.

COMPETITION AMONG TRISSOLCUS WASPS FOR EGG MASSES OF NATIVE AND INVASIVE STINK BUGS

Krista De Cooke

Time: 9:30 AM

Mentor(s): Ernest Delfosse (Entomology)

Halyomorpha halys, the brown marmorated stink bug (BMSB), is an invasive crop pest from Asia that has caused millions of dollars of damage since it was introduced. Trissolcus japonicus, a parasitoid wasp, was being evaluated as a potential biological control agent when adventive populations were discovered in the United States. Proposals to use native Trissolcus species as biological control agents have been made, but there is little research into how efficacious this might be, or what environmental impacts may arise. This project will investigate to what degree T. japonicus and a native Trissolcus species will attack H. halys and three native pentatomids in choice and no-choice experiments. We hypothesize the wasps will show a preference for the pentatomids on which they co-evolved; that these patterns will hold true when both species are exposed simultaneously to egg masses of all four pentatomid species; and if the parasitoids are forced to compete for one egg mass, one wasp species may be excluded. In Experiment 1, T. japonicus and a native Trissolcus species will be independently exposed to a single egg mass. In Experiment 2, a wasp of both species will be exposed to a single egg mass and forced to compete. These experiments will be repeated with egg masses of all pentatomid species. In Experiment 3, a wasp of both species will have access to all pentatomid species. This research will lead to a greater understanding of how T. japonicus will interact with native parasitoids as it spreads across the country.

TEMPORAL EXPRESSION PATTERNS OF TWELVE GENES DURING FETAL AND POSTNATAL SKELETAL MUSCLE DEVELOPMENT IN PIGS
Brianne Wolfer
Time: 9:45 AM
Mentor(s): Catherine Ernst (Animal Science)

Characterizing the temporal expression patterns of genes throughout fetal myogenesis and postnatal skeletal muscle hypertrophy in pigs is critical to better understand the genes involved in these processes. The objective of this study was to confirm expression profiles for 12 genes previously profiled using microarray assays in pig longissimus dorsi (LD) skeletal muscle at seven developmental stages: 57, 70, and 105 days of gestation, birth, and 1, 3, and 5 weeks postnatal. Total RNA was extracted from LD samples of male and female fetuses (n≈3 per sex per stage) obtained from Yorkshire x Landrace gilts. Expression profiles for each gene at each stage were determined using real-time RT-qPCR assays with TaqMan chemistry. The relative expression of each gene (ΔCts) was used in a linear model including fixed effects of sex, age, and sex by age interaction. Results were analyzed with ANOVA to assess the significance of each effect. Tukey-Kramer adjustments were used to conduct pairwise comparisons between developmental stages for each gene. A significant effect of age was observed on the expression of all target genes except for ATXN10 (p-value range: 5.89e-14 to 0.007). Six genes (ATF4, BTC, CACYBP, MYOZ1, NRAP, and USP13) increased in expression throughout development, while DLK1 decreased. Four genes (CYTH2, DCN, FST, and WRAP73) exhibited variable expression throughout development. These expression patterns were consistent with previously observed patterns of expression obtained from microarray experiments. Further research into temporal gene expression patterns will enhance our understanding of the regulation of muscle development in pigs.

AGRICULTURE & ANIMAL SCIENCE
ORAL PRESENTATIONS, SECTION 2
LAKE ONTARIO ROOM, 1:30 – 3:00 PM

ARTHROPOD NATURAL ENEMIES OF DANAUS PLEXIPPUS EGGS AND NEONATES IN CENTRAL MICHIGAN
Carissa Blackledge
Time: 1:30 PM
Mentor(s): Doug Landis (Entomology)

The monarch butterfly (Danaus plexippus), is an iconic insect species, known not only for its beauty, but also its incredible yearly migration. However, over the last few decades a distinct decline in overwintering populations has been observed. The decline is thought to be a result of many ecological factors including a decline in host plant habitat along the migratory route, a loss during summer breeding and a high prevalence of pathogens (especially Ophyocystis elektroscirrha), among other abiotic and biotic factors. Top down pressure caused by arthropod predators throughout the summer breeding could also contribute to significant losses but it remains unclear what suite of predators is capable of consuming the eggs and neonates of this notoriously toxic caterpillar. Therefore, the goal of our study was to identify potential predators of immature monarchs in central Michigan. By using a series of no-choice predation assays, we evaluated the potential consumption of over 50 different predators and herbivores commonly observed on milkweeds in our region. We found that earwigs, lady beetles, and various crickets were the most voracious in our assays. In addition, a few insects commonly considered strict herbivores also consumed the immature monarchs, even before initiating herbivory. Although our list is not exhaustive, it begins to help elevate the understanding of what the predator community looks like for monarchs in the Midwest.

ASSOCIATION OF ALLELES AT THE LEPTIN RECEPTOR GENE LOCUS WITH LEPTIN RECEPTOR EXPRESSION AND CARCASS COMPOSITION PHENOTYPES IN A PIG RESOURCE POPULATION
Taylor Dressel
Time: 1:45 PM
Mentor(s): Catherine Ernst (Animal Science)

The leptin receptor (LEPR) influences food intake and energy metabolism, and is a candidate gene for regulating economically important phenotypes in pigs. The objective of our research is to determine the effect of a single nucleotide polymorphism (SNP) in exon 14 of the LEPR gene on adipose tissue LEPR transcript abundance and carcass composition phenotypes in the Michigan State University Pig Resource Population. A total of 51 female pigs were selected based on LEPR-SNP genotypes (n=17 per CC, CT, and TT). Total RNA was isolated from fat tissue samples and analyzed using real-time RT-PCR to obtain LEPR expression levels. A conditional analysis was performed using genomic best linear unbiased prediction (GBLUP) with the LEPR-SNP genotypes as fixed effects, and LEPR gene expression and carcass composition phenotypes as response variables. A significant dominance effect was identified with the TT

genotype showing lower expression than the CC and CT genotypes (p=1.20e-02 and 4.05e-02, respectively). Conditional analysis for carcass composition phenotypes identified significant dominance effects for eight phenotypic traits ($p \leq 0.05$). The T allele was associated with decreased backfat thickness and increased muscle weight. A genome-wide association study (GWAS) identified two quantitative trait loci (QTL) for backfat phenotypes on SSC6. The conditional analysis for these two phenotypes completely removed the significance of the QTLs on SSC6. This study highlights the LEPR-SNP as a candidate marker regulating variation in LEPR transcript abundance, and backfat and muscle phenotypes, with the C allele associated with increased LEPR gene expression and backfat thickness, and decreased muscle mass.

EFFECTS OF HOST SPECIES ON THE BIOTIC POTENTIAL OF THE ASIAN PARASITOID WASP, TRISSOLCUS JAPONICUS
Emmaline Gates
Time: 2:00 PM
Mentor(s): Paul Botch (Entomology), Ernest Delfosse (Entomology)

The brown marmorated stink bug, Halyomorpha halys, is a highly invasive pest of U.S. agriculture and a nuisance in residential homes. H. halys lacks natural enemies necessary for controlling population growth. The Asian parasitoid wasp, Trissolcus japonicus (Tj), has been evaluated as a classical biological control agent for H. halys; however, little is known about its biotic potential. We investigated the biotic potential of Tj on H. halys, and non-target species, Podisus maculiventris and Thyanta custator accerra, to answer the following questions: After mating once, how many eggs can a female parasitize over the course of her lifetime? Do sex ratios of offspring change over time? Do these variables differ among host species? To investigate these questions, we ran a series of controlled experiments exposing a single, naïve 24-h-old female wasp to a 24-h-old egg mass of each species. After 24 h, the exposed egg mass was replaced with a fresh egg mass of the same species each day for the remainder of the wasp's lifetime. The exposed egg masses were observed daily to detect changes, and emergence data were collected. Data showed that Tj had the greatest average parasitism success on H. halys, with P. Maculiventris following closely behind. The lowest success was on T. custator accerra. Average emergences from H. halys were also greater than 2x that of the estimated average. Understanding the biotic potential of Tj is important for predicting the wasp's ability to establish and manage H. halys, as well as impact non-target species.

USE OF PROTOPLASTS AS A SYSTEM FOR ASSESSING GENE EDITING ACTIVITY USING CRISPR AND TALENS IN SOLANUM TUBEROSUM, POTATO
Thilani Jayakody
Time: 2:15 PM
Mentor(s): David Douches (Plant, Soil, & Microbial Sciences)

Potato is one of the world's most important food crops. Cultivated potato, Solanum tuberosum Group Tuberosum L. (2n=4x=48) is a heterozygous tetraploid outcrossing species and is vegetatively propagated as tubers. Conventional breeding and genetic analysis have proved very difficult due to its tetraploidy and heterozygosity. In recent years, genome editing by sequence-specific nucleases (SSNs) such as Clustered Regularly Interspaced Short Palindromic Repeats/CRISPR-associated systems (CRISPR-Cas9) and Transcription activator like effector nucleases (TALENs) have greatly simplified the process of developing new elite cultivars by precision breeding. These reagents are designed to target specific genes of interest in potato to cause targeted mutagenesis. We used protoplasts system for assessing the on-target activity of CRISPR-Cas9 and TALENs in potato using the T7 endonuclease I (T7E1) assay . The transformation efficiency in protoplasts is determined by co-expression of GFP. These assays in protoplasts provides information regarding the efficiency of genome editing reagents.

SENSITIVITY ANALYSIS OF DETERMINANTS AFFECTING THE TUBERCULIN TEST IN CATTLE
Emily Lynch
Time: 2:30 PM
Mentor(s): Philip Strong (Lyman Briggs)

Bovine tuberculosis (M. bovis) is a condition that affects cattle herds and farmers across the United Kingdom, mainly South West England and Southern Wales. The widely accepted method for M. bovis diagnosis is the single intradermal comparative cervical tuberculin (SICCT) skin test. In this test, two different purified protein derivatives are administered intradermally into the neck of the cattle: avian and bovine tuberculosis. Three days after injection, the veterinarian uses callipers in order to compare the resulting swellings between the bovine and avian injection sites. The diagnosis is M. bovis if the area with the bovine injection swells at least 5 mm for the standard interpretation or 2 mm for the severe interpretation more than the avian injection site. This study focuses on determining whether or not squeezing strength of the veterinarians plays a role in the sensitivity. In order to do this, data was collected on 29 veterinarians around the

U.K. The relationship between squeezing strength and size reading on the bovine positive skin was found to be significant; the bovine negative and avian positive and negative associations were all found to be insignificant. This result represents that over 70% of M. bovis positive cows are expected to be misdiagnosed on the bases of the 5 mm threshold resulting in a sensitivity of less than 28 percent. The larger the reaction, the less important the squeezing strength became; at 9 mm difference, no reactors are expected to be missed, given the current sample of tested veterinarians.

EFFORTS TO PROMOTE POPULATION ESTABLISHMENT AND PERSISTENCE : A REVIEW OF THE APPLICATION AND PREVALENCE OF ACCLIMATION-BASED TECHNIQUES AMONG NORTH AMERICAN ELK (CERVUS ELAPHUS) TRANSLOCATIONS
Waldemar Ortiz
Time: 2:45 PM
Mentor(s): Robert Montgomery (Fisheries & Wildlife)

Translocations have been a widely applied tool to meet wildlife conservation and management objectives for over a century. In that time, a number of techniques (e.g., hard releases, soft releases, and post-release monitoring), have been developed to promote population establishment of translocated animals in their new environments. Hard releases involve the immediate release of translocated animals upon arrival in the new landscape whereas soft releases provide involve the translocated animals spending a period of time spent in a temporary holding pen in the new landscape before formal release. In either case, post-release monitoring aims can be implemented to identify the factors that affect the population's establishment once translocated animals are released into the landscape to further inform translocation practices. Keen to examine the application and prevalence of these techniques, we reviewed literature on translocations of elk (Cervus elaphus), a widely-restored species in North America.

AGRICULTURE & ANIMAL SCIENCE
POSTER PRESENTATIONS, SECTION 1
LAKE HURON ROOM, 9:00 AM – 10:30 AM

EFFECT OF ANTIMICROBIAL FILM ON THE SHELF LIFE OF VARIOUS LEAFY VEGETABLES
Claire Bassett
Poster: 1
Mentor(s): Evangelyn Alocilja (Biosystems & Agricultural Engineering)

According to the USDA, 31% of food (equivalent to 133 billion pounds) is thrown away without being consumed each year in the United States ^[1]. This occurs for numerous reasons at the retail and consumer level. When it comes to vegetables, the length of time they can be safely stored in a refrigerator varies from 3 days to about 3 weeks, depending on the vegetable. However, even if cleaned and stored properly, these vegetables can quickly harbor and grow dangerous bacteria, such as E. coli and Salmonella. The objective of this study was to develop an antimicrobial film for reducing food waste by minimizing pathogenic contaminants in perishable food products. An antimicrobial film was developed and validated in its ability to kill present bacteria and prevent further growth on spinach, romaine lettuce, and cabbage. One gram of each leafy vegetable was wrapped separately with the antimicrobial film and then left in the refrigerator for different time periods. As a control, one gram of each vegetable was then wrapped using a regular plastic food wrapping. Samples of each vegetable were tested for bacterial load after various increments of time. Preliminary results show that the antimicrobial film had significant bacterial load reduction compared to the control, even when stored for two weeks. This antimicrobial film holds promising potential for increasing food safety and extending the shelf life of other perishable foods.

SHADING INFLUENCES COVER CROP AND WEED GROWTH AND PHOTOSYNTHESIS
Adam Constine
Poster: 2
Mentor(s): Karen Renner (Plant, Soil & Microbial Sciences)

Time constraints limit the opportunity to establish cover crops in the fall following corn harvest in the upper Midwest. Interseeding cover crops into corn at the early vegetative growth stages could benefit farmers by providing a longer time period to accumulate cover crop biomass, improve soil health, and suppress weeds. However, cover crops may compete with corn if cover crop growth is not suppressed by the shaded conditions beneath the corn canopy during the summer months. The objective of our research was to determine the effect of shade on the growth and development of five common cover crops and annual weed species in corn. Seedlings of each plant species were placed under 0, 30 and

60% shaded conditions in the greenhouse. Pots were sub-irrigated daily and fertilized weekly to negate water and nutrient stress. Chlorophyll content and photosynthesis of each plant species was measured three weeks after shading using a MultispeQ device developed by PhotosynQ. Plants were then harvested and dried. Plant species biomass, chlorophyll content, and photosynthetic rate were regressed against shade levels to determine cover crop and weed response to shade.

WHAT MAKES A FARMER WILLING AND ABLE TO ADOPT NO-TILL FARMING?

Alison Ferer
Poster: 3
Mentor(s): Scott Swinton (Agriculture, Food, & Resource Economics)

This research looks at the factors that influence farmers in Illinois, Indiana, Ohio, and Michigan to adopt, or not to adopt, sustainable farming practices, specifically no-till farming. No-till farming is farming without disturbing or turning the soil between planting seasons, which is important because it helps to limit soil erosion and to mitigate greenhouse gases through reducing breakdown of soil organic matter. It was found through data from the 2017 Crop Management and Stewardship Practices survey with 2290 viable respondents that 31% of corn-soybean farmers in the area studied practice no-till. The purpose of this research is to understand which factors affect both farmers' willingness to adopt no-till farming, as well as their ability to adopt this practice. We expect that increasing financial capacity, motivation to care for the environment, and adoption among surrounding farmers, some of the main factors expected to affect farmers' adoption decision, will lead to increased adoption. We also expect that amount of land and labor may be main factors that affect farmers' decision to adopt no-till farming because the practice can speed up farmers' work. Preliminary cross-tabulation analysis shows that the effect of financial capacity and environmental motivation is limited. However, these results do show that the adoption of other farmers in the state seems to have an effect on farmers' adoption. Because preliminary results are limited, we will conduct a multiple regression analysis to examine the effects of other aforementioned factors on farmers' adoption of no-till.

STATES OF BIRD ABUNDANCE IN A GREAT LAKES WETLAND: INFLUENTIAL LANDSCAPE FACTORS AND RECOMMENDATIONS FOR MANAGEMENT

David Heit
Poster: 4
Mentor(s): Daniel Hayes (Fisheries & Wildlife)

Understanding the abundance of wild populations is essential to species conservation and management. However, many species are difficult to detect and evaluate for their population status, especially wetland birds. Wetland birds serve as key indicators of ecosystem health and regulators of prey, plant and insect, populations—bolstering the necessity of their conservation. Therefore, research on the abundance of wetland birds, especially spatiotemporal factors that may control population abundance, provides conservation relevant information to wildlife managers. The Galien River Marsh is a coastal wetland system located on the southeastern shore of Lake Michigan, an important landscape home to numerous wetland birds despite that, to date, no research has been conducted. Understanding of how environmental factors impact local single-species populations is also lacking. To address these knowledge gaps, we (1) collected point-count data on local birds using a dependent double-observer approach, (2) gathered publicly available covariate data to relate to population data, and (3) applied multivariate Generalized Linear Models to describe relationships between bird abundance and environmental factors, including land cover and climate variables. Our preliminary results suggest that fine-scale land cover types and broad-scale climate variables influence variation in wetland bird populations, though fine-scale elements of point-counts contribute as well. We demonstrate the utility of point-count surveys and multivariate regression models toward better understanding wetland bird communities and factors that influence them to improve conservation and management in our study area and others. For local land managers, we offer recommendations for maintenance of healthy wetland bird populations along Great Lake shorelines.

DOES CONSERVATION RESERVE PROGRAM LAND SUPPORT HONEY BEE FORAGING THROUGH ENHANCED FLORAL AVAILABILITY?

Abigail Seeger
Poster: 5
Mentor(s): Rufus Isaacs (Entomology), Meghan Milbrath (Entomology), Gabriela Quinlan (Entomology)

Honey bees are economically important pollinators but high colony losses over the past several decades, caused in part by insufficient access to nutritional resources (flowers), has raised concern. The Conservation Reserve Program (CRP) has initiatives to enhance natural forage for wild pollinators, but it is unclear if these benefits extend to honey bees. Our purpose for the research was to determine if management through CRP supports greater floral forage for honey bees and leads to an increase in the number of honey bee foragers. To do so, we compared numbers of foraging honey bees

and floral community composition on CRP land to those on analogous, herbaceous forage land (roadsides and unmanaged land) in southwest Michigan. CRP land had the highest number of foraging honey bees, as well as the greatest floral diversity, compared to unmanaged and land and roadsides. Unmanaged land had the fewest honeybees as well as the lowest floral diversity. However, floral abundance did not differ between CRP, unmanaged land, and roadsides. This demonstrates conservation enhancements' ability to support managed pollinators through superior floral diversity, as well as the importance of floral diversity to honey bee foraging choice. Unmanaged and roadside land also had high floral diversity and abundance, and can also support honey bee foraging. Their potential to support honey bees could be further enhanced through education and management suggestions. As part of this research I've developed an outreach packet of our research findings and suggestions for landowners to promote honey bee health on non-conservation land.

GRAIN-SHAPE ANALYSIS OF SAD GRAINS FOR PALEOENVIRONMENTAL INTERPRETATION
Heem Vanlawala
Poster: 6
Mentor(s): Michael Velbel (Earth & Environmental Science)

When analyzing a singular grain of sand, there are many key factors that must be taken into account. There are numerous characteristics that need to be identified to analyze the origin of the grain, how it has been shaped by its surroundings, and how it has been impacted by outside factors. In our grain shape analysis some of the key factors that stood out and were commonly found between the two analyzed samples were: the presence of a subangular to subrounded outline, the presence of a large conchoidal fracture, meandering ridges, flat cleavage steps, grooves and scratches, imbricated grinding features, medium relief. A subangular or subrounded outline means that it has varying amounts of wear on it with the edges being rounded; A conchoidal fracture is determined by looking for a smoothly curving, fractured surface without any natural planes of separation; meandering ridges are small graded arcs that result from impact breakage by other grains; Flat cleavage steps are identified by looking for breakage and wear on the grain that is somewhat flat; grooves and scratches are identified by looking for a growth pattern along the grain that looks like hairline grooves or scratches; imbricated grinding features are identified by looking for a grain that has been ground into another adjacent grain; medium relief is identified by looking for the contrast between the grain and its surroundings. The results of the grain analysis will be further discussed in detail during the presentation.

AGRICULTURE & ANIMAL SCIENCE
POSTER PRESENTATIONS, SECTION 2
LAKE HURON ROOM, 11:00 – 12:30 PM

THE ROLE OF PHYTOHORMONES IN PLANT-MICROBE INTERACTIONS
Blake Bezemek
Poster: 9
Mentor(s): Nejc Stopnisek (Microbiology & Molecular Genetics)

Despite the extensive knowledge about many ways microbes contribute to plant health, there is still missing information about how the plant-microbe interactions are mediated. Root exudates are one of the most important factors mediating these interactions. Not only do the exudates change during plant development, they also change upon the attack of a pathogen or under abiotic stress such as drought. With the changes in exudates, also levels of phytohormones change accordingly. We hypothesize that phytormones are important signals helping plants to recruit plant beneficial microbes. To test our hypothesis, we aim to i) identify at what time of the stress the phytohormones are actively secreted by the plants and ii) how does the secretion of the phytohormones affect the rhizomicrobiota. To address first aim, hydroponically grown common beans and Arabidopsis thaliana will be treated with phytohotmones (IAA, ABA or BTH) to induce stress. Applying mass spectrometry on the growth medium we will identify when plants actively secrete phytohormones. For the second aim, plants will be grown in field soils under controlled greenhouse conditions and stressed similarly as in the previous aim. Applying live/dead cell staining and 16S rRNA gene amplicon sequencing using DNA and RNA, changes in rhizosphere community structure and activity will be identified in the stressed and unstressed plants. The results from this project will help to understand the role of phytohormones as mediators in plant-microbe interactions.

EARLY LIFE ADVERSITY AFFECTS ENTERIC CHOLINERGIC DEVELOPMENT IN PIGS
Katelyn Kerr
Poster: 10
Mentor(s): Adam Moeser (Large Animal Clinical Sciences), Calvin Pohl (Large Animal Clinical Sciences)

Early life adversity (ELA) has been shown to increase risks of developing functional gastrointestinal disorders (FGIDs) later in life; however little is understood about the mechanism linking early life events with FGIDs.1 Utilizing the porcine early weaning stress (EWS) model to mimic ELA, we investigated the interaction of EWS on choline acetyltranferase (CHAT) expression in ileal and colonic mucosa. CHAT is an enzyme that synthesizes acetylcholine, a neurotransmitter mediating enteric epithelial, immune, nerve, and muscle function.2 Previously, we demonstrated that ELA induces long term up regulation of intestinal CHAT expression and cholinergic mediated GI secretion.2 The enteric cholinergic system is under development in juvenile animals; however, the immediate effects of stress, particularly weaning, on the development of this system remain unknown. Here we test how weaning age affects the progression of enteric CHAT expression in juvenile pigs. Utilizing western blot to quantify CHAT protein expression, we identified two CHAT isoforms. One prominent band found at 83 kDa and another at 55 kDa, concordant with previous reports. We found that expression of the 83 kDa significantly increased over time. At 55kDa, a significant decrease is seen in piglets 17 days of age and a trending decrease at 70 days of age in both groups. These findings suggest a dynamic shift between these two isoforms throughout the course of this developmental period.

ANGELES NATIONAL FOREST: CHARACTERIZING RECREATIONAL USES AND USERS
Joshua Knoll
Poster: 11
Mentor(s): Frank Lupi (Agriculture, Food, & Resource Economics)

The Angeles National Forest comprises over 1,000 square miles of chaparral (shrub land) and mixed forest and lies directly northeast of Los Angeles. Studying the recreational uses and the recreational users of the Angeles National Forest is an important undertaking, given that it happens to be on the doorstep of one of the world's megacities. Not only does this data help advance research understanding of forests, NF mangers are aided by such knowledge when creating frameworks for policy and management. To gather information on forest users, the study managed over 1,000 intercept interviews across over 80 recreation sites. The interviews were conducted June through August of 2017 and followed a stratified random sampling plan. Interviewers were conducted in-person and recorded on computer tablets. The interview questions sought to understand characteristics of users and how they use the individual areas. This study uses descriptive statistics to summarize the data and test for significant differences across user types and locations. The findings will be shared with forest managers and other researchers in order to better understand National Forests, and to serve those who utilize them.

COLLECTIVE ACTION AND COFFEE PRODUCTIVITY IN RWANDA'S SPECIALTY COFFEE SECTOR
Espoir Tuyisenge
Poster: 12
Mentor(s): David L. Ortega (Agricultural, Food, & Resources Economics)

Rwandan coffee is increasingly recognized as a high-quality product, sought after by specialty coffee buyers and consumers world-wide. The coffee sector in Rwanda is made up of over 355,000 farmers, mostly smallholders, and is a major source of export revenue for the country. Despite impressive growth and a rapid transformation, the coffee sector in Rwanda continues to struggle with high production costs, low productivity, and low producer cherry prices. Over the past decade, collective action mechanisms such as farmers getting together voluntarily in agricultural cooperatives, where they can contribute to their governance through participatory decision making and share risks, are being used as a means to overcome some of these challenges. This study uses data from 1,024 coffee producing households to address two critical questions regarding the role of cooperatives in Rwanda's coffee sector: Does collective action increase adoption of best practices and coffee productivity? and does cooperative membership improve farm household welfare? Using a propensity score matching technique to account for selection bias, we find that cooperatives are a critical institution for building farmer capacity, promoting adoption of improved technologies and inputs, and increasing productivity. We discuss the role that cooperatives can play in increasing farmer welfare and reestablishing the coffee sector as a pillar of growth in the country.

HOW DO FIRE HISTORY AND VEGETATION COVER INFLUENCE SOIL HYDRAULIC CONDUCTIVITY?
Becky Wildt
Poster: 13
Mentor(s): Jessica Miesel (Plant, Soil & Microbial Science), Kathleen Quigley (Plant, Soil & Microbial Sciences)

Maintaining historical fire regimes is vital to sustain fire-dependent ecosystems, and prescribed fire has become an important tool for land management. The Moquah Barrens, in the Chequamegon-Nicolet National Forest (Wisconsin, USA) consists of a matrix of open pine 'barrens', shrubland, deciduous forest, and pine forest. Experimental management units have been subjected to repeated prescribed fires, while other regions have been fire-suppressed for up to 80+ years. The barrens ecosystems are considered globally imperiled, and scientific research in this region seeks to understand the effects of fire on soils because woody encroachment is controlled edaphically. One way fire affects soils is through thermal alteration of soil organic matter. At low to moderate fire temperatures (< 400°C), hydrophobic compounds form, which reduce water infiltration rates. Because soil hydraulic conductivity has important implications for surface runoff, soil water holding capacity, and soil nutrient status, our objective was to quantify the impact of recent fire history on soil hydraulic conductivity. We hypothesized that recently burned study plots would exhibit faster water infiltration rates than fire-suppressed sites because fire-generated ash deposits create large pores for water to drain through topsoil. To test this, we measured water infiltration rates in previously established plots with varied fire histories during the summer of 2017 using a Mini Disk Infiltrometer. We also leveraged data on fire severity and fire temperature to further understand whether each influences soil hydraulic conductivity. Our results will enable local land managers to better understand the impact that fire can have on ecosystem hydrology.

AGRICULTURE & ANIMAL SCIENCE
POSTER PRESENTATIONS, SECTION 3
LAKE HURON ROOM, 1:00 – 2:30 PM

PHYLOGENETIC RELATIONSHIPS AMONG BLUEBERRY (VACCINIUM, ERICACEAE) SPECIES AND THEIR CO-EVOLUTIONARY DYNAMICS WITH THE BLUEBERRY STEM GALL WASP
Oliver Autrey, Cameron Bennett, Torey Fischer, Adrianna Hoffman, Anu Kolawole, Haaniya Mallick, Benjamin Mitchell, Neeraj Padmanabhan, Moeka Yamamoto
Poster: 16
Mentor(s): Patrick Edger (Horticulture)

The blueberry stem gall wasp, Hemadas nubilipennis (BSGW), is a devastating pest to the U.S. blueberry industry. Females lay their eggs within young developing shoots, often near floral buds in highbush blueberry (Vaccinium corymbosum). This triggers susceptible cultivars to form a gall, a multi-chambered structure that serves as a protective habitat and nutritional source for developing larvae. Gall formation negatively affects plant growth both by the oviposition into stems which causes visible injury to the plant host and by the feeding of the larvae. This leads to significant decreases in crop yield. Susceptibility to BSGW is highly variable among related wild species and cultivars with different genetic backgrounds. A robust and well-resolved phylogeny for Vaccinium is needed to investigate the coevolutionary interactions between BGSW and host plants, as well as identifying genetic sources of resistance for future crop improvement. Methods: In this study, we sequenced, assembled and annotated the plastid genome for thirty Vaccinium and one outgroup species using the Fast-Plast and Verdant bioinformatics pipelines. Additionally, we screened each species for resistance to BSGW and conducted phylogenetic analyses on a concatenated data set comprising 72 plastid genes. Results: Our phylogenetic analyses obtained fully resolved and strongly supported estimates for all nodes. We used this new phylogenetic framework to investigate the evolutionary dynamics of BSGW resistance. Conclusions: We anticipate that these findings will aid future studies to identify the underlying mechanisms for resistance and dissect the genetic architecture of insect-induced gall formation in highbush blueberry.

WORKING TOWARD AN IMPROVED MOLECULAR MARKER FOR THE DETECTION OF HOP DOWNY MILDEW CAUSE BY *PSEUDOPERONOSPORA HUMULI*
John Baltusis
Poster: 17
Mentor(s): Mary Hausbeck (Plant, Soil, & Microbial Science)

Hop production in the United States generates $618 million annually (2017). Hop downy mildew (HDM), caused by *Pseudoperonospora humuli*, reduces cone quality and yield; crown rot can lead to 100% yield loss. HDM migrates via air currents and can infect all plant parts including rhizomes used for planting material. Morphological identification cannot distinguish airborne inoculum of *P. humuli* from closely related *P. cubensis*, a cucurbit DM species. Molecular

identification between these two species is based on a single nucleotide polymorphism in the cytochrome oxidase subunit II (*cox2*) gene. However, this maker is not suited for use in isothermal recombinase polymerase amplification (RPA) assays. The objective of this experiment was to determine the limit of detection (LOD) for a new dual use, qPCR and RPA, marker located at open reading frame 306 (ORF306). DNA was extracted from sporuating hop leaves using a cetyltrimethyl ammonium bromide (CTAB) assay. A 10-fold serial dilution of DNA (1ng to 1 fg) was determined with a fluorometric quantitation assay kit. Three technical replicates for each DNA concentration were performed. The average Cq value and standard deviation were plotted on a log10 scale to generate a standard curve (R^2 = 0.964). The lowest DNA concentration that produced consistent amplification was 0.0001fg. Preliminary results showed the ORF306 probe less sensitive then the *Cox2* probe (LOD 0.00001fg). Investigations are underway to determine if *P. humuli* DNA concentrations were lower than initially recorded due to contamination by plant DNA during extraction which could account for differences in the LOD.

FOREST RISK BEHAVIOR SURVEY
Nicole Timmreck
Poster: 18
Mentor(s): Emily Huff (Forestry)

Two cities were chosen for the research project, one in Massachusetts and the other in Colorado. The goal of the surveys, one concerning forest pest management and the other concerning wildfire management, was to determine how land owners choose to manage their land and if their neighbors' actions influence those management decisions and concerns.

FOOD INSECURITY AMONG ADULTS WITH TYPE 2 DIABETES IN MALAWI
Emma Wood
Poster: 19
Mentor(s): Getrude Mphwanthe (Food Science & Human Nutrition), Lorraine Weatherspoon (Food Science & Human Nutrition)

Food and nutrition availability, accessibility and quality are critical for both Type 2 diabetes management and addressing food insecurity, two serious problems in Malawi that can have serious health outcomes if limited or compromised. However there is a paucity of data on associations between these two serious problems. Face to face interviews were conducted (n=428) in urban (Lilongwe, n=288) and semi-urban (Kasungu, n=140) districts of Malawi to determine if Type 2 diabetes management (blood glucose level) and food security are related. Data collected included: demographic characteristics and household food insecurity using the Household Food Insecurity Access Scale (HFIAS) questionnaire, as well as average blood glucose levels over 3 months (glycosylated hemoglobin/ HbA1C) from blood draws. Descriptive statistics and chi-square tests using SPSS version 24 were performed. The HbA1C for the majority of the study sample (60.3%), regardless of location was above the clinical target guidelines of concern (HbA1C>8%). Only 22.7% were food secure; 37.6% were mildly and 39.5% were moderately-severely food insecure. There were significant differences ($p<0.01$) in food insecurity in the two study locations. Participants from urban-Lilongwe were more likely to experience mild food insecurity (46.2%) while in semi-urban-Kasungu, moderate to severe food insecurity (50%) was significantly higher. Therefore, the importance of diet cannot be overemphasized in this vulnerable target group to ameliorate or mitigate disease complications and associated costs, and warrants further investigation to inform food and nutrition policies and interventions.

ASSOCIATION OF WHOLE BLOOD FATTY ACIDS AND GROWTH IN GHANAIAN CHILDREN 2-6 YEARS OF AGE
William Yakah
Poster: 20
Mentor(s): Jenifer Fenton (Food Science & Human Nutrition)

Growth stunting is a global challenge prevalent in most Sub-Saharan countries. In Ghana, stunting rates in children below 5 years of age are variable. While the northern region reports 33.1% stunting rate, most regions in the south have rates below 20%. Dietary fatty acids (FA) are crucial for growth, but whether the blood levels in Ghanaian children are adequate for growth is unknown. This study determined the association between whole blood FAs and growth parameters in Southern Ghanaian children 2-6 years of age. A drop of blood was collected on an antioxidant-treated card and analyzed for FA composition. Weight and height were measured and z-scores calculated. Relationships between FAs and growth parameters were analyzed by Spearman correlations and linear regressions. Of the 209 subjects, 22% were stunted and 11% were essential FA deficient (EFAD). No FAs were associated with growth parameters. When the blood FA levels from this study were compared to previously reported data from Northern Ghana, omega-3 FAs levels were significantly higher in the southern Ghana population ($p<0.001$) but omega-6 FAs level were significantly lower ($p<0.001$). Mead acid, an indicator of blood EFAD, was higher in northern Ghana (0.14%) than

southern Ghana (0.09%) populations. Our results show fish and seafood consumption was high in the southern Ghana population; a nutrient dense food. This study supports previous studies demonstrating that high consumption of fish and fish oil intake is associated with growth in children and suggests that other factors other than EFAD may be causing stunting in this population.

AGRICULTURE & ANIMAL SCIENCE
POSTER PRESENTATIONS, SECTION 4
LAKE HURON ROOM, 1:00 – 2:30 PM

FINISHING GROWTH PERFORMANCE OF NURSERY PIGS FED LIQUID WHEY AD LIBITUM

Catherine Majinska

Poster: 23

Mentor(s): Dale Rozeboom (Animal Science)

The purpose of this study was to see if giving liquid whey to weaned pigs affected growth performance of finishing swine. This study was conducted in two different ways. The first, known as replicates 3 and 4, consisted of feeding whey and feed in a wet-dry feeder. The second, known as replicates 5 and 6, were given whey in a cup-drinker, independent of the feeder. In both studies, each replicate consisted of 6 pens: 3 controls and 3 treatments. Each pen contained 8 crossbred pigs. Liquid whey was provided for 4 and 6 weeks post-weaning (nursery phase), in studies 1 and 2, respectively. Pig weights, feed intake, and whey intake were recorded weekly. In the grow-finish phase, provision of liquid whey was discontinued and all pigs were treated similarly for 10 weeks. Performance was recorded every two weeks. Results showed varied statistical differences between control and whey treatment groups. In the nursery phase, pigs given liquid whey did not gain weight as rapidly or eat as much dry feed as the control group. Differences were noted between treatment and control group appearance and behavior. Weaned pigs experienced a strong, possibly detrimental preference for the liquid whey. In the grow-finish phase, growth rate, feed intake and feed efficiency was variable. Giving nursery pigs ad libitum access to pigs in the nursery phase led to market hogs that were lighter in weight compared to those not given liquid whey.

THERMAL RESISTANCE OF ENTEROCOCCUS FAECIUM NRRL B-2354 (SALMONELLA SURROGATE) IN TALC AT 0.45 AW

Angella Mwiza

Poster: 24

Mentor(s): Nurul Hawa Ahmad (Food Science & Human Nutrition)

Inert carriers, such as silica beads, and talc, have been used to perform dry-inoculation procedures for foodborne pathogen research; however, the effect of the carrier has not been considered. This study aimed to determine the thermal resistance of E. faecium in talc powder (0.45 aw) at 80°C. Talc was inoculated with E. faecium, dried, and conditioned to 0.45 aw in a humidity-controlled conditioning chamber. Isothermal treatment then was conducted by heating ~1 g of talc powder in aluminum test cells in a water bath at 80°C (minimum 5 time-points) and immediately cooled on ice to stop the inactivation. Thermal come-up time was determined by measuring the time for samples to reach 79.5°C. The treated samples were immediately chilled, recovered, and plated on esculin trypticase soy agar (a differential medium) for XX h (XX°C) for survivor enumeration. The initial population of E. faecium on talc ranged from 7.4 to 8.2 log CFU/g. The thermal resistance, of E. faecium in talc at 80°C was 20.6±1.1 min(D value). The root-mean-squared-error and D-value 95% confidence interval were 0.67 log CFU/g and interval of 18.3 to 22.9 min, respectively. This finding implies that the use of talc as a dry inoculation carrier for low-moisture food should be further investigated, because thermal resistance of E. faecium in talc can significantly influence the thermal resistance of E.faecium in low moisture foods.

NEMATODE QUANTIFICATION USING QPCR

Expery Omollo

Poster: 25

Mentor(s): Lisa Tiemann (Plant, Soil, & Microbial Sciences)

This project involves determination of nematode populations (Pratylenchus penetrans) using qPCR assay. The first phase involves counting 4 sets of nematodes; 80,40,20 and 10. From this nematode populations, DNA is extracted and their quantity and quality determined. The DNA is then amplified using qPCR. From the collected data, the cycle number, normal fluorescence and number of nematodes are used to generate a standard curve that is used to determine the number of (Pratylenchus penetrans) present in soil samples.

EFFICACY AND TOLERANCE OF XYLANASE ON TURKEY POULTS PERFORMANCE, BLOOD CHEMISTRY AND HEMATOLOGY AND HISTOPATHOLOGY OF LIVER
Mabel Redondo, Serenity Tyll
Poster: 26
Mentor(s): Natalie Trottier (Animal Science)

The objective of the study was to test the hypothesis that measurable health parameters do not differ in female turkey poults fed dietary xylanase over a 6-week period. The overall goal of this study was to validate the claim that xylase is safe in the diet of turkeys. Diets were as follows: treatment 1 (control), 2, 3, and 4, containing 0%, 0.02%, 0.10%, and 0.20% xylanase, respectively. A total of 160 female poults were randomly assigned to four brooder battery pens per treatment, with 10 birds per pen in a temperature controlled room. Data included daily feed intake, weekly bird weight, feed conversion, serum analytes, complete blood count (CBC), liver weight and histology, and mortality. A t-test was used to determine differences between treatment diets and control for the following variables: serum urea nitrogen, potassium, phosphorus, sodium, iron, total protein, liver enzymes, amylase, and cholesterol concentrations. Of the serum analytes compared to control, only cholesterol in treatments 2, 3, and 4 were greater (P = 0.017, 0.022, and 0.001, respectively), and treatment 4 plasma potassium and iron concentrations were greater (P = 0.038 and 0.010, respectively). Feed conversion, liver enzyme activity, and CBC did not differ between treatments and control. Xylanase inclusion rate at level exceeding commercial recommendation as high as 0.20% does not reduce growth or feed conversion efficiency, nor negatively impact the health of growing turkey poults. Dietary xylanase is a safe enzyme to incorporate into commercial turkey diets in the conditions tested in this study.

AGRICULTURE & ANIMAL SCIENCE
POSTER PRESENTATIONS, SECTION 5
LAKE HURON ROOM, 3:00 – 4:30 PM

POLYPHENOLIC PROFILING OF FORAGES AND GRASS VS GRAIN-FED BEEF
Carlos Diola
Poster: 30
Mentor(s): Jenifer Fenton (Food Science & Human Nutrition)

Dietary polyphenol intake is associated with positive health effects in humans. These compounds possess potent antioxidant and anti-inflammatory properties associated with mitigating disease risk. While the health benefits of beef consumption are controversial, beef from grass-fed/finished cattle is proposed to have a more favorable nutrient profile including higher omega-3 fatty acids and beta-carotene than grain-fed. In addition, the composition of the forage types in the pasture can influence the nutrient profile of beef. However, little is known about how polyphenol composition of beef changes comparing grass vs grain fed and type of forage consumed. The aim of this study is to characterize the polyphenol composition of different pastures and to compare the polyphenol content of grass vs grain-fed beef. Beef and pasture samples will be frozen in liquid nitrogen after collection. Beef samples will be pretreated with acidic solution to reduce protein levels that may interfere in the polyphenol extraction step. Polyphenols will be extracted from samples using methanol and fractionated using column chromatography into four classes: phenolic acids, anthocyanins, proanthocyanidins, and flavanols. UV-vis spectroscopy will be used to estimate the respective polyphenol levels, and pasture phenolics data will be compared to the respective beef sample phenol levels to determine if feed affects the polyphenol content of beef tissue. It is expected that cattle grazing in pastures with higher polyphenol content will have a higher polyphenol content in their tissue.

IDENTIFICATION AND EXPRESSION PROFILING OF NOVEL MICRORNAS IN PIG FETAL SKELETAL MUSCLE
Laura Ford
Poster: 31
Mentor(s): Catherine Ernst (Animal Science)

MicroRNAs (miRNAs) are a class of non¬coding RNAs known to post-¬transcriptionally regulate gene expression through binding with target mRNAs, ultimately affecting a multitude of biological processes and phenotypes. It has been documented that miRNAs influence skeletal muscle development; however, lack of miRNA annotation in pigs hinders understanding of these molecular mechanisms. We sought to identify novel miRNAs in fetal longissimus dorsi muscle and compare expression of these miRNAs at 41 and 70 days gestation (dg; n=3 per stage), representing primary and secondary fetal myogenesis. High-quality small RNA-sequencing reads were aligned to the Sus scrofa reference genome (v11.1), and mapping and prediction of novel miRNAs were performed using miRDeep2. High-confidence novel miRNAs were retained. Differential expression analysis was performed on novel miRNAs. Human homologues for common and

stage-specific novel miRNAs were found; we additionally obtained conserved targets of human homologues for differentially expressed (DE) pig miRNAs. At 41 and 70dg, 83 and 73 novel miRNAs were predicted in at least two samples, respectively. Of these, 59 were common to both stages. We identified 10 DE miRNAs (|log2 fold change|>1 and adj.p<0.05), most of which were downregulated. Seven DE miRNAs had <2 mismatches with the known human miRNAs: miR-188-5p, miR-200ab-5p, miR-3194-5p, miR-33a-5p, miR-34b-5p, miR-93-5p, miR-26a-5p. Targets of DE miRNAs were enriched for Gene Ontology terms and KEGG pathways related to skeletal muscle development. This study identified novel pig miRNAs with putative roles in myogenesis. Future efforts will analyze specific gene targets and their roles in skeletal muscle development.

IGG, IGM, AND IGA CONCENTRATION IN MILK IN BOVINE LEUKEMIA VIRUS POSITIVE VS. NEGATIVE DAIRY CATTLE

Ashley Greenlick, Monika Dziuba
Poster: 32
Mentor(s): Paul Coussens (Animal Science)

Bovine Leukemia Virus (BLV) is disease of growing concern in the dairy industry. BLV is a delta-retrovirus, similar to human HIV, but can cause lymphocytosis through unregulated proliferation of B-cells. The prevalence of BLV has grown tremendously over the years, with an estimated 83% of US dairy herds containing at least one infected animal. BLV is transmitted horizontally through bodily fluids, mostly by veterinary practices. BLV causes decreased milk production and increased risk of infected cows being culled due to reduced immune function, resulting in large economic losses for producers. Using ELISA techniques, serum was previously analyzed for total and antigen-specific IgG, IgM, and IgA antibody levels. Serum from BLV+ cows had significantly lower total and antigen-specific IgM levels than serum from BLV- cows. To further understand the extent of this disease, these antibody levels were tested in milk from BLV+ (n=20) and BLV- cows (n=20). The ELISA results show a significant ($p<0.05$) decrease in IgM concentration in milk from BLV+ cows when compared to BLV- cows, similar to serum. Decreased total IgM concentration may negatively affect critical immune functions in BLV+ cows. While no significant difference was detected in total IgG or IgA antibody levels, there could be differences in antigen specific levels, like serum. Furthermore, BLV may be limiting B cell maturation and reducing the effective strength of IgG and IgA antibodies. Further testing is underway to further examine the effects of BLV-infection on antigen-specific antibody levels in milk and in saliva.

INTERACTIONS OF CROP SANITIZERS AND YEASTS INFLUENCE SURVIVAL AND OVIPOSITION OF SPOTTED WING DROSOPHILA (DROSOPHILA SUZUKII)

Anne Johnson
Poster: 33
Mentor(s): Philip Fanning (Entomology), Rufus Isaacs (Entomology)

The invasive vinegar fly, Drosophila suzukii Matsumura (Diptera: Drosophilidae), is a critical pest of small fruits and cherries globally. The species differs from other drosophilids in that its serrated ovipositor allows egg-laying into marketable fruit, resulting in economic losses. Some of the highest losses are in organic fruit production, where growers have a limited number of expensive insecticides for control of D. suzukii. Previous research has shown Drosophila, including D. suzukii, have a strong association with yeasts, with this being used for nutrition to support egg-laying. The interaction between D. suzukii and yeast offers a novel avenue for control of this pest. We will use organically approved products containing peroxyacetic acid (PAA), which have fungicidal properties, to eliminate yeast populations on blueberries and compare D. suzukii survival and egg-laying when exposed to fruit treated with PAA products, industrial standards, and untreated fruit. This research will allow us to determine the importance of feeding on yeast to oviposition and survival in D. suzukii and determine if control of yeast on the surface fruit is an effective and sustainable way to control D. suzukii populations.

MONOCROP FIELDS CAUSE RESOURCE DESERT, OR DO THEY?

Michael Killewald
Poster: 34
Mentor(s): Rufus Isaacs (Entomology)

To feed the ever-growing human population, farmers are expanding their agricultural production to meet growing demands. Although this provides a benefit to the human species, it decreases the amount of diverse floral habitats, and replaces them with monocrop fields. This is concerning because pollinators obtain most of their nutrients such as pollen and nectar from floral resources located in natural habitats. Since many of these floral resources have been reduced in abundance and diversity, it has become increasingly necessary to identify which floral resources are most beneficial to pollinators. Some farmers have elected to plant wildflower strips along crop fields to increase the diversity of wildflowers available to pollinators. To encourage pollinators to stay within the crop, wildflower plantings are designed

to start blooming later in the season. This gap between the end of crop bloom, and when the wildflower planting blooms can last for several weeks on Michigan's blueberry farms. To better conserve blueberry pollinators, I designed a study to assess the pollen diets of pollinators collected around blueberry crops during the gap period. I hypothesized that the pollen diet of pollinators collected at sites with a wildflower planting would be more diverse than the pollen diet of pollinators collected at sites without a wildflower planting. To test this hypothesis, ten blueberry farms were selected, six without plantings and four with plantings, to be sampled for pollinators in June and early July of 2017.

HUMIDITY SENSING IN SPOTTED WING DROSOPHILA (DROSOPHILA SUZUKII), AND IMPLICATIONS FOR ITS MANAGEMENT IN FRUIT PRODUCTION
Benjamin Luttinen
Poster: 35
Mentor(s): Rufus Isaacs (Entomology), Jim Smith (Entomology)

The invasive vinegar fly, Drosophila suzukii Matsumura, is a significant pest infesting small fruits and cherries, in the majority of fruit growing regions globally. This insect adapts rapidly to various environments and has a vast range of wild and cultivated hosts. This study was the first to investigate if D. suzukii has the ability to detect differences in humidity. We also determine whether D. suzukii shows a preference for different types/cultivars of blueberries based on humidity. The summer and winter morphs of D. suzukii adults were tested to determine their ability to detect and respond to humidity by utilizing different saturated salt solutions that produce different relative humidity conditions. Adults exposed to two different humidities in choice arenas were scored for their location and a preference index was calculated. In addition, D. suzukii adults were exposed to ripe blueberries with varying levels of water loss to determine if this affects their preference for oviposition. Our results indicate a noticeable humidity preference in D. suzukii, with a strong preference for relative humidities above 20%, but somewhat variable preferences at 40%, 60%, and 80% relative humidity. Greater water loss from fruit did not affect oviposition by female. The results of this study have implications for management of this pest in fruit crops via the alteration of the microclimate within crop canopy, to make conditions less hospitable for D. suzukii adults.

AGRICULTURE & ANIMAL SCIENCE
POSTER PRESENTATIONS, SECTION 6
LAKE HURON ROOM, 3:00 – 4:30 PM

HOW DIVERSITY AFFECTS THE GROWTH OF OUR NEXT ENERGY SOURCE
Torel Beard
Poster: 38
Mentor(s): Katherine Gross (Integrative Biology)

Developing biofuels using perennial bioenergy crops sparks a high interest among researchers because perennials are thought to be more environmentally sustainable than annual crops. Switchgrass (Panicum virgatum), a candidate perennial for biofuel feedstock, has a large range and is adapted to many environmental conditions. It can be grown on marginal lands unsuitable for other crops and harvested many times without being replanted. There are morphological and physiological differences between switchgrass varieties that correlate with their productivity. Preliminary research suggests that diverse mixtures of these plants could have positive effects on productivity, including increasing resilience to climate change. This project asked how intraspecific biodiversity affects the growth of the Dakota variety of switchgrass, as well as the influence of the neighboring weed species on Dakota productivity. Dakota was selected because it was shown to be a low performing switchgrass variety in a previous study comparing traits of 12 different switchgrass varieties. Height, circumference, and SPAD were measured on Dakota plants in an experiment planted in summer 2016 in the KBS Plant Ecology Field Lab, consisting of 88 plots with 4 different switchgrass varieties and 11 biodiversity treatments. Change in height, circumference, and SPAD over time were calculated and compared between the 5 different biodiversity treatments for Dakota. These were monoculture, bi-culture (Alamo-Dakota, Trailblazer-Dakota, Cave-in-Rock-Dakota), and polyculture (all four). These results suggest that increased diversity of neighboring plants increases height over time.

THE EFFECTS OF PORCINE ZONA PELLUCIDA CONTRACEPTIVE VACCINE ON EQUID UTERINE MORPHOLOGY
Olivia Child
Poster: 39
Mentor(s): Dalen Agnew (Pathobiology & Diagnostic Investigation)

Porcine zona pellucida (PZP) is a form of zona pellucida extracted from pigs which, when injected into other mammals, has been shown to have contraceptive effects. In equids, antibodies are produced in response to the vaccine which are thought to prevent fertilization. However, previous studies have raised concerns over the long-term effects of PZP usage on ovarian activity, which in turn may alter normal cyclic development in the uterus. To analyze these effects, histological slides of uterus and ovary sections from feral and zoo equids were microscopically evaluated to determine stage of estrous cycle and identify abnormalities. Development of surface and glandular epithelium, inflammation, and vascular degeneration, among other parameters in the endometrium and myometrium were scored in each case. Comparisons were made between equids not treated with any contraceptives and equids treated with PZP to determine differences and evaluated using ANOVA. By analyzing the safety and effectiveness of PZP usage in equids, this contraceptive can be better used to manage wild equid populations in captive and free-ranging environments.

REASONS FOR "FAILURE TO FINISH" IN UNITED ARAB EMIRATES 100-MILE ENDURANCE RIDES
Madison Dale
Poster: 40
Mentor(s): Melissa Esser (Large Animal Clinical Sciences), Harold Schott (Large Animal Clinical Sciences)

Due to flatter terrain and a greater focus on competition, horse and rider teams participating in 100-mile endurance rides hosted in the United Arab Emirates (UAE) compete at much faster speeds than teams competing in 100-mile rides in the United States (US). As a result, a lower percentage of horses successfully complete rides in the UAE, as compared to US rides. From analyzing results of the same annual endurance ride over a 6-year period (2011-2016) posted on the Dubai Equestrian Club website (www.dubaiequestrianclub.ae), 31% of 854 horse and rider teams successfully completed the ride. This compares to completion rates of 60-70% for 100-mile rides in the US. Of the UAE horses that did not complete, 50% of the failures were due to development of lameness (assessed by veterinarians supervising the ride), 31% were due to a rider's voluntary withdrawal from the competition, 19% were due to development of metabolic/medical problems. We are examining ride data that may predict subsequent elimination in the ride. Specifically, we are testing the hypothesis that horses eliminated from competition due to development of lameness or metabolic/medical problems later in the competition either are competing at a faster pace or require more time after entering the veterinary checkpoint to have their heart rate decrease to the required 60 beats/min at the veterinary checkpoint before subsequent elimination from the ride, compared to horses compete successfully. If our hypothesis can be sustained, it would provide further information for ride veterinarians to more safely supervise 100-mile endurance rides.

THE EFFECT OF SHEARING MID-PREGNANCY CROSSBRED SHEEP ON PLACENTAL SECRETORY FUNCTION
Alex Mantey
Poster: 41
Mentor(s): Almudena Veiga-Lopez (Animal Science)

Manipulating the maternal environment during gestation can influence fetal development. Mid-pregnancy shearing increases lamb birth weight through an unknown mechanism. Pregnancy associated glycoproteins (PAGs) are placental products that are indicators of feto-placental well-being. We aimed to determine if mid-pregnancy shearing results in improved placental secretory function accounting for increased offspring birth weight. Single-bearing pregnant Dorset-Polypay ewes were allocated into two groups: shorn at gestational day (GD) 100 (S; n=18) and a control group (C; n=20; sham shorn at GD100). Maternal serum samples were collected weekly two weeks prior to shearing until parturition for PAG assays (IDEXX, ELISA assay). Lamb sex (M: males; F: females), birth weight, and body mass index (BMI) were recorded at birth. S male lambs (SM) were born heavier (SM: 5.94±0.20 vs. CM: 5.27±0.30 kg; $P<0.05$) and their BMI larger (SM: 0.49±0.03 vs. CM: 0.42±0.03; $P<0.05$) than control males (CM). S female lambs (SF) were also born heavier (SF: 5.09±0.18 vs. CF: 4.67±0.14 kg; $P<0.05$) and their BMI larger (SF: 0.41±0.02 vs. CF: 0.37±0.01; $P<0.05$) than control females (CF). The interaction between shearing and sex for birth weight and BMI was not significant. PAG analyses are currently underway. Supportive of studies in other latitudes and breeds, shearing at GD100 increases weight and size at birth in singletons. PAG results will help us understand if mid-pregnancy shearing results in less resources spent on wool growth in favor of placental secretory function contributing to fetal growth, thus resulting in increased birth weight.

SEM IMAGING OF HEXAGONAL CELLS OF BEEHIVES
Amy Wang
Poster: 42
Mentor(s): Per Askeland (Materials Science & Engineering), Carl Boehlert (Materials Science & Engineering)

There are around 25,000 different species of bees in the world, and each offering unique contribution to the planet. Human depend on the existence of bees since they are pollinators for crops. Honeybees live in colonies called hives that contain one queen bee, thousands of female worker bees, and hundreds of male drone bees. The internal structure of the beehive is a packed group of hexagonal cells made of wax, build by the bees. The cells are used to house the brood and to store food. The cells used to house the new bees can have different shapes and sizes. Worker cells have the smallest cell, drone cells are larger and more concave, and queen cells require a significant amount of space. With a scanning electron microscope (SEM), it can allow us to observe the structure of these different types of cells so that we can learn more about the importance of the cells for the bees.

ANTHROPOLOGY

ORAL PRESENTATIONS, SECTION 1
ROOM 30, 11:00 AM – 12:00 PM

CRANIOMETRIC ANALYSIS UTILIZING 3D PHOTOGRAMMETRY MODELS
Amy Hair
Time: 11:00 AM
Mentor(s): Gabriel Wrobel (Anthropology)

3D modeling technologies have been used in various bioarchaeological endeavors. Within the Bioarchaeology Lab at Michigan State University, work has been focused on constructing a database of digitized models of human crania and mandibles. In craniometric studies, digital technology provides a more efficient way to conduct research, as it represents an avenue that can help ensure preservation, increase precision, and embrace new methodologies. Using photogrammetry, 3D models of 29 individuals from Tipu, an ancient Maya site located in western Belize, were created. Using Stratovan Landmark, cranial landmarks were then placed on each model in order to compare size and shape. Using Tipu as a case study, this paper will discuss the process in which to make models, apply points, and statistically analyze and draw conclusions from digital craniometric data.

ANCIENT MAYA BIOARCHAEOLOGY
Peter Mercier
Time: 11:30 AM
Mentor(s): Gabriel Wrobel (Anthropology)

This paper outlines a project focused on comparative metric analysis of mandibles from ancient Maya mortuary sites in Central Belize. This project forms part of the current work in MSU's Bioarchaeology Lab, which focuses on constructing a digital repository of crania and mandibles using 3D Photogrammetry. The repository currently contains approximately 20 mandibles, which will be expanded in the near future to facilitate morphometric analysis of shape variations. My paper describes the creation of the repository, the digital placement of landmark points using Stratovan Checkpoint, and a preliminary analysis carried out on a small sample of mandibles. Physical anthropology can be done with great accuracy on computers, which remove much human error. With highly accurate data, I will gain a better understanding of the demographics of the ancient Maya civilization in central Belize. Who were the people that lived in this region? Who were they related to, who did they trade and interact with? Are our samples in the lab all from the same population? Comparative shape analysis will shed light on these inquiries and add to our anthropological knowledge base of the ancient Maya.

INSURANCE COMPANIES SETTING THE RULES FOR MEDICINE: A CLOSER LOOK AT THE POWER DYNAMICS BETWEEN PROVIDERS, PATIENTS, AND INSURERS IN A DIABETES CLINIC
Funmi Odumosu
Time: 11:45 AM
Mentor(s): Linda Hunt (Anthropology), Anna Martinez-Hume (Anthropology)

In the U.S., the care a patient receives for their health conditions may be more heavily influenced by their insurance coverage, than by the clinical decisions of their physician. Increasingly, clinical decision-making has been impacted by the growing dominance of insurance companies in determining multiple aspects of healthcare, including clinician choices of medications and treatment procedures. Drawing on ethnographic interviews and clinical observations conducted with patients and clinicians at a diabetes and weight management clinic in a Midwest City, we found that many clinicians are frustrated with the level of influence insurance companies have over clinical care due to their control over which drugs and procedures they'll cover. Clinicians report that they are often unable to choose the care they believe will be most effective for their patients. In this paper, we analyze the ways in which clinicians and patients are impacted by insurance companies. We described some of the strategies clinicians use to work around the impeding rules of insurance plans. We also consider how the competing power dynamic between physicians and insurers can challenge patient care, especially regarding drug coverage options and their treatment plans. We argue that as insurers' systematically expand their discretion over which treatments to cover and under which conditions, they ultimately create a competing power dynamic with clinical care providers, resulting in a power struggle in which patient care may be compromised.

ANTHROPOLOGY
POSTER PRESENTATIONS, SECTION 1
LAKE HURON ROOM, 9:00 – 10:30 AM

TEMPORAL ANALYSIS OF PLANT DIET AT THE CLOUDMAN SITE
Rebecca Albert
Poster: 45
Mentor(s): William Lovis (Anthropology)

The goal of this study is to establish the plant diet of Native American populations occupying the Cloudman site, on Michigan's Drummond Island, as well as analyzing how their plant diet changed over time. The Cloudman site provides an excellent opportunity to explore this problem because of the large range of time during which the site was occupied; from over 2000 years ago until European entry into the Great Lakes in the mid seventeenth century. Ceramic rim sherds from the Middle Woodland, Late Woodland, and Protohistoric periods contained large amounts of adhering carbonized food residue. Samples of the residue were chemically processed and then analyzed using optical microscopy for diagnostic plant phytoliths and starches. Results of this analysis have determined that several important cultigens were present, including maize (corn, Zea mays sp. mays) starches and phytoliths, wild rice (Z. palustris) phytoliths, and squash (Cucurbita ssp.) phytoliths were present in the residues adhered to ceramics, some Accelerator 14C dated to as early as cal 60-214 AD. This research confirms the early introduction of maize into the northern Great Lakes region, and further confirms the association of early maize with wild rice, with the latter perhaps acting as a dietary complement.

CONTRASTING PATIENT AND CLINICIAN PERSPECTIVES ABOUT MOTIVATIONS FOR BARIATRIC SURGERY
Maura Delaney
Poster: 46
Mentor(s): Heather Howard (Anthropology)

Bariatric surgery, an operation performed on the stomach, was initially designed to target weight loss, but has increasingly been suggested to patients as a cure for diabetes, metabolic disorders, and chronic conditions. The number of surgeries performed has increased significantly in the past decade, raising concern over the permanent effects experienced by bariatric surgery. This procedure is a major surgery that involves the reconfiguration of the stomach and digestives processes, permanently effecting the patient's social lives. Because of these drastic changes, it is vital to understand the multiple layers to a patient's motivation to undergo the surgery. The paper will discuss the social motivations patients experience through family, friends, and support groups as well as the marketing motivation provided by the health care clinicians. When learning about options for treatment of their diabetes, patients are told to attend healthcare presentations which end up being marketized towards surgery by medical and insurance industries. Other aspects the paper will address are the disparities between the clinicians' and patients' understanding of the surgery itself as well as its residual effects. Ethnographic research conducted in a Midwest city including twenty-five bariatric patients constitutes the foundation for the paper. The paper will discuss issues raised with the ethics of consent between both the patient and the clinician over the understanding of the physical and social outcome of this surgery.

ANALYZING CONSTRUCTION NAILS FROM MSU'S STATION TERRACE SITE

Kaleigh Perry
Poster: 47
Mentor(s): Lisa Bright (Anthropology), Lynne Goldstein (Anthropology)

During the summer of 2017, MSU's Campus Archaeology Program (CAP) Field School excavated the remains of a building identified as Station Terrace, which once stood at the southern end of the current Abbot Road median. Despite the building's positioning here for roughly 35 years and its varied use, the most abundant artifact found was heavily corroded construction nails. Research on the history of nails shows that these items have gone through several evolutionary phases to achieve the form we are the most familiar with today. Each of these phases produced unique identification markers, and these markers can ultimately be used to assist archaeologists in dating historic archaeological structures. One such phase – the replacement of wrought iron with steel in the production of nails – coincides with the five-year time range during which Station Terrace is believed to have been constructed. As a result, the Station Terrace assemblage could contain both wrought iron nails from the original construction of the building, and steel nails used during later renovations. This poster outlines some of what we can learn from this sample of nails. For example, if wrought iron nails are present in this collection, it can reduce the estimated date of construction for the building by one to two years. A random sample of six nails from Station Terrace were analyzed using portable X-Ray Fluorescence (pXRF) to determine if chemical composition can identify nails used in the original construction of the building.

THE CULTURE OF BODYBUILDING: A QUALITATIVE STUDY OF COMPETITION PREPARATION

Dani Stanbouly
Poster: 48
Mentor(s): Steven Fraiberg (Writing, Rhetoric, & American Cultures)

This ethnographic and qualitative study examines the culture of competitive bodybuilding amongst young adult males. Through a combination of participant-observation, field notes, semi-structured interviews, surveys, and the collection of artifacts, this study identifies key languages, rituals, motivations, and values associated with preparing for a bodybuilding competition. This study also investigates how bodybuilders confront the post-competition, as they transition from a phase of intense training and dieting to the off-season. In tracing this activity, the purpose is to better understand the ways that wider social and cultural structures related to masculine identity shape and are shaped through everyday embodied practices, such as diet, training regimens, and posing. More particularly, the study focuses on focal participants in the local gym and traces their activity over a period of several weeks. Framed within broader surveys and interviews, this study identifies key issues related to the risks and rewards of the sport and its impact on everyday identities and actions. The study ultimately contributes to gender studies as well as more pragmatic information about the sport that investigates complications, lore, and narratives associated with bodybuilders. It also contributes theoretically to developing spatial and embodied perspectives on the study of language, culture, and identity.

SYSTEMATIC BIAS IN THE MACROMORPHOSCOPIC DATABANK

Hannah Trevino
Poster: 49
Mentor(s): Joseph Hefner (Anthropology)

In biological anthropology missing data are an enduring problem. Over the past few decade's computational powers have increased and methods such as listwise deletion or a "careful guess" are no longer sufficient methods for assessing missing data. Methods like Hot Deck, Iterative Robust Model- Based Imputations (IRMI), and k-nearest neighbor are considered more accurate and reliable for data imputation. These methods are implemented into macromorphoscopic analysis to determine the effects of missing data. Even though these analyses are becoming more systematic and scientific, improvements are necessary. An inherent problem with the multivariate nature of missing data is systematic bias in the dataset. In other words, determining whether the data are missing at random, missing completely at random, or systematically missing has not been addressed; many studies just consider the data missing completely at random. The limited literature on systematic bias in missing data and its impact on the statistical methods to impute data, need further study. This study addresses systematic bias in missing data using the Macromorphoscopic Databank to generate non-random datasets containing various levels of missing data and testing their impact on data imputation methods.

CRANIAL NON-METRICS OF THE BEDOUIN POPULATION
Hannah Weeks
Poster: 50
Mentor(s): Gabriel Wrobel (Anthropology)

Non-metric traits have been explored in several aspects, especially in the measuring of cranial variation. These traits, also known as discrete traits are often abnormalities in the cranium, however, they're often believed to be of a genetic origin when present. In the case of this project, there will be a chance to understand the case study of these among the Bedouin population. Due to the ability of being able to compare crania from a number of individuals, this project will analyze the similarities among them. It will analyze, and draw conclusions based on the findings.

ANTHROPOLOGY
POSTER PRESENTATIONS, SECTION 2
LAKE HURON ROOM, 3:00 – 4:30 PM

EXPLORING ASSOCIATIONS BETWEEN MATERNAL ANEMIA AND BREAST MILK MACRONUTRIENTS USING SAMPLES FROM ARIAAL WOMEN IN NORTHERN KENYA
Mary Corbitt
Poster: 54
Mentor(s): Masako Fujita (Anthropology), Nerli Paredes Ruvalcaba (Anthropology)

Maternal anemia is a widespread problem and can have adverse consequences such as low birth weight or preterm birth. A small number of studies indicated that anemia was associated with lower concentrations of milk components, such as minerals and immunological factors. This study investigated a potential link between maternal anemia and milk macronutrients (fat, lactose, and total protein). It was hypothesized that anemia would be associated with a decrease in the concentrations of these components. Archived milk specimens from a cross-sectional sample of 208 breastfeeding mothers in northern Kenya, originally collected in 2006, were analyzed. Maternal characteristics (age, parity, etc.) and anemia status (determined using a hemoglobin cutoff of <12 g/L) were available from the original study. Fat concentration was determined via creamatocrit, lactose concentration was determined through an enzyme based lactose assay, and total protein was determined using a microBCA assay. Preliminary results indicated that milk fat was significantly lower for anemic mothers ($t(206)= 2.35$, $p < 0.05$) while total protein was higher ($t(206)= -4.13$, $p < 0.01$). Lactose concentrations showed no significant difference between these two groups. Maternal anemia showed an association with certain maternal characteristics such as lower age, shorter time since childbirth, parity, and exclusive breast feeding. Maternal anemia may be associated with changes in milk components. However, other factors such as parity and infant feeding may be influencing milk macronutrients. Further research is needed to clarify the impacts of maternal anemia and maternal characteristics on breast milk.

LEARNING FROM LANDFILLS
Cooper Duda
Poster: 55
Mentor(s): Lynne Goldstein (Anthropology)

The MSU Campus Archaeology Program (CAP) conducts archaeology across campus, often when building projects disturb the ground, such as during the construction of buildings or replacement of sidewalks. One area on campus that has been especially interesting for archaeology is the Brody Hall complex. The land on which Brody is located was the site of the first East Lansing city dump in 1907, and it was used for about 30 years. While a garbage dump may not sound important, the waste people leave behind can tell us much about their way of life. In addition, a person's habits pertaining to health and wellness can be seen through their waste, and provides a glimpse into how much our concept of health and wellness has changed. Since it was a community landfill, the site has a wide range of artifacts. I focus on a portion of the artifacts collected from the Brody site, and examine what these can tell us about the health and living habits of the time. This research provides a unique opportunity to learn more about the transition period of self-reliant waste disposal methods prior to more organized community landfills. In this presentation, I discuss artifacts recovered from the Brody Landfill site, how they were organized, and how they can be used to learn about the health and wellness habits of students and early members of East Lansing.

TALKING TRASH: AN ARCHAEOLOGICAL APPROACH TO INVESTIGATING SUSTAINABLE PRACTICES IN WASTE MANAGEMENT
Desiree Quinn
Poster: 56
Mentor(s): Lynne Goldstein (Anthropology)

The present-day Brody Complex was home to the East Lansing Landfill from 1907 to the 1930s. Archaeological research conducted by the MSU Campus Archaeology Program at the Brody Complex produced a large number of well-preserved glass bottles, many dated to the 1930s. Many of these bottles, specifically milk bottles and canning jars, were likely reused. However, the eventual placement of the bottles in a landfill suggests a truncated reuse cycle. The purpose of the research presented in this poster is to assess how sustainable practices in waste management at MSU have changed, and to examine if we are truly more sustainable today. Using past sustainable practices, such as reuse, to assess our current green efforts can help us think about sustainability in a whole new way and will hopefully help us improve our efforts as we face a global climate crisis. As a steward of MSU's cultural heritage, MSU's Campus Archaeology Program is in a unique position to assess past sustainable practices. Using historical bottles excavated from the Brody Landfill site, as well as archival data, I document MSU's history of sustainable waste management practices to target and discuss what is missing from our current sustainable framework.

A PALEODEMOGRAPHIC STUDY OF MEDIEVAL NUBIA
Louise Steele
Poster: 57
Mentor(s): Joseph Hefner (Anthropology)

Paleodemography is a field of study that applies demographic analysis to populations of the past found in archaeological contexts. Through skeletal analysis, age and sex are estimated for each individual within the population. This data is compiled to form life tables, which display statistics such as estimated life expectancy, frequency of death at given ages, or probability of death per year. A more visual representation of this information is in the form of a population distribution, which facilitates cross-population comparisons more easily. Critiques of paleodemography focus on the impossibility of a mortuary sample to accurately represent the living population from which it derived. The recognition of this has led to changes in the calculated statistics of populations from simple mortality and fertility rates to more complex calculations such as probability of death both within and between age cohorts. Combining the bioarchaeological data of age, sex, and population with contextual histories, this project aims to better understand the Nubian populations in two cemeteries. With the two distinct populations forming two population distributions, the comparison between will allow the study to ask questions about what contexts led to the cross-population variety or similarity.

USING GIS TO EXPLORE LEGACY SPATIAL DATA AT ISTHMIA
Louise Steele
Poster: 58
Mentor(s): Jon Frey (Art, Art History, & Design)

In archaeology, the location of an artifact or monument is just as important as its identification. Thus, visual representations of spatial relationships are a common feature of archaeological documentation. Hand-drawn maps and plans have served as the most common format until recently, when archaeologists have turned to Geographic Information Systems (GIS) software to create more robust and scalable representations their areas of study. Within GIS, different forms of information can be visualized and analyzed in many ways. These more dynamic maps and plans rely on electronically recorded data, which has meant that archaeological projects that collect digital data in the field have a more natural progression into these new techniques. For older projects where maps and plans on paper are the common form of archaeological documentation, the use of GIS technology may be more complicated, but no less informative. This poster reports on the ongoing effort of the Ohio State University Excavations at Isthmia to build a GIS using a variety of paper-based maps and plans from the past half-century of investigation at the site. Once digitized and anchored to real-world coordinates, the "legacy spatial data" contained in hundreds of rough sketches in field journals are being used to plot out the locations of artifacts and monuments throughout the larger site. As an ongoing study in the area of the Byzantine fortification already shows, the visualization of artifact scatters is beginning to reveal patterns of use not recognized in the isolated settings of the original excavations.

FIRSTING AND LASTING: WRITING INDIANS OUT OF (AND INTO) EXISTENCE AT MICHIGAN STATE UNIVERSITY
Monica Williamson
Poster: 59
Mentor(s): Heather Howard (Anthropology), Mindy Morgan (Anthropology)

Michigan State University has erased American Indian identities on campus by articulating a "since 1855" history that ignores American Indian presence. Understanding this rhetoric is difficult and important; however, through its acknowledgment can create indigenized institutional spaces. This research begins a historical analysis of Michigan State University according to local histories, the State of Michigan Constitution, and university landmarks. I reveal a constructed, pervasive myth of Indian extinction, guided by "Firsting" and "Lasting" (O'Brien, 2010). Firsting concerns the ushering in of modernity by the establishment of colonial institutions, and Lasting engages with the myth of Indigenous extinction and the consignment of American Indians to the past. Despite these myths, a continued indigenous presence exists on this campus because Native communities have embraced change and selectively incorporated aspects of non-indigenous traditions. To understand why Indians are written out of existence, I will question responsibility-taking at our university. I aim to reveal the policy of settler colonialism perpetrated by Michigan State University's "since 1885" narrative. I will explore reasons stakeholders resist providing space for the American Indian voice on campus to crack the facade of the American Indian extinction story.

BONE BREAKAGE: OSTEONS AT THE POINT OF TENSION AND COMPRESSION
Emma Wright
Poster: 60
Mentor(s): Per Askeland (Composite Materials & Structures), Carl Boehlert (Chemical Engineering & Material Science), Todd Fenton (Anthropology)

Bone breaks and fractures are one of the most common orthopedic problems brought to the attention of doctors each year. Just in the United States alone, 6.8 million people will break a bone by the end of 2018, but do they really know how or why their bones break? Through scanning electron microscope (SEM) research, it is possible to dive deeper into the world of bones to further understand how they function, as well as why they fail. The microscopic structures of bone will be examined, looking at osteons (as well as interstitial lamellae bone) at the point of tension, the point of compression, and the often ignored 'in between'. The samples of human femur bones were obtained courtesy of Michigan State's Department of Forensic Anthropology. These bone samples were broken in the Forensic Anthropology Lab under a 4-point compression system. Since these bones were broken under controlled circumstances, the results from the SEM research can be better understood using the model of the way bones fracture. The aim of this research is to confirm that tension side fractures produce osteon pull out, and that compression side fractures produce osteon slide, as well as to discover what action that osteons take through the middle or in between section of fractures. Through this research we are hoping to apply our finding to bone breakage model to better understand why they break.

BIOCHEMISTRY & MOLECULAR BIOLOGY

ORAL PRESENTATIONS, SECTION 1
LAKE ONTARIO ROOM, 11:00 AM – 12:30 PM

STRUCTURE-FUNCTION RELATIONSHIPS OF CSPZ
Talha Ali, Anahita Saifollahi
Mentor(s): Hanggao Yan (Biochemistry & Molecular Biology)

The first assault on an invading pathogen is the complement attack. To colonize and cause infection, the pathogen must escape human complement attack. A mechanism widely used by microbial pathogens to escape human complement attack is recruitment of host complement factor H, a protein regulator of the host complement system. The specificity of factor H recruitment is correlated with the host specificity of the pathogen. Thus, a human-specific pathogen recruits only human factor H, whereas a pathogen with a wide range of hosts can recruit factor H's from human and a variety of other hosts. Whereas our previous work focused on the human-specific pathogen Streptococcus pneumonia, our study has been focusing on the zoonotic pathogen Borrelia burgdorferi, which can infect not only human but also a variety of animals and birds. One of the highly conserved borrelial factor H-binding proteins is CspZ. In this work, using a combination of computational and experimental studies, including molecular dynamics simulations, site-directed mutagenesis and isothermal titration calorimetry, we have established structure-function relationships of CspZ. The results showed how CspZ binds complement factor H.

ACYLATION OF THE D-GLUCOPYRANOSYL MOIETY OF CARMINIC ACID THROUGH BIOCATALYSIS
Daniel Cortes
Time: 11:15 AM
Mentor(s): Robert E. Maleczka (Chemistry), Kevin D Walker (Biochemistry & Molecular Biology)

We look to employ a greener approach to isolate carminic acid (CA). Our approach centers on selectively changing the properties of CA from water-soluble to non-polar (i.e., less water-soluble) to ease the isolation of CA from other contaminants. To accomplish this in a pilot study, we look to selectively acylate the sugar groups in CA and cap the hydroxyl groups that make CA soluble in water. We will use acyltransferase (AT) enzymes that are known to produce acyl sugars of glucosyl compounds through biocatalysis. These enzymes will be made in and isolated from bacteria engineered with cDNAs encoding the ATs.

FUNCTIONAL CHARACTERIZATION OF COMPROMISED HYDROLYSIS OF TRIACYLGLYCEROL 7 (CHT7) PROTEIN AND ITS CXC DOMAIN IN *CHLAMYDOMONAS REINHARDTII*
Nick Fekaris
Time: 11:30 AM
Mentor(s): Christoph Benning (Biochemistry & Molecular Biology), Tomomi Takeuchi (Biochemistry & Molecular Biology)

In search for renewable energy sources, microalgae have widely been studied as a potential feedstock for biofuels. When deprived of nutrients, some algae go into a hibernation like state called quiescence where cells reversibly cease division and accumulate oil as triacylglycerol (TAG). Upon nutrient refeeding, TAG storage is degraded, and cells resume division. In a previous mutant screen in green algae Chlamydomonas reinhardtii, a mutant which showed a delay in the remobilization of TAG and growth during N-resupply was identified. The gene responsible for this phenotype was subsequently named *Compromised Hydrolysis of TAG (CHT7)*. The CHT7 protein contains a CXC domain, which is thought to bind DNA. To determine which portions of CHT7 are integral to its function, fourteen *CHT7* constructs expressing N and C-terminal truncation deletions of increasing size and a CXC domain deletion were generated by site-directed mutagenesis PCR in E. coli. The constructs were confirmed by restriction digest and DNA sequencing introduced into the *cht7* mutant through electroporation. CHT7 proteins with the CXC domain deleted (△CXC) as well as two CHT7 proteins truncated from the N-terminal end (N1 and N2) were detected in the transformants by Western blot; however, no truncated CHT7 protein was detected in other mutant lines. During N-deprivation and N-resupply N1, N2, and △CXC showed similar growth as the wild type. Additionally, N1, N2, and △CXC degraded TAG normally following N refeeding, suggesting that these portions of CHT7 are dispensable for the phenotypes tested.

TOWARDS THE ELUCIDATION OF CALYSTEGINE BIOSYNTHESIS IN PLANTS
Josh Grabar
Time: 11:45 AM
Mentor(s): Cornelius Barry (Horticulture), Matthew Bedewitz (Horticulture)

Plants synthesize diverse classes of bioactive specialized metabolites with roles in both beneficial and defense-related interactions with other organisms. Tropane alkaloids are a diverse class of medicinally important plant specialized metabolites comprised of over two hundred compounds, and includes the narcotic cocaine and the pharmaceuticals, hyoscyamine, and scopolamine. Calystegines are a class of polyhydroxylated nortropane alkaloids that were first identified in Calystegia sepium (Convolvulaceae) but accumulate in several other plant families, including multiple genera of the Solanaceae. Calystegines inhibit glycosidases and have received attention as potential therapeutics for the treatment of Gaucher's disease. Calystegines are synthesized from pseudotropine, through an unknown pathway that is hypothesized to involve demethylation and multiple hydroxylations. In the Solanaceae, tropane alkaloids are synthesized in the roots and known tropane-related genes are root-preferentially expressed. In this study, we mined transcriptome data derived from Atropa belladonna for root-preferentially expressed genes encoding enzymes that may catalyze hydroxylations of the tropane skeleton that are characteristic of calystegines. Several root-preferentially expressed genes, predicted to encode 2-oxoglutarate dependent dioxygenases and cytochromes P450s, were identified. Virus-induced gene silencing of two 2-oxoglutarate dependent dioxygenases altered the calystegine profile of A. belladonna, suggesting the involvement of the corresponding enzymes in calystegine biosynthesis.

BIOCHEMICAL AND BEHAVIORAL STUDIES OF THE ANTIDEPRESSANT EFFECTS OF KETAMINE ON THE DOPAMINE RECEPTOR PATHWAYS OF THE MEDIUM SPINY NEURONS.
Raghav Jain
Time: 12:00 PM
Mentor(s): Amy Ralston (Biochemistry & Molecular Biology)

Ketamine was developed in 1962 as an anesthetic. Recreational use of the drug increased due to its hallucinogenic effects and studies relating adverse effects to long term consumption led to the drug becoming highly controlled in the US. Research over the past few decades has shown administration of single doses of ketamine to depressed individuals can result in antidepressant effects occurring in the span of hours and days compared to commonly prescribed drugs which take weeks of continuous administration to work. As a result, researchers have been studying ketamine to understand the pathways through which it exerts its antidepressant effects in the hopes of creating safer alternatives. Dysfunction of dopamine pathways is related to many neural disorders. In the striatum, medium spiny neurons express either dopamine receptor 1 (D1) or 2 (D2). Activation of the D1 receptor leads to increased motor control, as does inactivation of the D2 receptor. Decreased motor control and activity is a hallmark of many neural diseases such as Parkinson's disease and depression, and reuptake of many of the neurotransmitters that affect the D1 and D2 receptors (serotonin, dopamine, glutamate, etc.) is affected by ketamine. Therefore, D1 and D2 knockout mice were bred and administered ketamine or saline as control. The Porsolt swim test was performed to asses behavioral differences due to drug administration, and western gels were used to screen for phosphorylated dopamine and cAMP related phosphoprotein presence in the striatum as it indicates activation of the dopamine receptor. This study is currently ongoing.

TUNABLE FLUORESCENT ORGANIC SALTS FOR IMAGING AND THERAPY
Mayank Jayaram
Time: 12:15 PM
Mentor(s): Sophia Lunt (Biochemistry & Molecular Biology)

Fluorescent organic cyanine dyes, which absorb and emit light in the near infrared (NIR) range, have the potential to become valuable theranostic agents for tumor imaging and photodynamic therapy. These theranostic agents, named for their dual therapeutic and diagnostic capabilities, offer several advantages compared to dyes that absorb and emit light in the visible range. NIR dyes reduce endogenous tissue absorption, increase tissue penetration, and limit background noise to enhance tumor imaging and therapy while minimizing side effects. Certain cyanine dye analogs preferentially accumulate in tumors and can generate reactive oxygen species when activated by NIR light. However, currently available photosensitizers lack independent control of optical and electronic properties, leading to low brightness and nonspecific toxicity. To address this problem, we have engineered fluorescent salts that can modulate toxicity by pairing a fluorescent cyanine cation (Cy^+), which controls absorption/emission, with various anions, which control toxicity. Our results show that paring Cy^+ with small anions such as hexafluorophosphate (PF_6^-) can be toxic to human lung cancer cells (A549) *in vitro* at 1uM. The toxicity of $CyPF_6$ can be further increased with NIR light, but the high toxicity results in poor image quality. We have been able to significantly decrease the toxicity of Cy^+ through pairing with anions such as tetrakis (pentafluorophenyl)borate ($TPFB^-$), which is nontoxic even at 20-fold higher concentrations. The low toxicity of CyTPFB greatly enhances NIR imaging of A549 lung cancer cells. This research will allow us to develop highly tunable fluorescent dyes to enhance tumor imaging and treatment.

BIOCHEMISTRY & MOLECULAR BIOLOGY
POSTER PRESENTATIONS, SECTION 1
LAKE HURON ROOM, 9:00 – 10:30 AM

DIVERSITY AND HETEROGENEITY OF NUCLEOTIDE-DERIVED SECOND MESSENGERS IN BACTERIA AND VERIFICATION OF THE NOVEL MESSENGER C-DI-UMP
Nils Benning
Poster: 64
Mentor(s): Christopher Waters (Microbiology & Molecular Genetics)

Bacteria use nucleotide-derived second messenger signals to respond to variations in the environment. These signaling pathways regulate numerous bacterial behaviors including central metabolism, motility, development, and natural competence. For example, the well-studied and ubiquitous cyclic mononucleotide (CN) cyclic AMP (cAMP) regulates central metabolism while the cyclic dinucleotide (CDN) cyclic di-GMP (c-di-GMP) regulates biofilm formation and motility. Despite increasing interest in second messenger signaling, little is known about the diversity of CN and CDN signaling in bacteria. To address this lack of knowledge, we screened for 8 species of CN and CDN in Gram negative and

Gram positive bacteria using liquid chromatography tandem mass spectroscopy (LC-MS/MS). Interestingly, we observed high concentrations of cyclic di-uridine monophosphate (c-di-UMP) in seven out of eight of the organisms analyzed including the soil organism Bacillus subtilis. To confirm the presence of c-di-UMP in B. subtilis, we measure c-di-UMP synthesis in cell lysates. Lastly, we will further verify these results by growing bacteria in stable isotope labeled D-glucose and monitoring cell lysates for isotope labeled c-di-UMP. Together, these results demonstrate novel CNs are present in various bacterial species. Further, we demonstrate that the previously uncharacterized CDN c-di-UMP is actively synthesized in B. subtilis. Future work will aim to identify the factor responsible for synthesizing c-di-UMP and roles the CDN in B. subtilis physiology.

ENHANCEMENT OF THE NANNOCHLOROPSIS TRANSGENIC TOOLKIT
Evan Clarke
Poster: 65
Mentor(s): Diana Bello (Integrative Biology), Christoph Benning (Biochemistry & Molecular Biology)

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

VARIATION OF SPCWINV1-LIKE GENE IN SOLANUM PENNELLII ACCESSIONS SPANNING THE GEOGRAPHIC RANGE OF THE SPECIES
Kathryn Harmer
Poster: 66
Mentor(s): Robert Last (Biochemistry & Molecular Biology)

Many species of the Solanaceae family produce acyl sugars as a chemical defense against insects. Acyl sugars are sugar cores such as glucose and sucrose esterified to fatty acid chains. The SpCWINV1-like gene converts acyl sucroses to acyl glucoses in *Solanum pennellii,* a wild relative of the cultivated tomato *Solanum lycopersicum.* Interest was generated in the mutants of this gene that affect the amino acid sequence in areas of functional significance. Non-synonymous mutants that could potentially alter the affinity of enzyme to the substrate, or Km were of interest. The different accessions that were studied in this project were chosen because of their geographic separation and easy access to published data on these accessions has allowed for a base of knowledge about the structures of their acyl glucoses. Studying these differences will allow for a comparison of acyl glucose metabolism in *Solanum pennelli.* The full-length sequence of the SpCWINV1-like gene from LA1693 was cloned into *E.coli* and sequenced to compare the amino acids sequence in areas of the protein that have functional significance. RNA was extracted from different *S. pennellii* accessions in the lab to generate the cDNA sequence of the SpCWINV1-like gene. Rapid amplification of cDNA ends (RACE) was attempted by designing primers for the known SpCWIN1-like gene to compare the end 3' UTR of the different accessions. Ultimately this study will allow us to assess the function of different amino acid groups on this enzyme and its importance in acyl sugar biosynthesis.

IDENTIFYING INTERACTING PROTEINS OF SHUGOSHIN (SGO1) DURING MITOSIS IN SACCHAROMYCES CEREVISIAE
Madison Smith
Poster: 67
Mentor(s): Min Hao Kuo (Biochemistry & Molecular Biology)

During cell division, the duplicated chromosomes are held together by the cohesin complex so all chromosomes of a genome can aligned at the metaphase plate for concerted separation. A key criterion for cells to coordinate the simultaneous separation of these chromosomes is to ensure each pair of sister chromosomes are under tension, which results from the tug-of-war pulling toward the two daughter cells when the sister chromosomes are still held by cohesin. After tension is detected in all chromosome pairs, cells initiate the anaphase by proteolytically cleaving the cohesin complex. The two sets of identical genomes can thus be evenly segregated. If cells initiate segregation before tension is built up, uneven distribution of genomes, i.e., aneuploidy, ensues. Aneuploidy is an underlying cause of many cancers and the majority of first-trimester spontaneous abortion in humans. The detection of tension between sister chromosomes is mediated by the Shugoshin protein (Sgo1p) and its partner the tension sensing motif of histone H3 (TSM). Without either, cells suffer from higher rates of aneuploidy. However, how Sgo1p and TSM relay the tension status to the mitosis machinery is elusive. We discovered that cells with a defective TSM can be rescued by two very specific mutant alleles of Sgo1p: one that is truncated at the residue Y317 (Y317X) and another one bearing a single alanine mutation at residue proline 353 (P353A). The mechanism underlying the suppression by these two Sgo1p alleles gives us a unique opportunity to understand how Sgo1p and TSM convey the tension status to the cellular mitosis machinery. To this end, I set out to identify proteins that may be targeted directly by the Y317X allele of Sgo1p. I take a yeast two-hybrid (Y2H) approach to genetically screen for Y317X-specific binding proteins. The initial screen identified 17 candidates and the identities and potential functions of these candidates will be presented.

PROBING THE BIOCHEMISTRY OF AN UNUSUAL FATTY ACID DESATURASE
Montgomery Smith
Poster: 68
Mentor(s): Patrick Horn (Plant Research Laboratories)

Photosynthesis is the natural biochemical conversion of sunlight into chemical energy. The photosynthetic thylakoid membranes within chloroplasts are comprised of galactolipids and the phospholipid phosphatidylglycerol (PG). Although researchers have extensively studied several of these lipid classes and individual species, we only have an elementary understanding of their roles and synthesis. A particularly unusual fatty acid, 16:1$^{\Delta 3trans}$ (16:1t), is synthesized by FATTY ACID DESATURASE4 (FAD4) and found only in chloroplast PG. We determined that, *in planta,* 16:1t synthesis requires both FAD4 and a thylakoid-associated redox protein, PEROXIREDOXIN Q (PRXQ). To determine the role of PRXQ in 16:1t synthesis we utilized biochemical and genetic approaches in *Arabidopsis thaliana* and *Saccharomyces cerevisiae* (yeast). In Arabidopsis and yeast, only when FAD4 and PRXQ are co-expressed did we see a *trans* fatty acid accumulate in the endogenous lipids, as confirmed by gas chromatography and thin layer chromatography. As the specific mechanism for FAD4-mediated 16:1t synthesis is unknown we tested several conserved FAD4 residues by site-directed mutagenesis. These results suggest that FAD4 may require a disulfide bond between monomers to form an active dimer form of the enzyme, requiring PRXQ. As PRXQ's primary attributed intracellular role is the reduction of toxic hydrogen peroxide molecules to water we worked to determine whether FAD4 synthesis requires a reactive oxygen species in 16:1t synthesis. Understanding the connection between these redox pathways and 16:1t synthesis will help describe the synthesis and role of 16:1t in plants and enable future experiments engineering the photosynthetic membrane for improved agricultural production and sustainability.

BINDING OF ADRENERGIC COMPOUNDS TO MU OPIOID RECEPTOR ENHANCE OPIOID ACTIVITY
Miah Turke
Poster: 69
Mentor(s): Robert Root-Bernstein (Physiology)

Evolution builds on molecular complementarity. Compounds that bind to each other will alter each other's physiological activity. Molecularly complementary modules in receptors confer dual-ligand control of receptors. Opioid compounds bind to adrenergic compounds, producing a molecularly complementary module, and adrenergic receptors have an opioid binding site. The purpose of this study was to determine if there is an adrenergic binding site on the mu opioid receptor, and to investigate the functional interactions between adrenergics, opioids, and the mu opioid receptor. It was found that when present together, the binding of epinephrine with some opioids results in synergistic binding with the intact mu opioid receptor, suggesting enhancement of opioid activity by adrenergics. The adrenergic binding site on the opioid receptor was identified by testing for binding to synthetic receptor peptides.

BIOCHEMISTRY & MOLECULAR BIOLOGY
POSTER PRESENTATIONS, SECTION 2
LAKE HURON ROOM, 9:00 – 10:30 AM

PHAGE IN THE ENVIRONMENT
Madeline Hilton
Poster: 73
Mentor(s): Kristin Parent (Biochemistry & Molecular Biology)

Phage are found everywhere in the environment and infect a variety of hosts. There are far more species of phage in existence than there are identified. Over the course of several months a variety of samples were collected from the red cedar river. These samples were analyzed for plaque morphology, infection efficiency, and host range. After comparing phenotypic similarities and differences the genomes are sequenced to determine the relationships between the samples collected.

NON-INVASIVE IMAGING TO ASSESS NEW THERAPIES FOR TARGETING SOLID TUMORS
Nathan Kauffman
Poster: 74
Mentor(s): Kurt Zinn (Biomedical Engineering)

Radiation therapy is widely used as a both a primary and adjuvant treatment to kill malignant cells in cancer patients. A new radiation therapy involves peptides and antibodies to deliver radiation. The success of this approach has many key components including specific cancer targeting accuracy, therapeutic radionuclide choice, kinetics of uptake and dose amount. Proteins with different targets can be chosen for the radionuclide delivery. A certain form of the protein annexin A1 (AnnA1) is present only on cancerous endothelium and an antibody binding AnnA1 has been shown to penetrate solid tumors. Technetium99m-tilmanocept is a radiotracer that targets activated macrophages in solid tumors. My project involves studying the movement and uptake of these two targeting agents in rodent tumor models. With the use of modern imaging technologies, it is possible to track and quantify the molecules' journey from the site of injection to point of tumor binding, allowing for determination of proper dose, understanding of specific drug kinetics, and efficiency of retention in tumor and other tissues. Once these are known, different therapeutic radionuclides can be attached to these agents and tested for tumor reduction and side effects on other tissues. This research is important because cancer is unique depending on its location, breadth of dissemination, and the individual it is attacking, so treatments must be just as unique in their therapeutic approach and targeting to properly treat all patients. Therefore, perfecting the key components of a radiotherapy can prove to be significantly beneficial to cancer patients worldwide.

USE OF A POPULATION-GUIDED APPROACH TO IDENTIFY NOVEL GENETIC MODULATORS OF TCDD-INDUCED LIVER TOXICITY
David Nava
Poster: 75
Mentor(s): John LaPres (Biochemistry & Molecular Biology)

2,3,7,8-tetrachlorodibenzo-p-dioxin (TCDD) is a persistent and pervasive environmental toxicant that has been linked to wide array of disease states including cancer, immunosuppression, and metabolic syndrome. TCDD-induced toxicity is known to be primarily mediated through the aryl hydrocarbon-receptor (AHR), a ligand-activated transcription factor. Though our understanding of AHR-regulated signaling has expanded, much remains unknown about how downstream gene dysregulation leads to TCDD-induced diseases. Previous studies have indicated that individuals respond differently to TCDD. Here, a genetically diverse mouse panel of 14 strains were dosed with 0, 1, or 100 ng/kg of TCDD for 10 consecutive days. At the end of dosing, liver samples were collected and the expression levels of 9 AHR-target genes for each strain and dose was measured. Notably, there were definite patterns of strain-specific expression that did not always correspond to the AHR allele found in the specific mouse line. The gene expression data were utilized to identify quantitative trait loci (QTL) in the mouse genome associated with the differing AHR-mediated responses. Statistically significant hits ($p<0.05$) were found on chromosome 2, 9, and X with overlaps across multiple AHR-target genes. While these overlapping significant regions may indicate variants associated with the inter-strain differences, they may also indicate novel genetic modulators of AHR-mediated gene transcription in the liver. As such, further analysis of the genes located within these QTLs may aid in identifying which sub-populations of humans with altered TCDDD sensitivity and suggest possible mechanisms that explain these variant sensitivities.

PHEROMONE SYNTHESIS GENES IN SPOTTED WINGED DROSOPHILA
Caitlin Peffers
Poster: 76
Mentor(s): Henry Chung (Entomology)

Pheromones are used by insects to increase their chance of passing on their genes during mating. Between different species, the ability to produce pheromones can be gained or lost, but it is not known why this occurs. Most fly species in the melanogaster group can produce the pheromone cis-11-octadecenyl acetate (cVA) which is used during mating to inhibit male to male courtship and prevent males from mating with recently mated females. Drosophila melanogaster is a species in this group that uses cVA in this way. The gene used in the synthesis of cVA is elo68a. Like other species of melanogaster, D. melanogaster produces cVA in its ejaculatory bulb. Another species in the melanogaster group is D. suzukii; this species is different from D. melanogaster in that it does not produce cVA. It is not known why D. suzukii lost the ability to produce cVA, but the atrophy of the ejaculatory bulb or a genetic change could have caused it. In this study, probes specific to the elo68a gene were produced to be used in in situ hybridization to detect the presence of the elo68a gene in the ejaculatory bulb of spotted wing drosophila.

MICROFLUIDIC APPROACH TO WHOLE CELL RESPIROMETRY
David Pegouske
Poster: 77
Mentor(s): Yan Levitsky (Physiology), Denis Proshlyakov (Chemistry)

Measuring cellular respiration provides insight into the health of living cells that can be used to detect and study diseases where significant alterations of the rate of oxygen consumption occur. Current techniques rely on measurements of oxygen consumption rate (OCR) and seek to balance the required quantity of cells and the ability to apply different conditions. We sought to develop a method of measuring cellular respiration that reduces the demand for living cells while maintaining the sensitivity and ability to manipulate cells in real time. This method uses a microfluidic device with a platinum porphyrin sensor for remote detection of oxygen. Adhesion of cells on the walls of the device allows for repetitive and differential measurements. Results on whole ARPE-19 cells show that cells remain adhered to the walls during medium flow, allowing measurement of OCR under different conditions. OCRs can be measured with as few as 1000 cells in the chamber, this is more than two orders of magnitude better than other commonly used techniques. The benefits of this novel approach include increased measurement efficiency and lower sample demand while permitting direct sample manipulations. This opens intriguing opportunities for OCR measurements in human and small animal tissues.

ELECTROCHEMICAL MANIPULATION OF COMPLEX III IN MITOPLASTS
Hoang Le Tran
Poster: 78
Mentor(s): Denis Proshlyakov (Chemistry)

Cancer, Parkinson's, and diabetes are some of the metabolic diseases linked to mitochondrial dysfunction. Current techniques for studying mitochondria involve monitoring oxygen consumption rates (OCR) as a measure of their metabolism, which reflects mitochondrial health. Since oxygen consumption occurs at the final component of the electron transport chain (ETC), which is complex IV, it is difficult to use OCR to assess individual contributions of upstream complexes, such as complex I, II, and III. Previous work with a custom electrochemical cell with fluorescence quenching optical oxygen sensor has shown that mitochondrial OCR can be stimulated by electrochemically-reduced TMPD, which shuttles electrons between the electrode and the ETC. In the absence of TMPD or another mediator, mitochondria exhibit no electrochemical stimulation because the distance, from the electrode to the complexes, is too far for effective electron transfer. Here we investigate other pathways of electrochemical manipulation of ETC, particularly that involving complex III and cytochrome c. Since cytochrome c cannot cross the outer membrane (OM) of intact mitochondria, we used mitoplasts, or mitochondria without the OM, to allow movement of exogenous cytochrome c between complex III and the electrode. Results show that electrons derived from substrates of Krebs cycle can be diverted to the electrode via complex III in the ETC and cytochrome c in the solution. Such current can be measured directly, irrespectively of oxygen consumption. The results show promise in developing a novel method of assessing the health of complex III in mitochondria by direct measurement of electric current.

BIOCHEMISTRY & MOLECULAR BIOLOGY
POSTER PRESENTATIONS, SECTION 3
LAKE HURON ROOM, 11:00 – 12:30 PM

INVESTIGATION OF INTRA-MEMBRANE CHLOROPLAST DIVISION PROTEIN HOMOLOGS ARC6 AND PARC6 FOR THEIR INTERACTIONS WITH STROMAL PROTEIN ARC3 VIA YEAST TWO-HYBRID

Shanelle Jackson
Poster: 81
Mentor(s): Cheng Chen (Plant Biology), Katherine Osteryoung (Plant Biology), Katie Porter (Plant Biology)

Chloroplasts, photosynthetic organelles, are a defining and essential feature of Viridiplantae. Originally free-living cyanobacteria, chloroplasts were derived through endosymbiosis by a eukaryotic cell. Chloroplast populations within cells are maintained by division, which occurs through the coordination of a number of proteins localized both inside and outside of the chloroplast. Chloroplast division requires the assembly and constriction of a ring, called the Z ring, made up of the first chloroplast division protein discovered, FtsZ. The assembly of this ring is carefully regulated by several intra-membrane proteins. In the vascular plant Arabidopsis thaliana, two intra-membrane proteins, ARC6 and PARC6, play an important role in the assembly and constriction of the Z ring. While ARC6 is found in cyanobacteria in addition to plants, PARC6, thought to be derived from ARC6, appears to be unique to vascular plants. The Arabidopsis protein ARC3, a stromal protein that negatively regulates Z-ring assembly, has been shown to be recruited to the division site by PARC6 during division. In the absence of ARC3 and PARC6, as in the Arabidopsis arc3 and parc6-1 mutants, division is asymmetric due to the formation of multiple off-center Z rings in single chloroplasts. We sought to characterize the specificity of the ARC3-PARC6 interaction, specifically whether ARC3 is able to interact with the ancestral ARC6. In this work, a yeast two-hybrid system was used to test these interactions. We found that ARC3 is able to interact with ARC6 and the strength of this interaction is similar to that between ARC3 and PARC6.

UNLOCKING A BACTERIA'S ENERGY POTENTIAL

Cody Madsen
Poster: 82
Mentor(s): Michaela TerAvest (Biochemistry & Molecular Biology)

This project is motivated by the need for innovative approaches to fulfill the demand for clean, renewable energy, biosensors and production of high-value chemicals. The bacterium Shewanella oneidensis MR-1 can be a part of these approaches, through its ability to metabolize simple sugars and produce electrical current. S. oneidensis MR-1 accomplishes this by exporting electrons across its outer membrane resulting in production of renewable electricity in bioelectrochemical systems. The biochemical pathway that transfers electrons across the cell membrane has been identified, but the intracellular redox cofactors that transfer electrons from an electron donor to this pathway are less well understood. Our hypothesis is that S. oneidensis MR-1 is dependent on NADH and NADH dehydrogenases to transfer electrons from the carbon source to this extracellular pathway. We also hypothesize that the importance of each NADH dehydrogenase may begin to be understood through this study. This will be tested by measuring differences between the wild-type strain and seven mutant strains, four strains with each one of the four NADH dehydrogenases removed and three with two dehydrogenases removed. Specifically, we will assess changes in current production, growth and metabolism in anodes of bioelectrochemical systems. We will observe these differences with N-acetylglucosamine as the carbon source. We expect to see greater differences in current production, metabolism and growth between the double-knockout strains and wild-type because the four dehydrogenases vary in role and importance. We suspect that our results will begin to indicate the role and significance of each NADH dehydrogenase.

SWITCHING TO SUGARS: OPTIMIZING METAL CATALYZED PRETREATMENTS FOR SWITCHGRASS

Jadan Norman
Poster: 83
Mentor(s): Hegg Eric (Biochemistry & Molecular Biology)

Switchgrass is a dominant prairie tallgrass native to North America and is currently a leading candidate as a source of biomass feedstock for the biofuel industry. Grasses such as switchgrass contain large quantities of glucose and xylose monomers in their polymeric form. To convert these polymers back into their respective sugar monomers, powerful enzyme cocktails are used to cleave the bonds linking the monomers. However, these enzymes are not effective on untreated biomass due to the recalcitrant structure of the cell wall, thus switchgrass must be chemically pretreated to change the structure of its cell walls and improve digestibility. We previously demonstrated that alkaline hydrogen peroxide (AHP) treatment with a copper bipyridine (bpy) catalyst is effective at degrading the cell walls of other lignocellulosic biomasses. While bpy does significantly increase the yields of woody biomasses it has been shown that

pretreatment of switchgrass with Cu-AHP, even in the absence of the bpy ligand, resulted in high glucose yields comparable to those in hardwood with bpy. Bpy is an expensive reagent and the elimination of bpy from the pretreatment process has opened the possibility of optimizing an economically feasible pretreatment process for switchgrass. In this poster, we will report the advances we made reducing the quantities of other expensive reagents including hydrogen peroxide, catalytic enzymes, and copper sulfate. we will also explore the role of naturally occurring trace metals in the switchgrass have on the catalytic process that could explain why bpy is not required in the switchgrass pretreatment.

INVESTIGATION OF THE ROLE OF RETINOBLASTOMA-FAMILY 2 IN CELL CYCLE PROGRESSION AND TRANSCRIPTIONAL REGULATION WITH CRISPR-CAS9 TECHNOLOGY

Jaideep Prasad
Poster: 84
Mentor(s): David Arnosti (Biochemistry & Molecular Biology)

Retinoblastoma-family (RBF) genes are tumor suppressor genes involved in the negative regulation of the cell cycle via their interaction with a select group of transcription factors known as E2F. These interactions typically result in widespread transcriptional repression of a variety of genetic targets. As such, the effects of RBF proteins extend beyond the regulation of cancer development, with reports suggesting they have additional roles in vital processes such as cellular proliferation, differentiation, gametogenesis, and metabolism. Drosophila melanogaster is used as a model organism to study RBF interactions due to the presence of a well conserved and simplified version of the RBF-E2F pathway. The Drosophila retinoblastoma family consists of RBF1 and RBF2, which collectively share roles with the analogous human members Rb, p107 (RBL1), and p130 (RB2). Previous studies have largely focused on RBF1 function, leaving RBF2 with a relatively limited characterization. This investigation seeks to identify the unique roles of RBF2 by genetically engineering and analyzing mutant Drosophila lines that possess defective RBF2 alleles. This presentation will discuss the CRISPR/Cas9 strategy used to precisely edit the RBF2 gene, the cross process used to generate homozygous and balanced lines, and the results or current progress of various survival, gene expression, fertility, and protein-interaction assays.

STRUCTURAL ANALYSIS OF CRYSTALLIZED WORM CADHERINS

Zach Smith, Numan Bashir
Poster: 85
Mentor(s): Xiangshu Jin (Chemistry)

Cadherins are transmembrane proteins that function by cell-to-cell adhesion, forming a network for intercellular communication. The cadherin extracellular domain can be extensive, containing conserved domains and multiple repeats. We observed a greater amount of repeats in lower animals, such as the roundworm (C. Elegans), when compared to vertebrates. Using X-ray crystallography, we are investigating the protein's structure from different angles in order to elucidate the molecular interactions. This will allow us to discern the mechanism of the C. Elegans cadherin interactions as well as determine how higher order organisms have retained protein function while excising over half of the repeated domains.

GENERATING AN ALLOSTERICALLY-REGULATED PROTEIN USING HUMAN CELLULAR RETINOL BINDING PROTEIN II AS A TEMPLATE

Ellen Studzinski
Poster: 86
Mentor(s): James Geiger (Chemistry)

Allosterically-regulated proteins are ubiquitous in biology, and they play essential roles in physiological and metabolic systems, such as oxygen transport by hemoglobin and pyrimidine synthesis by aspartate carbamoyltransferase. While many proteins have been identified as allosterically-regulated proteins, there are few reports regarding the design of a new class of these proteins. Our research is focused on using small cytosolic proteins belonging to the iLBP family as an engineering template to create novel functional proteins. The original role of the iLBP protein family is to shuttle hydrophobic cargo within the cell. Resilience toward mutations and the existence of a large binding pocket are the two important features that make these proteins suitable as an engineering template. Very recently we engineered the human Cellular Retinol Binding Protein II domain-swapped dimer to be a protein conformational switch. By using retinal as a ligand and a disulfide bond between the two domains, we generated four relatively large and distinct conformations. Now we have designed a zinc-binding site in the interface of two domains of the dimer that can potentially be regulated by redox potential or ligand binding. Our future goal is to use this zinc-binding protein as an allosterically regulated metalloenzyme.

BIOCHEMISTRY & MOLECULAR BIOLOGY
POSTER PRESENTATIONS, SECTION 4
LAKE HURON ROOM, 1:00 – 2:30 PM

INDUCTION OF TYPE 1 DIABETES IN LEW.1WR1 RATS IS INDEPENDENT OF CHANGES IN INSULIN SENSITIVITY AND ß CELL SECRETORY DEMAND.

Nandan Kodur
Poster: 89
Mentor(s): Karl Olson (Physiology)

Type 1 diabetes (T1D) is characterized by autoimmune destruction of pancreatic ß cells and the loss of insulin production and secretion, leading to loss of glucose homeostasis. What makes ß cells susceptible to autoimmune attack is uncertain, but it has been hypothesized that increased insulin secretory demand in individuals genetically at risk for T1D might be involved. We have previously reported that injection of T1D-genetically susceptible LEW.1WR1 rats with the toll-like receptor 3 (TLR3) agonist poly IC for up to 15 days sequentially causes insulitis followed by T1D. Since systemic inflammation has been linked to insulin resistance and increased demand for insulin secretion, we hypothesized that poly IC in LEW.1WR1 rats induces ß cell autoimmunity, in part, by causing systemic inflammation, insulin resistance, and increased ß cell secretory demand. To investigate this hypothesis, LEW.1WR1 rats were injected i.p. with vehicle or poly IC for 6 days. Sixteen hours after the last poly IC injection, there was a significant increase in expression of interferon-regulated genes (e.g. IRF7, IP10, UBD) in liver, muscle, circulating lymphocytes, and pancreatic lymph nodes, and increased expression of inflammatory-regulated genes (e.g. IL6, iNOS) in liver, lymphocytes, and pancreatic lymph nodes. No significant differences in blood glucose or insulin levels were observed. There were also no qualitative differences in pancreatic islet size between the two treatment groups. These findings indicate that initiation of ß cell autoimmunity in genetic susceptible LEW.1WR1 rats is not due to insulin resistance and increased insulin secretory demand.

INTERACTION OF PROTEINS INVOLVED IN THE SPORULATION OF *BACILLUS SUBTILLIS*: SPOIVFA AND BOFA

Elizabeth Lyons
Poster: 90
Mentor(s): Lee Kroos (Biochemistry & Molecular Biology)

Bacillus subtillis forms an endospore when under starvation conditions. Transcription factor, σ^K, is responsible for transcribing the genes that are involved coat formation around the forespore and the release of the mature spore. The precursor, Pro-σ^K, is cleaved by SpoIVFB which is an intramembrane metalloprotease (IMMP). Late-stage sporulation proteins, SpoIVFA and BofA help regulate the timing of Pro-σ^K cleavage by inhibiting SpoIVFB. Previous studies show that SpoIVFA, SpoIVFB, BofA, and Pro-σ^K are all in a complex together, where BofA is the primary protein of inhibition and SpoIVFA is needed to assemble SpoIVFB and BofA in the complex. This study aims to determine a site of direct interaction between sporulation proteins, SpoIVFA and BofA, through disulfide cross-linking in the C-terminal regions of both proteins. Using a functional version of cysteine-less SpoIVFA, BofA, SpoIVFB, and Pro-σ^K on a single plasmid, a cysteine was engineered into the C-terminal region of SpoIVFA and BofA. Copper activated 1,10-phenanthroline was used as an oxidizer to induce the formation of a disulfide bond if the cysteines in the C-terminal regions of SpoIVFA and BofA are close enough together in the complex with SpoIVFB and Pro-σ^K. When the proteins are run on an immunoblot, a shift in the complex size will be observed if disulfide crosslinking occurs. This result would provide direct evidence that the C-terminal regions of SpoIVFA and BofA interact in *B. subtillis*. Determining the regions of interaction lead to a better understanding of SpoIVFB regulation and other IMMPs.

ROLE OF LIPID SIGNALING IN PLANT DEVELOPMENT

Briaunna Murray
Poster: 91
Mentor(s): Susanne Hoffmann-Benning (Biochemistry & Molecular Biology)

The goal of the experiments is to determine the effect of phloem lipid-associated family proteins (PLAFP) on plant development and stress signaling in Arabidopsis thaliana. We hope to obtain data that will support the idea that phloem lipid binding proteins affect plant development. Several different mutant strains were used in the experiments; three lines overexpressing PLAFP, two being “knock down” which express lower amounts of PLAFP, one wild type used as a control and a complementary strand where wild type phenotypes have been restored by transforming an overexpressing PLAFP line into a knock-down line. Preliminary data suggest that the overexpression lines have a higher seed yield, thicker stems, and possibly more vascular bundles when compared to the other mutant lines, all

characteristics of enhanced growth and increased drought tolerance. For the seed yield experiment, approximately 16 plants of each line were planted and grown until seeds are matured. The seeds were then collected and weighed for comparison. For the second experiment, cross sections of primary bolts of each line were examined under a microscope. Length and width of each cross section were recorded, along with number and appearance of vascular bundle. As expected the overexpressing lines have displayed characteristics of enhanced vascular development due to PLAFP.

FUNCTIONAL COMPLEMENTATION OF DIVERGENT METHANOL DEHYDROGENASES IN METHYLOTROPHY
Carly Surlano
Poster: 92
Mentor(s): Norma Cecilia Martinez-Gomez (Microbiology & Molecular Genetics)

Methylotrophy is described as the ability to use reduced carbon compounds containing one or more carbon atoms but no carbon-carbon bonds as the sole source of carbon for assimilation. Methylotrophic bacteria are thought to be the most abundant organisms in the phyllosphere and are often found on leaf surfaces where methanol is released. Research has shown that lanthanide metals are very important to these bacteria that play a vital role in global carbon and nitrogen cycling. These heavy, highly insoluble elements are physiologically significant to the growth of model methylotroph, *Methylobacterium extorquens* AM1 and serve as the cofactors for key alcohol dehydrogenases, such as XoxF-type methanol dehydrogenases, needed for single-carbon growth. The contribution of lanthanide-containing XoxF enzymes in the environment is likely vastly underestimated. Genomic DNA sequences from methylotrophic communities indicate that all methylotrophs utilizing pyrroloquinoline quinone (PQQ) dependent MDHs contain a XoxF-type MDH which can be divided into five distinct phylogenetic clades. A complementation study was conducted in order to assess the ability of *M. Extorquens* to utilize XoxF-type methanol dehydrogenases from other methylotrophic bacteria, including an extremophile methanotroph isolated from a volcanic mud pot as well as two mesophiles. Preliminary phenotypic analysis indicates successful complementation, although, the growth rate is decreased compared to that with the native XoxF MDH. Activity data reveals that at least one of the complemented enzymes displays activity levels comparable to that of *M. Extorquens'* native XoxF1. Further study is needed to correlate the cause of the growth deficit in the complemented strains.

RETINOBLASTOMA FAMILY 2 (RBF2) REGULATION OF ISOCITRATE DEHYDROGENASE (IDH)
Dominic Thorley
Poster: 93
Mentor(s): David Arnosti (Biochemistry & Molecular Biology)

Retinoblastoma (Rb) is a tumor suppressor and has well studied regulatory control over cell cycle genes. Rb also exhibits its function in genes outside of the cell cycle family in mechanisms that are not fully understood. Previous findings from this laboratory suggest that Rbf2 binds to the E2F site of Idh in Drosophila melanogaster embyros. Since mutation or misregulation of Idh are found in the vast majority of certain human gliomas, Rb is a known tumor suppressor protein which is dysfunctional in many cancers, and there is evidence that Rb binds to Idh from ChIP-seq data, this study was designed to determine if Rb has regulatory control over Idh through the Rb/E2F pathway. Gamete directed CRISPR/Cas9 gene editing of the E2F binding site on Idh was coupled with co-editing of ebony (e) to produce a linked visible phenotype. A variety of genotypes were observed across the unique lineages of injected individuals, including a mutation that partially mutated the E2F site. It is hypothesized that a disruption of this regulatory site will result in an increase of Idh expression. Determination of the disrupted E2F site's effects on Idh will be performed by qPCR, enzyme activity assay, western blot, and chromatin immunoprecipitation.

DOMAIN SWAPPED DIMERS IN HUMAN FATTY ACID BINDING PROTEIN5 (HFABP5)
Yiwei Zhao, Joelle Eaves, Kathryn Pawlowski, Lukus Sun
Poster: 95
Mentor(s): Nona Ehyaei (Chemistry)

Intracellular lipid binding proteins (iLBPs) carry out cytoplasmic transport of hydrophobic, insoluble molecules. Past members of our research group have found that a certain a member of iLBP family, human cellular retinol binding protein II (hCRBPII), exhibits domain swapping. This so-called domain swapping results when two identical monomeric protein chains exchange parts of their structures to form a dimer, also known as a higher-order oligomer. The discovery of domain swapping in hCRBPII led us to research domain swapping in other types of iLBPs, such as human fatty acid binding proteins—more specifically in holo Human fatty acid binding protein 5 (hFABP5). FABPs bind to, and transport, fatty acids; FABP5 specifically is responsible for endocannabinoid anandamide (AEA) transport. AEA is a signaling lipid that activates cannabinoid receptors in the central nervous system and peripheral tissues. Furthermore, data reported below portrays the domain swapping of hFABP5 in bacterial expression. Previous studies on the Q64A mutation suggest that this mutation can control dimerization of hFABP5. Our eventual aim is to predict domain swapping solely from amino acid sequences in iLBPs.

BIOCHEMISTRY & MOLECULAR BIOLOGY
POSTER PRESENTATIONS, SECTION 5
LAKE HURON ROOM, 3:00 – 4:30 PM

MODULATING MITOCHONDRIAL RESPIRATION WITH ELECTROCHEMISTRY
Gabrielle Brakoniecki
Poster: 98
Mentor(s): Denis Proshlyakov (Chemistry)

Mitochondrial dysfunction is associated with many chronic illnesses, including autism spectrum disorder, type 2 diabetes, and Alzheimer's. The role of mitochondrial dysfunction in diseases is unclear. Current techniques for studying mitochondrial activity have emphasized observing rates of oxygen consumption by complex IV in the electron transport chain (ETC). The ETC, located in the inner membrane of the mitochondria, is composed of several protein complexes. While current techniques allow for analysis of all complexes in the ETC, deciphering exact contributions of each complex to respiration is difficult. This project focuses on utilizing electrochemistry to assess individual complexes in the ETC in whole mitochondria. The outer membrane (OM) of the mitochondria provides a spatial barrier that prevents electron transfer between an electrode and the complex of interest; a mediator is necessary to carry electrons across the OM. By applying electric potential to an electrode in the solution of mediators and mitochondria, it's possible to modulate mitochondrial respiration. When an oxidizing potential is applied, it's possible to determine activities of complexes within the ETC from direct measurements of electric current. Under reducing potentials, electrons from the electrode can catalyze oxygen reduction by complex IV. Results show that oxygen consumption rates can be controlled by the applied potential & depend upon the concentration of mediator and mitochondria in solution. We demonstrate that oxygen consumption rates can be directly correlated with amperometric data under reducing potential. Competition between oxygen and the electrode for electrons derived from the substrates is observed under oxidizing potential.

HIGH MOBILITY GROUP B1 ENHANCES ACTIVATION OF MACROPHAGES BY PLASMIN
Justin Ingram
Poster: 99
Mentor(s): Bryan Copple (Pharmacology & Toxicology)

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

EFFECT OF FIVE COMPOUNDS ON ADIPOCYTE DIFFERENTIATION IN AN IN VITRO MOUSE MODEL
Jordan Maust
Poster: 100
Mentor(s): Monique Floer (Biochemistry & Molecular Biology)

We have tested the effect of five compounds that inhibit signaling pathways on adipocyte differentiation using the 3T3 L1 mouse cell-line. 3T3 L1 cells were differentiated for 9 days in the presence of IBMX, dexamethasone and insulin as previously described (Scott, M.A. et al. 2011 Stem Cells and Development 20, 1793-1804). I determined the effect of the compounds on adipocyte marker gene expression on day 0, 3 and 9. The markers tested included FABP4, PLIN1, PLIN2, ADIPOQ, LEP, CIDEA, and UCP1. I isolated total cellular RNA from frozen Trizol samples, reverse transcribed the RNA into cDNA, and determined marker gene expression by qRT-PCR using specific primer pairs. We found effects of three of the compounds on adipocyte marker gene expression indicating that these compounds may inhibit adipocyte differentiation. Results were confirmed by reduced lipid droplet formation in the presence of the compounds.

MISSION IMOSSIBLE?
Balindile Motsa, Peiyen Kuo, Daniel Moser
Poster: 101
Mentor(s): Bjoern Hamberger (Biochemistry & Molecular Biology)

Physcomitrella and its side kick Mortierella are key players in the engineering of green factories to produce high value diterpenoids. The moss Physcomitrella patens is engineered as a production platform for a range of diterpenoids. These specialized metabolites are important for plant adaptation and defense and are being used by humans as flavors, fragrances and pharmaceuticals. The advantage of this ancient lower land plant lies in its simple diterpene background, its capability of homologous recombination and the possibility to scale up the production from single cells to bioreactors. We have successfully established a method for the propagation of sterile moss cultures and optimized new growth conditions while also maintaining a number of transgenic lines. After having transformed moss cultures, we performed several rounds of selection before potential positive clones were genotyped by PCR and subsequently prepared for biochemical characterization using GC-MS analysis. We are also investigating moss in co-culture with the potential symbiotic fungus Mortierella. The fungus possibly benefits from its host for the supply of sugar, while the effect on moss is still unknown. This fascinating plant-fungal system could also be engineered further as a biosynthetic production platform requiring only sunlight and CO2. We determined ideal co-culture conditions, key for sterile growth of both organisms on soil. We are next planning to test if the natural ability of the fungus to accumulate lipid droplets can allow storage of the hydrophobic diterpenes produced in the moss. Making the world greener, one moss at a time.

CHARACTERIZING A VANILLATE-INDUCIBLE FRUA TRANSCRIPTIONAL FUSION
Jordyn VanPortfliet
Poster: 102
Mentor(s): Lee Kroos (Biochemistry & Molecular Biology)

In conditions of extreme stress, such as starvation, many bacteria aggregate and make spores. It is known that this is done through coordinated signaling. Our research goal is to characterize a vanillate-inducible fruA transcriptional fusion in wild-type and mutant Myxococcus xanthus. It is known that FruA is involved in C signaling between the cells, but the exact system by which this happens is unknown. In hopes of understanding this, we have isolated a mutant strain of M. xanthus that does not normally develop fruiting bodies (a fruA mutant). We have inserted a construct into this mutant's genome so that when vanillate is introduced into the system, the mutant reverts back to the wild type behavior. This is happening because the vanillate is inducing the fruA gene in the construct. For this reason, we know that we have a system that only differs by the turning on and off of the fruA gene. We then ran experiments with our mutant and construct combination, adding vanillate at different times to determine when the induction of fruA was closest to wild type. This has ensured that we have rewired the fruA network and are now able to manipulate the FruA level. With this information, we have done a series of experiments and assays to measure the network response to changes of FruA level.

NONSENSE AND RUBBISH: IDENTIFYING THE ROLE OF NONSENSE MEDIATED DECAY USING SINGLE EXON GENES
Magie Williams
Poster: 103
Mentor(s): Steve Vannocker (Horticulture)

Errors in transcription, inaccurate or inefficient splicing and mutation can lead to the presence of premature termination codons (PTCs) within RNA transcripts. Such transcripts are targeted for elimination by an RNA surveillance pathway called nonsense-mediated decay (NMD). Where best characterized, NMD relies on interaction between splicing machinery and the exosome RNAse, therefore transcripts lacking introns are expected to be free from NMD surveillance. It has been hypothesized that such genes may avoid codons that are simply mutable to a stop codon (fragile codons) (Cusack et al 2011). To gain insight into variation of NMD mechanisms among eukaryotes, and to identify transcript classes that may escape surveillance by NMD, we are calculating codon usage for a wide array of organisms and gene functional classes. Results of this ongoing study will be presented.

BUSINESS

ORAL PRESENTATIONS, SECTION 1
LAKE MICHIGAN ROOM, 8:30 AM – 10:15 AM

EFFECTS OF NATURAL DISASTERS ON THE STOCK MARKET (OR LACK THEREOF)
James Anders
Time: 8:30 AM
Mentor(s): Kirt Butler (Finance), Antoinette Tessmer (Finance)

From 1900-2016, in the United States alone there have been 953 natural disasters, or just over eight per year. It has long been questioned what kind of impact natural disasters have on the financial stability of areas and industries prone to these disasters. The focus of this project was to assess the effects of natural disasters on specific industries that are most often impacted by hurricanes in particular, considered one of the most financially costly events. The portfolio contained equities (companies) from the insurance, travel, retail gas, oil, auto, real estate, and home improvement/restoration companies. The research was conducted in a mock portfolio with a market value of one million dollars that was observed beginning September 5, 2017. Performances will be evaluated based on overall return percentages, average daily percentages, and the standard deviations to the percentage daily change. All of this will be in comparison to the entire market's benchmark, the S&P500. In this presentation, I will evaluate and dissect the true impact of inevitable weather-related hazards on the industries listed above so that investors in the future can better prepare for and structure their portfolios given that natural disasters exist and occur over eight times per year in the United States.

DATA TOOLS FOR QUANTITATIVE PORTFOLIO CONSTRUCTION AND EVALUATION
Aleksandra Andersen
Time: 8:45 AM
Mentor(s): David Croson (Economics)

Using decades of daily return data from the New York Stock Exchange's largest one thousand securities by market capitalization ("NYSE 1000"), we have developed a tool to evaluate return correlations among assets across arbitrarily customized time periods. Our tool provides quantitative support for financial innovations both through demonstrating certain statistical relationships, and, intriguingly, seeking but failing to find others. Primarily, our analysis of correlations between commodity price returns and total returns of equities (including dividends) supports the design of a stock portfolio which tracks crude oil prices even with constrained (equal) weights on its holdings, in contrast to a regression hedge. As a second application, via treating a broad-based index (e.g., the S&P 500 or NYSE 1000 itself) as the commodity, we show that the beta of each stock changes over time -- and that incorporating this dynamic relationship reduces risk without impairing return. Like the oil application, this index application uses relationships that our tool does find to decrease uncompensated, firm- or commodity-specific risk without a commensurate reduction in performance. Secondarily, the tool allows us to evaluate widely-reported and -believed relationships for their statistical validity. For example, prices of agricultural inputs (such as corn) certainly affect the cash flows of input-intensive firms (such as chicken producers) -- yet we found no such statistical relationship in their assets' returns, despite exhaustive multivariate analysis. Such an application uses relationships that our tool does not find to suggest contrarian strategies against the "common wisdom" which invests in movements unlikely to occur.

EFFECTS OF MENTORING ON HOSPITALITY BUSINESS COLLEGE STUDENTS ACADEMIC LIFE
Kimmy Anderson
Time: 9:00 AM
Mentor(s): MiRan Kim (Hospitality Business)

It has been found that mentorship is significantly related to several desired outcomes in college students including both academic success and career development. Mentorship at college provides the necessary support and strengthens the deep learning experiences while attending college to enrich long-term outcomes after graduating from a college. College students who feel as though they have a mentor connection allows the student to pursue their educational goals and attain their dreams while experiencing the overall college experience. Whether it be our friends, professors, or alumni who inspire us, supportive and encouraging mentors, or the various services a college offers, these factors are all important aspects to the hospitality business college students. Thus, this study is to examine the effects of mentoring on hospitality business college students' academic life: involvement with social activities and events, campus services, study abroad, internship program, career development program, and effectiveness of academic performance. Students achieve a high level of satisfaction with respect to these factors researched, while other students may be dissatisfied with certain factors in certain areas of their educational academic experience. An online-survey will be conducted on Michigan State University undergraduate students who are currently enrolled in the school of hospitality business. This study can provide a deeper insight of importance of mentoring to college students.

WHAT CAN AN EMPLOYEE DO TO STOP UNETHICAL ACTIONS IN THE WORKPLACE? WHISTLEBLOWING AS A RESPONSE
Austin Langlinais
Time: 9:15 AM
Mentor(s): Hun Whee Lee (Management), Linn Van Dyne (Management)

With the rise of whistleblowing in popular culture, there has been an increase in calls for research on the actions that employees take to hold their peers and superiors accountable for what they believe violates company policy. This project seeks to evaluate the level of severity of the transgression, combined with the sense of psychological safety of the employee needed to engage in whistleblowing. As a "challenging prohibitive" OCB, whistleblowing is oftentimes one of the least desirable options for employees due to their fear of negative reactions from the organization. When an employer allows anonymous reporting, psychological safety will make it more likely that those who are motivated will take action. This research goes beyond existing research by highlighting the differences in whistleblowing vs promotive voice as the basis for identifying novel predictors for psychological safety. This presentation will describe the importance of whistleblowing, provide an overview of what provokes whistleblowing in the workplace, and most importantly, advance suggestions for ways to make whistleblowing less risky for employees so that violations against company policies can be identified and dealt with.

WHAT MATTERS TO INTERNATIONAL HOSPITALITY BUSINESS STUDENTS?
Pak Hin Kenneth Lee, Lingyun Xiao
Time: 9:30 AM
Mentor(s): Mi Ran Kim (Hospitality Business)

International students majoring in hospitality business have made significant academic and financial contributions to the hospitality industry. Thereupon, international presence is vital in both hospitality industry and education institute. Thereby, exploring factors that can influence international students' satisfaction in college is essential; to better support international students in the United States. This study examines the effects of factors (i.e., involvement with social activities and events, financial distress, English fluency, academic performance, internship program and career development program) on satisfaction with a college life for hospitality business international students. An on-line survey will be conducted on Michigan State University undergraduate international students who are currently enrolled in the hospitality business. This research shall provide a deeper and clearer insight of international hospitality students' college life.

HOW THE SHARING ECONOMY IS CHANGING THE HOSPITALITY INDUSTRY
Sarah Michelson
Time: 9:45 AM
Mentor(s): Bonnie Knutson (Hospitality Business)

The "sharing economy" may seem obscure, but it involves businesses consumers frequently utilize, such as Uber, eBay, AirBnB, and Grubhub. Currently, many hospitality companies view the sharing economy as a threat to their brand, and the hospitality industry as a whole. Since the Hospitality & Tourism industry is the largest single employer in the world,

there is certainly cause for concern. Through interviews with several professionals in both conventional hospitality and the sharing economy and analysis of the growth and future plans of sharing economy companies, I have determined that the sharing economy should not be viewed as a disrupter to the hospitality industry, but an opportunity to expand and redefine hospitality and travel. Major hoteliers should be considering partnerships with AirBnB, instead of viewing their exponential growth as a threat, and restaurants should look to find their niche in the industry by working with food delivery services, instead of categorizing them as competition. In the short-term, hospitality companies may be able to compete with sharing economy, but to thrive long-term hospitality companies must develop a mutually beneficial relationship with the sharing economy.

POLITICS AND STOCK PRICES: THE RELATIONSHIP BETWEEN THE STOCK MARKET AND PRESIDENT TRUMP'S TWEETS
Parker Nolan, Kate Sabelhaus
Time: 10:00 AM
Mentor(s): Kirt Butler (Finance), Antoinette Tessmer (Finance)

Our research investigates the correlation between President Trump's tweets and the stock market. Our research is based on two stock portfolios: one anchored on defense industry stocks, the other invested in stocks that are dependent on the United States' international trade relations. We hypothesized that on certain days where the president's tweets threatened war or threatened to reduce trade with a neighboring country, the value of the military defense portfolio would rise, and the value of the trade-based portfolio would fall. This research is important because it tests the possible effects that one government official's tweets may have on the stock market. This is a very sensitive subject and we assumed the market would have extreme volatility following certain tweets. It would be interesting if tweets could influence the stock market, and that is what we are trying to discover. We compared our portfolios to the S&P 500 based on their day to day fluctuations. We will be presenting on the relationship between these two experimental portfolios and the S&P 500, on which portfolio strategies offer the best potential for gain or risk management, assisted by our data, and on which sectors were most impacted by Trump's tweets.

SHORT TERM RISK VERSUS LONG TERM REWARD
Hannah Ahluwalia, Jenna Koppinger
Time: 1:30 PM
Mentor(s): Kirt Butler (Finance), Antoinette Tessmer (Finance)

Over the course of the semester, we conducted research on stock portfolios with two different focuses: sustainability and futures contracts impacted by changes in tax code. In our seminar we used "Stock Trak", a website that mimics the current stock market. Starting at $1 million, we were given complete freedom when investing in various stock exchanges around the world. Investor 1 chose to build a portfolio of volatile futures contracts that were dependent on the decisions of the current presidency and a strong economy. Portfolio 1 focused on short-term investment in stocks that were expected to provide high return in the current bull market climate. Investor 2 selected companies that had sustainable initiatives and progress plans in place to become eco-friendlier. Portfolio 2 was a small snapshot of what was designed to be a long-term investment, i.e. over the course of 10 to 20 years. We will present the current environment of the stock market and compare the risk versus return within both of these portfolios.

BUSINESS
ORAL PRESENTATIONS, SECTION 2
LAKE MICHIGAN ROOM, 1:45 – 3:00 PM

DOING WELL BY DOING GOOD? AN EVLUATION OF THE BUY ONE, GIVE ONE MODEL
Jake Arens
Time: 1:45 PM
Mentor(s): John Aerni-Flessner (Arts & Humanities)

Society at large is increasingly concerned with the impact has on both the ecological and the human environment. Consumers are more likely to spend money at businesses that are "socially responsible." Corporate social responsibility is a contested term, which will be, after some discussion, defined as corporate behavior that ensures the economic and ecological longevity of its sphere of influence, as well as promoting social equity. Buy One, Give One (BOGO) campaigns have been successfully marketed as socially responsible, but, in execution BOGO campaigns can do more harm than good. Case studies of BOGO campaigns by TOMS, Warby Parker and Mealshare will serve as examples of potential outcomes as well as recommendations for maximum positive impact.

BUSINESS HISTORIES OF NASHVILLE FIRMS
Mikela Czupski, Vincent Black
Time: 2:00 PM
Mentor(s): Elizabeth Mack (Geography)

Spinoffs are an important characteristic of regional business activity. This type of new business is important to analyze because the children of firms carry on business practices and contribute to the entrepreneurial culture of places. They can also be the source of industrial branching and create new sub-industries, which are important to diversifying the economic base. Accordingly, business lists for particular industries are used to track the heritage of firms and analyze spinoff activity. However, this is a somewhat limited means of analyzing the entrepreneurial heritage of new businesses. To take a broader, less industry-specific approach to analyzing spinoff activity, this study will triangulate business information from multiple sources to analyze the histories of over 3,000 business across multiple industries in the Nashville, Tennessee metropolitan area. Temporal and industrial trends of these businesses will be analyzed and the lineages of important firms visualized.

DISRUPTIVE INNOVATION IN THE SHARING ECONOMY: EXAMINING AIRBNB'S IMPACT ON HOTELS
Ian Hawthorne
Time: 2:15 PM
Mentor(s): Seung Hyun Kim (Hospitality Business)

Within the last decade, countries around the world have experienced the emergence of the sharing economy, defined by peer to peer sharing of access to goods and services, leading to disruptive innovation in multiple industries. Airbnb has become one of the largest examples of disruptive innovation in the lodging and tourism industry. Airbnb has impacted the hotel industry by giving consumers a wider variety of choices for their lodging. The purpose of this research was to confirm such impacts by determining the extent to which Airbnb is used as a hotel substitute and to examine how Airbnb guests expect their accommodations to perform relative to hotels. This study is to provide empirical insight into Airbnb's status as a disruptive innovation. This study involves a survey administered to a convenience sample of college students at a large US Midwest University who stayed at a Airbnb property. When considering traditional hotel attributes (e.g., cleanliness, social factors, and comfort), Airbnb is expected to outperform budget hotels, underperform upscale hotels, and have mixed outcomes versus mid-range hotels, indicating some, but not complete, consistency with the concept of disruptive innovation.

SERIAL ENTREPRENEURS AND SPINOFF ACTIVITY IN BURLINGTON, VERMONT
Samyuktha Iyer, Tatum Cho
Time: 2:30 PM
Mentor(s): Elizabeth Mack (Geography)

New business activity is important to regional economies because it is a source of employment and fosters industrial diversity. Due to this importance, researchers across a range of disciplines have analyzed the factors that drive entrepreneurial activity at the individual, firm, and regional levels. At the individual level, research has analyzed the individual characteristics of entrepreneurial people and the same is true for research about serial entrepreneurs. These are people that enjoy the start-up process and found several businesses, but do not necessarily manage these businesses after the initial start-up period is over. Research on this unique group of people has analyzed their individual characteristics and their success in obtaining venture capital funds. Little research has emphasized the types of businesses they start and the timing between start-ups for this unique group of entrepreneurs. To fill this gap in our knowledge, this presentation will focus on new business activity from spinoffs of existing businesses, non-profits, and government entities for the city of Burlington, Vermont using information from a detailed firm database that contains information about company histories and firm founders.

HOSPITALITY EMPLOYEE WELLNESS PROGRAMS
Taylor Kearly, Mackenzie Sappe, Natalie Villarreal
Time: 2:45 PM
Mentor(s): JaeMin Cha (Hospitality Business), SeungHyun Kim (Hospitality Business)

Over the past decade, health and wellness has been an increasingly important aspect of consumers' lives. In response to this trend, many hospitality companies are incorporating aspects of health and wellness throughout their organizations. In addition to expanding health and wellness programs for health-conscious guests, an increasing number of hospitality companies have also emphasized their corporate wellness culture and launched different wellness programs for staff members. The purpose of this research is to analyze the impact of added health and wellness programs for recruiting employees. We propose to analyze the importance of health and wellness activities and programs to graduating

university students in their job selection and in their life overall. A literature review was conducted understanding current hospitality organizations' wellness programs and how they have impacted their businesses. The main findings included the increase of employee participation rates as well as the increase of cost savings. It is shown that wellness programs not only help the bottom line but reflect positively on an organizational image. With this knowledge, we propose to develop a survey to further investigate how these wellness programs specifically affect the job decisions of hospitality students. We propose to distribute the online survey to upperclassmen who are engaged in the recruitment process. We propose to use the descriptive statistics, factor analysis, and regression analyses to examine our study objectives. Based on these findings, specific implications for hospitality companies, limitations of the study, and recommendations for future study are discussed.

BUSINESS
POSTER PRESENTATIONS, SECTION 1
LAKE HURON ROOM, 11:00 – 12:30 PM

BUYING MONEY TO MAKE MONEY: DOES IT WORK?
Macklin Carron, Jamil Rehemtulla, Claire Wojan
Poster: 106
Mentor(s): Kirt Butler (Finance), Antoinette Tessmer (Finance)

Our motivation for trading currencies was to challenge ourselves by investing in an industry not as well understood. Currencies are traded in pairs, and their returns can stem not only from positive domestic shocks but also negative foreign shocks. Therefore, there are numerous factors in play when deciding which currency to buy or sell. We were able to pinpoint these factors over a 7-month period of trading currencies on a website called Stocktrak. The process we followed started with careful investment decisions. We observed a currency's graphical patterns and key events that would shape its future performance. Keeping in touch with global news and potential shocks to the market, we grasped an understanding of our portfolio's movements. We discovered that higher domestic interest rates and reduced inflation had a profound negative effect on our portfolios. Our decision to invest in other currencies led to our initial downfall as the US dollar strengthened against other currencies. As the dollar has recently weakened, our portfolios have had positive results. The different degree of diversification of our portfolios has aided us in making conclusions about risk. From over a semester long process of tracking and evaluating our portfolios, as well as comparing it to American and global benchmarks such as the S&P 500 and ACWI, we were able to conclude what factors of the global economy and political events increased the volatility of the currency markets.

BREXIT: TAKING ADVANTAGE OF THE CHANGES
Zachary DeLang
Poster: 107
Mentor(s): Kirt Butler (Finance), Antoinette Tessmer (Finance)

The goal of this research is to manage a low risk stock portfolio that takes advantage of the market's reactions to developing events related to the United Kingdom exiting the European Union. Diversification was the strategy used to ensure that an outlier event in a specific industry did not significantly affect the portfolio in a negative way. Other positions were taken that would be less affected by Brexit, as to further diversify the portfolio and make it less sensitive to Brexit. The software that was used to simulate the portfolio was StockTrak Global Portfolio Simulations. A $1 million portfolio consisting of 20 positions was tracked over the course of seven months. While the effects of Brexit are yet to be seen, the portfolio shows a strategy that could be used to financially benefit from a country going through significant political and economic changes that are predicted to benefit their economy.

MAXIMIZING RETURNS WHEN INVESTING IN THE DEFENSE SECTOR
Cade Kozlowski, Ian Trost, Jack Vaglia
Poster: 108
Mentor(s): Kirt Butler (Finance), Antoinette Tessmer (Finance)

Following the election of a conservative President of the United States whose initiatives include growing the size of the United States Armed Forces, we each selected to research investments in companies that are in the defense sector. To develop our portfolio, we compiled a list of securities by researching the number of contracts these firms received in the past to project future contract performance as well as analyze their industry notoriety from relevant literature. By investing three separate $1 million-dollar portfolios in defense sector stocks, we invested in 15 to 20 different securities to maintain risk diversification. As the market fluctuated over the past months, our portfolios performed well and have reported positive returns, due to the continuous awarding of new contracts to companies in our portfolio. We

hypothesize that if the United States sees a change in political leadership to a more conservative president, then the defense sector of the stock market will rise in value due to the increases in military growth that create the growth of contracts for the defense industry. In conclusion, previous government contracts can be used to predict firm growth of defense contractor companies, which will see a strong rise in value and outperform general market performance due to the political climate.

AN EXAMINATION OF THE IMPACT OF SCHEDULING LOGIC ON SYSTEM PERFORMANCE IN A FLEXIBLE MANUFACTURING CELL ENVIRONMENT
Luke Pasini
Poster: 109
Mentor(s): Anand Nair (Supply Chain Management)

Firms have recently been adapting to new competitive priorities of satisfying different market segments with customizability. Traditionally, job shops have been used in the manufacturing process to make small quantities of customizable products. However, job shops cannot address high volume requirements necessitating the need for Flexible Manufacturing Cells (FMC). Flexible Manufacturing Cells provide the capability to efficiently produce custom parts, exploit speed of delivery, produce different parts without major retooling, and change production scheduling at a moments notice. This study will examine what processes can be changed to optimize Flexible Manufacturing Cells, by means of changing operational and scheduling logic. By finding the appropriate changes to the logic, the firm can ultimately increase the Flexible Manufacturing Cell's operational capacity, while keeping idle time at a minimum. The study will find scheduling logic that will increase Autonomous Guided-Vehicle (AGV) utilization rate, reduce Work-in-Process (WIP) inventory, increase the Machine Center utilization rate, and decrease lead-time for process queues. To undertake the research, this study will conduct experiments using a discrete event simulation software and analyze the resulting data.

MID-MICHIGAN'S PARTICLE ACCELERATOR CLUSTER (MMPAC): A SUPPLY CHAIN ANALYSIS AND ECONOMIC DEVELOPMENT STRATEGY OF AN EMERGING PARTICLE ACCELERATOR INDUSTRY CLUSTER IN MID-MICHIGAN
Joshua Pichardo, Josh Weidenaar
Poster: 110
Mentor(s): Jennifer Bruen (Center for Community and Economic Development), Nicholas Joblonski (Center for Community and Economic Development), John Melcher (Center for Community and Economic Development)

Michigan State being the location of the nation's premier particle accelerator, the Facility for Rare Isotope Beams (FRIB), offers a unique opportunity for high science cluster development. The wealth of knowledge coming from our elite particle physics graduate program & this facility develops a knowledge economy priming the mid-Michigan region for business ventures stemming from adaptive application of the research the new facility will produce. Our research will produce economic development initiatives and program recommendations that will most effectively foster the development of a particle accelerator industry cluster in mid-Michigan. Four areas of focus with respect to the mid-Michigan region will help actualize these recommendations. 1) Knowledge Economy and Talent Retention 2) National Innovative Practices 3) Supply Chain Analysis 4) Regional Assessment. Our research will further the literature on best practice in economic development, and uncover how to most effectively benefit from agglomeration economies in a way that is most socially equitable, developing business capacity to the current members of our regional economy. Our research team will provide a poster on our current research and recommendations to date on how we should foster the development of this burgeoning particle accelerator industry cluster.

THE IMPACT OF LOGISTICS IN CHINA IN THE RETAIL INDUSTRY
Frank Wang
Poster: 111
Mentor(s): Simone Peinkofer (Supply Chain Management)

China has become a fertile ground for logistics and fulfillment innovations due to the booming development of e-commerce. Over 50% of China's entire population lives in cities and is expected to further increase. It is estimated that about 80% of adults in China's biggest cities already shop online, and online sales are predicted to continue to rise within the next years. Thus, retailers are challenged to develop new logistics and fulfillment options to reach consumers. This research explores the overall logistics and fulfillment operations of Chinese retailers. The findings will help scholars to understanding the rapid logistics development in the Chinese retail industry.

BUSINESS
POSTER PRESENTATIONS, SECTION 2
LAKE HURON ROOM, 3:00 – 4:30 PM

THE PREDICTIVE POWER OF P/E RATIOS, DIVIDEND YIELD RATE, AND PRICE/52 WEEK LOW
Nathan Dutch
Poster: 114
Mentor(s): Kirt Butler (Finance), Antoinette Tessmer (Finance)

This research project examines the predictive power of three commonly used securities metrics: price/earnings ratio, dividend yield rate, and price over the 52 week low. These metrics are often used to predict future performance of shares on the stock market. We conducted this examination through the use of a portfolio simulation website called Stocktrak in which I created a portfolio consisting of three stocks from each of the major U.S. industries. We used one metric per industry to determine two stocks to hold a long position on and one stock to short. We then analyzed the portfolio's performance, comparing realized vs. expected performance based on these metrics. The analysis revealed that in our portfolio, the metrics had very little predictive power and were loosely correlated with performance. Although the scale of the project is small, the results should be somewhat consistent with trends in predictive metrics on a market-wide scale. Thus, we are able to conclude that these metrics may be weak predictors of future stock performance.

LONGITUDINAL SAFETY IMPROVEMENT IN THE MOTOR CARRIER INDUSTRY
Regin Horan
Poster: 115
Mentor(s): Jason Miller (Supply Chain Management)

Industrial buyers have a vested interest in understanding how suppliers of goods and services improve different facets of their sustainability over time. This research furthers understanding regarding factors that affect the rate at which firms improve their compliance with safety rules--an important facet of social sustainability--over a multi-year horizon using regulatory compliance data from the motor carrier industry, melded together from several archival sources. We find evidence that prior violation rates positively affect the rate of safety improvement at an increasing rate, with this effect being more pronounced in larger firms. We further find that firms prior change in their safety compliance during the previous year affects their subsequent improvement in safety compliance. In particular, we find evidence that firms improve their safety compliance at a more rapid rate when they exhibited either larger declines or larger improvements in the prior year. These findings further our knowledge regarding the dynamics of safety improvements.

SUPPLY CHAIN TRENDS
Theo Tanase
Poster: 117
Mentor(s): Yemisi Bolumole (Supply Chain Management)

Supply chain management is an industry that constantly relies on innovation and constantly evolving technology. As the industry has been steadily growing, so have different trends that work to make the supply chain more efficient and that reinforce the strategies implemented by executives. Technologies such as autonomous vehicles, robotics, drones, and wearable technology are all trends that seem to be gaining momentum in the supply chain industry, while other forms of technology such as 3-D printing and cloud computing are trends that appear to be cooling down as time progresses. It is the intention of this project to demonstrate and explore how different technologies are built to last over time and how others are not able to keep up with the progress that is constantly being made. To this end, a survey will be conducted with professionals in the supply chain industry in regard to what technologies they think are here to stay in the long run in order to harness the ideas of people that are directly affected by these ever-changing technologies.

THE COMPARISON OF INTERNET COMPANIES BETWEEN CHINA AND AMERICA
Jinwen Tu, Hao Wang
Poster: 118
Mentor(s): Butler Kirt (Finance), Antoinette Tessmer (Finance)

The purpose of our research is to study about American versus Chinese stock investment in the internet industry. We wanted to see which country did better in developing internet and Internet-related technology. Which country performed better in the stock market? We used Stocktrak, to track Chinese and American large internet companies' stock prices. Our analysis is based on our portfolio daily changes, S&P 500 Index daily changes from Yahoo Finance,

portfolio investment proportions, and return on each investment. Based on the data we collected, we are able to draw some valuable conclusions that worth to share. First, 2017 was an excellent year for stock investors. Second, Internet companies' stock prices were very volatile, and investment in Internet companies tend to be very risky. Finally, we observed these Chinese Internet companies performed slightly better than these American companies

SHARING EXPERIENCES: A PROPOSED RELATIONSHIP BETWEEN WORD OF MOUTH AND MATERIAL VS. EXPERIENTIAL PURCHASES
Conor Van Dusen
Poster: 119
Mentor(s): Ayalla Ruvio (Marketing)

Of the forces that drive consumer behavior, word of mouth is among the most powerful and least understood. Considered to be the most trusted of all marketing communication forms, word of mouth is the primary driver behind nearly 50% of all purchasing decisions and generates twice the sales of paid advertising. The extent to which word of mouth drives consumer decisions makes understanding this phenomenon a priority for marketing researchers and practitioners alike. Recent research has sought to broadly understand the psychological drivers of consumer word of mouth, but has so far failed to examine word of mouth relative to the tangibility of a purchase. The distinction between material and experiential purchases has demonstrated implications for consumer satisfaction and well-being for reasons that suggest a potential relationship between tangibility of a purchase and subsequent word of mouth. My research seeks to contribute to our understanding of word of mouth by examining relevant existing literature on consumer behavior and psychology to form novel theoretical propositions regarding the relationship between word of mouth and the tangibility of a purchase. Specifically, I posit that 1) consumers are more likely to spread positive word of mouth for their experiential purchases relative to material purchases, and that 2) the proportion of negative word of mouth is similar for experiential and material purchases in the short run, but is relatively smaller for experiential purchases in the long run. This proposed relationship between word of mouth and experiential consumption has broad implications for marketing practices.

CELL BIOLOGY, GENETICS, & GENOMICS

ORAL PRESENTATIONS, SECTION 1
ROOM 40, 11:00 AM – 1:00 PM

THE PITFALLS OF THE MODERN GWAS IN TODAY'S POPULATION
Lindsay Guare
Time: 11:00 AM
Mentor(s): Gideon Bradburd (Integrative Biology)

Understanding the relationship between a person's DNA and their health is perhaps one of the most important pursuits of contemporary biology. That pursuit primarily consists of connecting specific genotypes to their corresponding phenotypes in genome-wide association studies (GWAS). When the genetic basis of a trait differs across different populations, the power of a GWAS can be compromised, as the association between genotype and phenotype is specific to each population, rather than shared globally. Human skin pigmentation, for example, is a complex trait affected by several variants that arose through parallel evolution, so while performing a GWAS for individual populations would give clear results, modern admixed populations could present complications when trying to make associations. In this presentation, I describe my use of simulation approaches to demonstrate the way in which current GWAS approaches can fail when analyzing independently-arisen traits with multiple genetic bases. Additionally, I discuss possible statistical approaches that could be implemented to address this shortcoming.

IDENTIFICATION OF NOVEL ANTIBIOTIC COMPOUNDS FROM NEW ZEALAND SOIL COMMUNITIES USING A METAGENOMIC APPROACH
Amarpal Dosanjh
Time: 11:15 AM
Mentor(s): Jeanette McGuire (Integrative Biology)

Antibiotic resistance is a growing global crisis stemming from antibiotic overuse and misuse, and resulting in a resurgence of previously treatable infections. Prior methods of antibiotic discovery relied on culturing bacteria from soil; however, cultivation-based approaches have restricted our analyses to less than 1% of the earth's microbial diversity, because most microbes cannot be cultured under laboratory conditions. Metagenomic analysis allows researchers to

investigate for novel antibiotic compounds without having to culture microbes in the lab, which opens up substantial opportunities for new drugs to be discovered. New Zealand is known for its biodiversity, unique evolutionary history, and striking variation in habitats over a small geographical scale, and therefore likely harbors unique microbial communities. In this study, I used a metagenomic approach to evaluate soil from the North Island of New Zealand for antibiotic compounds. Working closely with researchers at Victoria University in Wellington, I used two sets of degenerate primers to amplify either adenylation domains or ketosynthase alpha domains. Transcribing adenylation and ketosynthase alpha domains produces non-ribosomal protein synthetase and polyketide synthase, respectively, both of which are enzymes commonly involved in microbial antibiotic production. Four successfully amplified regions were cloned and sequenced. Using a cDNA library at Victoria University, I determined if the sequences produced novel or known antibiotic compounds. Implications for the potential of antibiotic compounds and the ecological conditions of the soil from which they came from will be discussed.

ESTABLISHING A THREE-DIMENSIONAL UTERINE ORGANOID CULTURE
Lauren Jernstadt
Time: 11:30 AM
Mentor(s): Ripla Arora (Obstetrics, Gynecology, and Reproductive Biology)

With current developments in three-dimensional culture techniques, organoids are a prominent way to study physiological changes to organs in an in vitro environment. Organoids are spheroid-shaped clusters of cells that are produced by disassociating cells from a source organ, aggregating the cells and culturing them in an environment that allows for three-dimensional growth. Viable, well-produced organoids should mimic the source organ in vivo. Our organoids were made using uterine horns (cervix, oviducts, and ovaries removed) from wild-type mice, cut open to expose the epithelial wall of the uterus. Two different kinds of culture medium were used: a) DMEM-F12 with defined growth factors and b) DMEM-F12 with 10% fetal bovine serum and 1% penicillin streptomycin. Three different variations of matrix were used: 48 well-plate culture with Matrigel, hanging drop culture with Matrigel, or hanging drop culture without Matrigel. When tested, viable mouse uterine organoids that contain significant epithelial growth should stain for documented epithelial markers (eg E-cadherin) and gland marker (FoxA2). Once an organoid culture system is established it will be useful for testing the effects of hormones on organoid growth and cell structure differences. Specifically, we hypothesize that hormone treatment using E2 and P4 will alter epithelial cell polarity markers (eg Occludin). Successfully establishing a method for producing mouse uterine organoids has great implications for studying uterine receptivity in an in vitro setting bypassing the challenges of an in vivo system.

THE EFFECT OF ESTROGEN ON RETINAL MüLLER CELL VIABILITY UNDER HYPERGLYCEMIC CONDITIONS
Hailey Sheldon
Time: 11:45 AM
Mentor(s): Susanne Mohr (Physiology)

Diabetic retinopathy is a major complication of diabetes. It is characterized by blurred vision and dark spots in the vision field due to uncontrolled growth of retinal blood vessels. Those blood vessels are leaky leading to fluid accumulation within the retina causing the vision symptoms. Under diabetic conditions, retinal Müller cells that surround and protect the retinal vasculature initiate chronic retinal inflammation leading to Müller cell death and subsequent degeneration of the retinal vasculature. Recent reports suggest that estrogen can suppress inflammation although this has never been tested in the context of chronic inflammation and retinal diseases. Therefore, this study was focused on identifying whether Müller cells are capable of producing estrogen and whether estrogen is protective under high glucose conditions. Retinal Müller cells (rMC-1) were cultured in 5mM and 25mM glucose. Expression of aromatase, the enzyme responsible for producing estrogen, was determined using Western Blot technique. Viability following estrogen treatment was assessed using trypan blue exclusion assay. In both, normal (5 mM) and hyperglycemic (25 mM) glucose conditions, aromatase was equally expressed. Treatment with estrogen significantly reduced high glucose-induced cell death, from 63.06±7.07% in hyperglycemic conditions to 40.5±2.12% when treated with 10nM β-Estradiol and to 32.5±5.07 when treated with 100nM β-Estradiol. These results indicate that Müller cells are capable of producing estrogen. Estrogen itself seems to be protective against hyperglycemic insult. This new data will encourage (1) looking deeper into relationship of sex and diabetic retinopathy and (2) identifying new anti-inflammatory pathways mediated by estrogen in the diabetic retina.

GLYCOLYSIS AND ITS EFFECTS ON RETINAL MÜLLER CELL VIABILITY UNDER HYPERGLYCEMIC CONDITIONS

Brett Trombley
Time: 12:00 PM
Mentor(s): Susanne Mohr (Physiology)

Diabetic Retinopathy is a complication of diabetes in which excessive glucose causes retinal blood vessels to leak and hemorrhage leading to blindness. Although the cause of these events is unknown, recent research by us suggests that hyperglycemic conditions promote the death of Müller glial cells. Müller cells are in close contact with the retinal blood vessels and are essential for proper function of the retinal vasculature. Therefore, the topic of this study was to understand whether glycolytic flux and complete glycolysis are crucial for execution of cell death in Müller cells. A rat Müller cells (rMC-1) cell line was treated with either 5mM glucose, 25mM glucose, 5mM glucose + 20mM 3-O-methyl-D-glucose, or 5mM glucose + 20 mM galactose for 72 hours. Cell death was assessed by trypan blue exclusion assay. rMC-1 treated with high (25mM) glucose showed significantly higher cell death (61.67±2.08%) compared to cells treated with normal (5mM) glucose (25.43±2.27%). 3-O-methyl-D-glucose, a non-hydrolysable form of glucose that can enter the cell but cannot be metabolized, did not cause any cell death. In contrast, high galactose, another hexose sugar that enters glycolysis more downstream in the glycolytic pathway, caused significant cell death (35.96±2.89%) of Müller cells. Our data suggest that in diabetic retinopathy excessive blood glucose is taken up by retinal cells and that metabolism of glucose via the glycolytic pathway is crucial for cell death execution in Müller cells. Understanding mechanisms underlying Müller cells death will help identify new therapies for the treatment of diabetic retinopathy.

MOLECULAR METABARCODING QUANTIFICATION OF ARTHROPOD BIODIVERSITY IN MICHIGAN INLAND LAKES

Ellen Weise
Time: 12:15 PM
Mentor(s): Nick Sard (Fisheries & Wildlife), Kim Scribner (Fisheries & Wildlife)

Quantifying alpha and beta diversity in aquatic communities across space and time aids conservation efforts to protect habitat of imperiled species or identify and control invasive species. Traditional aquatic sampling techniques like netting and grid surveys can be effective for plant and fish species; however, they are less effective for invertebrate species. Environmental DNA (eDNA) metabarcoding assays are emerging as a sampling method to measure biodiversity, and is a relatively well-established method for plant and fish species; there is no metabarcoding assay available to measure diversity within Arthropoda. We developed and implemented a polymerase chain reaction (PCR) assay to identify arthropod species and quantify relative biomass in two Michigan lakes during two time periods. We developed a 16S ribosomal DNA sequence taxonomic database for 57 arthropod species from the National Center for Biotechnology Information and Sanger sequencing voucher specimens. We developed primers to amplify 190-210 base pair (bp) PCR products across species. In 2017 we collected 224 1L water samples in Lake George and Mullett Lake in June and August. eDNAs were extracted from filtered water samples, which were used to generate 16S arthropod PCR amplicons. Amplicon libraries were sequenced on an Illumina MiSeq. The metabarcoding library generated 5,360,822 paired-end 150 bp reads, which were processed using Mothur. Community matrices for Lake George and Mullett Lake will be used to identify native and invasive Arthropod species present, as well as test if measures of alpha and beta diversity differed between time periods and among locations within each lake.

THE ROLE OF EXTRACELLULAR VESICLES IN HYPERGLYCEMIA

Marilyn Zahrt
Time: 12:30 PM
Mentor(s): Philip Strong (Lyman Briggs)

Scientists have found increasing evidence that the number of extracellular vesicles, or carriers involved in cell-to-cell communication, is elevated in Type II Diabetes Mellitus and is further increased by Atherosclerosis and Cardiovascular Disease (CVD). The aim of the present experiment was to determine if extracellular vesicles (EV) influence vascular inflammation in human umbilical vein endothelial cells (HUVEC) under hyperglycaemic conditions. It was hypothesized that extracellular vesicles from hyperglycaemic cells would modulate inflammation and lead to more EV release in endothelial cells due to their ability to alter pathological settings. A ROS assay, scratch assay, and flow cytometry analysis were used as tests. All three assays that were conducted in an average human glucose condition yielded insignificant results ($p>0.05$) indicating that the expected increase did not occur. However, when the cells had been pre-treated with high levels of glucose (18mM), there was a significant increase in ROS production at 24 hours ($p=0.0021$). The treatments containing exosomes extracted from individual HUVEC isolates and the treatment containing supernatant that was removed from exosomes treated with 6mM of glucose had significantly lower ROS production than the rest suggesting that under hyperglycaemic conditions, exosomes act as a protective layer over the endothelial cells. Overall, the results of this study showed possible evidence that exosomes play a role in the inflammatory

responses in metabolic diseases. Further studies should be conducted to better understand if different types of EV oppose or work synergistically with one another.

EFFECTS OF COMBINATION ENDOCRINE TREATMENTS ON BREAST CANCER CELLS
Richard Kim, Ramya Erasala
Time: 12:45 PM
Mentor(s): Susan Conrad (Microbiology & Molecular Genetics)

Many different proteins regulate the balance between cell proliferation, cell metastasis, and cell death. One example is a family of proteins known as Mixed Lineage Kinases (MLKs), which function in intracellular signaling pathways. Previous studies demonstrated that inhibition of MLK activity using the MLK-inhibitor CEP-1347 led to a cell cycle arrest in early mitosis and reduced cell viability in estrogen receptor (ER)-positive breast cancer cells, while not effecting non-tumorigenic cells. This suggested that CEP-1347 has potential as a therapeutic drug to prevent tumor growth. ER-positive breast cancer is currently treated with drugs that target ER, including antiestrogens and aromatase inhibitors, and these drugs block the cell cycle in G1. In the current research, we used the FDA approved antiestrogen ICI 182,780 (clinically known as fulvestrant) and CEP-1347 to test the hypothesis that combination treatments would be more effective than either agent alone to decrease cell proliferation and/or viability. A live/dead experiment was conducted to show the effects of single and combination treatments on cell viability using trypan blue exclusion and colony formation assays. The result of this experiment will provide evidence for or against our hypothesis that a combination of fulvestrant plus CEP-1347 could reveal another method of combating (ER)-positive breast cancer.

CELL BIOLOGY, GENETICS, & GENOMICS
POSTER PRESENTATIONS, SECTION 1
LAKE HURON ROOM, 9:00 – 10:30 AM

DIMENSIONS OF FUNGAL DIVERSITY: NON-ESSENTIAL ENDOBACTERIAL SYMBIONTS IMPART A FITNESS COST TO THEIR HOST
Abigail Bryson
Poster: 122
Mentor(s): Gregory Bonito (Plant, Soil, & Microbial Sciences)

Mortierellomycotina are a lineage of early-diverging fungi that belong to the phylum Mucoromycota. These fungi have a global distribution and dwell in plant rhizosphere and soils. Mortierellomycotina fungi display several morphological and ecological traits, and can host endosymbiotic bacteria within their mycelium. A Burkholderia-related endobacterium (BRE) called Mycoavidus cysteinexigens was identified within the hyphae of Mortierella elongata, whose presence strongly impacts the metabolism and reduces the growth rate of the fungus. This study aims to understand whether other species of Mortierellomycotina fungi can host BRE and, if so, to determine their diversity, distribution and impact on the fungal host. We carried out a screening of approximately 420 Mortierellomycotina strains for endobacteria and employed a combination of microscopy, molecular phylogeny, next-generation sequencing and qPCR. We detected BRE in 26 strains. These symbiotic endobacteria represent novel bacterial lineages phylogenetically related to M. cysteinexigens. The presence of BRE across the major clades in this subphylum indicated they may have been acquired in the common ancestor of these fungi. We cleared endobacteria from the fungus with antibiotics and observed improved biomass production in isogenic fungal lines lacking BRE, demonstrating that, as M. cysteinexigens, these novel BRE impose some fitness costs to their fungal host. We conclude that Mortierellomycotina represent attractive organisms for exploring the ecology and evolution of fungal and bacterial interactions.

IDENTIFYING THE ACTINOBACILLUS SUCCINOGENES GLUCOKINASE GENE
Meghan Grossmann
Poster: 123
Mentor(s): Claire Vieille (Microbiology & Molecular Genetics)

Actinobacillus succinogenes is a fermentative bacterium isolated from the cow rumen, and is the best known natural succinate producer. If produced cost-competitively, succinate could replace oil as the feedstock to produce many industrial products. Today the succinate production is not cost effective but with genetic engineering the consumption of one glucose molecule could yield two moles of succinate. How A. succinogenes uptakes glucose to produce succinate is unknown, as this organism does not have a glucose phosphotransferase system. Our working hypothesis is that A. succinogenes uses an ABC transporter (ATP-dependent system) followed by glucose phosphorylation by glucokinase to glucose-6-phosphate, which then enters glycolysis. No gene annotated as aglucokinase gene is present in the genome

sequence, and no sugar kinase genes are upregulated in the transcriptome of glucose-grown cultures. Thus, the goal of my project was to identify what could be a completely new glucokinase gene in Actinobacillus. My approach was to build an Actinobacillus genomic plasmid library of partially digested Sau3A fragments, and use it to complement an Escherichia coli strain devoid of glucokinase for growth on minimum medium-glucose plates. The only colonies growing on these plates will have a plasmid carrying an Actinobacillus glucokinase-encoding gene. By sequencing the plasmid inserts of these colonies, we hope to identify the A. succinogenes glucokinase gene. In the future, we could overexpress this gene to increase glucose uptake and succinate production. This would result in a cheaper succinate production, and succinate replacing oil in the production of goods.

A NEW DNA FINGERPRINTING TOOL FOR HONEY BEES: 12 MULTIPLEXED TETRASTR MARKERS

Brenna Kizer
Poster: 124
Mentor(s): Patrick Venta (Microbiology & Molecular Genetics)

Conservation efforts for the European honey bee, Apis mellifera, have become increasingly important with the rise of colony collapse disorder. Genomics studies have the potential to elucidate the role of genetics in honey bee behavior and disease resistance, among other traits. Previous studies have documented the use of dinucleotide simple tandem repeat markers (STRs) for DNA fingerprinting of honey bees, but tetranucleotide STRs (tetraSTRs), which have greater potential for studies of mixed DNA samples, have not yet been explored. Our objective was to design a set of 12 independently assorting genetic markers based on tetraSTRs which could be combined in a PCR multiplex for identification of individual honey bees. 12 tetraSTR markers were designed and amplified in genomic DNA extracted from honey bee workers. Products were analyzed for variability using a combination of gel electrophoresis and high-resolution genotyping. Currently, three multiplexes of four markers each have been developed with a mean allelic richness of 4 (range 2-5), a mean observed heterozygosity of 0.50 (range 0.08-0.88), and a mean stutter ratio of 0.065 (range 0.06-0.10). A full 12-marker multiplex will be assembled from these smaller sets to maximize fingerprinting efficiency. These results have implications for simple, cost-effective fingerprinting of honey bee individuals, which will be useful in understanding the role of genetics in the well-being of bee populations.

TIMING OF EMBRYONIC LANDMARKS VERSUS GESTATIONAL LENGTH: A NEW ALLOMETRIC RELATIONSHIP?

Samantha McCoy
Poster: 125
Mentor(s): Brian Schutte (Microbiology & Molecular Genetics)

Allometry is the study of scaling relationships of living creatures, for example the relationship between brain size and body size. While developing a new dog model for palate fusion, we noticed that the timing of this embryonic event was related logarithmically to gestational length in mouse, dog and human. Data from 13 other species confirmed this relationship. To test the generalizability of our hypothesis, we compared the timing of other embryonic landmarks (e.g. digit separation, hand plate formation, and eyelid fusion) to gestational length. Since allometric relationships are often logarithmic, we also plotted the log-values of each variable and determined R2 values for each curve. We observed positive correlations in both linear and logarithmic plots, the latter being the stronger correlation, as seen with classic allometric relationships. Since this correlation is consistent across species, we hypothesize that evolutionarily conserved embryologic events, such as those listed above, are related to gestational length. We call this relationship “heterochronic allometry.” The simplest interpretation for the observed relationship is that all species that fall on the line share a common developmental pathway for embryonic events that originated in the lowest common ancestor.

AN IN VIVO MURINE MODEL OF MLK3 DEFICIENT METASTATIC BREAST CANCER

Hayden Stoub
Poster: 126
Mentor(s): Kathleen Gallo (Physiology)

Breast cancer leads the nation in newly diagnosed cases annually and is second only to lung/bronchus cancer in rates of cancer deaths. The cause of death in these cases is not due to the primary tumor, but rather metastatic growths in vital areas such as the lungs, liver, and brain. Mixed-lineage kinase-3 (MLK3) is a serine/threonine protein kinase kinase kinase with diverse involvement in the MAPK pathways and has been shown to influence malignancy and migration behavior in mammary carcinomas. In this study we aim to elucidate phenotype differences that may arise from MLK3 knockdown in respect to carcinomas that have already gained metastatic status.

THE EFFECT OF SUNSCREEN COMPONENT BENZOPHENONE-3 ON IMMUNE CELLS RECRUITMENT TO MAMMARY TUMORS IN MICE

Bing Qing Wang
Poster: 127
Mentor(s): Richard Schwartz (Microbiology & Molecular Genetics)

Multiple environmental chemicals may influences the immune response to tumor development. Benzophenone-3 (BP-3), commonly found in sunscreen, acts as a UV-protective agent and antioxidant. There is evidence that BP-3 is a possible endocrine disrupter. In order to understand how BP-3 influences anti-cancer immunity, we studied recruitment of various immune cells to mammary tumors in mice. We transplanted Tryp-53-knockout mammary epithelial tissue into inguinal mammary glands of wild type BALB/c mice that were surgically cleared of their endogenous mammary epithelium. Mice were then fed diets with or without BP-3 and monitored for mammary tumor development. Once tumors developed to a standard 1 cm size, they were surgically excised, fixed in formalin, embedded in paraffin, stained with hematoxylin and eosin, and classified as epithelial or spindle cell tumors. Representative samples of epithelial and spindle cells tumors were stained with antibodies directed against CD4, CD8, and FoxP3 to identify the major types of T-cells. These T-cells will be quantified by fluorescent photo microscopy. Other studies in the laboratory that identified a BP-3 induced increase in tumor promoting M2 macrophages, which can increase immunosuppressive regulatory T-cells, lead us to hypothesize that BP-3 will cause recruitment of Foxp3+ regulatory T-cells that can prevent the immune system from attacking the tumor. These findings would raise concerns that BP-3 may contribute to the breast cancer development in women with high sunscreen exposure.

CELL BIOLOGY, GENETICS, & GENOMICS
POSTER PRESENTATIONS, SECTION 2
LAKE HURON ROOM, 11:00 AM – 12:30 PM

THE EFFICIENCY OF SUSPENDING LYMPHOCYTES IN METAPHASE STIMULATED BY PHYTOHAEMAGGLUTININ (PHA) TO PRODUCE HUMAN KARYOTYPES

Haley Beaudoin, Dania Khatib, Lara Khatib, Sammy Soter
Poster: 131
Mentor(s): Jeanette McGuire (Integrative Biology)

Karyotyping is a procedure used both prenatally and postnatally to diagnose genetic disorders by examining allelic variations and incorrect chromosome numbers. Genetic disorders are abnormalities in the human genome resulting in deviation from normal health. Geneticists can identify many health complications using karyotypes (e.g., Down syndrome, duplications and deletions, or various types of cancer). After patient blood samples are collected, cultures are induced and lymphocytes are suspended in mitosis allowing karyotypes to be read. There are various mitogens used in the lab to induce mitosis in these blood cultures. The goal of this research is to specifically evaluate the efficiency of phytohaemagglutinin (PHA) - a protein that binds to lymphocyte membranes and stimulates cell division- and variation in samples among individuals. Blood samples were collected, cultured, and then stimulated by PHA to undergo mitosis. After 72 hours, lymphocytes were treated with colchicine and potassium chloride in order to be suspended in their current state. Mitotic states were evaluated after suspended chromosomes were fixed to slides and Giesma stained. In this presentation, we will evaluate the efficiency of the mitogen PHA by assessing ratios of lymphocytes suspended in metaphase versus those which were arrested in interphase. As a pressing issue in the medical field, detection of genetic disorders requires consistent research to improve efficiency of diagnosis. Therefore, by considering the effectiveness of methods used for karyotyping, additional research could be completed to establish more successful techniques.

RARE DAMAGING MISSENSE MUTATIONS IN IRF6 FOUND IN SEQUENCE CONTROL POPULATIONS

Kyleigh Buckley
Poster: 132
Mentor(s): Brian Schutte (Microbiology & Molecular Genetics)

One of the most common birth defects is cleft lip and palate. DNA variants in the IRF6 gene account for 12% of clefts worldwide. However, not all DNA variants in IRF6 lead to cleft. We hypothesize that rare IRF6 DNA variants found in cleft patients are pathogenic for disease and will not be found in sequence control populations. To test this hypothesis, we compiled three lists of DNA variants in IRF6: from cleft, from gnomAD, a sequence database from 122,000 individuals, and from an evolutionary database. We used predictive algorithms that assessed the pathogenicity of each DNA variant and assigned a score. We found 161, 123, and 535 missense DNA variants in IRF6 from the patient, gnomAD, and evolutionary dataset, respectively. As expected, variants from the cleft list were more likely to be damaging (OR =

29.4; 95% CI = 15 to 56; $p < 0.00015$). However, contrary to our hypothesis, we found 8 in both the patient and gnomAD lists and 2 in both the patient and evolutionary lists. In gnomAD, 3 were found in 1 individual, and 5 were found in multiple samples. Overall, our data support our hypothesis, but a small but significant subset of variants was found in the sequence control lists. Further studies are needed to determine whether the 8 variants shared in the patient and gnomAD lists are non-pathogenic or low-penetrant variants, and whether the 2 variants shared in the patient and evolution population lists are functional and may contribute to speciation.

INVESTIGATION INTO POST-TRANSLATIONAL REGULATION OF CYCLOPHILIN A FUNCTION DURING MITOSIS
Hannah Lufkin
Poster: 133
Mentor(s): Margaret McGee (University College Dublin)

Cyclophilin A (CypA) is a peptidyl prolyl isomerase protein which has the ability to change the confirmation of other proteins and thereby their function or structure. CypA is found at the centrosome during interphase in a range of human tumor cells and undergoes a cell cycle dependent relocalisation from the centrosome to the midbody during mitosis. Regulation of CypA localization to and from these distinct cellular locations in tumor cells remains unknown. It was previously shown that CypA can undergo post-translational modification including phosphorylation and acetylation in vascular endothelial cells and human tumor cells. Thus, it was hypothesized that phosphorylation and/or acetylation may control the subcellular localization of CypA during the cell cycle. A range of human chronic myeloid leukemia cells, K562 and KYO-1, and Jurkat acute lymphoma cells were cultured in-vitro and whole cell protein extracts were isolated. The expression and size of CypA was determined in the tumor cells by SDS-PAGE and Western blotting. Cells were synchronized in mitosis by treatment with a low dose of the microtubule disrupting agent, Nocodazole, for 16 hours and confirmed by flow cytometry. Post-translational modification of CypA was confirmed in K562 and KYO-1 by the detection of a protein with altered mobility by SDS-PAGE. Treatment of cell extracts with calf intestinal phosphatase did not alter the protein mobility pattern suggesting that CypA did not undergo phosphorylation. However, a band at approximately 18kDa was detected when probed with an antibody to detect acetylated lysine suggesting that the mitotic cells may undergo acetylation.

HISTOLOGICAL ANALYSIS OF A DOG MODEL FOR NONSYNDROMIC CLEFT PALATE.
Miranda Ratusznik
Poster: 134
Mentor(s): Brian Schutte (Microbiology & Molecular Genetics)

Nonsyndromic cleft palate is a common human birth defect, affecting ~1/1500 live births. In the US and developed countries, the standard of care is palatoplasty. A variety of approaches are used, but their relative outcomes are unknown. The long-term goal of this work is to generate a large animal model for nonsyndromic cleft palate that can be used to analyze the outcomes of surgical repairs. Since dogs mature in 18 months, outcomes research is feasible. Toward this goal, we maintain a breeding colony in which 11 of 63 pups were born with cleft palate. We hypothesize that the cleft in this line of dogs is nonsyndromic, and no other oral abnormalities occur. We performed histological analysis of the maxillary jaws of three newborn pups with cleft palate and three littermates without a cleft. Coronal sections of the jaws were stained using hematoxylin and eosin, then manually analyzed for the presence of distinct landmarks, such as hypodontia, as it is often found in human syndromes that include orofacial clefts. To date, we sectioned the full palate of three wild type and three affected pups. We have not yet identified any structural abnormalities, apart from the cleft of the mutant pups. In addition, we repaired the cleft palate of four pups. Gross inspection and CT scans of their oral cavities appear normal. These animals are thriving and reproductively fit. Our data, to date, are consistent with the hypothesis that the cleft palate in the MSU dog colony is nonsyndromic.

ACTIVATION OF LIVER X RECEPTOR REVERSES DECREASE IN CHOLESTEROL EFFLUX IN DIABETIC RETINAL ENDOTHELIAL CELLS
Mercedes Serratos
Poster: 135
Mentor(s): Julia Busik (Physiology), Elahe Crockett (Human Medicine), Sandra Hammer (Physiology)

Data from recent clinical trials suggest that dysregulation of cholesterol metabolism significantly contributes to the pathogenesis of diabetic retinopathy (DR), the number one cause of blindness among working age individuals worldwide. Liver X receptors (LXRα/LXRβ) are the central regulators of cholesterol elimination by activation of the reverse cholesterol transport (RCT) pathway. Specifically, LXRs have been shown to promote cholesterol efflux by activation of ATP-binding cassette transporters, ABCA1 and ABCG1. This study examines the role of LXR activation in control and diabetic human retinal endothelial cells (HREC). HREC were isolated from diabetic and non-diabetic donors. HREC were treated with tumor necrosis factor (TNFα) (10ng/ml), and/or LXR agonist dimethyl-3β-hydroxy-cholenamide

(DMHCA) (1uM) for 24hrs. RNA was analyzed by qRT-PCR for LXRα, ABCA1 and ABCG1. Cyclophilin A was used as a loading control. One-way ANOVA was used for statistical analysis. LXRα was significantly downregulated in diabetic HREC compared to non-diabetic controls (n=3 donors per group, p<0.0057). Treatment of HREC with DMHCA significantly increased LXR signaling targets, ABCA1 and ABCG1. This increase was seen in the presence of pro-inflammatory cytokine TNFα stimulation (TNFα vs. TNFα+DMHCA, ABCA1: n=3, p=0.0031; ABCG1: n=3, p=0.0026) as well as in the presence of diabetes (diabetes vs. diabetes+DMHCA, ABCA1: n=3 p<0.0001; ABCG1: n=3, p<0.0001). TNFα significantly decreased ABCA1 total protein. LXR activation prevented TNFα-induced ABCA1 protein downregulation. LXR agonists such as DMHCA effectively increase RCT genes in control, diabetic and cytokine-treated HREC. These data suggest that LXR agonists can be used as a strategy to normalize cholesterol metabolism in diabetic retina.

CELL BIOLOGY, GENETICS, & GENOMICS
POSTER PRESENTATIONS, SECTION 3
LAKE HURON ROOM, 1:00 – 2:30 PM

THE ROLE OF SWIMMING MOTILITY IN THE EVOLUTION OF A VIBRIO CHOLERAE PANDEMIC

Amber Bedore

Poster: 138

Mentor(s): Chris Waters (Microbiology & Molecular Genetics)

Vibrio cholerae is responsible for 7 pandemics of cholera since the 1800s. The first 6 were caused by the classical biotype, and in 1961, the seventh initiated by a new biotype called El Tor. Adaptive changes leading to emergence of El Tor is unclear. We've observed that El Tor exhibits reduced swimming motility compared with classical. The mechanisms responsible are uncertain. This study aims to identify the genes responsible for the reduced motility phenotype and determine if this change imparted a fitness advantage contributing to the new biotype. Genomic DNA from El Tor was inserted onto pLAFR cosmids, which were inserted into a V. cholerae classical strain. Approximately 200 classical colonies containing El Tor were screened on motility agar, 8 cosmids were found to reduce motility. The cosmids were isolated, sequenced, and aligned against the chromosomes of V. cholerae. Genes involved in chemotaxis and cyclic di-GMP synthesis, a signaling molecule that represses motility, were identified. To show the identified cosmids containing El Tor DNA are responsible for reduced motility, the cosmids will be reinserted into the classical biotype and rescreened. To identify what specific genes are responsible, the cosmids will undergo in vitro transposon mutagenesis. Mutants that lose the inhibition of motility will be identified and characterized. Additionally, cyclic di-GMP will be extracted and measured by mass spectrometry to test if this signal is contributed to reduced motility in the classical strain. The net result of these studies will increase understanding of the emergence of a global pathogen.

DETERMINING PHYLOGENY WITH RIBOSOMAL DNA

Gino Caruso, Olga Panagos, Zach Raad

Poster: 139

Mentor(s): James Smith (Lyman Briggs)

Rhagoletis pomonella, also known as the apple maggot fruit fly, has been a pest to North American apple orchard agriculture. Being able to distinguish this species from its relatives R. cornivora, R. zephyria, and R. mendax, which are not considered pests in apple orchards, is important for effective crop management. If any of these three relatives of R. pomonella were found in an apple orchard region, there would be no effect on the apple produce, and it could be distributed into markets. However, if R. pomonella were found in the same region, the entire apple orchard would have to be quarantined, and as a result its produce would be unable to reach markets. The present-day method to distinguish between these species is by examining their morphology under a microscope. The focus of our research is to look towards alternative identification methods, based on DNA sequences. Because analyzing mitochondrial DNA gives inconsistencies in differentiating between these species, our research focuses on determining phylogeny from ribosomal DNA sequences, which were generated using next generation sequencing techniques (NGS). The data gathered from Illumina sequencing were analyzed using numerous programs on MSU's HPCC for quality control purposes. The data were then analyzed using the computer program, Velvet, to compile contig files containing ribosomal RNA gene sequences, which were compared to determine phylogeny. This allows us to isolate R. pomonella from the other three species and gives insight on the evolutionary history of the Rhagoletis species and where each species diverged.

VALIDATION OF FGF-INDEPENDENT CELL FATE MARKERS OF THE PRIMITIVE ENDODERM LINEAGE
Eli Falk
Poster: 140
Mentor(s): Tristan Frum (Biochemistry & Molecular Biology), Amy Ralston (Biochemistry & Molecular Biology)

An important area of research in developmental biology has been to uncover the mechanisms that determine cell fate during embryological development. One such cell-fate determination occurs during the blastocyst stage of early mammalian development, where the inner cell mass (ICM) differentiates into primitive endoderm (PE) and epiblast (EPI) cell lineages. Previous research into the PE and EPI cell fate decision in mouse embryos has led to the model that the FGF-signaling pathway promotes all PE genes and represses EPI genes, and therefore determines whether a cell differentiates into the PE or EPI lineage. However, researchers in the Ralston lab, using RNA sequencing, have identified a set of transcripts that are enriched in PE cells but not regulated by FGF-signaling, suggesting that there exist FGF-independent cues that drive PE cell fate. In this experiment, our goal was to examine putative FGF-independent PE enriched transcripts to validate which, if any, are truly FGF-independent. Using QPCR, we compared the levels of putative FGF-independent PE enriched transcripts between embryos in which FGF-signaling was either stimulated or inhibited. In this presentation, I will summarize our analysis that confirms some PE enriched transcripts are likely FGF-independent. This analysis provides a roadmap to focus efforts in the Ralston Lab to refine the model of this critical cell-fate determination step, which has significant implications for our understanding of embryonic development and stem cell research.

IN UTERO VS. IN VITRO: THE DIFFERENCES IN EMBRYONIC GENE TRANSCRIPTION
Hannah Gulder
Poster: 141
Mentor(s): Tristan Frum (Biochemistry & Molecular Biology), Amy Ralston (Biochemistry & Molecular Biology)

The preimplantation period of embryonic development makes in vitro fertilization technologies possible. However, the embryo culture conditions used for in vitro fertilization were developed over thirty years ago, long before it was possible to examine embryonic development at the molecular level. During the preimplantation period, embryonic cells undergo many changes in gene expression and transcription factors that are necessary for the healthy development of the embryo. We previously discovered that cultured embryos display defects in the abundance of proteins essential for embryonic development in comparison with embryos developed in utero. In order to further examine the phenotype of cultured embryos by qRT-PCR, we identified a normalization control suitable for the comparison of gene expression levels across multiple developmental stages. We show that, in comparison to RNA-seq data, this normalization control generates more accurate stage-specific patterns of gene expression than the standard normalization controls used for qRT-PCR in the field. By comparing the abundance of transcripts in embryos developing in culture and in utero, we identified several transcripts that are sensitive to culture conditions. Our results suggest culture induces defects in gene transcription, providing molecular phenotypes to further optimize embryo culture conditions.

PHYLOGENETIC ANALYSIS OF NORTH AMERICAN XYLEBORUS SPECIES
Lidia Komondy
Poster: 142
Mentor(s): Anthony Cognato (Entomology)

The Xyleborini are highly specialized and ecologically successful scolytine ambrosia beetles (1,200 species) that bore into the sapwood of dead and dying trees where they cultivate fungi as food for larvae and adults. These beetles are highly inbred; haploid brothers mate with diploid sisters. With food and fertilized eggs, the females are able to start a new family upon leaving their natal nest. Thus xyleborines are quick to colonize new habitats and have spread throughout worldwide tropical forests. Six Xyleborus species occur in temperate forests of North America but little is know of their origins. We test the monophyly of the North America Xyleborus in the context of a molecular phylogeny (COI, CAD, 28S DNA sequence) including worldwide xyleborine species. North American Xyleborus species were polyphyletic as reconstructed with parsimony and Bayesian analyses. These results suggest at least three independent colonization events derived from species with worldwide distributions. The monophyletic groups, X. planicollis+ X. viduus and X. intrusus + X. pubsecens suggests species diversification since colonization.

ROLE OF EPITHELIAL DEVELOPMENT IN CANINE MODEL OF NONSYNDROMIC CLEFT PALATE

Abdullah Mahmood, Hunter Hall

Poster: 143

Mentor(s): Brian Schutte (Microbiology & Molecular Genetics)

Cleft palate affects 1 in 2500 live births world-wide. While surgical repair addresses immediate problems, complications can arise. A goal of our lab is to generate a dog model for cleft palate to test different surgical approaches. The dog was used as animal model because its head is fully grown in 18 months, not 18 years. We observed a dog family in the MSU colony with a high frequency of nonsyndromic cleft palate and found that the soft tissues of the palate shelves, including epithelial layers, continue to grow postnatally to narrow the gap. Our objective is to test whether presence and function of epithelial cell layers are normal in pups with cleft palate in this colony. We performed immuno-fluorescence with primary antibodies for K17 and p63, markers for periderm and basal epithelial layer cells, respectively. We sectioned maxillary regions of newborn palates of both unaffected (N = 2) and affected (N = 2) pups and observed K17 and p63 staining in the superficial and basal epithelial layer cells. Although the cleft in the palate shelf was apparent in affected animals, there was no detectable difference in presence of the epithelial layers in affected versus unaffected newborn pups. In the future, we will measure cell proliferation and apoptosis in the three cell types in the palate shelves in newborns and dog fetuses.

CELL BIOLOGY, GENETICS, & GENOMICS
POSTER PRESENTATIONS, SECTION 4
LAKE HURON ROOM, 3:00 – 4:30 PM

IDENTIFICATION AND QUANTIFICATION OF ANTIBIOTIC RESISTANCE GENES FROM CANADIAN GEESE FECES

Gabrielle Curtis

Poster: 146

Mentor(s): Poorna Viswanathan (Microbiology & Molecular Genetics)

The aim of this study was to discern whether bacteria found in fecal samples of Canadian Geese are a threat to human health. This animal inhabits areas in or near wetlands and comes in close contact with people. A strain of Escherichia coli was isolated from the feces sample and subject to various tests to determine if it contained the antibiotic resistant genes bla-TEM or tet(w); in addition to this, the gDNA from the feces was analyzed with qPCR to determine the quantity of bacteria in feces with these antibiotic resistant genes. A significant number of bacteria were found to have at least one of the two tested genes. The presence of these genes validates concerns for public safety; however further analysis is needed to determine the threat level presented by the Canadian goose.

PHYLOGENETIC ANALYSIS OF RHAGOLETIS SPP. USING ILLUMINA SEQUENCING TECHNOLOGY AND COMPARISON OF RIBOSOMAL RNA GENES

Joe Dziedziula, Wirat Pipattanamaitree, Holly Vangordon

Poster: 147

Mentor(s): Jim Smith (Lyman Briggs)

The genus Rhagoletis contains 65 species of fruit flies, many of which exhibit strong host-plant species relationships. The apple maggot fly, R. pomonella, infests hawthorns and apple trees, but is morphologically identical to the snowberry fly, R. zephyria, which infests snowberries. This poses a problem because if a single R. pomonella maggot is found in an apple, the orchard must be quarantined to prevent the risk of spreading R. pomonella, potentially losing the entire crop for that year. Rhagoletis zephyria, however, does not pose this problem. Our research team is working to develop molecular level identification tools to differentiate between R. pomonella and R. zephyria. Mitochondrial DNA, which is useful for the diagnosis of many insects, has not provided clear species distinction. Given that, ribosomal RNA (rRNA) genes are being explored because of their higher genetic conservation. We used Illumina sequencing, a Next-Generation Sequencing technology, to produce genomic data for R. pomonella, R. zephyria, and a number of other closely related Rhagoletis species. Using FastQC and Trimmomatic for quality control and Velvet for sequence alignment, available through the MSU High Performance Computing Center, we have isolated rRNA gene sequences from these flies, and constructed and compared consensus sequences. The rRNA genes in R. pomonella and R. zephyria were used to build a phylogenetic tree, which differs from the tree obtained using mitochondrial DNA sequences. We will discuss whether, and how, the phylogenetic trees built using rRNA gene sequencing establishes a clear genetic distinction between R. pomonella and R. zephyria.

INVESTIGATING THE MECHANISMS OF G-QUADRUPLEX LIGAND INDUCED DNA REPAIR
Kelly Geith
Poster: 148
Mentor(s): Katheryn Meek (Microbiology & Molecular Genetics)

G-quadruplexes are secondary structures in DNA that cause double strand breaks (DSBs) during replication. Their increased representation in oncogene promoters suggests they have a regulatory function, and molecules that interact with these structures are being investigated as anti-cancer therapies. It is unknown how the resulting DSBs are repaired. Pyridostatin, a g-quadruplex ligand, was used here to investigate the roles of both classical and alternative non-homologous end joining in repairing these DSBs (c-NHEJ and a-NHEJ, respectively). We have suggested that c-NHEJ defective cells have an increased sensitivity to pyridostatin, implicating this pathway's importance for DSB repair in these conditions. DNA polymerase theta (PolQ) is an enzyme involved with a-NHEJ that has been previously shown to replicate through g-quadruplexes. We are investigating whether ablation of PolQ results in pyridostatin resistance. Resistance would imply that a-NHEJ is involved in the repair of these DSBs, but that c-NHEJ may be more effective.

THE EVOLUTION OF ELECTRIC ORGANS IN ASTROSCOPUS AND MALAPTERURUS DUE TO THE NEO-FUNCTIONALIZATION OF SCN4AA
Hope Healey
Poster: 149
Mentor(s): Jason Gallant (Integrative Biology)

Electric fish are a study system for neurobiology and evolution, and have evolved electric organs. Although there is no electric common ancestor of all electric fish, these organs rely on similar proteins, sodium ion channel proteins, to produce electric signals. Due to multiple rounds of whole genome duplication, teleost fish have two copies of the sodium channel gene scn4a. In two independent lineages of electric fish, gymnotiforms and mormyrids, electric organs evolved from skeletal muscle. In both families, scn4aa accumulated mutations and experienced a change in expression location from skeletal muscle to the electric organ. Unlike scn4aa, scn4ab did not acquire mutations that altered the expression position or function of the protein. The relationship between scn4ab and scn4aa expression and organ type has been well documented in gymnotiforms and mormyrids; however, it is unknown whether these genes in other lineages of teleost electric fish such as electric catfish (Malapterurus) and stargazers (Astroscopus) follow the same pattern. To show whether scn4aa and scn4ab gene expression patterns in Malapterurus and Astroscopus matches that of gymnotiforms and mormyrids, these genes will be identified in Malapterurus and Astroscopus and expression will be analyzed through qPCR. Through examining the relative expression of each gene in electric organs and skeletal muscle as well as following the evolution of scn4aa and scn4ab sequences, the evolution of electric organs will be better understood. This study will examine the potential neo-functionalization of scn4aa and will play a role in understanding the evolution of novel phenotypes.

IDENTIFICATION AND CHARACTERIZATION OF CANDIDATE GENES INVOLVED IN FLAVONOID BIOSYNTHESIS AND REGULATION
Jacqline Njeri
Poster: 150
Mentor(s): Erich Grotewold (Biochemistry & Molecular Biology)

Anthocyanins (ANs) and proanthocyanins (PAs), specialized metabolites under the category of flavonoids, have been associated with protecting seedlings from ultraviolet light and heat stress by reacting with Reactive Oxygen Species. In *Arabidopsis thaliana*, PAs accumulate in the seed coat giving the seeds their characteristic brown color while ANs give leaves a purple color under visible light. Regulation of these metabolites is facilitated by the MBW complex of transcription factor TT2 (MYB), TT8 (bHLH) and TTG1 (WD-40) (Baudry et al. 2004). TT8 is involved in regulation of leucoanthocyanin-reductase (BAN) and dihydroflavonol-4-reductase (DFR) (Shirley et al. 1995) which are key enzymes in the PAs and ANs biosynthesis pathway respectively. Mutations in the *TT8* locus result in the inhibition of the two biosynthesis pathways leading to deficiency in AN and PA. Consequently, the brown seed phenotype changes to yellow. In collaboration with the Arabidopsis Biological Resource Center (ABRC), we screened the various insertion-line collections for abnormal seed color phenotypes that would suggest a perturbation in seed coat PA accumulation. We used a forward-genetic approach to identify and characterize candidate genes involved in flavonoid biosynthesis and regulation. Four candidates (*kin1, kin2, ppr* and *mybx)* have shown possible abnormal expression of *TT8*. By complementing these four lines with a p35S::TT8 construct, we test the hypothesis that T-DNA insertions in these four lines are responsible for alterations in *TT8* resulting in the yellow seed phenotype. Selection for transgenic plants uses kanamycin insertion along with our p35S::TT8 construct. This insertion is confirmed using PCR on genomic DNA.

THE EFFECTS OF A HIGH-FAT DIET ON BONE HEALTH IN DEVELOPING MICE

Allison Shinouskis
Poster: 151
Mentor(s): Laura McCabe (Physiology)

Obesity is an epidemic in the US, affecting more than 78 million adults and 12 million children and contributing to health risks such as heart disease, stroke and diabetes. The link between a high fat diet (HFD), obesity, and decreased bone health has received increasing attention. Chronic HFD (from weaning to adulthood) causes bone loss in mice. Recent studies in other systems, indicate that responses to diet can depend upon age. With regard to bone health, it is not known if a HFD is more detrimental during the pre-pubertal versus post-pubertal (>10 weeks of age) period of life. To test this, we examined the femoral trabecular bone volume of 3-week-old mice separated into 4 diet groups: 1) 10 weeks of a low (LFD) diet, 2) 10 weeks of a HFD, 3) 7 weeks of LFD followed by 3 weeks of HFD (LFD-HFD), or 4) 7 weeks of HFD followed by 3 weeks of LFD (HFD-LFD). Compared to mice fed a LFD, a HFD caused a significant decrease in the bone volume (BVF, 25.6 vs. 38.5%, $p<0.0001$). A similar decrease was observed in HFD-LFD mice. Interestingly, LFD-HFD mice displayed 20% higher bone volume compared to HFD mice. These results suggest that a HFD may be particularly detrimental to the skeleton when given pre-puberty, as switching to a LFD post-puberty did not rescue the bone density. However, a HFD in adulthood also had negative effects on bone health. Diet studies with an extended time-course are underway to assess the long-term impact.

CELL BIOLOGY, GENETICS, & GENOMICS
POSTER PRESENTATIONS, SECTION 5
LAKE HURON ROOM, 3:00 – 4:30 PM

GENETICS AND MOLECULAR GENOMICS

Oishi Bagchi
Poster: 154
Mentor(s): Xi He Zhang (Microbiology & Molecular Genetics)

In 2016, HIV-1 was responsible for 42 million infections worldwide, as well as 95% of the HIV infections known to us. The mechanisms through which HIV-1 infects and replicates in host cells involves complex interactions between virulence factors within the virus and the host cell's innate defense mechanisms. One such interaction can be observed through SERINC5/Nef and SERINC5/Env interactions. SERINC5 is a host defense protein that exists on the surface of host cells. When new HIV virions bud through with SERINC5 still present on the membrane, they are unable to advance and infect the subsequent cells. However, the presence of Nef inhibits SERINC5 activity, undoing the host's defense mechanism. For our experiment, we wanted to see how SERINC5 interacted with Nef and Env, but ended up finding a fascinating interaction between Env and SERINC5.

DETECTION OF THE R117H MUTATION IN THE HUMAN CFTR GENOME FOR MILD CYSTIC FIBROSIS UTILIZING ALLELE SPECIFIC PCR

Danielle Guist
Poster: 155
Mentor(s): Doug Luckie (Lyman Briggs)

On the seventh chromosome of the human genome resides a mutation in the CFTR gene known as R117H; at the 117th amino acid a guanine is altered to an adenine. It has been found that 4 of 18 cystic fibrosis patients tested show signs of having this mutation (Gervais et al, 1993), however it is not routinely screened for. Developing an accurate, inexpensive test for this mutation allows for individuals to be tested for the mutation of interest and treated quickly. Polymerase chain reaction was used to amplify the target DNA, containing the R117H mutation, with designed primers. It was hypothesized that the published primers for the R117H mutation that causes cystic fibrosis will allow researchers to see the R117H mutation when ran through gel electrophoresis because the primer base pairs will bind with and replicate target DNA, allowing for the mutation to become visible when ran through a gel electrophoresis. We predicted that the designed primers would detect the R117H mutation that leads to cystic fibrosis through genetic analysis because PCR is an effective method at amplifying target DNA for genetic mutations (Balogh et al 2004). The resulting amplified DNA was then analyzed using agarose gel electrophoresis. The agarose gel showed a band length of 307 base pairs containing the wild-type DNA. This allowed for the identification of an individual who possesses this specific mutation because the primers replicated the mutant DNA.

ELUCIDATING THE LANTHANIDE-DEPENDENT NETWORK AND ITS IMPACT ON THE PYRROLO-QUINOLINE QUINONE ROLE IN METHANOL DEHYDROGENASES
Zachary Jansen
Poster: 156
Mentor(s): Cecilia Martinez-Gomez (Microbiology & Molecular Genetics)

Methylobacterium extorquens AM1 is an aerobic methylotrophic bacteria that oxidizes methanol to formaldehyde. Typically, the methanol dehydrogenases used in this process need to incorporate calcium into their structure for catalysis. However, it has been found that methylotrophs produce additional methanol dehydrogenases that uses lanthanides instead of calcium, named XoxF1. XoxF1is a pyrrolo-quinoline quinone (PPQ) containing enzyme, and is used as a cofactor during methanol dehydrogenases. Mutants of Methylobacterium extorquens AM1 disrupting the genes Meta1_1746 and Meta1_1747, have been found to lack the ability to grow on media containing methanol and lanthanides in the absence of calcium. The targeted genes are found adjacent to the genes encoding enzymes that synthetize PQQ. Our hypothesis is that the mutations in Meta1:1746 and Meta1:1747 encodes for an uncharacterized protein that facilitate the incorporation of PQQ into the XoxF protein. Without PQQ, XoxF is unable to catalyze methanol oxidation reaction and therefore unable to grow. In order to test our hypothesis, a plasmid overproducing XoxF (pLB01) was transformed into Meta1_1746 and Meta1_1747 and grown on methanol plus lanthanum. Purification of XoxF from these cultures when compared to wild type showed differences in kinetic properties along with PQQ content.

IDENTIFICATION OF COPPER BINDING PROTEINS IN RALSTONIA PICKETTII ISOLATED FROM COPPER-CONTAMINATED SEDIMENT IN TORCH LAKE
Meghan Latouf
Poster: 157
Mentor(s): Terence Marsh (Microbiology & Molecular Genetics)

Eleven strains of Ralstonia pickettii(R.picketti) were isolated from copper-contaminated sediment from Torch Lake located within the Upper Peninsula of Michigan. A unique attribute of these strains is resistance to high levels of copper as well as their ability to sequester copper in their outer envelope. The genomes of two isolates have been previously sequenced and numerous genetic loci were identified that contribute to high metal tolerance of these strains. Although, the components that contribute to copper sequestration remain unknown. By sequence homology with a copper storage protein of a methanotroph, we have identified a candidate protein in R. pickettii strains 12D and 12J that is putatively capable of binding 50+ molecules of copper. Strain 12D harbors one copy on chromosome 2 and another on plasmid 2. Strain 12J's chromosome 1 has a copy identical to 12D's chromosome 2 as well as three additional variants. Two of the variants in question will be cloned from R.pickettii into a competent Escherichia coli for high level expression that will be induced. This will assist in identifying the role of these proteins in metal resistance and sequestration. Furthermore, this copper resistance protein may have importance by having commercial benefits such as copper chelation or even the ability to remove contaminating metals from wastewater. In addition, biofilm formation is another stress-avoidance strategy used by bacteria. The response of R.pickettii strains 12D and 12J will be characterized through cultivation in copper supplemented broth to determine if copper is an environmental signal that stimulates biofilm formation.

THE EFFECTS OF AN MLK FAMILY INHIBITOR ON CELL PROLIFERATION AND MAPK PATHWAY SIGNAL INDUCTION IN LUNG SQUAMOUS CELL CARCINOMA
Brandon Llewellyn
Poster: 158
Mentor(s): Kathleen Gallo (Physiology)

It is estimated that lung cancer will be responsible for approximately 25% of all cancer related deaths in the United States in 2018. The vast majority of these lung cancers are classified as non-small-cell cancers (NSCLC), and are comprised largely of adenocarcinomas and squamous cell carcinomas. Unlike the more common adenocarcinoma, squamous cell carcinoma which represents 30% of NSCLCs has no commonly available targeted therapy. As such, squamous cell carcinoma patients have lower survival rates than adenocarcinoma patients, leading to 400,000 deaths globally each year. Currently, the primary treatment for advanced lung squamous cell carcinoma is chemotherapy and/or radiotherapy. Identification of effective, targeted therapies for treatment has the potential to decrease mortality in patients with advanced squamous cell lung cancer. Using genomic data available in The Cancer Genome Atlas (TCGA), our lab found that the genes encoding Mixed-Lineage Kinase (MLK) family kinases, are amplified and/or have mRNA upregulation in a majority of squamous cell carcinoma, but not in lung adenocarcinoma. The purposes of this study are to 1) use an MLK family inhibitor to determine the role of the MLK family kinases in MAPK pathway signal induction and proliferation of squamous lung cancer cells and 2) investigate the potential of an MLK family inhibitor as a co-therapy

alongside common chemotherapy drugs for squamous cell lung cancer. Methods utilized include proliferation assays and assessment of MAPK pathway kinase activation using immunoblotting.

EVOLUTIONARY CONSERVATION OF EPITHELIAL DEVELOPMENT IN CANINE PALATE FORMATION

Ryan McAnelly
Poster: 159
Mentor(s): Brian Schutte (Microbiology & Molecular Genetics)

One out of every 700 children born today will be impacted by orofacial clefting. With a moderately high probability, those in developing countries are most affected as with lack of medical attention these abnormalities lead to malnutrition, speech impediment and subsequent expiration. With the goal of curving future hardship our lab generates a fetal dog's model in a human's stead due to its similar size and expedited adult growth cycle of 18 months in comparison to 18 years. Subsequently imposing the necessity to research how canine oral cavity cells interact to standardized immuno-fluorescence protein markers. The motivation behind this research is to delineate whether or not p63 and K17 antibodies sufficiently produce a comparable timeline of palate formation within canine species. Coronally sectioned maxillary regions of canine fetuses, aged 35-39 days post-conception (N = ≥3 per time point), were immuno-fluorescently stained with p63 and K17 primary antibodies to subsequently bind and signal their presence upon intracellular antigens within the periderm and basal epithelial cell layer's cytoplasm. We observed palatal formation at day 38 post-conception of canine fetal development. The loss of periderm was seen along the fusing palate on day 39 with random patches at other junction points. Conservation of K17 and p63 protein markers in periderm and basal epithelial cell layers provides evidence of evolutionarily conserved epithelial functions of palatal fusion. This wild strain data upon maxillary regions of canine fetal development provides a baseline in determining the pathophysiological mechanisms of canine orofacial clefting.

BP3 ALTERS INSULIN GROWTH FACTOR 1 EXPRESSION IN MURINE P53-NULL TRANSPLANTED MAMMARY GLANDS

Jordan Wagner
Poster: 160
Mentor(s): Richard Schwartz (Microbiology & Molecular Genetics), Fang Xie (Microbiology & Molecular Genetics)

Benzophenone-3 (BP3) is a known endocrine disrupting chemical, commonly found in sunscreen. In ovariectomized BALB/c mice fed a high fat diet (HFD), BP3 was found to have estrogen-like effects on mammary epithelial cell proliferation, which could contribute to promotion of mammary tumorigenesis. BALB/c mice transplanted with p53-null mammary epithelium were fed a low-fat diet (LFD, 10% kcal fat) or HFD (60% kcal fat) with or without BP3 for 10 weeks, beginning at 3 weeks of age. At 10 weeks of age, mice fed each diet were switched to the opposite diet (i.e., HFD to LFD and LFD to HFD). At 13 weeks of age, we collected mammary gland tissue, isolated RNA, and measured the expression of genes involved in cancer, inflammation, and immunity crosstalk using a PCR array for this pathway. We found that insulin growth factor 1 (Igf-1) gene expression was increased by BP3 ($p<0.05$) in mice fed HFD switched to LFD. We also found that mice with transplanted p53-null mammary glands and fed HFD-LFD switch diet developed more proliferative tumors when additionally treated with BP3. Increased Igf-1 expression is associated with breast cancer risk. Hence, the goal is to investigate IGF-1 protein expression in the mammary gland and tumor tissue of p53-null mice. If elevated levels of IGF-1 are found in both normal mammary epithelium treated with BP3 and in mammary tumors and/or their surrounding tissue that arise in BP3 treated mice, then heightened Igf-1 gene expression is a candidate mechanism for BP3 promotion of mammary tumorigenesis.

COMMUNICATION ARTS & SCIENCES

POSTER PRESENTATIONS, SECTION 1
BALLROOM, 9:00 – 10:30 AM

FRAMES AND SOURCES OF SHARED LINKS IN THE CLIMATE CHANGE DISCUSSION ON TWITTER OVER TIME
John Lavaccare
Poster: 164
Mentor(s): Kjerstin Thorson (Advertising)

In the first phase of this study, we analyzed 200 of the top-tweeted links from 12 major climate change events of the 2010s. We had the goal of finding which types of news outlets or other web sources were most commonly shared in the climate change discussion, and how this changed between events. In the second phase of the study, we focused on media links, with the goal of discovering which frames are most popular, and how the popularity of frames has changed over time in the Twitter climate change discussion.

EFFECT OF IMMERSIVE VIRTUAL REALITY ON WORKING MEMORY
Bailey McClure
Poster: 165
Mentor(s): Taiwoo Park (Media and Information)

The purpose of this project is to study working memory in both virtual reality (VR) and non-virtual reality settings. During the study, the effectiveness of VR as an educational tool will be evaluated, in terms of participant's performance on memory tasks. Participants will complete memory tests on educational content presented to them in both VR and non-VR settings, and the results will be used to determine any possible correlation between increased or decreased memory test performance and the immersive nature of virtual reality.

AUTONOMOUS TAXI USER INTERFACE RESEARCH AND DESIGN
Jinghan Ni
Poster: 166
Mentor(s): Taiwoo Park (Media and information)

Recently there has been a flurry discussion about self-driving cars in public; everyone seems to have realized that self-driving cars are the future of automotive industry. While auto manufacturers are quickly adopting the autonomous driving technology to obtain a share in the market, problems and concerns revealed alongside with excitements. It is evident that autonomous driving technology can empower people, giving them a sense of independence and freedom, however, the reality is that most people can't afford such a vehicle. Hence, deliver this piece of technology in the most efficient, cost-effective way, and still have an excellent user experience became the biggest challenge for the auto manufacturers. Among all the possible solutions, autonomous taxi seems to be a reasonable approach. Autonomous taxi is not only efficient and cost-effective but also provides an opportunity for the general public to participate as users to ensure future user experience design improvement. In this study, first, various user research methods will be employed to find out how to design user-friendly interfaces for self-driving taxis. I will then build digital interfaces prototype based on the findings from my research. Finally, user tests will be conducted with the prototypes to gather feedback and use it as guidance for revision. This study will be able to provide some insights for autonomous taxi manufactures on potential user experience design ideas, and also helps the general public to gain some knowledge on what to expect on an autonomous taxi to build trust and connection between passenger and vehicle.

EFFECTS OF PUFFERY TYPES AND SOURCES OF PUFFERY IN SOCIAL MEDIA POSTS ON BRAND-RELATED PERSUASIVE OUTCOMES
Jessica Hirsch
Poster: 167
Mentor(s): Saleem Alhabash (Advertising)

Puffery refers to the use of exaggerated claims in advertisements that combine creativity and deception. Most research on puffery has been centered on the legal and policy ramifications of using such deceptive claims in media advertising, where advertisers are charged with deceiving consumers through such claims. In the current social media environment, where brand-related messages are not only disseminated by companies and advertisers, but also by average consumers online, it is important to investigate the different elements that could affect consumers' cognitive responses to

persuasive communication. To do so, this online experiment utilizes a 3 (puffery type: attribute vs. negative vs. comparative) x 2 (sources: user- vs. company-generated content) x 3 (brand familiarity) x 3 (repetition) mixed factorial design. Participants will be exposed social media posts about ice-cream, yogurt, and energy drink brands that highlight the brand's features (attribute puffery), highlight a negative aspect of a competing brand (negative puffery), or highlight positive aspects of both company and competing brand, showing the competitive advantage of the company brand (comparative puffery). Participants will be randomly assigned to see nine social media posts for familiar or unfamiliar brands that are posted by an average consumer or the company. In addition to understanding the effect of brand familiarly, it is important to see the effects of the source of the message; now more than ever, as we rely on average consumers to influence our consumption behaviors. Upon exposure to the persuasive messages, participants will evaluate the source sincerity, persuasion knowledge, and advertising effectiveness.

PERCEPTUAL CHANGES IN A COACHES VOICE DUE TO A GAME
Kirsten Rockey
Poster: 168
Mentor(s): Eric Hunter (Communicative Science & Disorders)

Professionals in occupations that require heavy voice use have been shown to have higher instances of voice problems. These jobs have various levels of vocal requirements, including high vocal loudness, long speaking times, high stress, and clarity of voice. Included in these occupation is coaching. Coaches utilize their voice in a wide variety of environments, including one on one consultation, practice sessions in large facilities, and loud and stressful competition environments. Using publicly available sportscast interviews of a well-known basketball coach, speech segments were extracted from web archives from both before and after several games. These segments were perceptually rated and acoustically analyzed for game loading effects. Results will be discussed.

CONSUMERS' BRAIN ON POTBELLY: PSYCHOPHYSIOLOGICAL AND EYE-TRACKING MEASURES AIDING ADVERTISING CAMPAIGN
Alexandra Torres
Poster: 169
Mentor(s): Saleem Alhabash (Advertising and Public Relations)

Amidst content clutter on the Internet and social media, marketers and advertisers are challenged with producing and disseminating content that achieves the desired persuasive outcomes in terms of online engagement, attitudes, behavioral intentions, and purchase behavior. Research has documented that online engagement, defined as consumers' intentions to like, share, and comment on social media marketing messages, were the strongest predictors of offline purchase intentions. Messages that transcend the clutter on social media and achieve persuasive goals (attitudes and purchase intentions) are ones that are novel, relevant, and excite consumers positively. These are the messages that will not only get consumers' attention, they are more likely to get them to behave online in that moment (e.g., like, share, and comment), as well as generate favorable nodes in their memory associated with both the ad and the brand. The current study, conducted in collaboration with Doner agency in Detroit, tested the different psychophysiological, eye-tracking, and self-reported responses to campaign materials designed for Potbelly's 40th anniversary campaign. The campaign itself, relied on associating the brand with happiness, where Doner utilized social media posts from consumers and attempted to uplift them through different creative interactive posts. In the current study, I will report mainly on the experimental lab study that was conducted to evaluate the cognitive and affective responses to the different campaign elements.

COMMUNICATION ARTS & SCIENCES
POSTER PRESENTATIONS, SECTION 2
BALLROOM, 11:00 – 12:30 PM

A PEER EDUCATION RESOURCE FOR BREAST CANCER AND THE ENVIRONMENT PREVENTION
Elyse Beach
Poster: 172
Mentor(s): Kami Silk (Communication Arts and Sciences), Daniel Totzkay (Communication Arts and Sciences)

Recent research on breast cancer morbidity has begun to increasingly focus on the role of environmental factors like chemicals in commercial products and lifestyle choices. However, breast cancer educational programs have not kept pace and instead focus more on raising awareness of the disease and on detection behaviors like mammograms or breast self-exams. Breast cancer is a preventable disease and addressing risk reduction behaviors focused on environmental exposures is needed. As such, this project aims to translate recent research on breast cancer and the

environment into an educational resource for college-aged peer educators. This resource will be a succinct synthesis of research on the breast cancer and environment link, as well as effective communication strategies that have and can be used to address this issue. The focus will be on avoidable breast cancer risks that especially women are exposed to regularly and on behaviors that can reduce personal risk. This project will end with an evaluation of the program with knowledge-based questions in order to ensure its effectiveness

UPDATING NEURORUNNER, AN EXPERIMENTAL STIMULUS FOR RESEARCH ON AVATAR EFFECTS
Ian Crist, Daniel Anderson, Gabriela Gendreau
Poster: 173
Mentor(s): Rabindra Ratan (Media and Information)

The NeuroRunner game has been developed and used in previous studies of the role that avatar identification and embodiment play in the effects of avatar use. The general finding has been that identification and embodiment lead to stronger effects of use (e.g., running faster on a treadmill after playing the game). However, the game has used a rudimentary avatar with very few customization options. In order to study the phenomenon in greater detail, more complex avatar customization is needed. Thus, this project focuses on updating the game's avatars and choices the players can make about them. In addition, there will be a secondary avatar added shaped like a vehicle that will allow the research to expand to non-human avatars and the various effects this has on players.

WEARABLE ACTIVITY TRACKERS AND OLDER ADULTS: THE SOCIAL EFFECT AND IMPORTANCE IN HEALTHCARE
Jessica DeClercq
Poster: 174
Mentor(s): Marie Bowen (Sparrow MSU Innovation Center)

The purpose of this study is to explore how wearable activity trackers (WATs) connect older adults to those around them and to determine the benefits of sharing WAT data with healthcare providers. Ten focus groups and 20 interviews were conducted with older adults who had varying levels of WAT use. Discussion topics included: WAT social aspects, the frequency and benefits of sharing individual WAT data with healthcare providers, and strategies to increase the number of long-term WAT users among older adults. Preliminary data suggest that WATs have the potential to better connect people socially through their competition and gamification aspects. Trackers are able to connect numerous people together and turn an individual's health journey into an engaging and communal game. Tracking activity with others holds a person accountable and can make it more enjoyable. Initial analysis suggests that WAT users can benefit more from social interactions with their WATs. Some older adults also reported taking their WAT data to their healthcare provider. The features that were reported as most commonly talked about with providers were sleep patterns, steps taken, and heart rate. Sharing the WAT data made many participants feel like they were taking charge of their own health. Older adults can potentially talk with their doctors more intelligently about their activity levels through their WATs.

AGNèS FILMS: AN UNDERGRADUATE, GRADUATE, AND FACULTY PUBLISHING COLLABORATION
Jessica Kukla, Hannah Countryman, Valeria Obando
Poster: 175
Mentor(s): Alexandra Hidalgo (Writing, Rhetoric, and American Cultures)

agnès films: supporting women and feminist filmmakers is a digital publication run by a team featuring a faculty member, three undergraduate students, and one MA student. In 2017 we published 62 pieces: 28 film and festival reviews, 11 filmmaker interviews, 12 essays, and 10 news items. In this poster, we discuss the strategies we have developed to run a sustainable publication with a team made up of faculty and students. As we show in our poster, agnès films has significant readership around the world. In 2017 we had 19,999 page views coming from 10,123 users. These users came from all 50 states, with the top five states being California (1,560 sessions), New York (1,209 sessions), Michigan (1,056 sessions), Illinois (320 sessions), and Massachusetts (234 sessions). We also had users from 133 countries. The top five countries were the US (7,146 sessions), Great Britain (1,277 sessions), Australia (435 sessions), Canada (422 sessions), and India (371 sessions). Besides running the publication, we organized a screening of Sands of Silence, a film about human trafficking at MSU. Another achievement was the “Parents in the Palais” open letter to urge the Cannes Film Festival to be more welcoming to parents attending with children. The letter was signed by 340 filmmakers, actors, film critics, film festival organizers, and distributors from 35 countries. We also revitalized our member profile system. We redesigned the look of member pages and reconsidered what form fields should be available to make each profile as full of value as possible.

SELF-CRITICISMS IN BRAZILIAN JOURNALISM
Daniel Rayzel
Poster: 176
Mentor(s): Rachel Mourao (Journalism)

Rights of journalists and the free press are valuable to a democracy, but unsatisfactory reporting erodes trust among the public and journalists in each other. In our research, we look at how Brazilian journalists practice self-awareness and criticism of peers during two waves of protests in 2013 and 2015. Criticism of other journalists can be stigmatized in countries like the United States, where research has identified a "pack mentality" that can impede the process of constructive criticism. In this project, we analyze if these norms translate to the press in developing countries and how self-awareness helps in interpreting political news coverage. Using survey results from 1,250 journalists, we qualitatively analyzed a set of responses to interpret how media coverage of recent protests was evaluated. Questions addressed how the journalists viewed the quality of coverage such as avoiding bias and fixation on extremities and how it evolved over the course of each round of protests. After identifying key words and phrases in these results, we began to develop a codebook to aid in coding all responses for continued research. The data could serve to better understand how self-criticisms among journalists are present in different countries. A developed codebook and survey could lead the study to be replicated across the world and provide greater insight as to what it means to be a professional journalist.

THE EFFECTS OF RATE OF LATER-OCCURRING SPEECH ON PERCEPTION OF AN EARLIER WORD
Zachary Ireland
Poster: 177
Mentor(s): Laura Dilley (Communicative Sciences & Disorders), Matthew Lehet (Communicative Sciences & Disorders)

Previous studies have shown a robust effect of rate of context speech on word perception. For example, slowing down the speech around a target regionshort spoken word can cause a word spoken at its normal rate to "disappear" from perception. In fact, previous studies have shown that both speech rate preceding and following the short spoken word can affect whether or not a short spoken word is heard. This previous study aims to elucidate the contributions of rate preceding speech from that of following speech. To further understand these factors, the present study explores the effects of speech rate both before and after a target region in which a function word could perceptually "disappear". Stimuli were selected from a corpus of speech that contained several utterances containing a function word a, or, our, are, or her. Then, stimuli were manipulated such that the speech before the function word was at 1 or 2 times the original length, while the speech after the function word was at 1, 1.5, or 2 times the original length, or removed altogether. Participants then listened to each utterance with randomized speech rates. Function word reports were compared to determine how speech rate affects perception. The findings shed light on how human listeners are able to comprehend speech under a variety of speech rates.

COMMUNICATION ARTS & SCIENCES
POSTER PRESENTATIONS, SECTION 3
BALLROOM, 11:00 – 12:30 PM

DEVELOPING A CAMPUS WIDE VACCINATION CAMPAIGN TO PREVENT HPV RELATED CANCERS
Danielle Biskner, Jesstina McFarland
Poster: 180
Mentor(s): Jeff Searl (Communicative Sciences & Disorders)

It is estimated by the Centers for Disease Control that 79 million people in America are currently infected with the Human Papilloma Virus (HPV), and 14 million people are newly infected with HPV each year. The quickly spreading virus is responsible for approximately 70% of all oropharyngeal cancers (HPV strain 16), and more than 5% of human cancers overall. HPV related cancers are preventable with vaccination, yet vaccination rates are less than 62%. Most college students are in the final recommended age-range of receiving the HPV vaccine for maximum effectiveness, but information on how and where to get the vaccine is scarce and can be confusing. There is also a link between physician recommendation rates and vaccination rates indicating that educating individuals may be key to more widespread vaccination. We hope to inform students of the potential long-term risks of HPV and how to prevent those risks through vaccination by designing a campus-wide awareness campaign that utilizes online media and in person contact. By increasing awareness, the goal is to increase HPV vaccination rates among students and decrease the number of HPV related cancers over time.

ESTABLISHING TRUST IN THE ONLINE SHARING ECONOMY
Katie Schlafhauser
Poster: 181
Mentor(s): Brandon Van Der Heide (Communication)

Trust plays an important role in the sharing economy where service providers are directly connected with potential customers through a third-party website. The popular hospitality platform Airbnb is one example of such sharing economy. From reading the information on a host's profile, renters could develop trust judgments toward the host and thereby decide whether or not to stay with the host. The purpose of this research is to examine how users' trust toward a host on a hospitality platform is affected by 1) the credibility of the platform and 2) the number of reviews the host received. It is hypothesized that established service platforms are perceived as more credible and more trustworthy by users than unestablished platforms. It is also hypothesized that the number of reviews a host received positively influences potential renters' trust toward him/her, and thereby influence their intentions to stay with the host. The objective of this study is to investigate how perceived site credibility and the number of reviews a host received affect potential renters' trustworthiness toward a host. Participants of the study will take an online survey in which they will view a profile of a host on a hospitality service website and answer a few questions regarding their perceptions of the host, the website, the advertised apartment, and their intention to stay at the apartment.

EXPLORING THE LACK OF DIVERSITY IN THE FIELD OF COMMUNICATION SCIENCES AND DISORDERS
Katie Whalen
Poster: 182
Mentor(s): Matthew Phillips (Communicative Sciences & Disorders)

In the field of Communication Sciences and Disorders (CSD), it is imperative for professionals to understand clients from culturally and linguistically diverse backgrounds. This prevents the professional from diagnosing cultural and regional speech and language differences as disorders. Diagnosing differences as disorders not only is unnecessary and costly; it undermines the authenticity of these differences as recognized dialects. In addition, it is easier for patients to develop trust in their care providers, if they share a similar background. With the importance diversity in the field, it is alarming that it is so lacking in CSD. In 2016, only 7.9% of ASHA members belonged to at least one racial minority, compared to 23.1% of the U.S. population. 4.7% of ASHA members identified as male, compared to 49.2%. To explore this issue, an electronic survey was distributed to 71 adult college students with an interest in CSD. They were asked what factors influenced their interest in studying CSD and if they believed they had the skills and personality traits necessary for success in the field. The responses of different races and genders were then compared. It was found that some interest factors, skills, and personality traits had more variation than others among different races and genders. These findings indicate that further research may be needed to identify why different races and genders become interested in studying CSD, and if they believe they will be successful in the field, in order to understand the lack of diversity in the field of CSD.

THINK ABOUT IT: HOW ATTITUDES ABOUT OBJECTIVITY INFLUENCE MOTIVATION
Rachel Nelson
Poster: 183
Mentor(s): Michael O'Rourke (Philosophy)

Because ideal scientific research values objectivity (Douglas, H. 2009), it is no surprise that many scientists value objectivity. According to Sheldon & Elliot (1999), individuals are more likely to persist at goals that are consistent with their values. Therefore, individual scientists who view objectivity as "a lack of values" should have different priorities than scientists who disagree. This study will test if there is a correlation between objectivity and motivation in environmental research. Specifically, we hypothesize that individuals who view objectivity as "a lack of values" will be motivated to conduct research for different reasons than those who do not. This hypothesis will be tested using data from the Toolbox Dialogue Initiative. Select statements will be chosen from Toolbox workshops and organized into categories of "Objectivity" and "Motivation". Motivation will be divided further into "Policy Oriented" and "Knowledge Oriented" categories, where this distinction differentiates motivation grounded in contributing to society and motivation grounded in contributing to science. The statements are Likert items, with scores ranging from strongly disagree to strongly agree (1-5). The level of objectivity and motivation will be determined by the scores. Analysis will be carried out by linear regression.

LANGUAGE DEVELOPMENT AND ASSOCIATED BRAIN CONNECTIVITY SUPPORTS RECOVERY FROM STUTTERING
Madeline Van Eck, Rowaan Hermz
Poster: 184
Mentor(s): Soo-Eun Chang (Communicative Sciences & Disorders)

About 5% of preschool-aged children stutter and 80% of these children will recover (Yairi & Ambrose, 1999). Presently, there is no objective early marker that differentiates persistent stuttering children from those that will recover naturally. Recent studies suggest weaker language skills in children who stutter (CWS) compared to fluent controls, and that weaker language abilities may predict persistence (CWS-P) versus recovery (CWS-R) from stuttering (Kriedler, Hampton Wray, Usler, & Weber, 2017). The purpose of this study is to examine whether lexical diversity and its relationship with white matter connectivity patterns in the brain's ventral language pathways could predict persistence or recovery of stuttering in later years. A total of 47 stuttering children participated in this study. Conversational speech samples were collected from all children, transcribed offline, and then analyzed to extract three measures of lexical diversity: Type Token Ratio (TTR), Vocabulary Diversity (VOCD), and Moving Average Type Token Ratio (MTTR). The number of novel words compared to the total number of words uttered were calculated using Child Language Analyses (CLAN) and utilities (MacWhinney, 2000). Participants also completed diffusion tensor imaging (DTI; a type of structural MRI) scans to allow extraction of white matter integrity measures from the ventral tracts. Preliminary results suggest that CWS-P and CWS-R significantly differ in TTR results. The imaging analysis is on-going. We expect the results of this study will help identify behavior and neural markers associated with persistent stuttering that may have significant clinical applications in the future.

QUANTIFYING STUTTERING SEVERITY: IS IT BETTER TO COUNT SPEECH DISFLUENCIES PER NUMBER OF WORDS OR SYLLABLES?
Madeline Van Eck, Rowaan Hermz
Poster: 185
Mentor(s): Soo-Eun Chang (Communicative Sciences & Disorders)

Stuttering is a speech disorder affecting approximately 5% of preschool-aged children. Effective means of quantifying stuttering severity is important for researchers and clinicians to have a reliable metric for diagnostic and prognostic purposes. One such measure proposed by Ambrose and Yairi (1999) called the Weighted-SLD Formula (WTD-SLD) quantifies stuttering severity by placing greater weight on the durations of stuttering moments and the numbers of repeated sounds. To calculate WTD-SLD, one must first determine the percent occurrence of all stuttering-like disfluencies (SLDs) in speech samples. SLDs include part-word repetitions (PW), single-syllable whole-word repetitions (SS), and dysrhythmic phonations (DPs). The original WTD-SLD formula = {([PW + SS • RU) + (2 • DP)}, is calculated and divided by the total number of syllables uttered. Clinicians have asked, however, whether using number of words rather than syllables might derive a comparable measure, given that many preschool-age children utter single-syllable words, and less effort is required to calculate WTD-SLD using word counts. This study sought to compare the severity scoring of two groups of children who stutter between the ages of 3-6 and 7-10 using WTD-SLD calculated with words and syllables. We expect that using the word counts may derive comparable WTD-SLD in preschool-age, but not for children between ages 7-10, whose scores might be inflated when using words versus syllables. Use of the word count-based WTD-SLD formula for young children who stutter could greatly enhance the efficiency in which stuttering severity is assessed and applied in clinical practice.

COMMUNICATION ARTS & SCIENCES
POSTER PRESENTATIONS, SECTION 4
BALLROOM, 3:00 – 4:30 PM

MEDIATING TREATMENT OF ACROPHOBIA WITH VIRTUAL REALITY: A CASE STUDY WITH "RICHIE'S PLANK EXPERIENCE" & IN-VIVO EXPOSURE THEORY
George McNeill
Poster: 188
Mentor(s): Taiwoo Park (Media and Information)

Acrophobia, or more colloquially known as a fear of heights, is a common anxiety disorder and phobia. A natural fear of heights - especially when one is presented with a situation perceived as life-threatening - is an innate characteristic of children and adults alike. Due to its prevalence in society, several studies have attempted to remedy the severity of acrophobia with a variety of methods, such as in-vivo exposure therapy, augmented reality, and virtual reality. However,

none have provided a completely immersive user-driven experience for overcoming phobia. To this end, the HTC Vive Software, “Richie’s Plank Experience” (RPE), allows for a palpable presence within a virtual environment not previously possible for research purposes. Specifically, the game modes “Plank” and “Fire Deck” present users with objective-based goals that they can completely control and manipulate within the virtual environment, with the latter supporting flight. Furthermore, the software is specifically designed for utilization with an actual plank in the real-world environment and can additionally track user’s feet on said-board using additional VIVE hardware. In a research capacity, this study aims to unify an in-vivo exposure therapy with an immersive environment and gameplay that blends with the perceived physical environment of the user in an unprecedented manner (i.e. feet tracking, sound and feel of real-world plank meshing with the virtual plank presented, etc.). Specifically, the study will gauge how a user perceives putting themselves in a situation they perceive as life-threatening before and after they are allowed to simulate flying within the surrounding environment.

AUTOMATIC SPEECH RECOGNITION ACCURACY FOR DAY-LONG AUDIO RECORDINGS IN HOME ENVIRONMENTS OF CHILDREN WITH AND WITHOUT HEARING IMPAIRMENT
Nikaela Losievski
Poster: 189
Mentor(s): Laura Dilley (Communicative Sciences & Disorders)

Children learn language from their auditory environment, but children with congenital deafness show delayed language development. Cochlear implants (CI) can facilitate language development by translating sound into electrical impulses on the auditory nerve. Studies suggest that adults may not provide the same level of quantity, nor quality, of speech input to children with hearing impairments compared with normal-hearing children. LENA devices are wearable audio recorders that measure adult speech, allowing parents and clinicians to quantify variability in speech input provided in children’s naturalistic language environments. LENA devices record the auditory environment for up to 16 hours and use automated classifications to provide estimates of how many words are spoken by adults nearby. LENA’s estimates of adult word count depend on accurate classifications of adult speech as opposed to other sound sources, yet few unbiased tests of LENA’s accuracy in speech classification exist. We conducted an analysis of LENA’s accuracy in classifying speech from audio files collected from home environments of young children, some of whom had a CI. Human coders classified short chunks of audio for comparison to LENA’s automatic classification. Our results will indicate the usefulness of LENA as a clinical and research tool for assessing adult word count. These results will be applied to understanding the auditory and language environment of children with CI’s and developing guidelines aimed at optimizing their speech-language outcomes.

NEGATIVE PRESS COVFEFE: ANALYZING MEDIA COVERAGE OF DONALD TRUMP'S TWITTER
Rachel Beard
Poster: 190
Mentor(s): Manuel Chavez (Journalism)

Donald Trump's success in the 2016 presidential election is often attributed to his dominance on social media platforms, especially Twitter. Through his tweets, Trump was able to bypass traditional forms of media communication and interact directly with his supporters - and his critics. But his social media tactics also affected the ways in which the mainstream media talked about Trump. Instead of interviews or press releases, journalists have had to build news stories off of 140-character tweets (or, more recently, 280-character tweets). This research project attempts to examine how Trump's use of Twitter has affected the ways in which journalists, especially broadcast journalists, have covered his campaign and his presidency thus far.

MEMORABLE MESSAGES OF SEXUAL ASSAULT
Meghan Butler
Poster: 191
Mentor(s): Bree Holtz (Advertising and Public Relations)

Sexual assault happens every 98 seconds in the United States, yet 344 out of 1000 cases go unreported. By definition, sexual assault includes any type of sexual contact that is non-consensual, forced or coerced, or when the victim is incapable of giving consent because of temporary or permanent mental or physical incapacity or because of age.This brings into question how we can stop sexual assault as well as increase the number of cases reported. One way involves the use of memorable messages which is defined as verbal messages that may be remembered for long periods of time, and can have a major influence on the person's choices in life. Memorable messages surrounding sexual assault have potential to impact behavior when individuals are faced with these difficult situations. The present study aims to determine: 1) types of messages regarding sexual assault that are reported as memorable by college students; 2) sources of these messages; and 3) how these messages influence behavior. In order for us to decide which memorable

messages were salient, we conducted a survey with undergraduate college students. We can use this information to determine what kinds of memorable messages on sexual assault students remember as well as the memorable messages that influence students' behavior when faced with a situation involving sexual assault.

DEVELOPING A WEBSITE FOR PARENTS OF CHILDREN WITH TYPE 1 DIABETES
Alexis McCarroll
Poster: 192
Mentor(s): Bree Holtz (Advertising and Public Relations)

Approximately 200,000 children and adolescents aged 0-20 years across the United States have Type 1 Diabetes (T1D). Due to the complexity of proper T1D management, it is typical for parents and caregivers to aid with management, at various levels of involvement throughout their child's life. The objective of this study was to analyze the concerns of parents and caregivers of children with T1D and address them in MyT1DHope, a website designed for parents to use throughout all stages of their child's T1D journey. Parents (n=52) of children with T1D completed a preliminary survey that collected demographic information about themselves and their child, primary forms of T1D treatment, sources for T1D-related information, concerns about their child's T1D, and their social media platforms. This data was used to help determine which resources should be included on MyT1DHope. After piloting the website, a post-test was given to the parents for feedback. Out of the primary concerns shared in the pretest, 66% were long-term concerns (e.g., puberty, driving, alcohol), 27% were immediate concerns (e.g., fluctuating and/or low numbers), and the other 7% were financial concerns. The parents who participated in the post-test (n=25) expressed positive feedback regarding the information and layout of the website. Due to the multitude of concerns regarding their child's T1D, it is valuable for parents to have a single online resource to aid with better management.

FAKE NEWS IN THE 2016 PRESIDENTIAL ELECTION
Rianna Middleton
Poster: 193
Mentor(s): Rachel Mourao (Journalism)

During the 2016 presidential election, a deep mistrust of the media began to come to the surface, and many people were concerned about so-called "fake news." However, this kind of labeling began to be very problematic, because it was ill-defined and was often used as a political tool to discredit journalistic institutions. This research project attempts to analyze what fake news actually is by examining content from fake news websites on both sides of partisanship during the 2016 presidential election. The goal was to shed light on what kind of content was created by fake news sites based on a variety of factors, including Trump valence, Clinton valence, sensationalism, ideological leaning, clickbait and misinformation. The research sought to examine why certain kinds of content went viral and whether or not fake news was purely misinformation or if it was mixing fact with partisan bias. The data was gathered through in-depth content analysis of several factors that allowed us to convert qualitative data into quantitative data. Findings suggest that there is very little fake news content with a large amount of misinformation. Results show that misinformation isn't a predictor for social media engagement. A large predictor, however, is a small amount of bias as well as a small amount of sensationalism. The implications of this research may help reveal the real problem with fake news — while evidence suggests that there is little content that is outright misleading, there is a large amount that threatens journalistic integrity.

DIGITAL MEDIA

ORAL PRESENTATIONS, SECTION 1
LAKE ERIE ROOM, 8:30 – 10:00 AM

FOCAL POINT
Michael Epps, Tony Black, Griffin Stroin
Time: 8:30 AM
Mentor(s): Bob Gould (Journalism)

Focal Point is an Emmy-award winning student newscast within the School of Journalism at Michigan State University. I learned about this newscast group early in my freshman year, and started contributing more and more as time went on. I became one of the Senior Producers in my sophomore year, and became the lead Senior Producer in the fall. Communicating with the reporters was a huge part of this job, but perhaps the most crucial part was teaching the new producers how the newscast works and what the title of producer entails. I spent the first couple shows training Griffin

and Tony on the production aspects of the show, and how to properly communicate with the reporters to create a seamless production experience.

STUDY ABROAD: PR A LA MEDITERRANEAN
Elena Behrman, Liv Weller
Time: 8:45 AM
Mentor(s): Amol Pavngadkar (Media and Information)

The purpose of this documentary to was highlight our time abroad during the PR a la Mediterranean Study Abroad program in Rome, Italy, in the summer of 2016. Although we aren't media majors, we thought this would be a great way to remember our experience and show the important things we learned while abroad. Filming class trips, daily tasks, Italian culture, and our time at the Cannes Lions Festival, we hope to show how this program influenced all of our lives and widened our view of the world around us.

BIAS BUSTING MOTION GRAPHICS
Alexa Seeger
Time: 9:00 AM
Mentor(s): Joe Grimm (Journalism)

In the tradition of the School of Journalism's Bias Buster guides, Alexa Seeger has created three motion graphics to answer questions about Chaldeans. The motion graphics are intended to provide a foundation of factual knowledge to further conversations and relationships with Chaldeans in our communities. The first motion graphic is called "Who are the Chaldean people?" and focuses on Chaldean culture and history. The second motion graphic is titled "Two waves of immigration," focusing on the Chaldeans' immigration to the United States and specifically Detroit. The third motion graphic is named "Global turmoil" and focuses on the persecution of Chaldeans and other Christians in Iraq. Alexa Seeger researched Chaldean history and culture. She then developed the motion graphics' illustrations and storyline. Joe Grimm, with local Chaldean leaders, developed the scripts. The motion graphics were built in Adobe Illustrator and Adobe After Effects. Narrators and instrumentalists featured in the motion graphics are Chaldean. These motion graphics will be published in the School of Journalism's Bias Busters edition "100 Questions and Answers about Chaldeans."

SPARTAN SPORTS REPORT
Michael Epps, Griffin Stroin
Time: 9:15 AM
Mentor(s): Troy Hale (Media and Information)

The Big Ten Network has a student branch at each university, and the Michigan State branch broadcasts games for all sports. They previously used a blank screen on their broadcast during the intermission of the games, so we decided to create a sports show to fill that time. We also decided to post the show online every week and use social media to get more views. We cover all MSU sports, from football and men's basketball to rowing and field hockey. We have a great crew comprised of students, who go out in the field as reporters and also gain great experience in the studio.

TRANSLATING FOOD SYSTEMS RESEARCH AND POLICY FOR PUBLIC AUDIENCES
Max Johnston
Time: 9:30 AM
Mentor(s): Dave Poulson (Journalism)

The Food Fix. A podcast where you hear from innovators and policy makers on how to better feed the world. That sounds intimidating, but don't worry. As journalists covering highly-technical stories, it's our job to present research in a digestible (get it, like food?) way for a large audience. For example, over the course of a four minutes we turn a study titled 'Complex three-dimensional self-assembly in proxies for atmospheric aerosols' into a podcast called 'Deep Fried Clouds: Fried Food May be Changing Our Weather.' That's just some of the work we do. Our stories are as vast as our topic: food. We interview voices from around the world about everything from potatoes to politics. As journalists we strive to find stories that capture the public's attention and informing them while scientists strive to have their research reach as many people as possible. At The Food Fix, we're bridging that gap through storytelling. The Food Fix's Host and Producer Max Johnston will take you through the stories we produce and how we're bringing them to you.

CAREER EXPERIENCE OUTSIDE THE UNIVERSITY
Elizabeth Keller, Hannah Byrd, Diamond Lee
Time: 9:45 AM
Mentor(s): Amol Pavangadkar (Media and Information)

The operation time for entertainment varies on the category. The whole filmmaking process can take up to six months or more to complete. Professors, graduates, and undergraduates from MSU were able to produce and film a short story in less than four months. Undergraduate students rarely gain real world experience outside the classroom. The goal was to give graduates and undergraduates a taste of industrial filmmaking as well as a networking opportunity. The 39 participants during the project, Anya's Green Card, will be given a questionnaire and give a testimony. The results will be evaluated on the participants gains and setbacks during the filming.

DIGITAL MEDIA
ORAL PRESENTATIONS, SECTION 2
LAKE ERIE ROOM, 11:00 – 12:15 PM

POISONED SUCCESS
Eugene Kutz
Time: 11:00 AM
Mentor(s): John Valadez (Media and Information)

I'm producing a documentary about environmental justice, with support from the Knight Center for Environmental Journalism and filmmaker John Valadez. It's about a little group taking on a big company that poisoned its own hometown. When Michigan shoe company Wolverine Worldwide made Hush Puppies famously popular, the Grand Rapids area reaped the benefits of economic prosperity. The company expanded and now owns Merrell, Sperry, Keds and many other world famous brands. Decades later, a small but focused group of individuals uncover an eerie truth surrounding Wolverine's success story. Perfluoroalkyl substances (PFASs), the key ingredient in Scotchgard, a fabric protector and stain repellent, is an unregulated chemical ingredient used in the leather for Hush Puppies. Due to irresponsible dumping, PFASs leeched into the residential water table, poisoning hundreds, if not thousands, of people. Many residents are suffering from diseases associated with PFASs, and the rest are living in fear of drinking their water as more line up for blood testing. Experts say its an epicenter for "the next asbestos" with national and global implications. The world is watching Wolverine Worldwide. In essence, this is a story of perseverance, sleuthing, and the team that dug deep and acquired key information in an unusual way. I'm developing it over the course of my final three semesters at MSU for a documentary production minor through the School of Journalism. We are currently seeking funding and students interested in working on this project. I'll be presenting what I've accomplished so far.

JOURNALISM BROADCAST MINOR
Kendall Ashman, Michael Epps
Time: 11:15 AM
Mentor(s): Bob Gould (Journalism)

Michael and I are sharing a video promoting the new broadcast minor as well as opportunities the Journalism School has to offer for broadcast students. Michael will focus his portion of the video on sports and I will focus on news.The video will then be shared to prospective journalism students and shared on the website.

SPARTAN SPORTS JOURNALISM CLASSIC
Alexis Downie, Angelina Bazzano
Time: 11:30 AM
Mentor(s): Joanne Gerstner (Journalism)

We were in charge of helping coordinate the event, while running social media the day of the event. We interacted with School of Journalism alumni to instruct them on the day of the event. We also gathered biographies of each alumni. For our presentation, we will present a powerpoint that shows all of the work we did leading up to the event and then the actual event day photos. We will just need a laptop with a projector and powerpoint.

STANDING UP

Terrence Peugh, Alec Comes
Time: 11:45 AM
Mentor(s): Amol Pavangadkar (Media and Information)

All his life Greg has been a little different. From his obsessions with calculators to his lack of social skills he was always meant to be an accountant. His Mother Maureen, however, had other plans. She wanted Greg to follow in his father's footsteps and pursue a life in stand-up comedy. Following the passing of his father, It seemed Maureen would have her way But after receiving a promotion at his accounting firm Greg finally gains the power and confidence he needs to defeat his demons.

PIECING TOGETHER A STORY
Ilene Gould, Audrey Matusz
Time: 12:00 PM
Mentor(s): Geri Zeldes (Journalism)

Filmmaking is all about finding a story in everyday life. Throughout the production of this project we followed the life of a Medical Student, Nadya Ali, and her experiences with the LMU program, also known as "Leadership in Medicine for the Underserved," a program based out of Flint, Michigan. As visual storytellers, we examine our creative process throughout the planning, researching, shooting, logging, and editing of countless hours of footage in order to create a documentary feature of this nature. While we hope to show you the life of Nadya through the lens, we also hope to demonstrate what it's like to be a filmmaker behind the camera and the ins and outs of our creative process.

EDUCATION

ORAL PRESENTATIONS, SECTION 1
LAKE MICHIGAN ROOM, 11:00 – 12:15 PM

WHAT SUPPORTS AND RESTRICTS FACULTY ADOPTION OF THE THREE DIMENSIONS FRAMEWORK IN UNDERGRADUATE STEM COURSES?
Brandon Goocher
Time: 11:00 AM
Mentor(s): Becky Matz (CREATE for STEM)

The National Research Council's Framework for K-12 Science Education provides a vision for connecting the use of reasoning and evidence to student learning in science, a vision that is also applicable to higher-level education. This vision integrates scientific practices, crosscutting concepts, and disciplinary core ideas into a framework known as three-dimensional learning (3DL). However, the factors that support and restrict sustainable adoption of 3DL by faculty teaching undergraduate STEM courses remain elusive. Here, we report such barriers and levers identified by faculty from one cohort of the STEM Gateway Fellowship, a two-year professional development program here at Michigan State University focused on encouraging faculty adoption of 3DL in their courses. Audio recordings of Fellowship meetings were collected and transcribed. An undergraduate researcher proofed the transcripts by comparing them to the audio recordings. We then began an iterative, open-ended coding process to develop a coding schema that would be applied to future transcripts. Two blind coders independently identified barriers and levers present in the meeting discussions and developed the schema that contains consensus barriers and levers. The final schema will be used to analyze all meeting recordings and comprehensively identify and understand the barriers and levers that faculty experienced. These findings will be used to inform researchers and professional development for faculty as to what supports and restricts adoption of the 3DL framework in undergraduate STEM courses.

EXPLORING FUNDS OF KNOWLEDGE IN AN ELECTRIC ART LESSON
Chelsey Thelen, Olivia Eiden
Time: 11:15 AM
Mentor(s): Angie Calabrese-Barton (Teacher Education)

We studied how 6th-grade students leverage their "funds of knowledge" [FoK] towards deeper learning during an engineering investigation into electric art. Our questions include, How do students use their FoK to support deeper learning of energy transformation and engineering practices during a design investigation focused on electric art? How do teachers create pedagogical spaces for these FoK to emerge? FoK are the social practices youth have developed and knowledge they have produced and acquired in their everyday lives. We investigated this topic by using a) audio and

video recordings of classroom lessons, and b) student and teacher interviews. Findings reveal that students leveraged multiple forms of funds of knowledge that cross-cut home and community. Teachers utilized pedagogical moves, including “creating space” and “investigating new ideas” to welcome and support the students’ FoK. We noticed students applying FoK from their community, family activities, and past experiences while creating their electric art. This intelligence was celebrated and supported by teachers throughout the implementation of this project. We observed that the opportunities to use their funds of knowledge supported the students in doing “more complex” science and engineering. For example, to make a card with two light-up balloons to encourage his little brother, one student had to figure out how to make a parallel circuit. We noticed that students spent more quality time on their projects, as many youth worked during free time to perfect their projects. Our findings promote science education to be more equity-oriented in supporting teachers and students.

EFFECTS OF DEMOGRAPHICS AND PRIOR EXPERIENCE ON SUCCESS IN AN INTRODUCTORY ANIMAL SCIENCE COURSE
Brittany Mankowski
Time: 11:30 AM
Mentor(s): Karen Waite (Animal Science)

College level introductory courses typically cover the most basic material pertinent to that topic, due to the assumption that prior knowledge is limited. In a field such as animal science, however, it is not uncommon for some students to have already been exposed to that lifestyle through prior experiences and childhood atmosphere, while other students have little to no exposure. A survey was conducted not only to determine whether or not substantial knowledge was retained in an introductory animal science course, but also to identify what factors, prior animal experience in particular, mediated improvement in test scores. Students were given a preliminary test of information to be covered during the course at Michigan State University (ANS 110), which was followed up by a post test at the end of the semester. Additionally, each of the participants completed a survey outlining his or her previous animal experience, GPA, age, youth agriculture organization participation, year in college, and major, among other characteristics. In 2017, those categories were statistically compared to see if there was a substantial correlation between them and pre/post test score improvement. Other studies in combination with this one failed to find a strong relationship between previous animal experience and grade. The study was adjusted with focus on increasing participation and how animal experience, more so than other factors, affected success. The revised design is being implemented this spring semester, so current analysis will emphasize how previous experiences affect success on the pre-test score and the new design's impact on participation.

BEST PRACTICES FOR DEVELOPING OUT-OF-CLASS LEARNING ACTIVITIES FOR CHEMISTRY COURSES
Alec Shrode, Brianna Martinez
Time: 11:45 AM
Mentor(s): Ryan Sweeder (Chemistry)

Online learning resources, including simulations and illustrations, are becoming more widespread in education. Their ability to integrate macroscopic, microscopic, and symbolic levels of representation contribute to their widespread use in chemistry courses, especially for depicting interactions at the molecular level. Although there has been some research about how these visualizations influence student learning, little research has focused on effective design of companion assignments. To understand the role of design in student learning, both guided simulation activities and screencasts were

LITERACY COME TO LIFE: ENGAGING DETROIT YOUTH IN THE IDEAS OF STORYTELLING, SELF-EXPRESSION, AND PHILANTHROPY
Ryan Roehler
Time: 12:00 PM
Mentor(s): Kevin Brooks (Arts & Humanities)

In my presentation, I focus on my pedagogies within the Literacy Come to Life program in Detroit, MI, where I engaged with a group of 20 students, grades 4 through 6, in the concepts of storytelling, self-expression, and philanthropy. Over the course of an academic year, I guided these students through interactive and kinesthetic learning activities designed to improve their literacy skills, to increase their sense of self-efficacy and social responsibility, and, ultimately, to support their academic success. I began the program by reading and discussing a short story titled Tavon Does It All, which explores the ideals of empathy, cooperation, and service. Then the students were tasked with exploring and expressing their identities, and the identities of their peers, through creative and reflective workshops, where they, over time, gained confidence in their abilities as storytellers and realized the power of sharing their stories to affect change in their communities.

EDUCATION
POSTER PRESENTATIONS, SECTION 1
BALLROOM, 9:00 – 10:30 AM

QUESTION DEVELOPMENT USING UNDERGRADUATE STUDENTS' WRITING ABOUT THE ORIGIN OF GENETIC VARIATION

Hailey Cockerill
Poster: 196
Mentor(s): Mark Urban-Lurain (CREATE for STEM)

Genetic variation is an important core concept for undergraduate biology education as highlighted in "Vision and Change In Undergraduate Biology Education: A Call to Action" (AAAS, 2011). How new genetic variants originate in a population is challenging for students to understand because of the common misconception that mutations are harmful. The Automated Analysis of Constructed Response research group (AACR) develops computer-automated tools to analyze students' writing that use statistical analysis to predict human scoring. Our research group develops assessments focusing on "big ideas" in undergraduate STEM courses. To reveal student thinking on genetic variation, AACR uses constructed response assessments, in which students write short answers using their own words. In this study we developed a CR question about how a rapid increase in frequency of a new coat color in a population of buffaloes occurred. A qualitative analysis of responses using computerized tools (n=401) revealed several themes. However, many students restated phrases directly from the prompt, which lead us to revise the prompt. Qualitative analysis of most recent data responses (n=143) led to another prompt revision, which was distributed at two research universities. Analysis of data from University #1 revealed a strong reference to sexual mechanisms of the origin of genetic variation. This trend could indicate different instructor styles that may influence students' writing; however, more data is needed. Variation in student writing is beneficial for model generation; therefore, the resulting computer model will be capable of handling a diversity of written student language.

COMPUTER MODEL DEVELOPMENT TO ANALYZE STUDENT STRUCTURE FUNCTION UNDERSTANDING

Tanner Foster
Poster: 197
Mentor(s): Kevin Haudek (Biochemistry & Molecular Biology), John Merrill (Microbiology & Molecular Genetics), Mark Urban-Lurain (CREATE for STEM)

"Structure and function" is one of five core concepts for biological literacy identified in Vision and Change for Undergraduate Biology Education. However, many students struggle to understand this topic. Compounding the problem, increasingly large class sizes make understanding what students think especially challenging. The Automated Analysis of Constructed Response (AACR) group is developing computer tools that analyze student writing, which can be applied in classrooms of any size. To do this, we are creating machine-learning models that can accurately predict expert scores for student constructed responses to a question about enzyme binding, a common example of structure and function relationship in introductory biology courses. We developed an analytic rubric that contained bins ranging from structure-focused responses, such as lock-and-key or induced fit, to function-focused responses discussing energetics or reaction rates. The classification used for these bins was developed through analysis of student responses, as well as instructor interviews in which learning goals were identified among various courses. Differences in terminology used between instructors from different disciplines were incorporated into rubric development in order to encompass a wide range of student responses. Reports generated from these models can be used to guide instruction and better allow instructors to address misconceptions in the classroom.

DENOTING LEADERSHIP ACTIONS/TRAITS IN GROUP WORK

Kristy Griswold
Poster: 198
Mentor(s): Danny Caballero (Physics), Paul Irving (Physics), Daryl McPadden (Physics)

P^3 is an introductory mechanics based physics class at MSU that replaces lectures with a PBL learning environment. To promote the development of group based practices, students all receive group and individual feedback at the end of each week. The groups are comprised of four students, one of which often takes on the role of being the group's "leader". Developing leadership based skills is a specific learning goal of the P^3 learning environment and the goal of this research is to examine what actions/traits students in P^3 demonstrate while working in their group. The initial phase of this study examines multiple pieces of literature to identify possible characteristics and behaviors that may

present themselves in potential leaders. In this poster, we present the initial phase of our code book and a preliminary example of how it can be used to denote leader(s) and followers in our case study.

CLOSING THE OPPORTUNITY GAPS FOR BLACK MALES IN K-12 EDUCATION
Tim Herd
Poster: 199
Mentor(s): Chezare Warren (Teacher Education)

This research examines the opportunity gap and the adverse effect it has on young Black males in k-12 education. The opportunity gap is deficiencies in the foundational components of societies, schools, & communities. Through the use of survey questionnaires' in the form of a general teacher's belief scale, roughly fifty to seventy teachers will respond. Prior research suggests the opportunity gap is being perpetuated through race and socioeconomic status, with people of color being at the tail end of both categories. I will be examining these deficiencies that a diverse group of teachers may have which consequently contribute to this opportunity gap in schools. I will be searching for deficiencies in the areas of: color blindness, low expectations & deficit mindsets, context-neutral mindsets, cultural conflicts, and the myth of meritocracy. Follow ups will be done for ten teachers to uncover their feelings while taking the survey and what areas they can improve upon if necessary. The goal of the research is to create another sufficient measuring scale of teacher's empathy on students of color, as there are already two with teacher's conceptions and teacher's application of empathy. This scale will be called the general teacher's beliefs scale which examine those five areas that teachers may be able to improve upon.

RELATIONSHIP BETWEEN PROJECT BASED LEARNING AND STUDENT ENGAGEMENT
Peter Hulett
Poster: 200
Mentor(s): Nathan Burroughs (CREATE for STEM), Barbara Schneider (Education)

This study seeks to determine if Project Based Learning (PBL) increases engagement and higher grades among students who are performing average to below average in their courses. Using the Experience Sample Method (ESM), we were able to record students' feelings in the classroom. These reactions, synthesized with data collected from transcripts will help us determine if PBL is having an impact on engagement and performance. Phones distributed to students in eight classrooms containing surveys which ask about student feelings and engagement are set to go off at different times during the class. The results from these tests are uploaded and merged with transcripts of the same students who took

THE WORD NERDS PROJECT
Lindsey Kronemeyer
Poster: 201
Mentor(s): Laura Tortorelli (Teacher Education)

This poster shares the results (so far) of a year-old collaboration with two Intermediate School Districts in Michigan around Word Study. Sixteen K-4th grade teachers and their classes participated in in the project. At the beginning and the end of the year, teachers collected spelling inventories and additional spelling data from their students as well as standardized literacy test scores (e.g., DIBELS, F&P Benchmarks Assessment). This study tested the claim of developmental spelling theory (Bear, Invernizzi, Templeton, & Johnston, 2015; Ehri, 2005; Sharp, Sinatra, & Reynolds, 2008) that children can learn to spell words by analogy. The hypothesis was that elementary students would perform similarly on similar spelling items, for example, a child who could spell dig would also be able to spell jig, and a child who could spell coach would also be able to spell poach.

RACIAL TARGETING AMONG YOUTH: HOW TEACHERS RESPOND TO RACIAL TENSIONS AMONG STUDENTS IN PUBLIC MIDDLE AND HIGH SCHOOLS
Victor Ruiz-Divas
Poster: 202
Mentor(s): Terry Flennaugh (Teacher Education)

In the wake of the 2016 presidential election, the Southern Poverty Law Center (SPLC) released a nationwide survey that questioned the impact of the election on the school and students. Out of 10,000 participants consisting of teachers, administrators, and other school faculty, 90% of the participants claim there has been an overall negative impact on the school's climate (SPLC, 2016). The increase of verbal and physical harassment, racial slurs, and racial symbolism within schools has been attributed to the increase of hate and discrimination against marginalized groups which has been incited by the current president's rhetoric and political views (SPLC, 2016). In a society that was founded on and currently is dominated by racist and biased values, which was created through the spread of fear and ignorance towards

marginalized communities, many people become socialized around those select values (Harro, 2000). This in turn leads to the oppression and racially biased behaviors towards communities of color we see today in our society (Harro, 2000). With exposure to these ideologies and situations, children and adolescents may also become socialized to these similar values. This can lead to negative views towards their peers in school, which can result to racial targeting through chants, vandalism, and blatant altercations. This project examines the racial targeting of Black and Hispanic students in American public middle and high schools and focuses on how teachers respond to these racial aggressions from 2016 to our current time. For this project, I am addressing two research questions; 1) How are teachers trained to respond to racial issues among students? and 2) How do teachers respond to racial issues among students? To answer these questions, I conducted a content analysis of both news articles (2016—Present) and scholar research articles. I have also conducted voice recorded interviews with teacher educators, teachers, and teacher candidates in the MSU College of Education. It is important to see how our teachers respond to these issues. It is also important to see how teachers and teacher candidates are trained to respond to these issues. To gain a better understanding to how teachers respond, we must look at how they are trained in teacher education programs.

EDUCATION
POSTER PRESENTATIONS, SECTION 2
BALLROOM, 1:00 – 2:30 PM

STUDENT CONCEPTIONS OF STRUCTURE-FUNCTION RELATIONSHIPS IN CELL MEMBRANES.

John Knapp
Poster: 205
Mentor(s): Kamali Sripathi (CREATE for STEM), Mark Urban-Lurain (CREATE for STEM)

Student understanding of the structure-function relationship is an important core concept for undergraduate biology education as seen in "Vision and Change In Undergraduate Biology Education: A Call to Action" (AAAS, 2011). Structure-function specifically regarding cellular membranes is an important underlying concept for understanding most cellular processes. The goal of this research is to identify the most common student ideas about cellular membranes. Multiple Choice (MC) questions may not reveal the complete thought processes of students. Constructed response (CR) questions offer a more complex view of student thinking than MC questions. The Automated Analysis of Constructed Response (AACR) research group uses machine learning to provide lexical and statistical analysis of student constructed responses that predict expert human scoring. To understand student thinking about structure-function, we are developing a question that asks students to explain why individual phospholipid molecules in a membrane do not flip sides. We collected responses from 777 students from two universities. Consensus scoring between three scorers was done to develop consistent scoring and to uncover other emergent student conceptions that may be added to the scoring rubric. The most prevalent concepts about why membrane phospholipids will not flip include: unfavorable interactions between hydrophobic/hydrophilic parts of the lipids, unfavorable energy requirements, and integral proteins preventing movement. To further understand student thinking, eleven student interviews were conducted. Next steps include analyzing the student interviews, and obtain inter-rater reliability among human scorers. Our goal is to provide reports to instructors that represent the complexity of student thinking about this question.

AGRISCIENCE EDUCATORS' WORK-FAMILY BALANCE ABILITIES AND RELATIONSHIPS

Samantha Ludlam
Poster: 206
Mentor(s): Aaron McKim (Community Sustainability)

In the United States, Career and Technical Education (CTE) is a critical facet of secondary education and integral part of training our nation's workforce. One sector of CTE, Agriculture, Food & Natural Resources Education, is noted for having very untraditional educators (i.e., henceforth referred to as agriscience educators) that are not only instructors in their classrooms and laboratories, but also advisors to FFA chapters. Furthermore, agriscience educators are encouraged to facilitate supervised agricultural experiences (SAEs) for students throughout the entire calendar year, often outside of the classroom and laboratory. The nontraditional nature of the agriscience education profession has produced nontraditional lifestyles and nontraditional definitions of work-family balance. In this research, a previously collected, national dataset of 234 agriscience educators was analyzed with permission from Tyson Sorensen, Ph.D. from Utah State University. These data were analyzed to evaluate relationships between (a) gender and agriscience educators' perceived work-family balance (WFB) ability, (b) number of children and WFB ability, and (c) the combination of number of children and gender on agriscience educators' perceived WFB ability. Although no statistical significance was found between any of the variables measured, different trends throughout the data helped identify implications for the agriscience education profession. Specifically, lower WFB abilities for women across all categories was a repeating trend found in the data. Identifying and further evaluating this trend and others will continue to track the progress that

implementing different professional development programs, or management techniques can have for agriscience educators, and their families.

CHARTER SCHOOLS AND THE CHANGING TONE OF EDUCATION POLITICS
Susanne Mackel
Poster: 207
Mentor(s): Rebecca Jacobsen (Educational Administration)

Charter schools have become an increasingly important issue in major school board elections. They are a growing alternative to neighborhood schools, and many parents and community members see them as an appealing choice, especially when neighborhood schools are not seen as performing adequately. Others see them as drawing resources away from neighborhood schools, and as presenting problems with equity of admissions. Because Charter Schools have become such a contentious issue with strong advocates on both the for and against side, expansion of charter schools has become a key issue in some recent school board elections. For my research, I examined mentions of charter schools in school board elections. My research questions were, how are charter school issues discussed in school board elections? Does the degree of polarization over this issue increase in candidates over time? To research the changing nature of this conversation, I examined both the number and tone of mentions of charter schools in 241 newspaper articles detailing school board elections in 5 major districts. This data and the conclusions drawn from it is important because they connect to the changing tone of education politics in that participants are being driven to take extremely polarized stances on contentious issues.

DIFFERENCES IN ENGLISH-ONLY AND SPANISH IMMERSION INSTRUCTION WHEN TEACHING ENGINEERING FOR SUSTAINABLE COMMUNITIES
Molly McGinnis
Poster: 208
Mentor(s): Angela Calabrese Barton (Teacher Education)

In our poster, we aim to explore differences in how sixth-grade students at a Spanish Immersion Elementary/Middle School learn about engineering for sustainable communities. Spanish immersion classrooms provide cultural immersion giving greater appreciation of diverse perspectives (Downs-Reid, 2000). However, in the context of science/engineering more research needs to be done to understand how students, especially students whose first language is not English and who are culturally diverse enact practices and disciplinary core ideas in their science classrooms. In this paper, we argue that students who chose to participate in the Spanish immersion program, have a higher social and cultural capital in science than those students who are in English only classrooms. We use social practice theory (Holland and Lave, 2009) and science capital (Archer et al., 2015) where we want to look at how struggles with learning science in both Spanish immersion and English only classrooms are supported or not by the science capital students bring into their learning. Our data include an enactment of over 4 weeks of the I-Engineering curriculum implementation at a Spanish immersion school. We will also use mid-artifact and final artifact interviews of students to better understand their use of science capital in explaining knowledge of science practices and disciplinary core ideas. This study has important implications for how students in Spanish Immersion and English only classrooms succeed or struggle with domain-specific language of science and engineering and how language acquisition can help support or hinder learning of STEM for culturally diverse students.

THE RELATIONSHIP BETWEEN PRESCHOOL CHILDREN'S ORAL AND WRITTEN LANGUAGE ON A COMPOSITION TASK
Sydney Miller, Kelsey Johnson, Rachel Stadwick
Poster: 209
Mentor(s): Hope Gerde (Human Development & Family Studies)

Early writing in children is a skill that has been positively correlated to later school success (National Early Literacy Panel [NELP], 2008), and a range of early literacy skills (Diamond, Gerde, Powell 2008). Writing, even for young children, includes three components, handwriting (the specific forms of letters), spelling (the connection between letters and letter sounds), and composing (the message or ideas to share) (Kaderavek, Cabell, & Justice, 2009). While most research on early writing development focuses on handwriting and spelling (e.g., Puranik & Lonigan, 2011), work examining teachers' scaffolding of writing demonstrates targeting composing is particularly meaningful for supporting early writing development (Bingham, Quinn, & Gerde, 2017). Unfortunately, current measures of early writing do not include assessment of early composing, until now. This study utilizes a novel early writing assessment (Gerde & Bingham, 2017) to answer two research questions 1) what are the characteristics of young children's writing composition and 2) what is the relation between the oral language output and written output of these compositions. 350 children (ages 3-5 years) were assessed on the Gerde & Bingham Writing Protocol (Gerde & Bingham, 2017) in the fall of their

preschool year. Research assistants coded the data using a complex system to examine children's oral and written language output and the relation between the two (interrater reliability is .97). To answer research question 1, descriptive statistics will be used. To answer research question 2, correlation and regression analyses will be used. Implications for future data collection and practice will be discussed.

CONNECTING LITERACIES IN GENERAL EDUCATION SCIENCE COURSES
Alexander Reddy
Poster: 210
Mentor(s): Claudia Vergara (Center for Integrated Studies and General Sciences)

Democratic societies embrace the belief that people have the right and the responsibility to influence issues that affect them. In relation to science and technology decision making, there is a shift in the traditional perception of "trust us because we [scientists] are the experts", towards greater public participation. Our challenge is to provide all students the opportunity to make sense of science in ways that are relevant to their lives and reflect their responsibility in making decisions. The Center for Integrative Studies in General Science curricula focuses on scientific literacy (SL) and delivers intentional connections between SL, quantitative, standards and information literacies. Our objectives are to enhance students' abilities to interpret scientific findings and make informed decisions on issues ranging from personal health, to global environmental policies. We will discuss our work with standards literacy; standardization processes affect global challenges and guide businesses and organizations in implementing safe and efficient practices, that are sustainable for the environment, the economy and society. Our process involves collaboration between the faculty teaching the courses. We use case studies that focus on specific environmental and health issues and confront students with ethical and social justice implications. The modules include activities where students are required to practice different skills grounded in different literacies. We will present our analyses including student surveys, and artifacts related to the standard instructional modules. Our preliminary results indicate that participation in the standards modules contributes to increased awareness about the important role that standards play in our daily lives.

EDUCATION
POSTER PRESENTATIONS, SECTION 3
BALLROOM, 1:00 – 2:30 PM

MAY THE BEST WOMEN OF PHYSIOLOGY WIN: WOMEN FACULTY ACCOMPLISHMENTS IN PHYSIOLOGY
Kenya Daniels
Poster: 214
Mentor(s): Danita Brandt (Earth and Environmental Sciences)

Women enrolling into college was once proclaimed as a "dangerous experiment"[3]. Through the historic Women Civil Rights Movement, women students began enrolling into college all across America. During the desegregation of American colleges, female students were up against major biases from male professors while being resented by their male peers[3]. Nevertheless, a few professors thought female students had a real shot in a "male traditional" field. The overall goal of this research project is to shed light on accomplished women faculty and students from the department of physiology at Michigan State, University of Michigan and Ohio State. Data has been collect from the three school's physiology department newsletter, department homepage, University Archives and the Heritage Project from University of Michigan. *Keywords:* women, physiology, Heritage Project, STEM, Women Civil Rights Movement

WOMEN IN ELECTRICAL ENGINEERING AT MICHIGAN STATE UNIVERSITY AND COMPARISON TO NATIONAL AVERAGES
Ashleigh Gray
Poster: 215
Mentor(s): Danita Brandt (Earth and Environmental Sciences)

The field of electrical engineering has severe gender inequality. There are many reasons for this gender gap. Collecting data on gender distribution in academic departments is a way of identifying patterns and working toward understanding why women might be leaving the field. The purpose of this research is to compare the percentages of women faculty and undergraduates at Michigan State University to national averages of women in electrical engineering and analyze it in comparison to studies that have been done on why women leave the engineering field altogether. Gender disparities are important and complex issues for the world of engineering and need to be addressed in every aspect of the environment in which engineers surround themselves. Discussing and comparing gender statistics and data shines a light on one of the largest issues facing engineering today, and is the first step in correcting this situation.

FEMALE PALEONTOLOGISTS AT THE BIG 10 UNIVERSITIES
Lynnea Jackson
Poster: 216
Mentor(s): Danita Brandt (Earth and Environmental Sciences)

There are fewer women in STEM positions than men as is seen in many fields. In paleontology (including the subdisciplines of micropaleontology, paleobotany, palynology, vertebrate paleontology, invertebrate paleontology, paleobiology, and paleoecology), the same is true. Among Big 10 universities male faculty in paleontology currently outnumber female faculty in paleontology 40:14. Michigan State University (MSU) has a total of two paleontologists; one male and one female. This one to one ratio makes MSU one of two schools with equal representation of men and women in paleontology. In 1980 there were no women in any of the Big 10 schools and in 1990 there were two. The data from 2017 show a positive trajectory for women in paleontology. The University of Michigan (UofM) has the greatest number of female paleontology faculty in the Big 10. For this reason, I interviewed Dr. Catherine Badgley (UofM) to understand her experience as a woman in this field. I also researched Dr. Jane Smith Elliott, a paleontologist at MSU (1943-1977) who was MSU's first female faculty member in paleontology.

FEMALE FACULTY IN STEM AT MSU:DEPARTMENT FISHERIES AND WILDLIFE AT MSU COMPARED TO OTHER MIDWEST UNIVERSITIES
Margaret Jones
Poster: 217
Mentor(s): Danita Brandt (Earth and Environmental Sciences)

As with many disciplines, the number of women interested in the field of Fisheries and Wildlife has been increasing over the years. Like other STEM fields, this career path faces difficulties with stereotyping scientists and professionals as being men. Even though this notion is slowly disintegrating, there are still inequalities when looking at the ratio between men and women in STEM fields, and Fisheries and Wildlife is no different. At MSU, the number of women faculty has been increasing slightly every year, but there are still only 35.7% in the tenure system faculty. This is mirrored in the Fisheries and Wildlife department, where only 36% of the professors are female. These data were compared to the data on female professors at 14 other midwest universities that offer a fisheries and wildlife related major.

WOMEN IN STEM AT MSU: THE NEUROSCIENCE PROGRAM
Kiera McRae
Poster: 218
Mentor(s): Danita Brandt (Earth and Environmental Sciences)

The field of neuroscience is a relatively new area of study, becoming popular in the 1970s. The Neuroscience program at Michigan State awarded its first doctorates degrees in 1987, the first master's degrees in 2007, and the first bachelor's degree in 2014. From 1987-2015, MSU has awarded degrees to 82 women and 68 men. After 10 years of planning, the undergraduate neuroscience program was established at MSU in 2012. The program was founded by the current neuroscience undergraduate director, Dr. Laura Symonds. The program has grown exponentially in the six years since it was established and currently has 750 students enrolled. Of those students, there is a surprising majority of females in comparison to the current faculty numbers. After analyzing the current data of women in neuroscience at MSU, there are far more female students receiving degrees than men, but more men at MSU in professorial positions.

WOMEN IN STEM: REPRESENTATION AT MSU IN THE FIELD OF ECONOMICS (1957-2018)
Jordan Polk
Poster: 219
Mentor(s): Danita Brandt (Earth and Environmental Sciences)

Female faculty in Economics departments across Michigan are greatly unrepresented, compared to men, facing many barriers to entry and development in their professional fields. Michigan State University does not stray from this pattern. Currently, only 20.4 percent of faculty in the MSU Department of Economics is female and an even smaller percentage are of professor status. Despite this, there have been various improvements to the department in order to increase the quality of treatment and representation of these women. The purpose of this study is to document the number of female faculty currently in MSU's Department of Economics and show by how much – if any – Michigan State University has improved female faculty representation in the male-dominated field of Economics.

THE FEMALE FACULTY IN STEM AT MSU: BMB (2017)
Madelyn Rescorla, Brianna Finn

Poster: 220
Mentor(s): Danita Brandt (Paleobiology and Paleoecology, Invertebrates)

Michigan State University's Department of Biochemistry and Molecular Biology (BMB) was formed in April of 1961 and is now the largest Biochemistry Department in the country. MSU's department also has the most female faculty with 17 female faculty in the department. Having female faculty within the department has a large impact by encouraging other women to enter the field. MSU's contribution was examined and compared to Biochemistry Departments at the other Big Ten schools. Faculty percentages were compiled by gender and faculty rank, and research was done on the importance of distinguished professors. The Big Ten schools were chosen for this comparison due to their similarity in size and focus to MSU. MSU has the highest number of female faculty with 3 female Distinguished Professors, the most among all STEM departments at MSU. Further improvements to roadblocks within the field are working to inspire women from a young age to enter not just Biochemistry fields but all STEM fields. One way to do this is targeting scholarships in STEM fields towards female students. Biochemistry, like most STEM disciplines is still male-dominated, however MSU's success in recruiting and retaining female faculty compared to other MSU STEM departments is a good start in making it a field of equal opportunity.

THE STATUS OF FEMALE PROFESSORS IN THE DEPARTMENT OF PSYCHOLOGY AT MICHIGAN STATE UNIVERSITY (1946-2017)

Sydney Riedel, Aubrey Grevemeyer
Poster: 221
Mentor(s): Danita Brandt (Earth and Environmental Sciences)

The contributions of women to STEM disciplines are often overshadowed by those of their male peers, if for no other reason than the fact that men outnumber women in STEM. However, in the Psychology Department at MSU the percent of female faculty has been growing since the Department was founded. In 1955, with the first mention of the Psychology Department at MSU, merely 5% (1:18) of professors were women. In 2017, that number has increased dramatically to 49% of professors at Michigan State. The number of female psychology professors has been growing as the number of male psychology professors has been diminishing, resulting in near-parity of male and female faculty. This pattern is reflected in the overall psychology workforce as well.

EDUCATION
POSTER PRESENTATIONS, SECTION 4
BALLROOM, 3:00 – 4:30 PM

COMPARING STUDENTS' EXPLANATIONS OF THE FORMATION OF LONDON DISPERSION FORCES

Robert McKay, Matthew Neumann
Poster: 224
Mentor(s): Melanie Cooper (Chemistry)

A fundamental concept in chemistry is intermolecular forces because they explain how atoms and molecules interact. CLUE (Chemistry, Life, the Universe, and Everything) has been the established general chemistry curriculum at Michigan State for several years. In CLUE a greater emphasis is placed on the structural basis for intermolecular forces. We specifically focused on undergraduate students' text and drawing responses to a prompt asking about the formation of London Dispersion Forces (LDFs) between two neutral atoms. We looked at two cohorts of undergraduate students who were enrolled in the second semester CLUE version of general chemistry, with some having taken the first semester of CLUE general chemistry and others having taken a first semester of a traditional general chemistry class. We used a predetermined coding scheme to characterize the level of causal mechanistic understanding that each student had of the formation of the interactions. The hope was that students enrolled in CLUE for both semesters would exhibit a more sophisticated understanding of the process of LDFs forming between neutral atoms than those students enrolled in a traditional class the first semester. This comparison between the two cohorts of general chemistry undergraduate students then allows us to analyze the efficacy of CLUE and improve future instruction.

GETTING A CLUE (ABOUT CHEMISTRY) IN HIGH SCHOOL
Robert McKay
Poster: 225
Mentor(s): Melanie Cooper (Chemistry)

Different disciplines pose distinct and significant challenges to students' coordination, extension and use of knowledge. For example, a molecular level explanation of how the evaporation of sweat cools the body requires students to leverage knowledge about energy transfer between molecules and intermolecular forces to reason about populations of interacting particles. Atoms and molecules are far removed from students' experience and their behavior cannot be intuited based on macroscopic observation alone. A great many resources needed to understand how the world works at a molecular level must therefore be derived from instruction. Purposeful, evidence based sequencing and scaffolding of core ideas in chemistry can support students in developing coherent knowledge useful in reasoning about molecular level phenomena. The undergraduate curriculum Chemistry, Life, the Universe, and Everything (or CLUE) serves as an evidence-based prototype of what scaffolded progressions of core ideas might look like in chemistry. Here we report on our program aimed at adapting CLUE conceptual progressions for use in high school. Nine teachers worked with the project team to craft a working model of CLUE for high school that is appropriate in scope, well-aligned with the physical science performance expectations of the Next Generation Science Standards, and focused on explaining, predicting, and modeling phenomena at the molecular level. Five of these teachers are piloting the materials we developed in their classroom for the 2017-2018 school year. We report here on the adaptation effort as well as student performance on several assessment prompts. Plans for continued curriculum refinement will be discussed.

FUNDING FOR THE FUTURE GENERATIONS OF FEMALE UNDERGRADUATE COMPUTER SCIENTISTS AT MSU
Olivia Mikola
Poster: 226
Mentor(s): Danita Brandt (Earth and Environmental Sciences)

The number of female undergraduates majoring in computer science (CS) at Michigan State University has fluctuated over the last quarter-century. Enrollment of undergraduate women in this major fell from 1994 to 2008, but has since increased with women recruitment programs and funding provided by the National Center for Women and Information Technology (NCWIT). The percent of female computer scientists has further increased since 2014 when intentional efforts to recruit and retain women began and continues to rise with the passing years.

EXAMINING THE RELATIONS OF RACE TO COLLEGE STUDENTS' SELF-EFFICACY AND FEELINGS OF BELONGING IN ENGINEERING
Harmony Murray, Kalli Schabbel, Kathryn Schwartz
Poster: 227
Mentor(s): Lisa Linnenbrink-Garcia (Counseling, Educational Psychology, and Special Education), Cary Roseth (Counseling, Educational Psychology, and Special Education), Jennifer Schmidt (Counseling, Educational Psychology, and Special Education)

In Science, Technology, Engineering, and Mathematics (STEM) disciplines in the U.S., underrepresented racial minorities (URMs; e.g., African American, Latino/a) are less likely to complete degrees in STEM than their counterparts (e.g., Caucasian, Asian; Hernandez et al. 2012). Given the importance of college students' self-efficacy (Bandura, 1994) and sense of belonging (Freeman, Anderman, & Jensen 2007) in their academic motivation and success in a college setting, we will examine how students' engineering self-efficacy and sense of belonging with their peers in the College of Engineering changes over time as a function of their URM group membership. To this end, we will use data from a longitudinal study focusing on first-year engineering students (N = 1,305) at a large Midwestern university. We will run two separate two-way repeated measures analyses of variance (ANOVA) with the URM group variable (0=non-URM; 1=URM) to compare how to change students' (1) self-efficacy and (2) feelings of belonging with their peers from the end of the first year to the end of the second year. The engineering discipline is mainly dominated by Caucasian and Asian students and we expect that URM students will experience steeper decreases in both engineering self-efficacy and feelings of belonging over time compared to non-URM students. This study is expected to provide implications for the importance of supporting self-efficacy and sense of belonging when intervening to support URM students' STEM persistence.

RELEVANCE AND ENGAGEMENT DURING PROJECT-BASED LEARNING IN HIGH SCHOOL SCIENCE STUDENTS

Elizabeth Paulson

Poster: 228

Mentor(s): Nathan Burroughs (Center for the Study of Curriculum), Barbara Schneider (Sociology)

This study investigates the impact of project-based learning, an instructional technique that aligns well with the Next Generation Science Standards (NGSS), and its influence on student engagement through increased relevance in chemistry and physics. The NGSS and project-based learning aid in student preparation for higher learning institutions by helping students gain valuable critical thinking skills and practice creative problem solving. However, students in exact science classes can find it difficult to personally connect with the material, especially groups who are underrepresented in science fields (e.g. gender, race, etc.). This study examines students from 12 Mid-Michigan schools, in both urban and suburban settings, from the 2016-2017 school year. Smartphones equipped with an application for collecting experience sampling method data were distributed to students six times for three days at a time, emitting signals both in and out of their science class. When signaled, students answered questions about the relevance of their current activity to themselves and their future. We find that when girls and minoritized students have experiences they perceive as relevant to their personal lives, they have more positive affective experiences in science, which may lead to persistence in future coursework, postsecondary education, and careers. Promoting greater tenacity through stronger relevance to abstract science concepts could contribute to addressing the so-called “leaky pipeline” in STEM. This could contribute to diversifying future STEM fields, and may increase economic opportunities and technological advancement.

GENDER DIFFERENCES IN WRITTEN EXPRESSION: TOTAL WORDS WRITTEN & ACCURACY

Lauren Troiz, Kristin Hanzek, Rachel Williams, Shiyi Trinity Zhou

Poster: 229

Mentor(s): Adrea Truckenmiller (Counseling, Educational Psychology, and Special Education)

Throughout schooling, males have poorer writing achievement compared to females (NAEP, 2011). Studies identify this gap in several component skills of writing achievement. Specifically, in third grade, females handwrite more words than males in a short period of time (i.e., three minutes) and they produce more grammatically accurate writing (Fearrington, Parker, Kidder-Ashley, Gagnon, McCane-Bowling, & Sorrell, 2014). The purpose of our research was to replicate previous findings about quantity and accuracy when students are required to type instead of handwrite their response. We also expand upon the previous study by investigating whether the gap between females and males remain when they are given more time and if there is a gap between females and males in middle school. Female and male students in grades three, six, and eight were asked to read informational passages and respond to an expository writing prompt. The students had fifteen minutes to type their responses and once the responses were given, the responses were scored at five and fifteen minutes for production (measured as total words written) and accuracy (measured as correct writing sequences minus incorrect sequences) and accuracy. Nonparametric tests indicated that female students typed significantly more than male students at five and fifteen minutes, but that accuracy between the female and male students in this sample did not significantly differ.

HALF TRUTHS WITH FULL CONSEQUENCES

Mara Zumberg

Poster: 230

Mentor(s): Blair Zaid (African American and African Studies)

This research will examine the effects of the growth of the Elementary and Secondary Education Act (ESEA) of 1965 on the Detroit Public School System. The act survived many presidential reauthorizations. The most recent from Barack Obama entitled the Every Student Succeeds Act of 2015. The federal legislation works to allocate funds for the creation of equitable opportunities for low-income children, particularly in rural and urban areas. Subsequent reauthorizations of the ESEA eventually came to include accountability requirements and incentivized charter schools, with such initiatives as Race to The Top passed in 2002. Legislation in the state of Michigan allows private corporations to operate charter schools, referred to in Detroit as Education Management Organizations. These private sector companies control the staffing of the school and often the school board as well as curriculum development. Thus taking more power away from low-income communities the federal legislation espouses to aid. By examining how the reauthorizations of ESEA undermined its initial intent this research will illuminate structural inequalities, with legal origins, endured by the students of Detroit for the last five decades.

ENGINEERING, COMPUTER SCIENCE, & MATHEMATICS

ORAL PRESENTATIONS, SECTION 1
ROOM 30, 1:30 – 3:00 PM

DETECTING CARDIAC ARRHYTHMIA FROM ECG SIGNALS USING THE 0-1 TEST FOR CHAOS

Brianna Forsthoefel

Time: 1:30 PM

Mentor(s): Firas Khasawneh (Mechanical Engineering), Tamara Reid Bush (Mechanical Engineering)

Heart beats are characterized by an electrical impulse which travels through the heart muscle causing it to contract and pump blood through the body. These impulses can be recorded using a skin probe and the resulting record is called an electrocardiogram (ECG). While a healthy heart is characterized by regular electrical impulses, abnormalities in the heart's electrical impulses, called cardiac arrhythmia, generate an irregular ECG. Cardiac arrhythmia can occur randomly, making it difficult to detect unless a very long ECG record is obtained. Therefore, there is a need for efficient methods for the automatic and accurate detection of arrhythmia in ECG records. Motivated by this challenge, our work utilizes an approach from dynamical systems for distinguishing periodic behavior (similar to normal ECG) from a chaotic one (similar to arrhythmia). This approach is based on the 0-1 test; a binary test which yields 0 for a periodic signal and 1 for a chaotic one. We applied the 0-1 test to a total of 172 ECG signals from the MIT-BIH arrhythmia database: 310 normal ECGs, and 9 with different types of arrhythmia. The resulting classification success rate for the examined signals was 100%; thus, our results show that given an ECG signal, the 0-1 test can correctly detect arrhythmia. The advantages of our approach are that it is fast and that it only requires minor adjustments of existing methods for pre-conditioning ECG signals.

LEAD LEVELS IN COPPER AND LEAD SERVICE LINES IN FLINT, MICHIGAN

Calley McPherson

Time: 1:45 PM

Mentor(s): Susan Masten (Environmental Engineering)

Following the lead (Pb) contamination crisis in the Flint water supply, the State of Michigan instituted the Sentinel program to monitor water Pb levels (WLLs) in Flint houses. This paper will discuss the data collected and insights that might be gained from the Sentinel and other Pb monitoring programs in Flint. While there are concerns associated with the Sentinel program, the results provide insights into the changes in WWLs in Flint over time. There has been a significant decrease over time in the percentage of houses with Pb service lines (LSL) in which WLLs exceed the 15 ppb Action Limit set under the federal Lead and Copper Rule, but not copper. In 2017, the percentage of exceedances was greater in houses with CSLs (8.4%) than in homes with LSLs (5.9%). This difference is statistically significant. Overall, Pb concentrations >15 ppb were observed in 7.6% of the homes with CSLs. In Flint, phosphate has been added at a concentration of >3 mg/L. In the US, where phosphate is added as a corrosion inhibitor, it is generally added at a concentration of 1 mg/L or less. Phosphate has been found to accelerate the galvanic corrosion of Pb from simulated soldered copper joints (Nguyen et al., 2011) so, in homes where the copper pipes were soldered with lead solder, it is possible that the elevated phosphate levels in Flint drinking water could result in increased WLLs. Future work will investigate the impact of water chemistry on Pb levels in Flint drinking water.

AIRSENSE: AN INTELLIGENT INDOOR AIR QUALITY MONITORING AND ANALYTICS SYSTEM

Haochen Sun, Philip Dooley

Time: 2:00 PM

Mentor(s): Mi Zhang (Electrical & Computer Engineering)

In the U.S., people spend approximately 90 percent of their time indoors. Unfortunately, indoor air quality (IAQ) can be two to five times worse than the air outdoors, and is often overlooked. In this project, we present AirSense, an intelligent IAQ monitoring and analytics device adopted as a replacement of smoke detectors that are installed in every home and public building. AirSense is packed with leading-edge sensing technology for measuring multiple most common indoor air pollutants all on a printed-circuit-board smaller than a credit card. It is also equipped with state-of-the-art analytics algorithm that not only report the IAQ data to the user but also analyze the data to automatically detect pollution events, identify pollution sources, estimate personal exposure to indoor air pollution, and provide actionable suggestions to help people improve IAQ. All these information will be delivered to the user through a smartphone app and a web portal. We hope AirSense could increase users' awareness of IAQ and help them better manage IAQ. A U.S. provisional patent application out of our AirSense technology has been filed.

DEPTH OF SLIP TRANSFER IN TITANIUM
Alex Hughes
Time: 2:15 PM
Mentor(s): Martin Crimp (Chemical Engineering & Materials Science)

Polycrystalline samples of titanium will manifest slip lines in the crystal grains that have been stressed above yield stress. In some cases, adjacent crystals have similar slip system, which can be activated as a result of slip or strain transfer between the grains. Since crystals are defined as single volumes with the same orientation and slip transfer occurs between two different crystals, the slip plane within the crystals are likely not the same. In this study, a titanium sample was strained ~2.5% to initiate slip, then observed using a Scanning Electron Microscope (SEM) to locate positions where slip transferred. Electron Backscatter Diffraction information was collected from the crystals to determine their orientation. Three types of slip transfer-- direct, indirect, and curved-- were observed, taking note of their positions in the sample. Material was removed from noted areas to observe the slip transfer below the surface. This study gave us an insight into how slip transfer occurs below the surface of a sample, to better understand how polycrystals deform and how damage nucleation develops. Limiting damage nucleation can lead to more reliable and lighter weight structure, leading to more cost-efficient final products.

ISEE: AN INTELLIGENT MOBILE SENSING PLATFORM FOR ENHANCING UNIVERSITY COUNSELING SERVICES
Collin Dillinger, Brian Wang
Time: 2:30 PM
Mentor(s): Mi Zhang (Electrical & Computer Engineering)

Depression is the leading health issue in colleges in the U.S. Today, college students are dealing with depression at some of the highest rates in decades. Unfortunately, as the primary mental health service provider, university counseling centers are limited in their capacity and efficiency due to time constraints and reliance on student patients' self-reports. This project aims to enhance college counseling services for students with depression. In this project, we present iSee, a mobile behavioral sensing platform to enhance the efficiency, accessibility, and scalability of university counseling services. iSee consists of three components: a smartphone/wristband sensing system continuously and passively tracking daily behaviors of depressed students using onboard sensors; a behavior analytics engine running on the cloud to translate the large amount of raw sensor data into quantitative and meaningful analysis results; and an information system running at the counseling center to visualize behavior information and analyze results to help clinicians make clinical decisions. By doing this, iSee provides an innovative technological solution to address the challenges that university counseling centers are facing today. We are confident that iSee can serve as a model for all the university counseling centers across the nation and thus has the significant potential to enhance mental health services in thousands of colleges and universities, benefiting millions of college students.

SHARPEAR: AN INTELLIGENT HEARING AID DEVICE FOR ENHANCING THE CLARITY OF CONVERSATION IN NOISY ENVIRONMENTS
Nathan Bagnall, Haochen Sun
Time: 2:45 PM
Mentor(s): Mi Zhang (Electrical & Computer Engineering)

According to the National Institutes of Health, nearly 30 million adults in the U.S. could benefit from using hearing aids. Unfortunately, existing hearing aids are much less capable than human ears. They are essentially amplifiers that amplify all sounds, including the sounds the user wants to hear as well as the sounds they do not. As a consequence, one in five of those who should wear hearing aids do not. In this project, we present SharpEar, an intelligent hearing aid device that is capable of filtering out unwelcome sounds while keeping the sounds that users want to hear in real time. Our SharpEar technology has the significant potential of redefining hearing aids and dramatically improving the lives of hearing impaired people. SharpEar won Third Place at the 2017 NSF Hearables Challenge. A U.S. provisional patent application out of our SharpEar technology has been filed.

ENGINEERING, COMPUTER SCIENCE, & MATHEMATICS
POSTER PRESENTATIONS, SECTION 1
BALLROOM, 9:00 – 10:30 AM

THREE-ARM POLY (ε-CAPROLACTONE) POLYMERIZATION USING TWIN-SCREW EXTRUSION
Nathaniel Arnold
Poster: 233
Mentor(s): Ramani Narayan (Chemical Engineering & Materials Science)

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

MONETIZING THE IMPACT OF FOOD SAFETY RECALLS ON THE LOW-MOISTURE FOOD INDUSTRY
Carly Gomez
Poster: 234
Mentor(s): Brad Marks (Biosystems & Agricultural Engineering)

New Food Safety and Modernization Act (FSMA) regulations require that food producers validate that their processes sufficiently reduce the risk of known hazards, such as microbial pathogens. Technology choices are often driven by business decisions, and current decision-making methods make it difficult to see financial value in risk reduction. Predicted financial loss is a tangible way to quantify how the probability of a recall may affect the livelihood of a manufacturer. Financial impacts of recalls on three major food companies were analyzed by computing Cumulative Abnormal Returns (CAR) in stock values over a recall event period. Using Gretl software, returns for a stock under normal conditions without a recall event were predicted. The difference between predicted returns and actual returns during a recall event period was considered the Abnormal Return (AR). Abnormal returns were aggregated over an event window to compute CAR. In preliminary work, the stock values of three food manufacturers that issued recalls of low-moisture foods were analyzed, and the mean CAR after 30, 90, and 399 days post-recall were -2.8%, -4.3%, and -14.2% respectively. This translates to market capitalization mean losses of ~$559 million, $842 million, and $2.8 billion. This method can be used to add a monetary value for risk management and to provide manufacturers with an economic basis for food safety decision-making processes.

DNA LOCK N' KEY ANTI-COUNTERFEITING TECHNOLOGY
Rebecaa Jones, Tess Cannon
Poster: 235
Mentor(s): Evangelyn Alocilja (Biosystems & Agricultural Engineering)

Pharmaceutical counterfeiting is a crime against humanity because of its impact on human health; 450,000 preventable deaths occur annually due to counterfeit malaria drugs^[1]. Current methods of preventing fake drugs from entering the market are failing for many reasons: some are easily forged, and others are expensive or not practical. In this study, interactions between DNA and gold nanoparticles are used in an assay that can test the legitimacy of products. A sample of the DNA/AuNP solution can be fixed on a product's packaging and later authenticated. This technique can be thought of as a "lock and key," where the lock is an oligonucleotide sequence infused on gold nanoparticles, for example 5'-CTCGCATCCGCAGCCACT-3', and the key is its complementary sequence (3'-GAGCGTAGGCGTCGGTGA-5'). The assay will result in the gold nanoparticles changing color from red to purple if the key (complementary sequence) is correct, indicating a legitimate product. If a product is counterfeited, there will be no color change. Preliminary results show that the technique is highly specific between lock and key, simple to operate, non-clonable, and inexpensive. Product authentication can be done in the field and throughout the supply chain with minimal energy requirement. This DNA Lock n' Key technology can be applied not only in the pharmaceutical industry

but also in many types of products where counterfeit goods are rampant. The assay requires no advanced skills to operate, rapid to perform, and is not easily reverse-engineered, making it ideal for use in the supply chain.

POLYURETHANE FLEXIBLE FOAMS DERIVED FROM RENEWABLE FEEDSTOCKS
Ian Scheper
Poster: 236
Mentor(s): Ramani Narayan (Chemical Engineering)

Polyurethane foams (PUFs) are an indispensable material having a wide range of applications in automotive, construction, packaging, and insulation. PUFs are made from two major components: polyols and isocyanates. Polyols are polymers containing multiple hydroxyl (OH) groups, whereas isocyanates contain isocyanate groups (N-C=O). Most of the polyurethanes available commercially are produced from polyols which are derived from non-renewable petroleum feedstock. The primary objective of this work was to synthesize PUFs from polyols made from soybean oil. Bio-based polyols derived from soybean oil are available in the market but most of them have secondary hydroxyl groups making them less reactive. In this work, bio-based polyols containing primary hydroxyl groups, with low hydroxyl values, and higher renewable content were used. PUFs are formed from two simultaneously occurring reactions: gelling reaction and blowing reaction. The former involves reaction of isocyanates with polyol, while the latter involves reaction of isocyanates with water. A good foam having uniform cell size and mechanical strength can be produced by balancing these two reactions. Various catalysts such as blowing agents, surfactants, and crosslinking agents, control the rates of these two reactions. The goal was to optimize the proportion of each of the catalysts in the final foam formulation. The final formulation will then be used to make a box foam which will be subsequently characterized for mechanical properties (tensile, tear and compression strength), as well as thermal properties. These properties will then be compared with the control foam made using commercially available polyols.

EVALUATION OF CRYSTALLIZATION KINETICS FOR POLYLACTIDE
Clayton Threatt
Poster: 237
Mentor(s): Ramani Narayan (Chemical Engineering)

Polylactide (PLA) is a biobased polymer that is used in various commercial applications including film packaging and biodegradable injection-molded commodity items. For all injection-molded PLA articles, it is important to optimize both the processing time, as well as the mechanical properties of the final product, thus, improving its cost-effectiveness. The mechanical properties of a PLA product are strongly dependent on the percent crystallinity of the processed PLA, which is, in turn, dependent primarily on the optical purity of the base resin, and the type of processing and post-processing carried out on it. The post-processing method used in these experiments was high temperature isothermal annealing. 3001D and 3100HP are two common grades of PLA that are supplied by NatureWorks LLC., with 3100HP being the faster crystallizing grade of the two. The effects of the addition of 5% by weight of a nucleating agent - Poly(D-lactide) or PDLA, to these to grades of PLA was studied. The addition of the nucleating agent is expected to reduce the amount of time required for complete crystallization to occur. The results of these experiments will provide insight into ideal cycle times and temperatures for annealing these two different grades of PLA. Additionally, the different polymorphic structures of the PLA in these samples, and how they change with the isothermal annealing temperature was also considered. Different polymorphic structures of PLA can have notably different thermal and mechanical properties, so controlling these structures can greatly influence the final properties of the PLA article.

SPIDERS, WORLD'S GREATEST KNITTERS
Claire Weessies
Poster: 238
Mentor(s): Per Askeland (Composite Materials & Structures), Carl Boehlert (Chemical Engineering & Materials Science)

Spiders are magnificent creatures, adept at spinning beautiful webs. This project compares spider silk to acrylic, cotton, silk, and wool fibers in terms of structure and elemental composition using scanning electron microscopy. I will present images of each fiber at a micro scale and identify correlations and differences between them. This includes how the fibers are shaped at a micro scale, whether the individual fibers have scales, or whether they are smooth. I will see how the microstructure affects its feel and strength at a macro level. I will also measure the tensile strength of each type of fiber and correlate it to their structure. I will analyze the x-ray energies of the fibers to ascertain whether there are any significant differences in the elemental makeup of different fibers, and if so, how their elemental differences affect their behavior. I will synthesize this data, and determine what types of fiber are most similar to each other, and hypothesize what a sweater lovingly knitted by a spider would feel like, and how it would perform in comparison to a sweater made of more typical fibers.

ENGINEERING, COMPUTER SCIENCE, & MATHEMATICS
POSTER PRESENTATIONS, SECTION 2
BALLROOM, 11:00 – 12:30 PM

COMPARING CLOTHING IN A SCANNING ELECTRON MICROSCOPE

Kevin Lesser

Poster: 240

Mentor(s): Per Askeland (Composite Materials & Structures), Carl Boehlert (Chemical Engineering & Materials Science)

I will be looking at different types of clothing and materials to determine which is best to be waterproof and worn during certain weather conditions. Different types of materials, such as natural and synthetics will be observed under a scanning electron microscope. I will be looking at silk, microfiber, polyester, leather, cotton, and others. First, I will analyze structure under the scanning electron microscope and make some comparisons. Outside of the microscope, these samples will be tested with drops of water to see if the material absorbs the liquid or not. The materials will then be grouped into different categories, and from there these categories will be placed in the scanning electron microscope again, where they will be exposed to water and photographed. The materials will be heated to dry and then photographed again. I will be using fabric from an umbrella as reference since it is known that they whisk water away. I hypothesize that natural materials were once most waterproof, but now with improved textile technology, man-made fibers will be most waterproof.

LINKING TRANSCRIPTOMES AND GENES TO BIOLOGICAL CONCEPTS ON A LARGE-SCALE

Marc Maldaver

Poster: 241

Mentor(s): Arjun Krishnan (Computational Mathematics Science & Engineering)

Tissue type and cell function is not always black and white. Although each cell in our body has all of our genetic information, only a small portion of that code is utilized in any given cell. Cell differentiation is not always clear and it can be difficult to definitively link genes to specific tissues. As innovations regarding stem cells and CRISPR emerge, understanding the genes that are used in a given tissue is becoming increasingly relevant. Using machine learning techniques, we will attempt to explicitly associate genes to tissue types. This will be done by analyzing gene expression data to identify which genes are upregulated and downregulated. We will be utilizing ArrayExpress, one of the largest repositories of gene expression data in the world. By automatically curating ArrayExpress samples using a modified annotating pipeline (metaSRA), we will be able to employ a large training set.

PRODUCTION-LEVEL PERFORMANCE OF PARTITIONSORT IN LAGOPUS OPENFLOW SWITCH

Jacob Marcus

Poster: 242

Mentor(s): Eric Torng (Computer Science & Engineering), Sorrachai Yingchareonthawornchai (Computer Science & Engineering)

As computer networks increase in complexity, the hardware becomes difficult to manage and expensive to maintain. Software-defined networking (SDN) is a potential solution to this problem; however, virtual switches are currently slower than their hardware counterparts. One bottleneck for virtual switches is the packet classifier, the algorithm which determines how to process incoming information based on a set of rules. PartitionSort is a new classifier that has been shown to outperform state-of-the-art classifiers in a simulated environment. Our goal was to demonstrate that PartitionSort outperforms state-of-the-art classifiers in a real SDN environment. To do this, we compared the performance of PartitionSort and the three packet classifiers used by Lagopus, an open-source virtual switch developed by Nippon Telephone and Telegraph (NTT). Some challenges in making these comparisons included differences in simulated and production-level environments, differences in programming language, and the volume of code needed to integrate the algorithm into Lagopus for comparison. After overcoming these challenges, classifiers were compared using the metrics of classification correctness, speed, and update time. Comparisons were made with various rule sets to simulate different applications for the switch. It was found experimentally that PartitionSort outperforms all of the classifiers in correctness and update time while it demonstrating similar classification speed. A merge request has been made on GitHub and is pending acceptance into the Lagopus software. In this presentation, the results of the comparisons will be discussed in detail along with the implications in regard to the practicality of PartitionSort.

PROFILE MONITOR SCATTERING AND EMITTANCE GROWTH IN IONS WITH NON-RELATIVISTIC VELOCITIES
Jorge Mateus
Poster: 243
Mentor(s): Steve Lidia (Facility for Rare Isotope Beams)

Beam-profile monitors are essential diagnostic tools utilized in particle accelerators. Scanning-wire-type profile monitors are placed in series along a beam line to observe the evolving spatial distribution of the ion beam. However, each measurement done affects the underlying beam quality due to Coulomb scattering on the wire, limiting how many measurements can be performed on the beam. Using the computer software SRIM, the scattering pattern of ions in the 12 keV—20 MeV per nucleon range from 100–300 μm diameter tungsten wires was simulated, and the growth of the emittance profile (the spatial and angular distribution) of the particle beam was calculated.

A TWO-DIMENSIONAL MECHANICAL MODEL OF THE INDEX FINGER
Brandi Mazzella
Poster: 244
Mentor(s): Tamara Bush (Mechanical Engineering), Sara Roccabianca (Mechanical Engineering)

To diagnose osteoarthritis (OA), doctors physically examine the hand and use x-rays to view the joints. These observations are used in conjunction with verbal feedback from the patients about the level of pain they are experiencing. Yet, currently there are no quantitative methods to estimate the hand function of people with OA, thus the overall goal of this project is to develop a mechanical model to estimate joint stiffness. Such model will give clinicians the ability to measure and diagnose the stage of the patient's arthritis. A two-dimensional (2-D) model has been developed that represents an individual finger as three links connected at three joints with a spring at each joint. The model reduces the continuous kinematic field that describes the finger's motion capabilities to a subset of three discrete quantifiable mechanical parameters per finger, i.e., the spring constants at each of the three joints of the finger. Said parameters can be used to describe the stiffness of the joint, because the spring constants at each joint can be used to quantify the severity of the arthritis in the joint compared to non-arthritic normative values. Future work will use data from testing that investigates the force and range of motion of the hand of participants with and without osteoarthritis in this model. The participants without OA should have significantly different spring constants than the participants with OA.

PROJECT INSIGHT: DEVELOPMENT OF PROGRAMMING TOOLS FOR SCIENTIFIC IMAGE ANALYSIS
Bella Oh, Ty Buckley
Poster: 245
Mentor(s): Dirk Colbry (Computational Mathematics, Science, & Engineering)

Data in research is often gathered in arrays as images. Scientists need effective image annotation tools to analyze data for research. One major problem with the existing tools is that they are labor intensive. In this research group we develop automated image annotation tools that optimize scientist workflow. Our team's current project is improving the annotation capabilities of Jupyter notebooks, an interface used by researchers to combine notes, multimedia, programing and results into a single document. However, since these notebooks are a fairly new technology and primarily web-based, they currently do not have effective user interface for image data annotation. The project presented in this poster focuses on the development of a tool for users to define regions of interest (ROI) in images and providing the ROI as a mask array inside of Jupyter notebooks. The first step in this tool development is to develop a functioning paint program by merging a Javascript-based paint program inside of the Jupyter Notbook using Python and HTML5. Next we will modify the paint program to load any user-chosen image as the background of the paint canvas, allowing users to paint a mask over the image. The final step is to add detailed functions in the paint program for interface functionality and accessibility. Once complete the program will be tested on a variety of scientific image workflows.

BAG-IN-BOX TECHNOLOGY FOR CUCUMBER FERMENTATION
Anna Raschke, Kiran Lantrip
Poster: 246
Mentor(s): Steven Safferman (Biosystems & Agricultural Engineering)

Food loss is a growing problem in the United States, with an estimated 30-40% of the food supply going to waste. A significant portion of this is accounted for by fresh produce. This is not only due to its limited shelf life, but also from natural growth distortions and bruises obtained during harvest and shipping. In the case of cucumbers, the USDA upholds stringent guidelines for grading and selling. Cucumbers that do not meet the specifications for sale are collected and fed to livestock or go to a landfill. Development of a small-scale fermentation unit could provide a profitable and

sustainable alternative use for cucumbers and reduce the astounding amount of annual food waste. So far, pickled cucumbers are fermented on a large scale, using high quality cucumbers and separate from the cucumber farms. Bag-in-the-box fermentation units with a 400-gallon capacity could be applied in numerous settings, such as cucumber farms and urban and developing communities, to pickle normally unsuitable cucumbers and create a value-added product. The aim of this project is to find optimal construction and operation procedures for bag-in-the-box technology. Main parameters of focus will be finding an optimal nitrogen purging rate and frequency and maintaining a suitable pH during the fermentation process. Using experimentally optimized operation methods, bag-in-the-box technology has the potential to promote sustainability and reduce food waste while creating a value-added product.

ENGINEERING, COMPUTER SCIENCE, & MATHEMATICS
POSTER PRESENTATIONS, SECTION 3
BALLROOM, 11:00 – 12:30 PM

DISSONANCE AS A PATH IN A HIGH DIMENSIONAL TORUS

Adam Huston
Poster: 249
Mentor(s): Jose Perea (Computational Mathematics, Science, & Engineering)

Dissonance is the concept in music where the ear hears multiple tones that clash and create tension. We will show how dissonance can be represented and measured through geometry and topology. More specifically, a given sound wave can be represented as a path in a high dimensional torus, and the presence and type of dissonance is reflected in the space-filling properties of this curve. Computational experiments with both synthetic and real sound recordings will be used to illustrate this phenomenon.

UNDERSTANDING THE EFFECTS OF FLUSHING ON WATER QUALITY IN DETROIT HOMES AFTER PROLONGED PERIODS OF NON-USE

Esha Jain
Poster: 250
Mentor(s): Jennifer Carrara (Sociology), Jade Mitchell (Biosystems & Agricultural Engineering)

A major concern with water supply is that the drinking water can be contaminated due to the premise plumbing and water distribution sites being shut off or a lack of consumer use for various reasons including conservation. To address this concern, a citizen science project through the MSU Water Network Water Cube program was conducted to better understand these effects. Community researchers took water samples from 34 homes in Detroit, Michigan to analyze the chemical components and microorganisms. Additionally, the homeowners completed surveys to add more information about the building construction and water usage. The water samples were collected from each home at three different times, when the faucet was initially turned on, 2.5 minutes later, and 10 minutes after that. These samples were taken to the Department of Environmental Quality (DEQ), where tests were run to discover what chemicals were present in each sample. Many chemicals were tested for, including, minerals, iron, lead, and disinfection byproducts. In this study, the data collected was compared across the three different times in each house for levels of lead. The results of this analysis across the households is ongoing.

DURABILITY OF DIFFERENT WOODS FOR MUSICAL APPLICATIONS

Joshua Saluk
Poster: 251
Mentor(s): Carl Boehlert (Chemical Engineering & Materials Science)

When playing percussion, numerous sticks or mallets made out of different materials are available for similar purposes and differ based on playing style and how the materials needs to perform. Many hardwoods are used for these, namely hard maple, oak, beech, and hickory, as well as a similar woody material, rattan. All of these complete the same task, but are differentiated by their stiffness and flexibility, which could offer an advantage for a given playing style, as a harder material would give a more intense strike on an instrument but would also give away flexibility which could be detrimental to the structure if the striking surface is very stiff, itself. All wood is made up of cellulose fibers bonded together with a supporting polymer, lignin. I am interested at looking at the patterns, widths, and spacing of these fibers for each material, and seeing what on a microscopic scale dictates these properties using a variable pressure scanning electron microscope. Also, different materials present different chemical compositions, different amounts of carbon, oxygen, hydrogen, calcium, potassium, and trace amounts of a few other elements, which may be another factor that dictates said properties, and would be interesting to find under wavelength-dispersive spectroscopy.

CELL/PARTICLE ISOLATION AND FILTRATION USING PASSIVE DEFORMABLE MICROFLUIDICS
Vasha Sedlacek
Poster: 252
Mentor(s): Aryan Mehboudi (Mechanical Engineering), Junghoon Yeom (Mechanical Engineering)

Isolation of one or multiple cell types from a non-homogeneous population is an essential part of medical research, particularly when investigating rapid cell division. Certain cell filtration techniques are already used in clinical diagnosis, primarily entailing antigen binding, centrifugation or adhesion based isolation. Compared with current cell selection methods, microfluidics-based filtration techniques offer the advantages of increased simplicity, reproducibility, greater volume capacity, and high yield of cell collection. In this presentation, we will report our recent efforts to develop a novel microfluidic platform using a deformable ceiling for particle (or cell) isolation and separation. When a pressure is applied to the inlet of a straight, shallow, ultra-low aspect (height-to-width) ratio microchannel covered with a flexible membrane, the membrane would deflect more close to the inlet and less toward the outlet. This gradient of the membrane deflection provides a continually varying size of sieving. For a given applied pressure, various sizes of particles are trapped at different locations, following the membrane contour. Filtration devices were fabricated using an etched glass substrate and a polyethylene terephthalate (PET) membrane with polydimethylsiloxane (PDMS) gaskets. When injected with a solution of varying size particles, smaller particles are trapped in the downstream while larger particles in the upstream of the microchannel. We also investigate the volume flow rate and efficiency of particle filtration over a range of pressures for devices of varying dimensions. Future work is geared towards testing our microfluidic platform with circulating tumor cells, opening up new opportunity in the treatment of cancer patients.

TOPOLOGICAL DATA ANALYSIS OF THE SPACE OF NATURAL IMAGES
Paul Soma
Poster: 253
Mentor(s): Jose Perea (Computational Mathematics, Science, & Engineering)

This research focuses on applying topological data analysis methods to natural phenomena. One dataset we examine is the space of natural images, meaning grayscale photos taken in nature. More specifically, the space of high-contrast n-by-n pixel patches. It has been shown in previous research that the most relevant portions of this space make up a surface with the topology of the Klein bottle. We will use a multiscale method (akin to zooming in and out) to enlarge this space.

NANOCHROMATOGRAPHY MONITORING OF AMMONIUM IN SYNTHETIC HYDROLYZED URINE SOLUTIONS
Zoe Wilton
Poster: 254
Mentor(s): Rebecca Lahr (Civil & Environmental Engineering)

In low resource areas throughout the world, urine-to-fertilizer reactors are being installed to collect nutrients from human urine to use as fertilizer; however, the technology needed to examine reactor function is frequently inadequate due to time or budget constraints. A new method to monitor reactor function was created using only a jeweler's loop, cell phone camera, and aluminum slides. This inexpensive and user-friendly method harnesses the coffee ring effect to view the unique residue patterns formed when droplets of synthetic hydrolyzed urine solutions dry. The unique residue patterns can be used to identify the concentration of ammonium, phosphate, and magnesium in solution. Raman spectroscopy and particle analysis are being used to determine associations between features in the residue patterns and concentrations of specific nutrients. The composition of the synthetic hydrolyzed urine solutions were altered to try and imitate the residue pattern formed by human urine.

ENGINEERING, COMPUTER SCIENCE, & MATHEMATICS
POSTER PRESENTATIONS, SECTION 4
BALLROOM, 1:00 – 2:30 PM

RECONSTRUCTION OF THE MOTION OF A DOUBLE PENDULUM USING 3D POSITION TRACKING
Genevieve Kobrossi
Poster: 257
Mentor(s): Firas Khasawneh (Mechanical Engineering), Tamara Reid-Bush (Mechanical Engineering)

Double pendulums are often used to model limb movement in biomechanical studies and sports mechanics. Since double pendulums demonstrate rich dynamic behaviors such as periodic, quasi-periodic, and chaotic oscillations, they are also used to test new methods for studying complex systems. Prior studies have observed these oscillations;

however, the ability to automatically distinguish between each type remains an active area of research. In this study, we instrumented a double pendulum with nine reflective markers and surrounded it by seven motion capture cameras, thus allowing the collection of three-dimensional point data for each marker over time. Three of the markers were placed directly on the front side of the top rigid bar of the double pendulum, while six markers were placed on the sides of the second rigid bar. The pendulum was released from different angles relative to the horizontal plane, and the cameras were used to image the oscillations at a rate of 200 Hertz. For each run, data were collected until the pendulum oscillations completely stopped. The collected data were used to acquire the pendulum angles and to compute the pendulum's total energy over time. The information obtained from tracking the position of each marker was used to reconstruct the pendulum's rigid body motion utilizing R software. We found the reconstructed rigid body motion of the pendulum to be indistinguishable from the recorded video. Future work aims to automate the classification of the regions in the signal with different dynamic behavior, and to extend the results to biophysical signals.

PLASMA ETCHING OF CARBON-BASED SUPERCAPACITORS
Brad Luzenski
Poster: 258
Mentor(s): Qi Hua Fan (Electrical & Computer Engineering)

Activated carbon (AC) is a popular electrode material for supercapacitors. It has high specific surface area, due to its porous structure, high cycle stability, and high cycle life. However, to make supercapacitors more viable energy storage devices, the capacitance needs to be increased. Using plasma etching, it is possible to increase the specific surface area by creating microscopic cuts within the pores of the material. This increase in surface area causes an increase in specific capacitance. The effects of different plasmas on specific capacitance were analyzed. Both oxygen and nitrogen plasma were tested to compare the effects of each plasma at varying treatment times. The results indicate the viability of air plasma for future research. Air plasma treatment is a desirable alternative to pure plasma treatments due to being cheaper, easier, and more marketable in an industrial setting.

ANALYSIS OF BIO-ABSORBABLE IMPLANTS
Shalvi Save
Poster: 259
Mentor(s): Per Askeland (Composite Materials & Structures), Carl Boehlert (Chemical Engineering & Materials Science)

For this project, a Scanning Electron Microscope (SEM) will be utilized to conduct an analysis of the microstructure of a Magnesium Alloy- BioMg250. This bio-absorbable Magnesium based alloy is as strong as bone and contains biocompatible elements that will dissolve when introduced into the body as part of an implant and will help promote the regeneration of a new bone. This alloy could essentially replace regular implants- typically made of Titanium or stainless steel- that are used, and this would help save a lot of money on secondary operations. To observe the microstructure of the BioMg250 alloy, the techniques of Electron Backscattered Diffraction (EBSD) and Energy-dispersive X-ray spectroscopy (EDS) will be used. EBSD is a high-resolution technique for identifying the distribution of crystallographic orientations in multi-phase, polycrystalline microstructures and EDS is an analytical technique used for the elemental analysis or chemical characterization of a sample and thus they can be used to observe the properties of the BioMg250 alloy.

LABORATORY COLUMN STUDY ON THE VERTICAL MOVEMENT OF ORGANIC AND INORGANIC PHOSPHORUS-BASED FERTILIZERS IN MICHIGAN'S SOIL
Thiramet Sotthiyapai
Poster: 260
Mentor(s): Steven Safferman (Biosystems & Agricultural Engineering), Jason Smith (Biosystems & Agricultural Engineering)

Eutrophication is caused by the runoff of nitrogen (N) and phosphorus (P), which are used in fertilizers. Excess amounts of these nutrients in the environment can damage the quality of water, economy, and disturb the freshwater ecological structure and functions. In addition, there are potential risks when a significant amount of subsurface N and P leakage reaches groundwater. A laboratory column study was conducted to determine the vertical movement of P-based nutrients from organic and inorganic fertilizers and to identify fertilizers that have the smallest amount of subsurface nutrient runoff. Ultimately, statistical analysis has been conducted to compare significant differences within and between effluent from organic and inorganic fertilizer groups. Michigan's summer weather and typical soil properties were set as standard conditions for every column. Organic and chemical sources of P were investigated through surface application to the columns. Sources of organic fertilizers were dairy and swine manures. The chemical fertilizers investigated were mono-ammonium phosphate, di-ammonium phosphate, and triple superphosphate. Rain events were simulated at a frequency of 7-35 days at 2.54 cm h⁻¹, in accordance with Michigan annual rainfall data.

Subsurface effluent from each column will be collected and then tested with HAHC test kits and a 6,000 Spectrophotometer for soluble phosphorus, total phosphorus, and nitrogen. The result from the column study has shown that the organic fertilizer had a lower amount of total P and soluble P runoff than the inorganic fertilizer.

COMBINING POPULATION AND NEARBY STORE INFORMATION FOR FUTURE STORE LOCATIONS
Kaiwen Wang, Jiehui Ding, Kristen Lidwell
Poster: 261
Mentor(s): Gee Lee (Mathematics)

When identifying a new store location, traditionally a company considers the age, income, and number of people living near the potential sites. Unfortunately, this information does not always adequately represent the customers. What if additional information about the nearby stores was included in these analysis? While the types of nearby stores does not directly provide information about individual customers, nearby stores can indicate the types of establishments the customers -- as a whole -- prefer to frequent. Using nearby stores and nearby population information provides a better representation of potential store locations.

UNDERSTANDING ANTI-COUNTERFEITING MEASURES USING A SCANNING ELECTRON MICROSCOPE AND A LIGHT MICROSCOPE
Brent Weakland
Poster: 262
Mentor(s): Per Askeland (Composite Materials & Structures)

In this study, the molecular features of United States currency will be analyzed to understand anti-counterfeiting measures. The research will be done using a Scanning Electron Microscope (SEM) and sensors to produce microscopic images of the specimen. First, the SEM will be used to look at the molecular composition and structure of the notes to understand how the typical note should be composed. A secondary electron detector will be used to look at topographical features on the currency, for example, the ink. In all United States Dollars, the ink printed on the note is raised and the SEM will allow for magnified photography to show how the layering of the ink and depth makes it noticeable. Also, there is distinct and unique microprinting on each note that is done very precisely. Some of the notes, typically the higher denomination bills, use optically variable ink which changes color based on different viewing angles. Each different style of ink will be examined using an x-ray diffraction method in an attempt to know what the composition of each ink is and what causes different colors. Also, the optically variable ink will be analyzed using a combination of the secondary electron detector and the x-ray detector in order to understand what the chemical makeup and structure is that causes the various different features.

PERSISTENCE MODELING OF MS2
Emily Willis, Kara Dean
Poster: 263
Mentor(s): Jade Mitchell (Biosystems Engineering)

The bacteriophage MS2 is an indicator organism for viral pollution that is used to evaluate drinking water and wastewater treatment. To properly treat water sources, it is important to understand the persistence of viruses in different wastewater matrices and groundwater. This study looked at previous sampling studies that addressed the inactivation of MS2 in urine, sludge, and groundwater over time and utilized a maximum likelihood estimation fitting routine in R to test a suite of inactivation models. The goal was to determine the appropriate model form as the conventional approach currently only uses the exponential, logarithmic and linear models. Models that fit the decay data in only specific regions can be a source of uncertainty about the remaining concentrations of pathogens. MS2 in urine samples had an average T90 of .813 days and in the sludge and groundwater the average T90s were 4.4 days and 5.04 days, respectively. For urine, the Juneja and Marks 1 model was the most frequent fit to the data. For sludge, it was both Juneja and Marks 1 and Gamma, and for groundwater, it was Juneja and Marks 2. Only five of the 13 models tested fit at least one set of data from each matrix which provides a selection of plausible models for future researchers to test. Modeling the persistence of viruses is important for creating treatment protocols that achieve the necessary log reductions to protect human health. Our results also show where MS2 is an appropriate surrogate for the viral pathogens of interest.

ENGINEERING, COMPUTER SCIENCE, & MATHEMATICS
POSTER PRESENTATIONS, SECTION 5
BALLROOM, 3:00 – 4:30 PM

ARE PAPER TOWEL BRANDS REALLY "THAT" DIFFERENT?

Logan Coles
Poster: 266
Mentor(s): Per Askeland (Composite Materials & Structures), Carl Boehlert (Chemical Engineering & Materials Science)

Paper towels are commonly found in households throughout America. Different paper towel brands claim that their product is better than the other because it is stronger or more absorbent. Paper towels are made up of loosely woven fibers. These loosely woven fibers allow for liquids like water to flow in between the fibers while opposing gravity. I will analyze the microstructure of 3 different brands of paper towel (Bounty, Brawny, and Scott) underneath a variable pressure scanning electron microscope (environmental SEM). Water vapor will be used in the environmental SEM to saturate each brand of paper towel. Once the paper towel is saturated, I will evaporate the water away from the paper towel. To compare the different brands, the paper towel brand that is able to retain water at the lowest humidity setting will be considered the most absorbent. In addition, this will be compared to the microstructures of the paper towels to note any differences that resulted in it being able to retain moisture at the lowest humidity setting.

DESIGNING AN ECONOMICALLY AND ENERGY EFFICIENT MODEL FOR ALTERNATIVE WASTEWATER BIOSOLIDS TREATMENT

Sean DePalma
Poster: 267
Mentor(s): Umesh Adhikari (Biosystems & Agricultural Engineering), Steven Safferman (Biosystems & Agricultural Engineering)

The processing of municipal wastewater requires significant amounts of energy and economic resources to properly treat. A costly component is stabilizing the process residuals, or biosolids. Current treatment methods are expensive; however, alternative biological and chemical methods can be used to cut costs and increase energy efficiency. The objective of this project is to optimize economic and energy efficiency through researching and testing these alternative treatment methods to design a profitable model for wastewater treatment plants to adopt. These techniques have the additional benefit of producing profitable byproducts, namely methane and biochar. The combination of greater energy efficiency and possible economic profit from the byproducts has been the driving reason for researching these alternative methods, which include anaerobic digestion, pyrolysis, oxidation, and alkali treatment. This project has been initiated through completing literature reviews of the biological and chemical techniques to analyze energy inputs/outputs and determining relative revenues from the value of the byproducts. The top three options researched will be evaluated through experimental biogas assays over a twenty week period to determine the relative profitability of the byproducts each option produces. From the results of these trials, the most economically and energy efficient option will then be used for a forty-five week pilot scale test. This test will finalize the results for the alternative wastewater biosolids treatment model.

ELECTRONS OF ELECTRONICS

John Kim
Poster: 268
Mentor(s): Per Askeland (Composite Materials & Structures), Carl Boehlert (Chemical Engineering & Materials Science)

For my research project utilizing the scanning electron microscope, I plan to analyze and compare various electronic components from varied sources. I will use the scanning electron microscope to compare and contrast the composition of various electronic components. The purpose of this study is to attempt to discern if there is a correlation between the elemental compositions of the components and the age and purpose of the original electronic device. I will mostly be focusing on using the x-ray detector to determine the elements in the component as well as the the backscatter electron detector to create an image that will represent which elements are located in which parts of the component. Imaging secondary electrons will most likely not be necessary due to electrical components generally lacking any sort of significant typography. I will most likely not be coating any samples, as electronic components are mostly conductive or semi-conductive and thus should be able to be imaged without any kind of coating. I may attempt to polish the samples slightly if possible, however it may prove to be difficult due to the typically rigid and blocky nature of electronic components. If possible to polish, I will be able to also analyze the grain structures of various areas on the pieces of study.

DESIGN OF A NEW MEMBRANELESS ORGANIC REDOX FLOW BATTERY
Ethan Lau
Poster: 269
Mentor(s): Andre Benard (Mechanical Engineering), Thomas Guarr (Holland Initiative)

The growth of intermittent energy sources such as solar and wind power requires electrical energy storage to improve the grid efficiency and decrease electricity costs. This research project looks at a new type of redox flow battery (RFB) as a solution to the energy storage problem. In a RFB, chemicals charge and discharge in a reaction chamber, similarly to a fuel cell, but they are stored separately in storage tanks. This decouples the energy capacity from the energy generating ability of the system, which increases cost and energy efficiency. In this RFB, the use of a new type of organic active species developed by Dr. Guarr decreases the cost and toxicity of the system. These new chemicals result in the same products at the anode and the cathode, thus removing the need for ion-selective membranes. In view of the new reacting compounds, a new type of reacting cell must be designed. The reaction chamber is constructed through CAD and 3D printing techniques, which allows for rapid testing of various chamber designs. The first iterations of the cell design relied on a conventional flow design. Current designs utilize interdigitated channels, which decrease the pressure drop, thereby increasing efficiency. Different channel and rib widths and heights are being tested to determine the optimal design. Furthermore, with innovative new chemicals, future plans include constructing a membraneless chamber. By removing the membrane, the upfront and maintenance costs of the battery drop, which increases the viability of RFBs for future energy storage.

ADDITIVE MANUFACTURING AND MOTORS
Orwell Madovi, Joshua Ward
Poster: 270
Mentor(s): Shanelle Foster (Electrical & Computer Engineering)

3D printing has expanded beyond its original use for time- and cost-efficient prototyping to include quality plastic and metallic parts. Technological advancements in 3D printing technologies have also enabled production of full assemblies with moving parts made of multiple materials. The flexibility in size and shape enabled by 3D printing technologies can revolutionize electric motor manufacturing. Electric motors are made up of many components, including the stator core, rotor core, windings, shaft and bearings, manufactured from a number of different materials. In this project, an axial flux permanent magnet motor was designed and assembled using 3D printed components, with exception of the permanent magnets, bearings and copper windings. Commercial printers and PLAs are used to manufacture the components. A commercial ferromagnetic PLA is used to construct the stator and rotor core. The motor was assembled and coupled to a dynamometer to evaluate the feasibility of using fused deposition modeling to manufacture electric motors.

ROPES AND THEIR STRENGTHS
Austin Smith
Poster: 271
Mentor(s): Carl Boehlert (Chemical Engineering & Material Science)

What gives different strings and ropes they properties they posses? In this research we will be looking in depth about the different properties of strings and rope ranging from yarn to shoelaces, to paracord; and identifying the different properties with each type of rope and how that impacts their strength. Strength will be defined as how much force will it take before the string breaks. In order to do so, the samples will be studied using a Scanning Electron Microscope (SEM) to really see the different properties. Using the SEM the microstructures of each sample will have pictures taken and analyzed for differences. In order to do this study, each sample will have to have a coating over it to make it conductive. This will then make the topography of each sample unidentifiable. Because of this, some samples will be analyzed using an environmental SEM (eSEM). This will give us the ability to see the surface of the samples and identify any differences in makeup, materials, or processes. These images will be helpful to find smaller differences between each sample, that may help give hints as to how it affects the strength and different properties. At the end of this, it will be determined how the microstructures are different for various types of strings. How these microstructures impact the properties; and lastly how the properties of the rope affect the strength of the samples.

TETRIS PLAYING AI
Rahul Yalamanchili
Poster: 272
Mentor(s): Kalyanmoy Deb (Electrical & Computer Engineering)

This project involves the use of a genetic algorithm that finds the optimal weights for an AI to play Tetris. We started by replicating the work done by the author of a Tetris AI Paper. This paper defines four heuristics that the AI is trying to

either maximize or minimize: aggregate height, complete lines, holes, and bumpiness. The AI uses these characteristics of the game's landscape to assess the best position and permutation of an incoming piece, and the genetic algorithm is initially used to find the optimal weights for the above four functionalities of the game to place on each of these heuristics. Once we were able to replicate their work, we added an additional heuristic called altitude for the AI to take into consideration. The addition of this component did not seem to make much of a difference in the performance of the AI, so we are considering extending the initial research work by implementing a neural net for coming up with the weights. Results will be reported at a later date.

ENGINEERING, COMPUTER SCIENCE, & MATHEMATICS
POSTER PRESENTATIONS, SECTION 6
BALLROOM, 3:00 – 4:30 PM

VISUAL TEST FOR RAPID SCREENING OF INFECTIOUS DISEASES AND THEIR SUSCEPTIBILITY TO ANTIBIOTICS

Abbigail Bugenske, Emma Dester
Poster: 275
Mentor(s): Evangelyn Alocilja (Biosystems & Agricultural Engineering)

Human diseases are difficult to diagnose in many resource-limited or rural areas, as many diagnostic tests are expensive or require trained physicians and access to medical equipment. The use of biosensors has allowed for both cheap and rapid detection of pathogens. This research study takes advantage of the principles behind biofilm formation. The rapid user-friendly diagnostic test uses functionalized magnetic nanoparticles (MNP) to visually detect a wide range of pathogens. In this procedure, a magnet is placed on the side of a 0.5-mL tube containing phosphate buffered saline (pH 7.4), MNP and a dilution of the pathogen. The supernatant is discarded and the MNP-pathogen complex is retained. The visual effect utilizes the hydrophobic interaction between the pathogen being tested and the tube wall to produce a matting pattern of the MNP. These matting patterns are based on different concentrations of the pathogen; higher concentrations result in more matting. A control is used to visually compare the matting patterns. This matting pattern can be used to qualitatively determine the concentration of a pathogen in a sample. Successful visual tests of viruses, fungi, and both gram-positive and gram-negative bacteria, were conducted. This method has the ability to detect pathogens in humans, plants, and animals. This test is ideal for use in resource-poor settings or rural areas because of its simplicity: it does not require a trained professional to perform, it costs less than a nickel, takes less than 15 minutes to conduct, and does not rely on electricity or medical facilities.

THE FUNCTION OF ENDOCYTOTIC PATHWAYS IN SIRNA THERAPEUTICS

Kaitlyn Dann
Poster: 276
Mentor(s): S. Patrick Walton (Chemical Engineering)

Current therapeutics such as small molecule therapeutics or antibodies are unable to treat every disease. siRNA therapeutics act through a different mechanism, and can therefore target what other treatments cannot. The problem with siRNA therapeutics is getting the siRNA molecule into the cell. Binding the siRNA to a delivery vehicle allows for successful entry across the cell membrane. While we know the necessity of a delivery vehicle, we are unaware as to what makes one vehicle better than another. Part of the lack of knowledge on what makes a better delivery vehicle comes from not being aware of how the molecule takes to enter the cell. Various endocytotic pathways are used for getting external components into the cell. Inhibitors can be used to block of these individual pathways. By comparing the success rates of siRNA entry into the cell by fluorescence measurements, we can determine which pathways are essential for the delivery vehicles path.

ONE-STOP-SHOP FOR ANTI-COUNTERFEITING TECHNOLOGIES

Aidan Fox
Poster: 277
Mentor(s): Evangelyn Alocilja (Biosystems & Agricultural Engineering)

Product counterfeiting is a serious problem that concerns nearly every industry, from party balloons to pharmaceuticals. Though it can sometimes seem trivial, there can be some serious implications. It is estimated that fake malaria pills contribute to over 450,000 preventable deaths each year globally. Many companies have developed anti-counterfeiting technologies (ACTs) to combat fraudulent products, such as taggants, RFIDs, packaging designs, and other technologies. However, descriptions of these technologies are dispersed in different internet locations. Therefore, the objective of this study is to create a "virtual ACT one-stop shop" (VAS) where potential users can get and compare information about hardware, software, and service ACTs in the same location. The ultimate goal is for VAS to be the

place where providers and users can “meet” in an unbiased environment. This poster will present the concepts and contents of VAS. Presently, VAS has a compilation of information and literatures on the latest ACTs in the market, summaries of upcoming technologies in the research pipeline, links to forecast documents, and other information relevant to the ACT industry and potential technology users. VAS is an innovative concept to combat counterfeiting and fraud for the protection of the public and for the viability of industries affected by fake products in the supply chain.

BIODEGRADABILITY STUDY OF BIOBASED MATERIAL IN AN AQUEOUS ENVIRONMENT
Sara Kolar
Poster: 278
Mentor(s): Sayli Bote (Chemical Engineering), Ramani Narayan (Chemical Engineering)

The amount of plastic waste accumulating in landfills and oceans is a rapidly growing concern since it has an adverse effect on the environment. Biodegradable polymers in conjunction with composting or anaerobic digestion provide a solution to this problem. Biodegradable carbon polymers can be utilized by microorganisms. It is not necessary that all biodegradable materials are derived from bio-based materials and vice versa. Bio-based materials offer reduction in carbon footprint, whereas biodegradable materials complete the carbon cycle. In this work, biodegradation of biobased materials was evaluated in aqueous medium. The aqueous environment also allows for the breakdown of the polymers by hydrolysis. Water cleaves polymer chains containing ester groups on the backbone resulting in small molecules that can transport into the microorganisms. In aqueous biodegradation, CO_2 free air was bubbled through Erlenmeyer flasks containing the test sample, the reference material and a blank. CO_2 is a product of aerobic biodegradation, and the amount of CO_2 evolved from each flask is measured. The amount of CO_2 formed in the blank flask is subtracted from the CO_2 found in the flask containing the test sample. This value was divided by the theoretical amount of CO_2, thus giving the extent of biodegradation. The theoretical amount of CO_2 was calculated using carbon content of the sample which was determined through a CHN analyzer. The biodegradation test is performed according to the ISO 14852 standard, and the results are to be considered valid only if the reference material shows a percent biodegradation greater than 90%.

COMPARISON OF SPIKE SORTING STRATEGIES FOR NEURAL DATA ANALYSIS
Stefanos Palestis
Poster: 279
Mentor(s): Erin Purcell (Biomedical Engineering), Joseph Salatino (Biomedical Engineering)

By directly “reading-out” or “writing-in” electrical signals to and from the brain, implanted microelectrode arrays have become invaluable tools in the study and treatment of neurological diseases and injuries. In this research project, spike sorting approaches for processing extracellular neural data recorded with microelectrode arrays implanted in the brains of rats were further developed for use in an ongoing study of device biocompatibility. The broader study pertains to the impacts of implanted microelectrode arrays on the intrinsic excitability of neurons at the device interface. The objective of current work is to input raw data recorded during the study into two spike sorting software packages, optimize their parameters, streamline processing, and compare the positive and negative aspects of each approach. The software packages include an in-house, custom-generated MatLab code and open-source software packages which have been recently adopted in the neural engineering field. The first objective of the project was to expedite processing and user-friendliness of the in-house code by incorporating a batch-processing feature to sequentially analyze recordings and organize outputs in an easily accessible format. The second objective was to compare the unit detection accuracy of our approach to an alternative open source software, and identify the optimal approach to signal processing. The first objective has been completed, various open source options have been pursued (including KlustaKwik, Kilosort, and JRClust), and ongoing work is aimed at assessing the ‘pros’ and ‘cons’ of each approach while modifying parameter settings to optimize outputs. These efforts will complement the interpretation of quantitative histology indicating novel sources of signal loss from implanted devices over time.

ASYNCHRONOUS PROCESSING IN EVOLVABLE COMPUTATIONAL BRAINS
Christopher Reeves
Poster: 280
Mentor(s): Arend Hintze (Integrative Biology)

Most contemporary computational systems impose a strict synchronous an sequential update rule on all their computational components. This is very different from natural brains, where not only all neurons work in parallel, but signals are also processed asynchronously. For example, the different action potentials can arrive within a time window and still be integrated. This is one way to mitigate the timing issue. In contrast, a transistor (or logic gate) in a computer would not tolerate such variance. The computational evolvable model we use (a Markov Brain) allows us to either use synchronous or stochastic update rules. We evolve these Markov Brains to solve cognitive tasks that require the integration of stochastic signals. Specifically, we use the so-called "Value Judgement Task" from psychology, where a

test subject has to identify which of two flickering lights is lit more often. We compare the neural architectures evolved under different conditions to understand how asynchronous computational systems differ from their synchronous counterparts. The goal of this work is to derive a paradigm for building better computational cognitive systems.

ENVIRONMENTAL SCIENCE & NATURAL RESOURCES

ORAL PRESENTATIONS, SECTION 1
ROOM 36, 1:30 – 2:45 PM

RIVER ROUGE REVIVAL
Alondra Alvizo
Time: 1:30 PM
Mentor(s): Rene Rosenbaum (Planning Design & Construction)

River Rouge Park promotes great opportunity to efficiently promote access and affordability of locally grown foods, create a safe space for youth to interact and learn about agriculture through native prairie restoration. With over ten schools in the surrounding area, conditions are right to engage youth and adults in urban development. River Rouge Park is 1,184 acres of overlooked opportunity that has potential of profitability through the creation of community led farmer's market. It would also serve as a way to keep youth in an urban area out of the streets and guide them into the agricultural world through hands-on restoration projects. The Rouge River contains 26,000 feet of water frontage that could be used for gardening projects that could improve community sustainability. These projects would be sustainable because high school students in the surrounding area are responsible for completing community service hours in order to graduate. A service day would provide the opportunity to earn community service hours while learning about the importance of community engagement and urban beautification. Park beautification would create safe environments for the youth and adults to visit and enjoy. In addition, if each school was responsible for one plot of a garden, as a community we would be able to introduce urban farming to city youth. Furthermore, with our harvest, we could increase local revenue by creating a community farmers market. Rouge Park Revival could be the beginning to identifying solutions that are sustainable and realistic in urban areas.

QUANTIFYING THE EFFECTS OF FOREST COMPOSITION ON LAKE WATER QUALITY WITH MIXED EFFECTS MODELS
Lindsie Egedy
Time: 1:45 PM
Mentor(s): Patricia Soranno (Fisheries and Wildlife)

Land cover and land usage are known to influence lake water quality but previous studies have focused primarily on the effects of agriculture and developed land, while different forest types tend to be grouped together as undisturbed environments. However, forests transmit nutrients and organic material to lakes, but the effects of these inputs on water quality have not been widely studied. Differences in vegetation composition of forested regions may impact nutrient input in lakes because of nutrient cycling processes and breakdown rates of canopy litter. Understanding the underlying effects of forest composition (coniferous, deciduous, or mixed) on water quality would allow scientists to use these relationships as predictors for how lake ecosystems are influenced by their catchment composition. Water quality will be determined by total phosphorus, total nitrogen, Secchi depth, and chlorophyll-a concentration. This study used lake water quality and forest composition data from the LAGOSNE database, which spans the Northeastern United States. With a mixed effects model approach, the questions addressed are: 1) How does forest composition affect lake water quality and 2) how do these effects vary within and across regions? Regions were created based on ecological drainage units (EDUs) as natural boundaries and the distribution of lakes. Since lakes naturally vary in surrounding forest composition due to regional differences in climate and land use, mixed effects models are useful because they can accommodate these regional differences. In this presentation, I will discuss the methods in quantifying and modeling the effects of forest composition on lake water quality.

COOKING PROPERTIES AND NUTRITIONAL EVALUATION IN A DIVERSE SET OF DRY BEANS (PHASEOLUS VULGARIS L.) COLLECTED FROM THE MARKETPLACES OF EAST AFRICA.
Hannah Peplinski
Time: 2:00 PM
Mentor(s): Karen Cichy (Plant, Soil, & Microbial Sciences), Jason Wiesinger (Plant, Soil, & Microbial Sciences)

The common dry bean (*Phaseolus vulgaris* L.) is a nutrient dense food produced globally as a major pulse crop for direct human consumption. Dry beans are an important source of protein and micronutrients, including iron, for hundreds of millions of people across Latin America, the Caribbean and Sub-Saharan Africa. Because of their long preparation times, in comparison to starchy vegetables, knowledge of the cooking properties of beans is vital to consumers; especially to those who rely on expensive fuelwood for food preparation. To the average consumer, bean seeds may appear static on the outside, but their cooking quality is deceptively sensitive to postharvest handling, storage and distribution conditions in route to the marketplace. How the transition from farmer to consumer impacts the cooking or nutritional value of dry beans is unknown. This study measured the cooking times and iron concentrations of 76 bean samples representing eight different seed types collected from the markets of East Africa within Kenya, DRC, Burundi, Uganda, Rwanda and Tanzania. Cooking times in boiling distilled water were determined in soaked seed with an automated Mattson pin-drop device. Significant and wide variations in cooking times were recorded among beans collected from the marketplace, ranging from 25 to 220 minutes. Iron concentrations of these same raw seed also varied significantly, ranging from 52 to 129 μg/g. Communities with limited fuel resources are negatively impacted by such variability in cooking and subsequent nutritional quality at the marketplace; factors which act as a deterrent for bean consumption in these regions.

GIGGLES AT KILLS: SPOTTED HYENAS (CROCUTA CROCUTA) AVOIDING EAVESDROPPING IN A COMMUNICATION NETWORK
Carrie Walls
Time: 2:15 PM
Mentor(s): Kay Holekamp (Integrative Biology), Kenna Lehmann (Integrative Biology)

In animal communication networks, signalers have to worry about competitors or predators eavesdropping. In the case of spotted hyenas, competitors are often group-mates. Hyenas live in rigid hierarchical societies in which higher-ranking hyenas have priority access to food and often steal kills from lower ranking hyenas. Oftentimes at a kill, a higher-ranking hyena will aggress on a lower ranking hyena, which can elicit a high pitched vocalization called a giggle. Giggles are easily localized and are known to attract hyenas and lions. At a kill with few hyenas, we would expect subordinate individuals to resist giggling to avoid attracting eavesdropping competitors. Similarly, we expect mid-ranking hyenas to avoid aggressing on subordinates at kills to prevent eliciting giggles. Using data from the MSU Hyena Project, we will investigate the rate of aggressions and the likelihood of a giggle occurring during aggressions at kills. We will test whether either of these variables are influenced by the number of hyenas present, the size of the kill, food availability, and the ranks and ages of the aggressor and the recipient of aggression. This will demonstrate whether hyenas adjust their vocal behavior to prevent eavesdropping and will help elucidate the role of giggles in hyena communication.

RESILIENCE OF URBAN AGRICULTURE IN THE GREATER LANSING AREA
Quinn Zimmerman
Time: 2:30 PM
Mentor(s): Lissy Goralnik (Community Sustainability)

Urban agriculture (UA) is a growing phenomenon that impacts a range of positive social, economic, and ecological impacts in an area. In addition to strengthening food security, UA can also strengthen the local economy, deepen community relationships and create a greener community. This study explores why and how local actors participate in UA and how local environmental governance either hinders or supports the resilience of UA in the greater Lansing area. Toward this end I have created an annotated bibliography summarizing scholarly articles related to UA and resilient food systems, which led me to identify key factors, including social learning, trust, sustainability networks, relationships, and communication. I will apply this framework and a concept map I have created to explain the relationships across these factors to 20 key informant interviews, conducted in fall 2017 with community gardeners, urban farmers, and representatives from food system organizations and farmer's markets. The interviews focused on participants' motivations for participating in UA, the relationships between participants, and the ways formal and informal governance either promotes or inhibits their participation in UA. We will follow up the interviews with a survey this spring. Understanding how the elements of resilient food systems identified in the literature review are represented in the greater Lansing area will help us determine if and how the local system is resilient. We hope to apply the methodology created for this Lansing case study to other UA contexts in the future.

ENVIRONMENTAL SCIENCE & NATURAL RESOURCES
POSTER PRESENTATIONS, SECTION 1
LAKE HURON ROOM, 9:00 – 10:30 AM

EARLY INDICATORS OF ALTERED REPRODUCTIVE OUTPUT IN LAKE TROUT (SALVELINUS NAMAYCUSH) FOLLOWING SEA LAMPREY (PETROMYZON MARINUS) PARASITISM

Phillip Ankley
Poster: 283
Mentor(s): Cheryl Murphy (Fisheries & Wildlife)

Sea lamprey (Petromyzon marinus) are an invasive species that feed by parasitic attachment on fish, which can lead to death of their hosts either directly by loss of fluids and tissues or indirectly by infection of the exposed wound. Though lake trout (Salvelinus namaycush) often survive parasitism events, parasitism can be detrimental to surviving lake trout, and could affect many physiological functions, including reproduction. However, the extent and magnitude of these sublethal effects are poorly understood. The goal of the project was to assess the sublethal effects of sea lamprey parasitism on lake trout reproductive physiology. We also aimed to assess differences in response to parasitism between two lake trout morphotypes, siscowet and lean, that differ in habit and morphology. Sea lamprey were allowed to parasitize lake trout in a controlled laboratory environment after which the wounds were classified as either A-type or B-type based on a previously described classification system and the lake trout were allowed to recover for one year. Egg production, egg diameter, and milt concentration were measured and compared to control lake trout. The results indicated that female siscowets with A-type wounds had reduced egg production. It was also observed that all parasitized males for both morphotypes had reduced milt concentration. No clear trends appeared in egg diameters between the two morphotypes. Despite early trends indicating negative effects of sea lamprey parasitism on lake trout reproduction, the sample size of lake trout should be increased to allow greater confidence in the results of the experiment.

DETERMINING ACCURACY AND REPEATABILITY OF SNOW TRACK SURVEYS

Johanna Becker
Poster: 284
Mentor(s): Gary Roloff (Fisheries & Wildlife), Melissa Szymanski (Fisheries & Wildlife)

Regeneration of northern hardwood tree species is impacted by method of harvest and herbivory from animals such as white-tailed deer (Odocoileus virginianus). Additionally, harvest method can affect animal communities found at a treatment site. A variety of methods can be used to quantify species in animal communities and all depend on the ability of researchers to reliably detect animals. At eight recently harvested 30-ac northern hardwood sites in Michigan, we conducted snow track surveys within and around treatment sites to quantify use by winter animal communities. Data were collected by three different surveyors who walked each transect and recorded tracks that intersected the transect line. Tracks were identified to species. This survey protocol provided temporal replication needed to quantify species-specific reliability of the snow track survey technique. Results help inform whether track identification is consistent across surveyors and snow conditions and will provide evidence for the number of tracks that can be accurately identified of those encountered.

SHELF-LIFE OF A FOOD PRODUCT PACKAGED WITH POLY(LACTIC-ACID)/CELLULOSE NANOCRYSTALS BIO-BASED FILM

Allison Friebe
Poster: 285
Mentor(s): Laurent Matuana (Packaging)

Poly(lactic-acid) (PLA), a bio-based plastic derived from fermented plant starches, is an alternative to petroleum-based polymers due to several advantages such as its biodegradability, reasonable strength, and high stiffness. PLA is not commonly used in food packaging due to its poor water and oxygen barrier properties. Cellulose nanocrystals (CNCs) are nanomaterials, which are currently being used in our laboratory as an additive to improve both the water and oxygen barrier performance of PLA films. Despite these attributes, it is unknown how these films will impact the shelf life of water and/or oxygen-sensitive food products. Therefore, this project seeks to evaluate the effectiveness of PLA/CNC film in extending the shelf life of crackers, which are water-sensitive products. Packaging for crackers relies on petroleum-based polymer films. PLA/CNC film may be of interests to companies looking to utilize bio-based materials, which have a smaller impact on the environment, while extending product's shelf life and minimizing food waste. A

package with good barrier properties can prevent these wastages from occurring. For these reasons, it has become increasingly important for companies to create sustainable packages with excellent barrier performance.

DIFFUSION ORDER SPECTROSCOPY OF LIGNIN MONOMERS
Julian Ingram-Palmer
Poster: 286
Mentor(s): Benjamin Appiagyei (Chemistry)

Proton NMR is a great analytical tool for the identification, quantification, and study of molecular interactions for simple mixtures. Unfortunately, the 1D-NMR is limited in its analysis of complex mixtures of compounds due to signal overlap. DOSY-NMR is a pseudo 2D-NMR that reduces, if not removes the limitations of 1D-NMR in analyzing complex mixtures. This technique measures the diffusion coefficient of the individual components based on their molecular weight and shape according to the Einstein-Stoke equation. DOSY-NMR uses diffusion properties of the individual components to resolve them in a complex mixture. In this project we envisage to employ DOSY-NMR to study the interaction of lignin fragments from biomass pyrolysis. Literature suggest that the substituents attached to the ring may be available to interaction with the neighboring compounds on the Ni surface. Our recent study of ECH of guaiacol isomers by Lam suggests that the isomers react based on closer proximity of the attached substituents. Our electrocatalytic system shows that reactivity varies with varying concentration. Since our model compounds (guaiacol isomers) possess hydrogen bonding abilities we hypothesize hydrogen bonding effect as a major factor for reactivity. As association increases with concentration, molecular weight and shape would be perturb leading to different diffusion rates between the extremums of concentration. Using the Stoke-Einstein equation to derive the diffusion coefficient at different concentrations, DOSY would provide us an understanding of the nature association (molecular hydrodynamic radius) of the models as they concentrate on the Raney™ Nickel surface during ECH process.

STALKING THE CATALYST THROUGH THE COPPER AHP PRETREATMENT PROCESS FOR ETHANOL PRODUCTION
Andrew Kozel
Poster: 287
Mentor(s): Eric Hegg (Biochemistry & Molecular Biology)

The replacement of petrofuels and chemicals by a renewable source of energy is a solution to the decline in fossil fuels and increase in greenhouse gas emissions. The conversion of renewable feedstocks such as woody biomass has proven difficult and expensive due to its recalcitrant nature. One technology that has successfully broken down woody biomass is the copper catalyzed-alkaline hydrogen peroxide pretreatment (Cu-AHP). Cu-AHP, like its name implies, involves basic conditions, hydrogen peroxide and a catalyst, in this case bipyridine (bipy) coordinated with cooper, which oxidatively breaks whole biomass down using oxygen radials. With the highest cost of this process coming from the bipyridine ligand to make this process economically viable, the catalyst must be recycled. Determination of the ligand and metal's location at each step in the process is necessary for recover. Quantification has proven difficult because most analytical techniques give inaccurate results due to the sticky nature of bipyridine and copper to glass and other metals. Elemental analysis of total nitrogen can be used as a measure of bipyridine in solution and the solids after pretreatment. Likewise, copper content can be assessed in both liquid and solid fractions. In both copper and total nitrogen analysis, correction factors must be applied for baseline wood protein and copper content. The accountability of the Cu-Bipy allows for further studies into the recovery and recyclability of the catalyst allowing the Cu-AHP technology to be industrialized for the breakdown of woody biomass for biofuels and chemicals.

REMOVAL OF POLYETHYLENE LINER FROM COFFEE CUPS
Courtney Sturza
Poster: 288
Mentor(s): Donatien-Pascal Kamdem (Packaging)

A polyethylene liner is frequently used to improve the water barrier properties of several beverages, including coffee cups. The problem with polyethylene is that it is not recyclable and many facilities around the world do not have the infrastructure to remove a polyethylene lining. The purpose of this experiment is to develop a method to remove the maximum amount of polyethylene from Starbucks paper coffee cups and explore the reusability of the recovered pulp fibers. In this experiment, a pulping process is used with Starbucks paper coffee cups at different sodium hydroxide concentrations and temperatures. The density of polyethylene (0.925 g/cm^3) is less than the density of water (1.00g/cm^3), therefore, polyethylene floats at the surface of the solution and the paper fibers sink due to a density greater than water (1.20 g/cm^3). The weight of polyethylene recovered from each experiment determines the most effective pulping solution strength and temperature. The information from this study can determine if it is feasible to collect polyethylene coated paper products and reuse the remaining paper fibers after the PE liner is removed.

ENVIRONMENTAL SCIENCE & NATURAL RESOURCES
POSTER PRESENTATIONS, SECTION 2
LAKE HURON ROOM, 11:00 – 12:30 PM

STATES OF BIRD DIVERSITY IN A GREAT LAKES WETLAND: INFLUENTIAL LANDSCAPE FACTORS AND RECOMMENDATIONS FOR MANAGEMENT

Audrey Bolke
Poster: 291
Mentor(s): Daniel Hayes (Fisheries & Wildlife)

Understanding states of local biodiversity and how such states respond to multi-scale habitat conditions is essential to the conservation and management of animal species, especially wetland birds. Wetland birds serve as key indicators of ecosystem health and regulators of prey, plant and insect, populations—bolstering the necessity of their conservation. In southwestern Michigan, Galien River Marsh is an important, yet development-threatened, area for wetland bird communities. To date, research has neither described the state of avian diversity nor explained how such diversity responds to environmental factors in the marsh. To answer research questions about the state of local avian communities and state responses to environmental covariates, we (1) collected point-count data on local birds using a dependent double-observer approach, (2) gathered publicly available covariate data to relate to community diversity, (3) estimated multiple community diversity scores—species richness and evenness, and (4) applied General Linear Models to said diversity scores to describe relationships between community diversity and covariate data, including land cover and climate variables. Our preliminary results suggest that fine-scale land cover types and broad-scale climate variables influence variation in wetland bird communities. We demonstrate the utility of point-count surveys, community diversity metrics, and univariate regression models toward better understanding wetland bird communities and factors that influence them in order to improve conservation and management in our study area and others. For local land managers, we offer recommendations for maintenance of healthy wetland bird communities along Great Lake shorelines.

GRAIN-SHAPE ANALYSIS OF SAD GRAINS FOR PALEOENVIRONMENTAL INTERPRETATION

Dev Dayal, Heem Vanlawala
Poster: 292
Mentor(s): Michael Velbel (Earth and Environmental Sciences)

When analyzing a singular grain of sand, there are many key factors that must be taken into account. There are numerous characteristics that need to be identified to analyze the origin of the grain, how it has been shaped by its surroundings, and how it has been impacted by outside factors. In our grain shape analysis some of the key factors that stood out and were commonly found between the two analyzed samples were: the presence of a subangular to subrounded outline, the presence of a large conchoidal fracture, meandering ridges, flat cleavage steps, grooves and scratches, imbricated grinding features, medium relief. A subangular or subrounded outline means that it has varying amounts of wear on it with the edges being rounded; A conchoidal fracture is determined by looking for a smoothly curving, fractured surface without any natural planes of separation; meandering ridges are small graded arcs that result from impact breakage by other grains; Flat cleavage steps are identified by looking for breakage and wear on the grain that is somewhat flat; grooves and scratches are identified by looking for a growth pattern along the grain that looks like hairline grooves or scratches; imbricated grinding features are identified by looking for a grain that has been ground into another adjacent grain; medium relief is identified by looking for the contrast between the grain and its surroundings. The results of the grain analysis will be further discussed in detail during the presentation.

SEALING PERFORMANCE OF PLA FILM REINFORCED WITH CELLULOSE NANOCRYSTALS

Haley Ferer
Poster: 293
Mentor(s): Laurent Matuana (Packaging)

Poly(lactic) acid (PLA) is a bio-based polymer that has the ability to biodegrade, but is limited in food packaging applications, because it has poor water and oxygen barrier performance. To enhance barrier performance, cellulose nanocrystals (CNCs) can be incorporated in polymer processing, without compromising the material's ability to biodegrade. However, the effect of CNCs on hot tack strength and seal strength of PLA film is not known. If seal failure occurs because of lack of hot tack strength or seal strength, packaging materials and food will be wasted. This waste has significant financial and environmental impacts, hurting both the producers and the greater society. To assess the effect of CNC addition on sealing performance of PLA film, cast film extrusion was used to manufacture PLA film at neat level

(0% CNC – control), 0.5% CNC, 1% CNC and 2% CNC. Films were tested according to ASTM F1921-98 to measure hot tack strength as a function of temperature. Ultimately, the addition of CNCs decreased hot tack initiation temperature (HTIT) and increased maximum hot tack strength (MHTS), which are both positive outcomes as this would lower the energy required in manufacturing and improve hot tack performance of PLA film. Films were also tested according to ASTM F88/F88M-15 to measure seal strength, indicating the force required to separate two sealed materials, causing seal or material failure. Here, the addition of CNCs increased the seal strength of PLA film, significantly.

ASSESSING NONECONOMIC IMPACTS OF NATURAL RESOURCE RESTORATION: MICHIGAN COASTAL COMMUNITIES
Erin Keller
Poster: 294
Mentor(s): Lissy Goralnik (Community Sustainability)

Michigan is heavily dependent on its natural resources, especially water. Previous literature primarily assess natural resources impacts on local communities through an economic lens. This leaves other impacts such as social and cultural under-explored. This study, funded by the Department of Environmental Quality's Office of the Great Lakes (DEQ-OGL), examines four Michigan coastal communities that have invested in water ecosystem restoration projects expected to encourage residential and visitor use of Michigan's water resources and ultimately contributing to stronger communities. This poster will outline the process of capturing multidimensional measures of community wellbeing, including economic and noneconomic values, as well as describe indicators of life domain satisfaction, including community vitality, resilience, sense of place, and place attachment. The presentation includes descriptions of these approaches to wellbeing, as well as how they differ or complement each other in assessing community-level development. Finally, metrics will be suggested from across these frameworks to inform a multi-dimensional analysis of community vibrancy related to natural resource use. The framework described will inform the analysis of interview and focus group data collected in each of these towns, allowing us to draw conclusions about the vibrancy of each town as a result of the water restoration projects. These results will inform the development of an online survey, as well as community-wide forums in each town. In addition to meeting the goals of the DEQ this project also aligns with Michigan's Water Strategy by recognizing equal importance of Michigan's water resources from an economic, environmental, social, and cultural standpoint.

IMPROVING A HYDROLOGIC MODEL USING DRONE IMAGERY
Julia Michienzi
Poster: 295
Mentor(s): Anthony Kendall (Earth and Environmental Sciences)

There is a lack of knowledge of the interaction of roots and groundwater. In an effort to better understand this relationship, the Michigan State Hydrogeology Research Lab started collecting data in 2010 at The Kellogg Biological Station, in Gull Lake. This specific plot is special because it was a maintained field that was retired and we have observed the natural regression to its innate form. At this site, there are three distinct foliage zones: forest, shrubs, and open grass. This unique land coverage gives us a platform to compare changes over time and differences in roots of contrasting vegetation. In an effort to build a complete hydrologic model of our research site, we have permanent electrodes installed. Twice a month electrical resistivity of the ground is collected with geophysical equipment. This data has a direct relationship with volume of water within the soil. Along with the geophysical data, soil temperature, moisture, and samples are collected. Within the last year, we have pushed to excel the research at this site, by collecting drone imagery, LAI, daily pictures of the varying zones, and updating the geophysics cable box. The drone imagery was collected at peak leaf coverage, with the intention to observe the change in the canopy of each transition zone. This use of drone imagery has never been seen before and is being used to create a more dynamic model and to directly understand biology interacting with the earth.

SUPPLEMENTING MUNICIPAL WASTEWATER FOR SUSTAINABLE BIOFUEL PRODUCTION WITH CYANOBACTERIA
Abby Sulesky
Poster: 296
Mentor(s): Graham Peers (Colorado State University), Marjorie Weber (Plant Biology)

Wastewater centrate is a side-product of municipal wastewater treatment and contains high amounts of polluting nutrients such as nitrogen and phosphorous. Utilizing centrate as a sustainable water and nutrient source in the production of cyanobacteria could lead to adequate remediation of the water while simultaneously producing biofuel feedstock. However, cyanobacteria cultures do not reach high densities when grown on centrate alone. We followed a

bioassay approach using the cyanobacteria strain Synechocystis sp. PCC 6803 - a model photosynthetic laboratory organism - to determine the limiting factor preventing high growth in centrate. Supplementing diluted centrate with Na2SO4 yielded final cell densities 7-fold higher than cultures growing in centrate alone (similar to final cell densities in traditional artificial growth media), while cultures supplemented with other nutrients showed no significant increase in growth. Additionally, RT-qPCR performed on transcription of sulfate transport genes showed a 40-fold increase in transcription in cells growing with no added sulfate compared to cells with supplemented sulfate - further supporting that the cultures are sulfur-limited in centrate. These results give strong evidence that sulfur is the primary limiting nutrient in the centrate-cyanobacteria system. Supplementing centrate with sulfate for cyanobacterial production could provide a solution for centrate remediation during wastewater treatment. Cyanobacterial remediation would assist in removing large amounts of nutrients from the centrate and allowing its release with other wastewater plant effluent. Overall, combining wastewater remediation with biofuel production could reduce the carbon footprint of both processes.

ENVIRONMENTAL SCIENCE & NATURAL RESOURCES POSTER PRESENTATIONS, SECTION 3 LAKE HURON ROOM, 1:00 – 2:30 PM

STANDARDIZING SAMPLING EFFORT WITH RAREFACTION CURVES TO ESTIMATE BIODIVERSITY OF FISH IN MICHIGAN LAKES

Maggie Brown, Sophie Morin

Poster: 299

Mentor(s): Mary Bremigan (Fisheries & Wildlife)

Biodiversity is a valuable measure in ecosystem assessment, aiding in understanding ecosystem complexity and predicting ecosystem response to environmental change. However, understanding biodiversity across spatial and temporal scales challenges ecologists due to a lack of standardization in sampling. This proves especially true in the field of fisheries, as numerous gears and sampling efforts are often required to characterize fish species composition within various habitats. We are analyzing fish assemblage survey data from 98 Michigan lakes to assess the adequacy of these data for comparing fish species composition within and among lakes. Specifically, we are developing rarefaction curves for each unique lake and gear combination to establish a minimum effort level required for estimating total species number per lake. Rarefaction curves randomly subsample survey data, affording the opportunity to characterize the rate at which the number of sampled species accumulates with sampling effort (or minimum number of individuals sampled). We hypothesize that habitat complexity will influence the minimum effort required to estimate the total species number, because habitat heterogeneity is likely to result in heterogeneity in the spatial distribution of species as well. Specifically, we predict that lakes with higher habitat complexity will have a lower rate of species accumulation as sampling effort increases. Our findings will indicate the minimum amount of sampling effort required to include surveys in future quantification of biodiversity at multiple spatial scales. Comparing these diversity values across lakes that vary according to physical and anthropogenic characteristics can reveal why species richness and composition varies.

FINDING GROUNDWATER AND SEPTIC TANK SEEPS USING DISTRIBUTED TEMPERATURE SENSING AND DRONE IMAGES AT HIGGINS LAKE, MICHIGAN.

Sabrina Curtis

Poster: 300

Mentor(s): Anthony Kendall (Earth and Environmental Sciences), Sherry Martin (Earth and Environmental Sciences)

In 2014 the MSU Hydrogeology Lab conducted two distributed temperature sensing (DTS) data collections at Higgins Lake. To record the temperature a pulse was sent down a fiber optic cable and back, recording the surrounding temperature every 1 meter; a pulse was sent every 15 minutes over the course of several days for each data collection. Variation in temperature could be an indicator of where the water surrounding the cable is coming from: groundwater, septic tank seep, or surface water from the lake itself. A drone was also flown over the area taking pictures of the lake bed along the length of the cable. The goal of this project is to determine whether or not there is a connection between variations in the temperatures along the length of the cable and visual markers in the drone images. If there is a connection, then finding groundwater and septic tank seeps can be as straightforward as flying a drone around the shoreline of the lake.

AN ECOLOGICAL TRAIT DATABASE OF NORTH AMERICAN FRESHWATER INVERTEBRATES FOR THE ASSESSMENT OF CLIMATE CHANGE EFFECTS ON STREAMS

Ethan Hiltner

Poster: 301

Mentor(s): Laura Twardochleb (Fisheries & Wildlife), Phoebe Zarnetske (Forestry)

Climate change is a threat to freshwater invertebrates around the world primarily due to the specific climatic and environmental conditions many of these species require. Because these freshwater invertebrates are so important to the overall health of an ecosystem, we have set out to create a database that includes their functional traits, for use in future ecological studies. Functional traits are ecologically based traits commonly used to understand relationships between organisms and their environment, including organismal distribution, and species diversity. However, without the compilation of such traits, it is difficult to quantify relationships between the environment and functional diversity for use in large-scale studies. Consequently, we are expanding the USEPA biological trait database, which includes traits of invertebrates in the United States, to include traits for more species in more locations. Functional traits included in this database pertain to life-history, habitat preference, dispersal ability, and morphology. Data contributions were obtained by using standardized search protocols to search books, online trait repositories, and the primary literature in Web of Science and Google Scholar. The final product will be a functional trait database for over 1,200 freshwater invertebrate genera that occur across North America. Other researchers will be able to access our database for future studies on the composition of functional traits, and the relationships between functional traits and the environment across North America. In future studies, we will use this database in conjunction with species occurrence records to investigate influences of climate, elevation, primary productivity, and land-use on freshwater invertebrate communities.

SPATIALLY-EXPLICIT ANALYSIS TO QUANTIFY REPORTING RATES OF WHITE-TAILED DEER ENTERED IN THE BOONE AND CROCKETT RECORDS

Garrett Knowlton
Poster: 302
Mentor(s): Rebecca Cain (Fisheries & Wildlife), David Williams (Fisheries & Wildlife)

For effective white-tailed deer (WTD) management in the United States, managers need data that accurately reflect of the population for which they are managing. Using data sets that are biased can lead to incorrect conclusions about the status of the population, which can result in improper management of the species. The Boone and Crockett Club white-tailed deer records are thought to be a heavily biased data set, and to ensure that the inferences drawn by researchers using these data are appropriate, information about this assumed bias is required. The objective of this research was to quantify reporting bias in the Boone and Crockett records for white-tailed deer in the Midwest. We used data from Hoosier Record Book (Indiana), Iowa Trophy Deer, Commemorative Bucks of Michigan, Minnesota Record Book, Buckeye Big Buck Club (Ohio), and Wisconsin Bear and Buck Club for our analysis. To quantify the spatial and temporal bias within the Boone and Crockett Club records, we compared the number and location of entries in each record book to the Club's records. Our analysis suggests that there is bias within the Boone and Crockett Record Book, which could have implications for future research that uses the Club's records as a baseline to make management decisions.

KANSAS IRRIGATION: ENERGY CONSUMPTION OVER THE LAST 25 YEARS

Benjamin McCarthy
Poster: 303
Mentor(s): Anthony Kendall (Earth and Environmental Sciences)

Water used for agriculture in Kansas is drawn primarily from the High Plains Aquifer (HPA). In an initiative to better understand statewide water usage, Kansas developed the Water Information Management and Analysis System (WIMAS). This program collects yearly water usage data in Kansas and tracks every registered point of water diversion in the state, which is commonly in the form of a well. The data from these wells, collected from 1990 to 2016, was extracted and analyzed for this research. Each point of diversion contains total water use, irrigation system type, and location. We used this data to create a yearly energy expenditure model. There are various irrigation systems in the region of Kansas bound by the HPA, and they all differ in pressurization requirements. By using derived pressurization requirement values for each system, we calculated how much energy is used for each point of diversion. From that data, we calculated a cumulative energy budget for the year. Our data shows a gradual decrease in total energy use over the course of 26 years. Implementations of low pressurization irrigation systems, mainly low energy precision application center pivots (LEPA), correlate with the decrease in energy use for high pressurization conventional center pivots. These results indicate that proposed mitigation strategies have had a positive impact on energy and total water use. Many scientists have placed the HPA at the forefront of efforts to understand and mitigate climate change and its impacts on important agricultural regions. This research aims to encourage that process.

EVALUATING A NEW METHOD FOR DETECTION OF LEGIONELLA PNEUMOPHILA

Abigail Shotwell
Poster: 304
Mentor(s): Joan Rose (Fisheries & Wildlife)

Legionella pneumophila is the primary causative agent of Legionnaires disease, a pneumonia that can be fatal. L. pneumophila is found in freshwater environments, including rivers, lakes, and water cooling systems. Agar-based culturing methods are the gold-standard for identifying L. pneuomphila in samples from these environments. However, such methods are difficult due to L. pneumophila's growth requirements and long incubation period. Legiolert is a new most-probable number assay designed to specifically identify and quantify L. pneumophila in water samples without the difficulties of agar-based methods. However, the applicability of using Legiolert for various water types, including ambient surface water samples, is unknown. The objective of this work was to assess the ability of Legiolert to accurately detect and quantify L. pneumophila in ambient surface waters by testing nine samples from the Flint River during the 2017 summer season. The experiments showed that Legiolert yielded false positive results for L. pneuomphila for samples when compared to other identification techniques, including PCR. While Legiolert results indicated that L. pneumophila was present in nine river water samples collected from April to August, droplet digital PCR results for these same samples were negative for L. pneumophila. This experiment suggests that Legiolert may be inappropriate for use with ambient surface water samples due to the possibility of false positive results.

ENVIRONMENTAL SCIENCE & NATURAL RESOURCES
POSTER PRESENTATIONS, SECTION 4
BALLROOM, 3:00 – 4:30 PM

COMPARATIVE ANALYSIS OF HYPERALKALIPHILES FROM SERPENTINITE-INFLUENCED ENVIRONMENTS

David Chalmers

Poster: 307

Mentor(s): Matthew Schrenk (Earth And Environmental Sciences)

Microbial communities in soils are generally high diversity due to micro-niches that shelter organisms from the environment, facilitate cell-cell interactions, and allow access to surface derived nutrients. Serpentinite soils, however, are known to be harsh with low amounts of calcium and nitrogen, high pH, and high concentrations of magnesium and heavy metals. Serpentinite-influenced environments are also used as analogs for understanding soil fertility and habitability on distant planets, such as Mars, and for understanding microbial homeostasis at alkaline pH. Samples from Tablelands Ophiolite in Gros Morne National Park, Canada were used to test whether microorganisms attached to solids differed from those in liquid sources in serpentinite-influenced environments. Culture-dependent and culture-independent approaches were taken for observing the microbial diversity. For culture-dependent approaches, rock samples were crushed, suspended, and grown on pH 11 plates. Once microbial isolates were obtained through streaking, pH 11 liquid media was inoculated with individual colonies. Pigmentation, size, shape, and ease of growth on solid and liquid media were observed. For culture-independent approaches, DNA was extracted and used to sequence the SSU rRNA gene to aid in taxonomic identification. Taken together, these results will provide insights into microbial diversity and function across distinct niches in a serpentinite-influenced ecosystem.

THE EFFECT OF SONICATION PRE-TREATMENT ON MEMBRANE FILTERED BIOSOLIDS

Brynn Chesney, Augustus Evered, Megan Nalazek, Marshall Welmer

Poster: 308

Mentor(s): Steven Marquie (Biosystems & Agricultural Engineering), Steven Safferman (Biosystems & Agricultural Engineering)

The recovery of valuable resources such as nitrogen and phosphorus from waste is necessary to meet the demands caused by a growing human population and lack of renewability of these and other resources. Membrane filtration is one method of separating valuable resources from biosolids and other waste. However, in order for the filtration technology to be economical, the efficiency must improve. In many food processing unit operations, sonication has become a popular method of forcing molecules into suspension. We propose that if sonication is applied to biosolids found in wastewater biosolids, we will be able to separate the biosolids. The following experiment will test varying conditions of sonication of the biosolids, exploring how sonication affects the degree of fouling in the membrane system, as well as the effect of sonication on the yield of resources. By measuring the resource yield from these experiments, changes can be made to better utilize the grey water that will be produced from the membrane filtration, and improve the sustainability of the system. However, further research needs to be conducted to better understand the potential composition and applications of the remaining biosolids post filtration. In conclusion, the goal is the successful design of a pilot system with the best membranes that can be used for long-term applications in the field of wastewater treatment.

SAND-GRAIN SURFACE-TEXTURE INVENTORY FOR PALEOENVIRONMENTAL INTERPRETATION
Taylor MacKenzie, Hailey McDonald
Poster: 309
Mentor(s): Michael Velbel (Earth and Environmental Sciences)

The goal of our research group is to establish a database which shows the frequency of different surface features on two different samples of sand grains from different periglacial patterned ground landforms in Michigan. The occurrence of these features can then be used to infer the processes that interacted with the grains to establish whether the sands of different landforms were affected by different processes. The results can then be compared to samples from other locations, and used to develop a more informed presumption of how sand grains on Mars could have interacted with their environment. Two different samples were gathered from two different locations and imaged using a Scanning Electron Microscope (SEM). The images of these grains were then individually catalogued. Students studied an individual grain's image and searched for specific surface features such as conchoidal fracture. A comparison of the inventories will be analyzed in the coming weeks.

ANALYSIS OF ON-PREMISE SIGNAGE PRE-ATTENTIVE PROCESSING IN PEDESTRIAN STREETSCAPES TO INFORM PLACEMAKING DESIGN STANDARDS IN FORM-BASED CODE DEVELOPMENT
Stephanie Onwenu
Poster: 310
Mentor(s): Patricia Crawford (Planning, Design and Construction)

Does the inclusion of placemaking elements in the streetscape affect the ability of people to find the business signs? How much is too much? This study examines the correlation between streetscape design intensity and the likelihood of finding on-premise signage through photoshop image manipulation and 3M's Visual Attention Software (VAS). 3M's Visual Attention Software (VAS) measures the likelihood of a person to find the sign during one's pre-attentive processing. Pre-attentive processing is a universal process demonstrating what a person will see in the first three to five seconds. It does not predict what a person will see once cognition starts.

COMPARISON OF TERRESTRIAL AND MARTIAN SAND GRAINS TO PROVE EXISTENCE OF WATER ON MARS
Michael Vezmar, Alissa Kainrath, Shelby Parks
Poster: 311
Mentor(s): M. A. Velbel (Earth and Environmental Science)

Through our research, we compiled an inventory of surface grain features of terrestrial analogs from two different, periglacial samples, then compared them to their martian counterparts. In order to do this, we created images of our grain samples using a Scanning Electron Microscope. From there, we individually analyzed the grains, and we are currently working on comparing the data amongst group members. Some common features that were found were: adhering particles, meandering ridges, angular to subangular grains, angular to subrounded grains, and grooves and scratches. Adhering particles are all the particles that are attached to the grain that is under observation. On quartz grains they can be be remnants of source rocks. They can also characterize glacial environments. Meandering ridges are extended conchoidal fractures that are directly adjacent to an area of high elevation and an area of low elevation. Angular grains have sharp, defined features, which is often the result of the grain being broken and crushed by its environment. Subangular to subrounded grains have slightly blunt edges and slightly round edges. This is often caused by environments where severe abrasion is common, thus resulting in more rounded edges. Grooves and scratches are fractures on the surface of a particle; typically between 2 and 25 μm in length that are caused by grain to grain collisions.

EPIDEMIOLOGY & PUBLIC HEALTH

POSTER PRESENTATIONS, SECTION 1
BALLROOM, 9:00 – 10:30 AM

MATERIALS RESEARCH USING A SCANNING ELECTRON MICROSCOPE
Matthew Zadel
Poster: 314
Mentor(s): Per Askeland (Materials Science & Engineering)

This research involves the examination of a Marlboro cigarette and tobacco leaves under a Scanning Electron Microscope with Energy Dispersive Spectroscopy. The objective of the research is to examine the inorganic chemical composition and microscopic view of a cigarette and pure tobacco leaves. Tobacco products are a combination of dried tobacco leaves and additives designed to make smoking more enjoyable. Tobacco smoke is comprised of a mixture of products resulting from the burning of the tobacco leaves and additives. Several known carcinogens are present in tobacco smoke and can also cause major health issues other than cancer. The tobacco leaves are responsible for most of the carcinogens instead of the additives in tobacco products. In addition to the known carcinogens, radioactive materials have been found in tobacco leaves due to the presence of radioactivity in the soil and in fertilizers. The focus of the research will be visualizing and analyzing these chemical components that comprise a cigarette and the potential health effects of smoking them as well as comparing and contrasting the differences in chemical composition and structure between the cigarette as a whole and separate tobacco leaves.

FRAILTY: A RISK FACTOR FROM CANCER TREATMENT PUTS ELDERLY CANCER PATIENTS AT RISK FOR FALLS
Kelsie Krauss
Poster: 315
Mentor(s): Amy Hoffman (Nursing)

Falls are the leading cause of fatal injury and the most common cause of non-fatal trauma related hospital admissions among older adults. Moreover, mounting research shows that the fall rate is higher in elderly cancer patients compared to their age matches not diagnosed with cancer. However, there is not much research conducted addressing the question why cancer patients fall more often. This study critically reviewed the literature to uncover the risk factors that provide evidence as to why elderly cancer patients fall more frequently than their age matches without cancer. After initial searching with broad keywords that yielded many thousands of results, the search was strengthened and limited by using the keywords "factors of weakness" and "cancer patients". The targeted search resulted in 65 articles. After applying inclusion criteria of: English articles only from years 2008-2018, and participant's mean age of 60 years and older, 27 articles were retrieved. The included articles presented multifactorial evidence that the risk factors common for falls are indicative of frailty in elderly patients. The evidence linked these risk factors to significant impacts of cancer treatment that leads to declining physical activity, poor physical status, weakness, and depression. This study provides evidence that cancer patients fall more often because they are frailer due to their cancer treatments. With this discovery, oncology nurses need to take preemptive steps to prevent falls in their high-risk patients. Furthermore, research needs to be conducted to propose preventive interventions for frail cancer patients at risk for falling.

THE IMMIGRANT HEALTH ADVANTAGE: REAL OR ARTEFACTUAL?
Shay Robison, Mary West
Poster: 316
Mentor(s): John Waller (History)

This literature review will present the latest evidence on one of epidemiology's most enigmatic phenomena: that immigrants to countries such as the United States seem to live longer on average than the native-born. The 'Healthy Immigrant Effect' (HIE) is surprising to epidemiologists because newcomers tend to be socially and economically disadvantaged and they have often left dangerous and unhealthy environments. Having surveyed the data on the HIE, we present the results of a literature review on its causes. In particular, we analyze the possibilities that: on average it is the healthier who relocate; those who migrate tend to live healthier lifestyles by not readily adopting the poor habits of their host country; and the data has been skewed by migrants returning home once their well-being begins to decline. The results show that no explanation alone can adequately explain the cause of the Healthy Immigrant Effect, leading to the conclusion that multiple factors are involved or that an as-yet unidentified cause is responsible.

MECHANISM AND APPLICATION OF HEART RATE VARIABILITY AS AN OUTCOME MEASURE OF RESILIENCY IN NURSING BEHAVIORAL HEALTH INTERVENTIONS
Rachel Fisk
Poster: 317
Mentor(s): Roxane Chan (Nursing)

Heart rate variability (HRV) or the measure of the ability of the heart to adapt to stress has been shown to be a strong measure of morbidity and mortality, particularly in chronic disease and cancer populations. Improvements in technology now allow this important biomarker to be easily collected in the community creating opportunity for powerful outcome measurements regarding the effectiveness of nursing health promotion interventions in these vulnerable populations. However, nurse researchers investigating novel applications of behavioral health promotion interventions in the community first need to understand the mechanisms of heart rate variability in relation to autonomic function and downstream physiological responses. Nurse researchers also need to become adept at appropriate data reduction processes and heart rate variability measurement selection. Establishing protocols for collection of HRV in the community, working with complex cardiac data and selecting appropriate HRV measures will provide powerful outcome measures to important nursing behavioral health interventions. This presentation aims to explain the importance of HRV as a tool for improving evidence based practice in the chronically ill population, distinguish between various types of HRV measures and their uses, as well as touch on recent nursing research on HRV as an outcome measure of behavioral health interventions.

SOCIAL AND SPATIAL PATTERNS OF HIV IN NEW YORK CITY
Alexander Lafler
Poster: 318
Mentor(s): Leo Zulu (Geography, Environment, and Spatial Sciences)

Whereas many infectious diseases leave equal risk to all populations, the direct transfer of infection through STIs like HIV leaves different populations at disproportionate risk of infection. This presentation will focus on a spatial analysis of different populations across different zip codes in New York City. Previous research has found that populations in poverty, non-white populations, and people in their late 20s and early 30s are among the populations at the highest risk of acquiring HIV. Through analysis of broad demographic data, this project will display the spatial correlation between concentrations of at-risk demographics and HIV rates in corresponding Zip Codes.

SOCIAL AND SPATIAL DISPARITIES OF ASTHMA IN MICHIGAN AND WISCONSIN
Alexander Lafler
Poster: 319
Mentor(s): Ashton Shortridge (Geography, Environment, and Spatial Sciences)

Research performed on asthma consistently shows results of clear differences in the distribution of populations that are afflicted by the disease. Populations that are affected disproportionately include urban residents, populations in poverty, and non-white persons. This project explores broad correlation and spatial patterns of asthma distribution at multiple geographic scales in Michigan and Wisconsin, of which display similar rates of Asthma occurrence. Measures explored in this multi-level analysis are described below. Due to Michigan and Wisconsin's similar overall rates of asthma, they will be compared at multiple spatial scales. At the state-level, county hospitalization rates are explored, along with their statistical correlation with demographic data in each county. Other spatial correlations are created from this data set. To understand urban distribution, census tract data for crude rate of asthma is analyzed for urban areas in Michigan and Wisconsin, excluding information for all other areas. Demographic data is compared with asthma rates as well as housing quality, with statistical and spatial correlations created for both. This measure is extended to each respective state's largest cities and most prominent hubs for Asthma, Detroit and Milwaukee. Results from these analyses reveal distinct spatial and statistical patterns, yet yield some results that may require further research.

EPIDEMIOLOGY & PUBLIC HEALTH
POSTER PRESENTATIONS, SECTION 2
BALLROOM, 3:00 – 4:30 PM

THE IMPACT OF VISUAL AIDS ON RECRUITMENT AND MEDITATION PROTOCOL DELIVERY FOR A NATIONAL CANCER INSTITUTE STUDY

Andrea Nguyen
Poster: 322
Mentor(s): Rebecca Lehto (Nursing), Gwen Wyatt (Nursing)

Using the sequential multiple assignment randomized trial (SMART) design, the study aim is to improve symptom management strategies among cancer patients with solid tumors. This National Cancer Institute (NCI) study will enroll 350 dyads, who will be randomized into the first intervention stage for 4 weeks of either meditative practices, reflexology, or a control group. A caregiver who is either a friend or family member will be paired with the patient. If there is inadequate symptom improvement, the dyads are re-randomized for weeks 5-8 and may continue for 4 more weeks of the same therapy or add the other therapy. People differ in how they best learn new skills. Introducing visual aids for recruitment and the intervention protocol will help dyads potentially better understand the interventions, especially the meditative practices portion. In order to introduce possible dyads to the study, the recruiters need visual aids that are appropriate for the three areas of meditative practices: gentle yoga, breathing exercises, and quiet meditation. The visual aids will be distributed to all study sites and recruiters with IRB approval. Refinement of the meditation protocol sheets for caregivers will aid in the delivery of the intervention via pictures and description of home practice for meditative practices. Visual representation illuminates the verbal instructions and support retention of skills which will allow a reference for consistent implementation and information on meditative practices. This project was funded from grant #1 R01 CA193706.

ENSURING STANDARDIZED TRAINING OF RESEARCH PERSONNEL IN A MULTI-SITE NATIONAL CANCER INSTITUTE NATIONAL STUDY: SIGNIFICANCE OF THE EDUCATION COORDINATOR MANUAL

Sophia Kilgast
Poster: 323
Mentor(s): Rebecca Lehto (Nursing), Gwen Wyatt (Nursing)

The National Cancer Institute funded Sequential Multiple Assignment Randomized Trial (SMART) study has complex protocol that requires standardized delivery in three stages across several sites. The protocol requires randomization of 331 patient/caregiver dyads into an intervention arm(meditation or reflexology) or a control group with a re-randomization at four weeks if fatigue improvement is not observed. The education coordinator, whose responsibilities include ensuring systematic training across sites for recruiters, interviewers, and interveners, faces a challenging task in ensuring there are no procedural deviations. The purpose is to describe the quality management associated with the Education Coordinator role and best strategies in manual development to depict the specific training required. Systematic processes were undertaken whereby draft copies of the educator training manual were critiqued and compared by the study team members for consistency/completeness. Next, sections were edited, including training for recruiters, interveners, and interviewers, and ensuring Quality Assurance via benchmark checklists. Written procedures to respond to challenging situations, booster sessions, and protocol deviance were included. The final documents, including both desk and electronic formats were approved by the Project-Manager for accuracy. Given changes in personnel that occur during a long-term study, the manual assures consistent orientation for new Education Coordinators who are tasked with ensuring standardized training of personnel from multiple sites. The Education Coordinator Manual is an important component of treatment fidelity management. It is a reference for training personnel at all stages of experience, while providing best strategies for managing protocol deviation.
Study Number: 1 R01 CA193706

IMPROVING BREAST CANCER SCREENING IN COMMUNITIES THROUGH EDUCATION AND TRAINING OF HEALTH PROMOTERS

Elyse Pfeiffer, Roberta Dankyi
Poster: 324
Mentor(s): Mary Smania (Nursing)

Despite having a lower breast cancer incident rate than Caucasians, Hispanic and African American minority populations have a higher breast cancer mortality rate. Although there are many factors that contribute to this disparity, much of it is attributed to lack of access, information, and trust in the health care system. The purpose of this program is to educate women, connected to their communities, about topics such as breast health, breast cancer risk, prevention, detection,

and treatment through the utilization of the Witness Project Model. This model calls for the training and implementation of lay health advisors: women who desire to promote breast health in their own communities by serving as advocates and educators. Implementation of this program began with a three-hour educational program about breast health, which supplied the health promoters with the knowledge and tools necessary to educate the women in their communities. We evaluated the participants' knowledge through a pre-test/post-test design, and then we tracked their progress in the community to evaluate the effectiveness of their outreach efforts.

EPIDEMIOLOGICAL EVIDENCE ON INCIDENCE OF OXYCONTIN® USE, 2004-2014
Hamza Kaakarli
Poster: 325
Mentor(s): Omayma Alshaarawy (Epidemiology and Biostatistics), James Anothony (Epidemiology and Biostatistics)

In 2010, the sustained release opioid product OxyContin® was re-formulated in 'abuse deterrent' tablet form intended to reduce positive (and negative) reinforcement. Under a null hypothesis, we sought epidemiological evidence that re-formulation now reduces the estimated probability of taking OxyContin® for extra-medical reasons just one time and then never again. Each year, 2004-2014, the population under study consisted of civilian non-institutionalized United States residents aged 12+ years, with nationally representative probability samples drawn for the National Surveys on Drug Use and Health (NSDUH; aggregate n = 594,800). Computer-assisted self-interviews assessed initiation and persistence of extra-medical use (e.g., to get high or other feeling states not intended by a prescriber) and identified 1,625 newly incident extra-medical OxyContin® users. Our analysis-weighted year-specific NSDUH estimates, with Taylor series confidence intervals (CI), yield a meta-analysis-derived annual incidence rate (MADAIR) of 14 new users per 10,000 population during 2004-2010, versus 9 per 10,000 during 2011-2014, with apparently attenuated incidence ($p<0.05$). Nevertheless, estimated probability of continuing to use after first use shows little change, with epidemiological evidence of a stable reinforcing function, possibly reflecting (a) sustained availability of original formulations, (b) no strong 'abuse deterrent' effect with oral tablet use, or (c) other explanations deserving investigation. . By studying whether newly incident users take the drug again, following the first trial, we sought epidemiological evidence of reduced reinforcing functions. Instead, we see a coincident reduced occurrence rate for newly incident use, but no clear epidemiological signal of intended effects on persistence of use once use starts.

THE EFFECTIVENESS OF MHEALTH ON CANCER PREVENTION, EARLY DETECTION, AND SYMPTOM MANAGEMENT
Elizabeth Taber
Poster: 326
Mentor(s): Kelly Brittain (Nursing)

Cancer is a chronic health condition with an estimated 1,685,210 new cases being diagnosed and 595,690 people dying from the disease in the U.S. this year. Cancer related issues include prevention, early detection, and symptom management. The proliferation of mobile health (mHealth) has opened the door to the new strategies in addressing the aforementioned issues. mHealth is a general term for the use of mobile phones and other wireless technology in health care. However, the benefits of using mHealth for cancer early detection, prevention, and symptom management is not known. The purpose of this literature review was to examine the effects of using mHealth for cancer early detection, prevention, and symptom management for certain types of cancer. CINAHL and PubMed were searched using these key words: mHealth, mobile apps, text messaging, online forum, social media, social network, cancer, breast cancer, colon cancer, prostate cancer, lung cancer, prevention, treatment, and early detection. The search resulted in 209 studies from 2010 to 2017. Of the 17 studies reviewed, six studies found that mHealth facilitated a better way to connect the patient and healthcare professional, which allowed for improved symptom management during treatment. The remaining eleven studies found that mHealth was an effective aid in reminding patients of cancer prevention and early detection activities. Overall, the results of the studies indicate widespread use of mHealth may change cancer outcomes due to earlier detection and better symptom management.

"SMOKING DOPE" AND GETTING INTO TROUBLE WITH THE LAW: AN EPIDEMIOLOGICAL TEST OF POTENTIALLY REDUCED RISK
Adnan Barazi
Poster: 327
Mentor(s): Omayma Alshaarawy (Epidemiology and Biostatistics), James Anthony (Epidemiology and Biostatistics)

Each day in the United States (US), an estimated 3000-to-3540 12-to-17-year-olds start using cannabis. 'Medical marijuana' and other cannabis liberalization might have relaxed police enforcement. We stated a null hypothesis of no recent change in the risk of getting into trouble with the law due to cannabis possession or use. Each year, 2002-2015, the population under study consisted of civilian non-institutionalized United States residents aged 12+ years, with

nationally representative probability samples drawn for the National Surveys on Drug Use and Health (NSDUH; aggregate n > 600,000). Standardized interviews (mainly computer-assisted self-interviews used to promote accuracy of self-reports) identified 12-to-17-year-olds with newly incident cannabis use, and assessed whether they had had cannabis-related legal problems. Our estimation approach started with analysis-weighted year-specific NSDUH estimates and Taylor series confidence intervals (CI), followed by Stata software meta-analyses; Joinpoint regressions will aid trend analysis. Our meta-analysis indicates that an estimated 4.2 percent of newly incident adolescent cannabis users experience legal problems within an interval of 1-24 months after first use (95% CI = 3.7, 4.8). There has been no appreciable year-to-year variation (heterogeneity chi-square =18.2; d.f.=13; p = 0.150). The smallest estimate, 2.3%, is from 2005; the largest, 5.7%, is from 2007. Notwithstanding a liberalization of cannabis policies within the US, these epidemiological estimates are consistent with a null hypothesis of no reduction in risk of getting into trouble with the law for newly incident adolescent cannabis users. Strengths include large nationally representative samples and standardized assessments; a limitation is reliance on self-report.

FOOD SCIENCE & HUMAN NUTRITION

ORAL PRESENTATIONS, SECTION 1
ROOM 30, 8:30 – 9:15 AM

ASSOCIATIONS BETWEEN MATERNAL PRE-PREGNANCY BMI AND INFANT GROWTH IN THE FIRST YEAR OF LIFE: A PROSPECTIVE COHORT STUDY IN THE STATE OF MICHIGAN

Aashka Chhabria
Time: 8:30 AM
Mentor(s): Sarah Comstock (Food Science & Human Nutrition)

We know that maternal BMI is strongly positively associated with her children's BMI. This study enrolled mothers in pregnancy and followed the infants through the first year of life. Self-reported pre-pregnancy weight and height as well as self-reported infant weight and length at birth, 1 week, 6 months and 12 months of age was collected from participating women. The CDC online calculator was used to calculate pre-pregnancy BMI, and WHO Anthropometric software was used to calculate infant BMI-for-age z-score and weight-for-height z-score. GraphPad Prism was used to conduct linear regression analyses of the pre-pregnancy BMI with infant growth parameters for 3 time points in the first year of life. There were 42 subjects at the birth time point, 37 at 6 months, and 31 at the 12-month time point. Within the samples used, 2 of the infants are missing maternal pre-pregnancy BMI data. It's important to know if relationships that have been reported elsewhere in the US and the world are detected in our local study population to determine if other results from the study are generalizable.

PERSISTENCE OF THE TETB ANTIBIOTIC-RESISTANCE GENE IN THE FECAL MICROBIOTA OF PREGNANT WOMEN AND THEIR INFANTS

Kristen Schmidt
Time: 8:45 AM
Mentor(s): Sarah Comstock (Food Science & Human Nutrition)

Factors mediating the positive relationship between pre-pregnancy obesity and infant growth are poorly described. Maternal-to-child transfer of gut bacteria possessing specific genes may be one factor. Antibiotic resistance may be a defining factor for gut microbiota assembly. We focus on a specific antibiotic resistance gene, tetB, which confers resistance to tetracyclines, prescribed to treat urinary tract and respiratory infections. We isolated DNA from fecal samples of pregnant women and their 6-month (6mos) or 12-month (12mos) infants. Utilizing quantitative real-time polymerase chain reaction assays (Qiagen), we determined sample tetB presence. We hypothesized that tetB presence in pregnancy would predict presence of tetB in her baby. Presence of tetB would be associated with higher pre-pregnancy BMI and infant BMI-for-age z-score (BAZ). Of tetB positive 6mos and 12mos, 50% had mothers who were tetB positive. When all three samples were present (Mother, 6mos, 12mos), tetB results persisted 33% of the time. In sets without maternal data, tetB results persisted from 6 to 12 mos 50% of the time. There was no difference in BMI of tetB positive and negative mothers or in BAZ for tetB positive and negative infants. Average pre-pregnancy BMI of mothers with 6mos positive for tetB (avg BMI = 26.8) was numerically, but not statistically, lower than that of mothers of 6mos negative for tetB (avg BMI = 27.0). Lack of significance may be due to the small sample size. A clearer pattern may be identifiable as study sample size increases and show application to antibiotic control and education.

BREASTFEEDING RATES IN LANSING AND TRAVERSE CITY, MICHIGAN COMPARED TO STATEWIDE, NATIONWIDE AND GLOBAL LEVELS
Manyun Zhao
Time: 9:00 AM
Mentor(s): Sarah Comstock (Food Science & Human Nutrition)

Advancing our understanding of breastfeeding is a priority for ongoing infant health research. We compared data from a local study population to that from four local counties, state, national and global. We sought to not only quantify rates but also to compare with the broader level of state and nationwide recommendations. This study used data collected from two cohorts in the Lansing and Traverse City, Michigan. Samples were mainly collected in a low-income population from 2015 to 2017. Women were enrolled in either the ARCH GUT (n=27) or BABY GUT (n=17) cohort at any point during pregnancy, but data were collected during the third trimester and post-partum. Questionnaires were administered to collect detailed information at both 1 week and 6 months post-partum. At 1 week, nearly all infants were breastfed: 87% were fed ≥ 50% human milk and 64% were fed exclusively human milk. There was a significant drop in exclusive breastfeeding rate at 6 months of age. A larger percentage of infants whose mothers were obese prior to becoming pregnant consumed formula than did infants whose mothers were of normal weight pre-pregnancy. The complementary foods introduced at 6 months were fruits, vegetables, grains, tubers, and roots. Our population met the nationwide and global target rates and recommendations. Local infants are breastfed optimally at birth, but more work to reduce infant formula usage and improve rates of human milk feeding past 6 months of age is needed.

FOOD SCIENCE & HUMAN NUTRITION
POSTER PRESENTATIONS, SECTION 1
BALLROOM, 11:00 – 12:30 PM

UNCOMMON EXPERIENCES: DIFFERENCES BETWEEN DOMESTIC AND INTERNATIONAL UNIVERSITY STUDENTS' HEALTH OUTCOMES DURING THE FIRST SEMESTER
Nachuan Luo
Poster: 330
Mentor(s): Robin Tucker (Food Science & Human Nutrition)

First-year university students typically experience negative health outcomes, such as weight gain. This study's purpose was to examine if the health changes observed in international students during the first semester were similar to those of domestic students. American domestic and Asian international students from two Midwestern universities were recruited. Height, weight, body mass index (BMI), percent body fat (%BF), resting heart rate (RHR), and blood pressure (BP) were measured three times during the first semester (September – December). The amount of change over time was calculated by subtracting baseline from end-of-semester values. Differences between groups at each time point and differences in change over time were measured using independent samples t-tests. 31 males (20 international) and 70 females (22 international) were assessed. At the end-of-semester assessment, and compared to domestic students, systolic BP was lower among male international students; whereas, diastolic BP, RHR, weight, and BMI were lower among female international students ($p<0.045$, all). %BF was lower among female international students at each visit ($p<0.002$, all); the largest difference was at the end-of-semester assessment. Male international students experienced smaller changes over time for systolic BP and %BF ($p<0.028$, both). Female international students experienced smaller changes in systolic BP and RHR ($p<0.032$, both), with trends for weight and BMI ($p<0.078$, both). International students experienced fewer and smaller negative health changes over time than domestic students. Future work will recruit additional students to further test these relationships and seek to determine the protective factors experienced by international students. Participants will be able to discuss how different groups of students experience health changes over the course of the first semester.

THE FRESHMAN "15"? NOT IF YOU'RE AN INTERNATIONAL STUDENT
Linmeng Wu
Poster: 331
Mentor(s): Robin Tucker (Food Science & Human Nutrition)

First-year university students typically experience weight gain and other negative health outcomes. This study's purpose was to characterize health outcomes and behaviors among international students studying in the US. International students from Asian countries attending a large Midwestern university were recruited. Anthropometric and metabolic health measurements in addition to various health-related behaviors were measured three times during the first semester (September – December). Differences between visits were measured using repeated measures ANOVA and Bonferroni post-hoc tests. 43 participants (22 females) were assessed. No differences in height, weight, BMI, or blood

pressure for either sex were observed over time. Males experienced an increase in percent body fat (p=0.020), and females' resting heart rate decreased over time (p=0.006). Sleep quality and self-reported duration did not change. The percent of meals consumed in the cafeteria decreased between visits 1 and 3 (p=0.028), and time spent eating breakfast decreased over time in females (p=0.033) and in males (p=0.050, trend), with more participants indicating they skipped breakfast over time. Total score on the Three-Factor Eating Questionnaire decreased over time (males: p=0.008; females: p=0.050 (trend). Dietary intake of commonly consumed American foods did not change. International students experienced surprisingly few negative health changes over time, unlike what is commonly reported among their domestic counterparts. These positive outcomes might be explained by retaining cultural food practices and engaging in fewer maladaptive eating behaviors over time. Future work will recruit additional students to further test these relationships and explore protective factors. Participants will be able to discuss factors that might protect international students from negative health changes over the course of the first semester.

DESCRIPTION OF A GARDENER SUPPORT PROGRAM IN DETROIT, MICHIGAN
Colleen Joseph
Poster: 332
Mentor(s): Katherine Alaimo (Food Science & Human Nutrition)

Keep Growing Detroit is a non-profit organization in Detroit, Michigan whose mission is "to promote a food sovereign city where the majority of fruits and vegetables Detroiters consume are grown by residents within the city's limits." Their programming currently supports over 1500 gardens in the city of Detroit. The foundation of their programming is the Garden Resource Program (GRP), which provides seeds and plants for a low annual fee, and access to technical gardening support from the organization. The Garden Resource Program offers a wide variety of educational classes that cover topics on gardening, cooking, and more. The objective of this research is to provide summary statistics of garden characteristics and program involvement in the GRP from 2009-2014. Garden characteristics include type of garden, number of gardeners, and resources received. Program involvement includes class and social activity attendance. The data used for this research consists of program records collected by Keep Growing Detroit. Data cleaning and management was conducted by researchers at Michigan State University. Descriptive statistics were tabulated using Stata. This research is important to understand the scope of a successful gardener support program.

THE IMPACT OF AN INTRODUCTORY NUTRITION COLLEGE COURSE ON STUDENT NUTRITION KNOWLEDGE, ATTITUDES, AND BEHAVIORS
Meghan Donovan
Poster: 333
Mentor(s): Katherine Alaimo (Food Science & Human Nutrition)

Poor nutrition, including lack of fruit and vegetable consumption, and a high consumption of processed foods are currently contributing to a chronic disease health crisis. Chronic diseases, such as diabetes, heart disease, and cancer, are among the leading causes of death in the U.S. and worldwide. The goal of our research is to determine whether the Michigan State University college course, HNF 150 (Introduction to Human Nutrition), increases nutrition knowledge, and changes attitudes and behaviors among college students. Students who take the course were asked to complete pre and post class surveys containing questions about their knowledge, attitudes, and behaviors regarding nutritious food. The surveys included questions from the National Cancer Institute's Fruit and Vegetable Screeners food frequency questionnaire to determine students' intake of fruit, vegetables, meat, dairy, and whole grains. For this project, we will analyze data from approximately 5,100 students collected during 8 semesters. Differences in nutrition knowledge, attitudes, and behaviors between the pre and post class surveys will be calculated using STATA 13.0. We will also determine associations between nutrition knowledge and attitude changes, and behavior changes. We hypothesize the students will report an increase in knowledge and change in attitudes towards nutritious food, and that behavior changes will be associated with increased knowledge and attitude changes. This study will help determine whether college nutrition courses are an effective means to improve student nutrition knowledge, attitudes and behaviors.

THE TOTAL OMEGA-3 FATTY ACID CONTENT OF BEEF SAMPLES VARIES GREATLY DEPENDING ON THE BEEF PRODUCER
Raghav Jain, Travis Goeden
Poster: 334
Mentor(s): Jenifer Fenton (Food Science & Human Nutrition)

Fatty acids (FAs) are lipid compounds involved in a variety of metabolic processes crucial to health. The omega-3 (n-3) and omega-6 (n-6) FAs are particularly important due to the role their downstream metabolites play in the modulation of inflammation. Red meat consumption and its relationship to human health outcomes is a contentions topic. While beef is a nutrient dense food, the high n-6/n-3 FA ratio in beef is proposed to contribute to inflammation and chronic

disease. To better characterize the FA profile of beef available to consumers, 750 samples from 17 producers were collected from September 2017 to August 2018. Producers were also asked to complete a survey detailing the production system. FAs were extracted using microwave assisted extraction and methylated using a 1.09M methanolic HCl solution. Individual fatty acids were quantified using gas chromatography mass spectrometry. Mean FA values of all producers were compared and samples collected in fall were compared to spring samples to determine if season affected FA values. No overall difference was observed for samples collected in different seasons for any of the FA groups (saturated, monounsaturated and polyunsaturated [PUFAs] FAs). Spring samples were significantly higher in n-3 PUFAs than fall samples ($p<0.001$). Total n-3 and n-6 FAs for individual producers ranged from 5-23 mg FA/100g beef and 30-120 mg FA/100g beef, respectively. Together, these data indicate high FA variability among the producers who submitted samples, which may be due to differences in feeding practices. To our knowledge, this is the largest such experiment performed.

ASSESSMENT OF THE SMARTER LUNCHROOM STRATEGIES EFFECTIVENESS ON FRUIT AND VEGETABLE CONSUMPTION RATES IN MICHIGAN SCHOOLS

Lauren Pringle
Poster: 335
Mentor(s): Katherine Alaimo (Food Science & Human Nutrition)

This project evaluated the effects of applying Smarter Lunchroom (SL) strategies to schools in Michigan. SL initiatives involve enhancing school cafeterias to promote children's consumption of fruits and vegetables. Food service providers were provided support through Michigan State University Extension coaches, trained by Michigan Team Nutrition staff. Eighty schools were chosen to implement SL techniques between February 2016 and May 2017. These schools formed student teams, completed online SL training, submitted 5 days of lunchtime production records before and after implementing changes, spent $250 on material for changes, completed SL Scorecards (checklist of 100 possible lunchroom practices) before and after implementing changes, and wrote a success story. 67 schools submitted completed pre/post SL scorecards and 37 schools submitted completed pre/post production records. Of the 67 schools, all experienced increased SL scores compared to their pre-scores (mean change of 15.75 practices; $p=0.00$). There was also a statistically significant increase for each SL scorecard section. Production records showed no statistical significance in improvement for selection of cups/student of fruits ($p=0.48$), cups/student of vegetables ($p=0.54$), or fruits and vegetables together ($p=0.48$). This project was effective in providing training and support to food service providers within schools and implementing changes within cafeterias but did not cause an increase in the rate of consumption or student selection of fruits and vegetables.

DIETARY QUALITY OF FOODS AND BEVERAGES SERVED BY IN-HOME CHILD CARE PROVIDERS COMPARED TO THE 2015 DIETARY GUIDELINE RECOMMENDATIONS

Anna Jursinic, Miya Hourani
Poster: 336
Mentor(s): Dawn Earnesty (Food Science & Human Nutrition), Lorraine Weatherspoon (Food Science & Human Nutrition)

Childhood overweight, obesity and nutrient deficiencies are significant public health issues associated with poor diet quality among young children. Since children are spending increasingly more hours in child care, it is important to examine the dietary quality of meals and snacks served by the child care providers. The study objective was to describe the dietary quality of meals and snacks served to children 2-5 years of age receiving child care in individual provider homes in low-income areas in Michigan, and compare the dietary quality to the 2015 Dietary Guidelines for Americans. A cross-sectional observational study was conducted from June 2016 to January 2018 in 16 counties in Michigan with a total of 36 in home child care providers serving 351 children. The dietary quality of foods and beverages served in these homes to children, 2-5 years of age, were assessed by direct diet observation and compared to 39% (based on lunch and 1 snack) of the Dietary Guidelines for Americans. Recommendations for whole grains, vegetables, dietary fiber, iron and potassium were not met. Refined grains, protein, added sugars, sodium and Vitamin D exceeded recommendations. These findings are of concern because of the immediate and long term implications for nutritional behavior and health if not addressed. Therefore, more in-depth dietary quality exploration is needed to inform nutrition education and policy efforts for in-home and likely also other child care providers who serve foods and beverages to young children.

THE TOTAL VITAMIN AND MINERAL CONTENT OF BEEF SAMPLES VARIES GREATLY DEPENDING ON THE BEEF PRODUCER
Vanessa Tan
Poster: 337
Mentor(s): Jenifer Fenton (Food Science & Human Nutrition)

Vitamins and minerals are involved in a variety of metabolic processes crucial to health. Micro minerals, such as iron and zinc, are particularly important in modulating the immune system, and cell growth. Red meat consumption and its relationship to human health outcomes is a contentions topic. To better characterize the vitamin and mineral profile of beef available to consumers, 750 samples from 17 producers were collected from September 2017 to August 2018. Producers were also asked to complete a survey detailing the production system. The vitamin and mineral analysis were run at a commercial laboratory. Out of all of the macro minerals (potassium, sulfur, phosphorous, magnesium, and sodium), potassium was the only macro mineral that did not differ overall. Iron was the only micro mineral with overall seasonal differences ($p<0.0001$), which is potentially due to the differences in diet, and was lower off pasture. The other micro minerals (copper, zinc, and selenium) differed within producers, but it's quite variable. Vitamin E and beta-carotene showed seasonal differences overall, with vitamin E displaying a trend ($p<0.0001$). The data indicate that all antioxidants and minerals, except magnesium, were observed to be highly significantly different between producers. There were overall differences in the minerals and vitamins by producer, season and region of the country. To our knowledge, this is the largest such experiment performed.

FOOD SCIENCE & HUMAN NUTRITION
POSTER PRESENTATIONS, SECTION 2
BALLROOM, 3:00 – 4:30 PM

THE STRUCTURE OF SPAGHETTI NOODLES
Ava Ringhelsen
Poster: 340
Mentor(s): Per Askeland (Composite Materials & Structures), Carl Boehlert (Chemical Engineering & Materials Science)

My research will be on the differences between protein and starch organization in spaghetti noodles before and after cooking. I will use scanning electron microscopy to observe the organization of pasta components. The spaghetti noodles will contain the same ingredients and will be cooked the same way. Uncooked spaghetti will be observed in the SEM to see the structure of protein and starch at its original state. The original structure will be noted, and many pictures will be taken to document. The breaking down of starch and the formation of proteins occur during pasta cooking so the structure differences might be more evident after cooking. Cooked spaghetti will then be observed in the SEM to see the resulting structure of the protein and starch, and discover any new or missing components. The structure of the entire noodle will be documented as well, and the differences noted. Another factor to consider is the chemical and physical properties that affect the breaking down of starch and formation of protein. The differences between the structure of protein and starch will be observed before and after the noodle is cooked and the result will explain the effect cooking spaghetti noodles have on protein and starch formation.

DIETARY SUPPLEMENTATION WITH OMEGA-3 DOCOSAHEXAENOIC ACID AT PHYSIOLOGICALLY RELEVANT CONCENTRATIONS BLOCKS SILICA-INDUCED AUTOIMMUNE GENE EXPRESSION IN LUNGS OF LUPUS-PRONE FEMALE NZBWF1 MICE
Kristen Gilley
Poster: 341
Mentor(s): James Pestka (Food Science & Human Nutrition)

Environment and diet influence latency/severity of genome-driven autoimmune disease (AD). In female NZBWF1 mice, a model for lupus, installation with crystalline silica (cSiO2) triggers premature loss of self-tolerance in the lung as evidenced by robust ectopic lymphoneogenesis. Thus the lung serves a platform for exacerbating systemic autoimmunity and glomerulonephritis. Dietary supplementation with ω-3 polyunsaturated fatty acid (PUFA), docosahexaenoic acid (DHA), abrogates cSiO2-accelerated autoimmunity. Here, we assessed the time-dependent effects of DHA consumption on cSiO2-triggered pulmonary autoimmune gene expression. Cohorts (n=8/gp) of 6-wk old female NZBWF1 mice were fed an isocaloric AIN-93G diet containing 0.0, 0.4, or 1.0% DHA for 2 wk. Mice were then intranasally instilled with 1.0 mg cSiO2 or vehicle once per week for 4 wk and then maintained on experimental diets for 1,5, 9, or 13 wk. Cohorts were sacrificed, total RNA isolated from lungs, and gene expression levels using nanoktring methodology.cSiO2 induced expression of 48, 90, 106, and 99 autoimmune-related genes by more than 1.5-fold ($p>0.05$) in the 1, 5, 9, and 13 wk cohorts, respectively. Categories of upregulated genes included interferon-driven

proteins, chemokines, cytokines, complement, and macrophage/lymphocyte activation markers. Diets containing low and high DHA concentrations blocked expression of 80-90 % and 100 %, respectively, of the autoimmune genes triggered by cSiO2. These results suggest that DHA supplementation at physiologically relevant doses might be useful in preventing cSiO2 triggering of lupus and other human autoimmune diseases.

IN VITRO MODEL FOR STUDY OF PRO-RESOLVING LIPID MEDIATOR RESOLVIN D1 IN MACROPHAGE TOXICITY AND INFLAMMATION
Liz Ross
Poster: 342
Mentor(s): James Pestka (Food Science & Human Nutrition), Josephine Wee (Food Science & Human Nutrition)

Systemic lupus erythematosus is an autoimmune disease that's severity and onset are shown to be influenced by genetics, as well as by lesser known environmental factors. Our goal was to discover if the events triggering lupus (primarily the activation of the NLRP3 inflammasome and cell death) by a common environmental toxicant (crystalline silica) could be prevented by the addition of a specialized pro-resolving metabolite (SPM) of docosahexaenoic acid. Our work previously demonstrated that the omega-3 fatty acid docosahexaenoic acid (DHA), a well-known dietary supplement extracted from cold-water fish, dose dependently attenuated silica-induced inflammation and toxicity *in vivo* and *in vitro*. However, the effects of the pro-resolving lipid metabolites of DHA on silica-induced toxicity and inflammation is unknown. In this study, we developed a novel *in vitro* model to explore the effects of an SPM, Resolvin D1 (RvD1), on RAW 264.7 murine macrophages. Our hypothesis was that Resolvin D1 protects against silica-induced cell death and inflammasome activation in RAW 264.7 cells. Preliminary data suggest that Resolvin D1 protects against silica-induced cell death measured by LDH release and IL-1B levels in RAW 264.7 cells. Future studies are directed toward further characterization of other SPMs such as Resolvin D2, Maresin-1, and PD-1 in this established *in vitro* model. Elucidating mechanisms of lipid metabolites could bring novel insights into how manipulating cellular lipids through diet can be targeted to prevent particle-induced toxicity and inflammation.

EFFECTS OF SENSORY STIMULI ON BLOOD GLUCOSE
Nicole Desmet, Stephanie Roskelly
Poster: 343
Mentor(s): Erica Wehrwein (Physiology)

The sight and or smell of food may induce the rapid release of preformed insulin vesicles in preparation of a meal's glucose load. We postulated that the sight and smell of cookies will decrease blood sugar due to pre-secretion of insulin, with the olfactory stimulus resulting in a greater decrease. We also hypothesized that the peak of the olfactory glucose response curve will be lower than that of the visual stimulus, with both intervention groups lower than the control peak. An oral glucose tolerance test was performed on 10 females (age 20.75 +/- 0.24). Three conditions were used on different days: control, visual, and olfactory interventions. The subjects consumed 3 chocolate chip cookies and blood glucose was measured in mg/dL every 30 minutes for 120 minutes. During the visual and olfactory interventions, the subjects were exposed to an image or smell of cookies, respectively, for 5 minutes, then blood glucose measured 15 and 30 minutes after exposure but before consuming the cookies and performing the glucose tolerance test. The visual stimulus significantly decreased preprandial blood sugar from 80.3 +/- 4.67 to 72.8 +/- 3.77 after 15 minutes, and the olfactory stimulus increased blood sugar from 82.1 +/- 4.36 to 88.3 +/- 2.91 after 15 minutes. After 30 minutes post-presentation, each group's blood glucose had returned to baseline. There was no statistical difference between any group's glucose response curve. These results may explain how food advertisements succeed in making consumers hungry, as they induce an insulin driven reduction in blood glucose.

FREEZE-THAW CYCLES EFFECT ON PHOSPHORUS RELEASE FROM WINTER WHEAT
Rachelle Crow
Poster: 344
Mentor(s): Steven Safferman (Biosystems & Agricultural Engineering)

This research investigates the effects of freeze-thaw cycles on the phosphorus release from winter wheat. Data is being collected by exposing winter wheat plants of varying ages to variable numbers of freeze-thaw cycles. Tests are then completed to find the phosphorus content in the plants. The findings are anticipated to demonstrate that the most phosphorus is released from the younger plants that have been exposed to the most freeze-thaw cycles. The results of these experiments and their implications will be discussed at this poster presentation. The findings of this research will add information to the conversation regarding the connection between winter wheat cover crops and nutrient transport in agricultural fields.

ALL IN THE REALM OF CHOCOLATE: A COMPETITIVE ANALYSIS OF THE MATERIAL STRUCTURE AND FLAVOUR OF CHOCOLATE
Violet Butts
Poster: 345
Mentor(s): Per Askerland (Composite Materials & Structures), Carl Boehlert (Chemical Engineering & Materials Science)

There is more to the best chocolate than what meets the eye. With the Scanning Electron Microscope, we can explore how the material structures of chocolate differs, possibly leading to advantages in taste and texture. As well, with this technology, we can identify how the consistency of chocolate changes across different brands. This research is important to identifying how differences in structure actually appear within the chocolate itself due to the way that chocolate was made and how ingredients in that chocolate interacted at different phases. I will be observing multiple samples of chocolate under the SEM and comparing differences in appearance to ingredients in the chocolate and the overall qualities that the chocolate possessed.

EFFECTS OF RESOLVIN D2 TREATMENT ON CYTOTOXICTY AND IL-1B RELEASE IN SILICA EXPOSED RAW 264.7 CELLS
Augie Evered
Poster: 346
Mentor(s): James Pestka (Food Science & Human Nutrition)

Systematic lupus erythematosus (SLE) is an autoimmune disease characterized by loss of self-tolerance in the immune system and systemic inflammation. Previous in vivo research in our lab has shown that exposure to the environmental toxicant crystalline silica leads to earlier onset of autoimmune disease in lupus-prone mice, but disease onset is delayed in mice fed a diet supplemented with docosahexaenoic acid (DHA), an omega 3 fatty acid and major component of fish oil (Bates et al. 2016). Upon inhalation, crystalline silica will deposit in the alveoli where it can be phagocytosed by alveolar macrophages, which can lead to macrophage activation and a variety of downstream inflammatory responses. While DHA has been shown reduce silica-inflammation in vitro, it is not clear whether the effects are due to free DHA itself or its downstream metabolites, known as specialized pro-resolving mediators (SPMs). It has been shown that SPMs are anti-inflammatory, and could thus combat the systemic inflammation that is seen in lupus. Our study examines the effects of Resolvin D2 (RvD2) on silica-induced inflammation and cytoxicity in ASC-transfected RAW 264.7 cells. Analysis will include measuring the release of lactate dehydrogenase (LDH) as a measure of cytotoxicity and the release of interleukin-1B (IL-1B) because it is an essential component of inflammasome activation leading to an inflammatory response. Future experiments include analyzing the protective effects of other SPMs to elucidate potential mechanisms for the anti-inflammatory effects of DHA.

UNDERSTANDING THE IMPACT OF AFRICAN AMERICAN WOMEN'S BREASTFEEDING SELF-EFFICACY AND PERCEIVED BREASTFEEDING SOCIAL SUPPORT IN LATE PREGNANCY
Natalie Poage
Poster: 347
Mentor(s): Lorraine Weatherspoon (Food Science & Human Nutrition)

Breastfeeding is disproportionately lower in the African American population compared to others in the US. Two reasons for the disparities may be social support and self-efficacy prior to delivery. The objective of this study was to understand how African American women perceive breastfeeding social support and self-efficacy during late pregnancy prior to a breastfeeding support and weight management intervention, using a longitudinal randomized control design. Socio-demographic characteristics, breastfeeding social support and self-efficacy were assessed and analyzed. Data was collected at baseline, early postpartum, and five months postpartum. Participants included fifty-two pregnant African American women recruited from Henry Ford Health System in Detroit, MI aged 18 to 45 years. Baseline results showed participants having the intent to breastfeed exclusively at three and six months. Mean scores of the three constructs of breastfeeding social support showed tangible (M=31.9; SD=8.8), informational (M=28.5;SD 9.6), and emotional (M=34.2;SD= 9.3). The majority of participants reported having a suitable amount of support in all constructs, the highest score report in emotional support. A mean of 61.5 (SD 8.14) for breastfeeding self-efficacy was also reported. Although literature has shown African American women having low levels of breastfeeding social support and self-efficacy, preliminary results show that women enrolled have considerable amounts of social support, confidence in their ability to continue breastfeeding and intent to exclusively breastfeed up to six months. Further investigation is needed to see if the perceptions of social support and self-efficacy change postpartum, and how they change in relation to breastfeeding duration and exclusivity outcomes.

GLOBAL & AREA STUDIES

ORAL PRESENTATIONS, SECTION 1
LAKE SUPERIOR ROOM, 8:30 – 10:30 AM

A SPATIAL ANALYSIS OF DETROIT WATER RATES
Alexander Brown
Time: 8:30 AM
Mentor(s): Elizabeth Mack (Geography Environment Spatial Sciences)

Across the United States, interest in the drivers of increasing water and sewer costs is rising. Several cities around the country, including Philadelphia and Baltimore, have been recognized as hubs for this issue and Philadelphia has implemented income-based billing in response to rising affordability challenges for customers. One of the first cities to appear in the news however was Detroit, Michigan where thousands of customers have had their water shut off for non-payment of services. We know water rates vary, sometimes dramatically, from utility to utility. However, there has yet to be an examination of the spatial variation in these rates in accordance with the demographic and corresponding socio-economic characteristics of provider areas. Research of this kind is important to understand distributional questions associated with current billing practices of water and wastewater entities that may have unintended or unforeseen consequences for low-income and/or minority households. To assess distributional questions associated with current water and wastewater billing practices, this study will conduct a spatial assessment of water rates using historical data for both water and wastewater costs obtained from utilities. Policy implications of findings will be discussed.

DERADICALIZATION AND RESTORATIVE JUSTICE IN SAUDI ARABIA
Natalie Hix
Time: 8:45 AM
Mentor(s): Derrick Franke (Criminal Justice)

With the threat of terrorism continually becoming a subject of fear throughout society, alternatives to the typical counterterrorism measures are being sought out. One such example is the Mohammad bin Naif Center for Counseling and Care, an institution in Saudi Arabia focused on deradicalizing and minimizing the extremist beliefs of would-be terrorists. This research presentation examines the treatment center, and its claims of success, through a criminological lens. Of particular note is the Center's alignment with restorative practices, a strategy that highlights offender accountability, repair, and successful reintegration. We discuss how the Saudi experiment could signal a shift in governments respond to extremism generally, and in particular how former extremists are reintegrated into their communities, from approaches that rely on strictly punitive measures towards ones that promote a more rehabilitative and restorative ideal. Drawing on research of criminal desistance, we propose tools to enhance the Saudi program and offer suggestions for expansion to other extremist populations, including homegrown terrorists in the United States.

RE-IMAGINING STRI SHAKTI: FEMALE LEADERSHIP IN A HINDU NATIONALIST DISCOURSE
Madelyn Averill
Time: 9:00 AM
Mentor(s): Jon Keune (Religious Studies)

Since religious nationalism is typically associated with conservative ideas about a woman's place in society, it may seem surprising to find women at the head of Hindu nationalist organizations in India. How should we understand powerful female leaders advocating for a system that seems to confine women to narrow gender roles? Women in conservative movements are typically overlooked as "brainwashed" or individuals who are coerced into accepting a subservient role in society. However, a closer look at how women in right-wing movements view themselves reveals ways that they expand the "ideal woman" to be a powerful and nuanced identity. The emergence of female Hindu nationalist organizations has given women a role in society that contradicts many of the stereotypes and teachings of the ideal Hindu woman, creating a meaningfully diverse interpretation of what exactly it means for a woman to be a part of the Hindu nationalist identity. Having explored the construction of gender in Hindu nationalism, the emergence of women's organizations, and how women have become leaders in a masculine dominated space, this project analyzes the way women interpret their roles in an idealized Hindu society situated at the intersection of religion, gender, and nationalism. Specifically, this section will examine how women understand their roles on their own terms, and how they interpret femininity as powerful without challenging the overarching moral discourse of Hindu nationalism.

AN EXAMINATION OF COLONIAL SENTIMENTS REGARDING NATURE IN SHAPING THE LANDSCAPE OF THE MAASAILAND REGION OF NORTHERN TANZANIA
Charlie Booher
Time: 9:15 AM
Mentor(s): Robert Montgomery (Fisheries and Wildlife), John Waller (History)

The Maasailand of Northern Tanzania is one of the most biodiverse regions on the planet and is home to numerous charismatic species, including elephants, lions, and giraffes. However, this landscape experienced a fundamental shift in land and wildlife management as European empires, and Western philosophies regarding nature, expanded to control this territory. It has become a tinderbox for ecological catastrophe. Human populations are rising at an exponential rate, while wildlife numbers suffer, land becomes scarcer, and imperial-era land allocation policies blight all stakeholders involved. Scientists, conservation managers, and humanitarian entities have attempted to solve these problems without success, notably due to a lack of interdisciplinary collaboration and a minimal consideration of the colonial history of this region. The problems that face this region require a coordinated effort and an understanding of both the social and physical sciences. In this case, the history of the region, and the attitudes of its colonizers, illustrates an important story for future conservation. These sentiments are often left out of consideration in the formulation of conservation policies, but this research is meant to raise the salience of these sensibilities. For the last year, I have conducted a historiographical review of these to better understand the human dimensions of these ecological issues. Here, I will present a brief history of how colonial sentiments regarding nature shaped the physical and social landscape of the Maasailand.

MIDDLE CLASS WOMEN IN PINOCHET'S CHILE: THE PRESERVATION OF HISTORY THROUGH MEMORY
Samantha Minnette
Time: 9:45 AM
Mentor(s): Scott Boehm (Romance and Classical Studies), Jonathan Glade (Linguistics and Germanic, Slavic, Asian and African Languages)

The purpose of this paper is to research the effect that the 1973 Pinochet coup had on the lives of middle-class Chilean women. My main question will be about the impact of memory on history and how exclusion of certain memories can change the way history is remembered. By researching this specific demographic and topic, I aim to draw larger conclusions about the importance of memory and the use of non-mainstream or public perspectives in the pursuit of historical accuracy. Frequently history is viewed through a male, public centric view, ignoring the perspectives of minority populations. By looking at an influential historical event through women's perspectives and researching the effects it brought to their private lives, I hope to discover more about how Chilean middle-class women navigated the socially and politically turbulent waters of 1973 Chile. In addition, I hope that this specific demographic will provide more information about how minority populations and other groups preserve their memories and create their own history. In this paper I will be using several theoretical approaches, including the use of Marxist and transnational feminist theory. These theories will help to explain how global capitalist influence oppressed the Chilean women and kept the Chilean population in a state of subservience during the Pinochet years, and how international influence from women helped Chilean women find alternate methods to express their memories and experiences of living in Pinochet's Chile.

RUBBER SUITS AND SCALE MODELS: HOW CULT MONSTER MOVIES HELP A NATION HEAL FROM HISTORICAL TRAUMA
Emily Quinlan
Time: 10:00 AM
Mentor(s): John Aerni-Flessner (Arts & Humanities)

What place does popular culture have in discussions of trauma and healing? Can a fantasy movie effectively highlight historical trauma to jumpstart the healing process? By portraying fictional events that parallel real events, fantasy films can help make historical events more comprehensive and relatable. Seeing the violence and destruction wrought by a fictional creature, and then connecting it to violence and destruction in the past makes it easier to grasp the reality of those events. Beginning in 1954 with Ishirō Honda's Gojira (Godzilla, for American audiences), the Gojira series spans six decades, with a grand total of thirty-two films. The majority of the films are light-hearted romps, with several notable exceptions, including the original film that spawned the series. The Gojira films function as agents that translate the horrors of World War II and the atomic bombing of Japan into a finite and comprehensible format for survivors and descendants of survivors of the Hiroshima and Nagasaki bombings. They depict and address allegorical representations of the trauma of the bombings, and serve to help the Japanese people come to terms with what happened. In the films, the pain and pathos brought to ordinary citizens by Gojira is deeply evocative, and makes the connection between the symptoms of trauma and their source. This is the first step toward healing, and healing from trauma is resistance to that trauma.

TIME AND SPACE: AMERICA VERSUS IRAQ
Veer Shah
Time: 10:15 AM
Mentor(s): Simei Qing (James Madison)

This study will be the first attempt to employ a cognitive psychological and cultural approach toward U.S and U.K foreign policy making prior to the Iraq war. The cognitive psychological approach focuses on how the intelligence information about the Iraq Weapons of Mass Destruction (WMD) issue was selected and analyzed. The Cultural Approach will be utilized to examine those deeply-embedded, but rarely examined, cultural assumptions about the Middle East in public discourse. My research will examine, specifically, the following questions: why was the connection between Iraq and 9/11 formulated so quickly? And why did citizens, pre-war, overwhelmingly believe that Saddam Hussein's Iraq had WMDs targeting the U.S. and U.K? To answer these questions, I will present U.S and U.K intelligence communities' postwar testimonies, such as the Curve Ball incident (vital information in the decision on the Iraq War, which turned out to be false), and major media coverage of Iraq's WMD question. This inquiry particularly interests me because I am an Indian-born, American citizen and student who hopes to learn more lessons from the Iraq War decisions. The message I hope to convey is that the short-term goals of attacking the branches of a tree, rather than watering the roots, is one that has failed consistently. Thus, a new foreign policy approach is recommended – one which considers both time and space of other nations - so that we can achieve mutually beneficial relationships and "do less, but achieve more" in America's policy toward non-Western, developing countries in the 21st century.

HISTORY, POLITICAL SCIENCE, & ECONOMICS

ORAL PRESENTATIONS, SECTION 1
LAKE SUPERIOR ROOM, 11:00 – 12:45 PM

LIBERATION AND THE FORMATION OF JEWISH MASCULINITY IN WORLD WAR II
Anna Cumming
Time: 11:00 AM
Mentor(s): Kirsten Fermaglich (History)

With the end of World War II, the horrors of the Holocaust were discovered by those encountering the camps for the first time. Those that would eventually come to be known as the "liberators" of these camps experienced the unedited terrors of the Nazi regime's reign in Europe. One hears much about the experiences of those that lived in the confines of the camps. There is a plethora of information about the liberators as well. Many people have taken a general look at the experiences of the various members of "liberation" teams, from soldiers to doctors to religious leaders. However, there is a dearth of information on the experiences of Jewish liberators' experiences in confronting the camps. The broad objective of the research is to examine if Jewish liberators had a different experience than Gentile liberators of Nazi concentration camps. The hypothesis of the research is that there Jewish masculinity was profoundly shaped by pre-liberation encounters with fellow soldiers, liberation, and discussing liberation after the fact. Finally, the research will discern the changes in religious beliefs after the liberation and end of the war. Did those that did not have strong beliefs before the war suddenly find themselves increasingly drawn to religious movements? Or was the experience so traumatic that people found themselves turning away from religion and questioning their faith?

TOCQUEVILLE, THE EQUALIZING OF CONDITIONS, AND THE MODERN COMMITMENT TO TECHNOLOGICAL DEVELOPMENT
Natalie Holland
Time: 11:15 AM
Mentor(s): Tobin Craig (James Madison)

This project will examine Tocqueville's thesis on the equalizing of conditions and the effects it produces on liberal democracy. Tocqueville says, "I very clearly discern two tendencies; one leading the mind of every man to untried thoughts, the other prohibiting him from thinking at all" (Chapter II: Of the Principal Source of Belief Amoung Democratic Nations). Toqueville is correct in his analysis of the effects of the equalizing conditions. It can be seen and explicated through the modern commitment and imposition of technology. This project will argue that the embrace of modern technology in the 20th century can be seen as the product of Tocqueville's thesis on the equalizing of conditions and can be expanded to include his thesis of the tyranny of the majority. Particularly, modern embrace of technology by the majority can lead to the forced embracement of technology on the few.

FACTORS ASSOCIATED WITH POLICY ADOPTION ACROSS US STATES
Babs Hough
Time: 11:30 AM
Mentor(s): Matt Grossmann (Political Science)

Both Republican and Democratic policies have been concerned with social issues rather than economic or partisan platforms. Republican states have passed conservative policies on abortion access, right-to-carry laws, charter school increases, and voter identification requirements. Democratic states have launched progressive policy on gay rights, drug liberalization, smoking regulation, health access, early childhood education, and business regulation. These policies have not been seriously challenged, and so have been enacted rather easily in response to social trends. In order to understand the factors associated with policy adoption, we conduct a systematized literature review of these policies across states. A careful evaluation of this should shed further light on policy adoption along partisan lines and the motivation of legislators. In addition, it could spur further research into socio-political issues and their corresponding policies.

LGBT CIVIL RIGHTS V. RELIGIOUS FREEDOMS: IS THERE A RIGHT TO DISCRIMINATE?
Madison Hubbard
Time: 11:45 AM
Mentor(s): Constance Hunt (Social Relations and Policy)

Throughout this oral presentation, I will prove why the Fourteenth Amendment Equal Protection Clause should reign of paramount importance in the majority ruling of Masterpiece Cakeshop v. Colorado by the Supreme Court. Through my research, I look at the historical use of Public Accommodation Laws, Religious Exemption Laws, the history of Freedom of Expression, and prove that this discussion has happened before in our history, during the Civil Rights Movement and, therefore, must be treated similarly. Although there are some people in the United States that fear social change so much that they try to preserve the status quo of the societal inequalities, it does not make religious liberties a constitutional exemption from public accommodation laws. Therefore, I conclude that the United States must re-analyze the use of religious exemptions within the context of public accommodation laws and recognize that the current use of religious exemptions, although intended only to preserve religious liberties, is too often used for reason to discriminate, which is not equal protection. Furthermore, I propose guidelines for the Supreme Court as they work through the ruling of Masterpiece Cakeshop v. Colorado.

A COMPARATIVE ASSESSMENT OF FRENCH AND GERMAN PROGRESS TOWARDS RENEWABLE ENERGY DEVELOPMENT
Grace Johnson
Time: 12:00 PM
Mentor(s): Norman Graham (James Madison)

This project explores the future of energy and sustainability in Europe, specifically France and Germany, given their current dependency on external suppliers, initially from the Middle East and more recently from Russia. More recently, renewable energy development has been an apparent priority in both countries. This paper will provide a comparative analysis of the record and prospects for an effective transition to renewable energy sources. France's unique response to the 1973 OPEC Oil Embargo was to build dozens of nuclear power plants. Nuclear energy accounts for 75% of France's total energy (Boselli, 2013). While it has helped the country become more independent, the French have become wary of the possible repercussions of nuclear power. The solution to the dependence on external suppliers and nuclear energy for power could be found in renewable energy sources such as solar, wind, and hydropower. At the same time, Germany is engaged in a plan (The German Energiewende) to reduce foreign dependence and increase renewable energy to help combat climate change. The German plan to modernize and expand nuclear energy development is on hold. Previous work on France and its transition from nuclear to renewable energy will be updated to assess President Macron's ambition programs develop wind, solar and hydroelectric generation capacity in order to reduce carbon emissions. This will be compared with Germany's plan and progress, along with some attention to the political, economic, and technical feasibility of nuclear energy as a significant component of French and German energy plans for the future.

EFFECTS ON PLEA BARGAINING: IPPSR
Nidhi Kumar
Time: 12:15 PM
Mentor(s): Matt Grossmann (Political Science)

I am looking through various articles focusing on potential influences on plea bargaining and to what extent each influence dictates a defendant's likelihood to be offered a plea bargain vs. to not be offered a plea bargain. One study

showcases the defendants race as a potential influence which found that black defendants were less likely to receive reduced charge offers, and both black and Latino defendants were more likely to receive custodial sentence offers. Another focused on the effect of the election of prosecutors and whether reelection pressures led to an increase in the number and proportion of convictions from jury trials and a decrease in the average sanction obtained in both jury trials and pleas which was upheld in their study. While another also explored the role of evidence in plea bargaining and found that prosecutors made more punitive charge offers when they had audio/video evidence, eyewitness identification(s), or had recovered currency.

AN ALTERNATIVE EXPLANATION FOR QUARANTINE IN EYAM
Andrew Rockett, Alex Lafler, Shay Robison, Mary West
Time: 12:30 PM
Mentor(s): John Waller (History)

Eyam, a small but famous tourist destination in the United Kingdom's Peak District National Park, derives its relevance from a famed plague outbreak in 1665. What sets this outbreak apart from other plague outbreaks of the time is the story surrounding it: the people of Eyam are said to have, under the leadership of rector William Mompesson, voluntarily quarantined the entire village so that the sickness would not spread to neighboring towns. Residents of Eyam stayed within village boundaries in exchange for food and survival provisions from neighboring parishes. Records indicate that, while 259 of Eyam's 350 residents died during the outbreak, the quarantine was successful and no neighboring towns were infected. To this day, Eyam is famous for this selfless act of heroism. However, numerous aspects of the story suggest that the tale is at least somewhat fabricated. Extensive review of primary sources from Eyam found no mention of voluntary quarantine, and review of

HISTORY, POLITICAL SCIENCE, & ECONOMICS
ORAL PRESENTATIONS, SECTION 2
LAKE SUPERIOR ROOM, 1:30 – 3:15 PM

FEMINISM AND THE BLACK PANTHERS
Brittany Wise
Time: 1:30 PM
Mentor(s): John Aerni-Flessner (Arts & Humanities), Kevin Brooks (Arts & Humanities)

While some may argue that The Black Panther Party for Self-Defense was exclusionary in their tactics for Black liberation, my research strives to challenge that notion by considering the Party to be a feminist one. Given their intersectional approach to politics and the emphasis placed on solidarity between marginalized groups, the Panthers paved the way for future social movements, including the Pink Panther movement, and Black Lives Matter. Through analysis of various sources including accounts from former Panthers, notable scholars on the movement during this period, and Op-Ed pieces regarding the policies of the various branches, my research situates the Panthers as an intersectional feminist organization. Through the purging of particular branches and solidarity with other groups facing systemic oppression, the Black Panther Party set themselves apart from other Black liberation movements of the time with their ideals of militant self-determination and community-based activism and defense.

MEASURING THE EFFECTS OF ETHNIC HATE RADIO ON VIOLENCE AND DISCRIMINATION IN KENYA
Jessica Alcaraz
Time: 1:45 PM
Mentor(s): Jeffrey Conroy-Krutz (Political Science)

Up to 1500 people died and thousands more were displaced in post-election violence in Kenya in late 2007 and early 2008, as members of groups associated with leading presidential candidates engaged in targeted killings and ethnic cleansing campaigns. Radio stations' role in the run-up to and during this violence was well-documented, and the International Criminal Court indicted one station manager—Joshua arap Sang, of Kass FM—for inciting violence against particular ethnic groups. However, there has been no research establishing a causal link between particular stations' broadcasts and violence. Theoretically, it is possible that stations' content merely mimicked already-existing inter-ethnic polarization on the ground, and that such broadcasts therefore had little, if any, actual impact on violence in the country. Using Irregular Terrain Modeling, we generate maps of estimated radio signal propagation for most of Kenya's nearly 400 FM stations. Since ability to access a particular broadcast message in an area is determined by station characteristics and local terrain, an individual's level of exposure can be considered to be somewhat exogenously determined. We then merge these data with georeferenced points of over 5,000 incidents of political violence that have occurred in Kenya since 1997, as well as with public opinion data from several rounds of the Afrobarometer survey,

which measure Kenyans' attitudes towards and experience with violence, and trust in in- and out-groups. This strategy allows us to measure more precisely the effects of access to certain broadcast messages on violent incidents and exclusionary attitudes.

PRECEDENT VITALITY: HOW LONG DOES A LAW LAST?
Austin Langlinais
Time: 2:15 PM
Mentor(s): Ian Ostrander (Political Science), Jessica Schoenherr (Political Science)

Supreme Court decisions are one of the most important aspects of the legal landscape, however, they are often ignored in research literature regarding the Court. As common knowledge dictates, the older a decision is, the faster it depreciates- but this does not always hold entirely true. This presentation opens a discussion on the longevity of court decision citations within judicial briefs to best understand what allows a case to continue to provide a precedent for the court. These cases that continue to be cited ultimately shape many different legal decisions far beyond what even the original authors of the majority(or dissenting) opinion may have ever anticipated, and it is crucial to fully understand how they came to be, as well as why. For example, even though the Lemon v. Kurtzman case originated in 1971, it still continues to hold strong as the base test for whether or not an action violates the Establishment Clause, even though Black and Spriggs determined that a case's precedents normally deteriorate between 81% and 85% within the first twenty years of existence. This project will describe the importance of precedent vitality, it's history in the court system, and it will evaluate the current state of commonly used precedents through a data set of over fifty search and seizure cases, and twenty-five Establishment Clause cases to best understand the current landscape of the legal system.

VIOLENCE AGAINST WOMEN AND THE HOLOCAUST: VIDEO TESTIMONY AND THE HISTORICAL RECORD 1
Allison Medley Julia Kelm, Miranda Matern
Time: 2:30 PM
Mentor(s): Amy Simon (History)

In War and Genocide (the text for our Honors Seminar on the Holocaust) Doris Bergen says that "Gender, age, nationality, class, and even physical appearance all affected the possibilities of making it through any given situation." Our group presentation features the first of these categories, focusing on two themes and using testimonies to show how women were often the targets, as women, of Nazi violence and how they act in the present with their accounts of the past. There is first the unending sexual assault. But, as the USC Shoah Archive testimonies (at the MSU Library) show, conditions and acts of gendered violence differed according to where women were held, in ghettos, prisons, and concentration camps. We can learn how power and fear overwhelmed survivors' gender identities as well as their Jewish ones. The second theme is the experience of mothers and pregnant women under the Nazis. The Archive includes accounts of infanticide, abortion, miscarriage. The testimonies show the responses of mothers and those around them. The decisions they made in ghettos, prisons, and concentration camps were a test of their humanity, morality, and prospects for survival. Our research also features attention to the particular kinds of historical knowledge that comes from video and audio testimony. We ask important research questions of it, including: How does a living testimony offer insight into the past? What do survivors do to make their testimony powerful? Can we tell what makes any testimony distinctive in its contributions to the historical record?

RACE, GENDER, AND THE COLD WAR: PHOTO CAPTIONS IN THE SPACE AGE
Matt Schmucker
Time: 2:45 PM
Mentor(s): Howard Bossen (Journalism)

The presentation Race, Gender, and the Cold War: Photo Captions in the Space Age documents press photography of the space race and their accompanying captions. The white male dominated newsrooms of the period were especially bad at avoiding bias when it came to women and minorities, leaving behind some captions that often lack journalistic integrity. When these pictures featured women, the male media of the era tried to write a caption, and by today's standards, failed to do so well. These captions identify the woman and unlike the captions that run with photos of their male counterparts, they either don't focus on the merit of the woman in question, or they get sidetracked mid-caption and talk about an unrelated piece of information. Many of these issues often extend into the media's coverage of minorities in this era. Minorities were often excluded from the narrative of the time, and much of this is due to the way the press covered the time. While being reflective of race and gender norms at the time, captions in the space era often reflected the broader Cold War context of the time period. These photos and their captions often displayed the tension between the Soviet Union and the United States. Race, Gender, and the Cold War: Photo Captions in the Space Age, will look at how these minority groups were covered, how photo captions showed the tense geopolitics, and try to contextualize these images in the broader perspective of the time.

HISTORY, POLITICAL SCIENCE, & ECONOMICS
POSTER PRESENTATIONS, SECTION 1
BALLROOM, 11:00 – 12:30 PM

A YEAR IN TRUMP FOREIGN POLICY RHETORIC
Katie Anderson
Poster: 350
Mentor(s): Ian Ostrander (Political Science)

A president's first year in office sets the tone for the remainder of their term. It showcases their true agenda to voters, demonstrating which policies they are dedicated to pursuing and which policies they intend to leave on the campaign trail. Consequently, this study examines how and when President Trump discussed foreign policy in his first year of office. Foreign affairs is a policy area in which the executive branch has an advantage; the president carries the most responsibility when it comes to determining if and how the United States interacts with foreign actors, with little oversight to prevent the president from doing and saying as they wish. By analyzing major speeches, remarks, and weekly addresses, this research reveals the manners in which Trump presented his foreign policy agenda to both domestic and international audiences. Moreover, it specifically delves into if and how his America First agenda transitioned from the campaign trail to the Oval Office. By compiling an original data set coded for foreign policy content, actors mentioned, and references to prioritizing American citizens above citizens of other countries, this data reveals several key aspects of Trump's foreign policy rhetoric. First is the relationship between a country's geographic location and which foreign policy areas it is associated with. Second is how the plan to "Make America Great Again" translates into foreign policy. Lastly, the data reveals that the countries that the media is eager to associate with Trump are not always the countries that he mentions in public addresses.

STATEMENTS OF ADMINISTRATIVE POLICY AND GOVERNMENT UNIFICATION
Katherine Beekman
Poster: 351
Mentor(s): Ian Ostrander (Political Science)

Statements of Administrative Policy are documents issued by the executive branch to Congress containing its reasoning for either opposing or supporting a bill. Statements often include veto threats, objections, suggestions, and endorsements for specific provisions all signaling the President's level of support. By tracking the number of objections, the statement's tone, and the administration's overall position in over 1,500 statements over a span nearly two decades, it is clear that the attitude of the executive changes depending on the level of unification in the government. Specifically, the content and severity of statements are contingent upon whether the party of a president is also in control of the houses of Congress. Statements are more supportive when the government is less divided and less supportive when the government is more divided.

AMERICA'S DRUG CRISES: TRANSITION FROM A CRIMINAL-JUSTICE MATTER TO A PUBLIC-SAFETY PROBLEM THROUGH RACIAL PERCEPTIONS
Nicole Jedding
Poster: 352
Mentor(s): Charles Ostrom (Political Science)

This poster contrasts the difference in public response during the 1980s crack-cocaine and the current opioid crisis through the media's portrayal of race during coverage of related news segments and articles. There is no question that the present day opioid crisis is severe, as an estimated 25 million people began nonmedical use of opioids between 2002-2011. In 2010, 16,651 deaths were attributed to prescription opioid medications, and in 2016, opioids were involved in 42,249 deaths, according to the CDC. However, the mid-1980s onward experienced a similar wave of cocaine usage, especially crack cocaine—the crystalized variant of the drug which is smoked for a more immediate and intense high. The typical attitude towards this problem, which predominantly plagued people of color and the urban poor, was to blame the addict and respond with incarceration and a renewal of Reagan's War on Drugs. Conversely, for the opioid crisis, media and the criminal justice system have adopted a gentler tone and frames the issue as an outside threat—absolving fault from the addict. The plural of anecdote may not be fact, but as humans, we tend to better remember and form opinions based on stories rather than abstract statistical information. This presentation aggregates approximately 500 news segments and articles to determine if the news media's racial depiction of drug addicts is a plausible explanation for the difference in the public and policymakers' response to the comparable drug crises.

EVALUATING THE ACCURACY OF THE LEGEND AT EYAM, DERBYSHIRE
Kyle Jones, Yena Berhane, Brett Binkowski
Poster: 353
Mentor(s): John Waller (History)

This project investigates the historical accuracy of a popular tale regarding the English village of Eyam. In the mid 17th century, Bubonic Plague broke out in Eyam. The rector of the town is said to have called upon the residents of Eyam to self-impose a quarantine of the village, preventing the transmission of plague to neighboring villages, at the cost of a heightened risk for the non-infected. This project has examined the motives of the quarantine by exploring historical literature to develop an understanding of the social dynamics and regulatory policies of Bubonic Plague in Stuart Britain. Ultimately, using this mix of historical and epidemiological evidence, we assess the likelihood of this story being true as it is remembered.

UNITED STATES VICE PRESIDENTIAL FOREIGN TRAVEL RESEARCH
Collin Bleech
Poster: 354
Mentor(s): Ian Ostrander (Political Science)

The current research aims to explore how United States Vice Presidential foreign travel time has been utilized to act as a diplomat in the event of presidential bottlenecking. The President of the United States has a limited amount of time to handle foreign policy, resulting in the need for assistance. There is no clear documentation describing how the vice president assists the president with foreign policy, but foreign travel records can provide insight to this question. Through the use of statements and releases obtained from the official White House government website, a data set was created that contains travel data for United States Vice Presidents from January 20th, 2013 through January 20th, 2018. This data set revealed that the vice president primarily travels to foreign countries that are in Asia or Europe and are typically lower on the president's foreign policy concern list. There is a correlation in the frequency of vice presidential foreign travel around election periods.

ECONOMIC FACTORS OF GENOCIDE
Elizabeth Walter
Poster: 355
Mentor(s): Christina DeJong (Criminal Justice)

In the relatively new field of genocide studies, scholars have worked to find commonalities between past genocides to determine if there are relevant factors that are precursors to genocide. Some research analyzes a single component such as perpetrators of the violence or structural characteristics of a society. For these, they derive factors from various disciplines that, when present, will increase the risk that the single component will facilitate genocidal actions. In this they seek to explain why genocides are committed and establish strong indicators of genocidal behavior. This study will be analyzing the economic factors that are related to genocide. Evaluating genocides and politicides from the turn of the century, I will explore the correlation between shared economic characteristics of nations that committed the genocides and seek to explain how these factors encourage the perpetration of genocidal acts.

TOPICS OF PRESIDENTIAL VETO MESSAGES
Hannah Wellman
Poster: 356
Mentor(s): Ian Ostrander (Political Science)

The presidential veto is a powerful facet within inter-branch relations and is one of the most influential tools a president has at his or her disposal when it comes to effecting legislation. My research has focused on the presidential messages sent to Congress explaining the president's reasoning for his or her use of the veto power. Every time legislation gets vetoed the president sends a message along with it and I focused on grouping these documents by their topics. Using these, I investigated whether a veto messages' topic influenced the propensity of Congress to challenge the veto, as well as how the topic of the message affected the type of arguments the presidents' employed. Every time a president vetoes legislation, he or she must send this explanation, and I collected data by aggregating these messages by topic. This categorizing was done in accordance with the US policy Agenda Project Topic Codebook. My dataset was created to display the tendencies which exist for the modern presidents and ranges from President Harry Truman to present day, which resulted in approximately 800 cases examined. The data can be utilized to facilitate future research to explore other questions about the presidential veto.

REDUCING CROSS-BORDER SCAPEGOATING: EVALUATING A RADIO INTERVENTION IN AFRICA'S GREAT LAKES REGION
Robin Daniels, Veronica Buschhaus
Poster: 357
Mentor(s): Jeff Conroy-Krutz (Political Science)

Radio has been accused of exacerbating inter-ethnic tensions, and even encouraging violence, in several countries in Africa's Great Lakes region, including Burundi, the DR Congo, and Rwanda. However, some practitioners have been working on strategies to use radio as a force to reduce inter-ethnic tensions and, therefore, improve stability in these countries. Particularly, the Dutch-based NGO Radio La Benevolencija (RLB) began implementing various programs in 2002 in the Great Lakes region. RLB's strategies rely heavily on "edutainment," i.e., the production of radio soap operas, in various local languages, in which characters engage in relationships—cooperative and conflictual—with one another. Audiences are encouraged to identify with key characters, who eventually model "good" (i.e., conciliatory towards out-groups) behavior. These interventions are constructed around theories developed by social psychologists, to improve individuals' abilities to reject attempts by political entrepreneurs to scapegoat ethnic out-groups and act as "active bystanders" when they witness such strategies. Our project is evaluating one RLB program—Media for Dialogue (M4D)—which attempts to combat scapegoating of non-national "others" in the border region between Burundi, the DR Congo, and Rwanda. We designed a survey to measure target populations' knowledge of scapegoating as a tool, their attitudes about the practice, and their reported or expected behavior in response to it. We will draw on results of this survey—organized for early 2018 in the three focus countries—to make preliminary conclusions about M4D's effectiveness.

HISTORY, POLITICAL SCIENCE, & ECONOMICS
POSTER PRESENTATIONS, SECTION 2
BALLROOM, 1:00 – 2:30 PM

PRESIDENTIAL MEMO RESEARCH
Preston Rashkov
Poster: 359
Mentor(s): Ian Ostrander (Political Science)

How presidents make use of their power to issue an executive memorandum is a recent focus in the study of the United States presidency. Before research on these elusive documents was conducted, scholars thought we had a true grasp on how presidents issued orders. The discovery of these memos; however, started presidential scholars questioning how the executive branch truly operates. The prevailing wisdom is that memos can carry the power of an executive order but may be easier to issue. To examine how memos are used by presidents in practice, I have studied the first several dozen of President Trump's official memos as well as how these messages differ from the prior administration. Overall, I have found that each president views memos differently. While President Obama's memos were all kept on one site, the Trump administration has begun to pool publicly released memos with other executive actions. However, some variables stand out. When a president wants to make a huge policy change with a memo he wants it to be published in the federal register. An example is a big immigration change like ending the wet foot dry foot program with Cuban immigrants. Memo's addressees also show who the president thinks is important to fulfilling his policy goals and where his true priorities lie. Ultimately, I demonstrate that executive memos open the door to new research possibilities and make us view the presidency in a way that we never have before.

REASSESSING MACROECONOMIC INFLUENCES ON AMERICAN WELFARE PERCEPTIONS
Zach Brown
Poster: 360
Mentor(s): Matt Grossmann (Political Science)

Tracking the American public's perception of government welfare and public assistance programs can provide insight into when it is most valued, whether that be in times of relative prosperity or economic downturn. This can be examined by assessing the impact of various macroeconomic baseline measurements on people's views of federal welfare expenditures. Using an earlier study by Kam and Nam as a guide, individual-level data from 1973-2012 are used to identify perceptions of welfare spending at the state level, while macroeconomic statistics, specifically inflation, unemployment, and productivity, are pulled from various resources. While the results of this analysis are still being compiled, when completed, they will assist policymakers in determining when Americans most value the social safety net. Of particular note will be how opinions changed around the Great Recession in 2007, and whether Americans were more favorable of the welfare system than the metrics would predict.

POOR HEALTH LITERACY AND ITS RELATION TO POOR HEALTH OUTCOMES
Francesca Caal Skonos
Poster: 361
Mentor(s): Matt Grossmann (Political Science)

Looking at particular states with low levels of Health literacy and comparing those results to the health outcomes in those states. Is there a positive or negative correlation between the two, and are the directly related to each other?

MNRTF RECIPIENT STUDY
Dean Martin
Poster: 362
Mentor(s): Matt Grossmann (Political Science)

This research delves into current trends regarding Michigan Natural Resources Trust Fund (MNRTF) distribution. With the Michigan Department of Natural Resources' priorities shifting in recent years to assist state-wide projects, the ability for community-driven recreation to receive grants possibly becomes at risk. The impacts of less equitable funding could have profound impacts on communities that seek grants as the primary source of recreation resource development. Subjectivity in applicant scoring criteria allows the DNR extensive efficacy in deciding which communities receive the limited funds. Specific priorities of the department since 2012 are centered around the Iron Belle trail, which is reflected in the amount of money the agency has directly decided to directly invest in using the MNRTF. In addition, the scoring criteria lists regional trails in their priority metrics, giving applications headed by local governments an explicit point boost and implicitly satisfying non-priority criteria by contributing to the Iron Belle Trail. The research is part on an ongoing project to develop a framework for evaluation, creating summative and program-oriented judgements on the effectiveness of the MNRTF policy in terms of equity and placemaking. This framework uses the historical "Since 1974" MNRTF recommendation spreadsheet and synthesizes census data to make conclusions on population impacts and community five year masterplans to determine if public priorities are fulfilled.

CONSTITUTIONAL OBJECTIONS AND THE RISE OF PRESIDENTIAL POWER
Daniel Olweean
Poster: 363
Mentor(s): Ian Ostrander (Political Science)

This presentation examines the how constitutional objections raised in vetos indicate the historical rise in presidential power. While in the past, many objections raised related to state rights, protection of the judiciary, or civil rights, the vast majority of objections since the early 1900s have been in relation to the protection of the executive. As presidents such as the Roosevelts and Wilson began to expand their reach, the legislature attempted to restrict their power. Meanwhile, presidents became more confident in vetoing these restrictions. This presentation looks at all vetoes raised with constitutional objections since the founding of America. In doing so, the presentation progresses historically to see how the power dynamics in American politics have and continue to change.

FROM EXTREME EXPERIENCE TO RECOUNTING THE PAST: VIDEO TESTIMONY AND THE HISTORICAL RECORD 2
Andrew Sevic, Jack Emaus, Matt Mayer, Chris Winiarski
Poster: 364
Mentor(s): Steven Weiland (Educational Administration)

In War and Genocide (the text for our Honors Seminar on the Holocaust) Doris Bergen says that "The process of crushing people's sense of dignity and worth often began with destroying their identity and honor as women and men." The video and audio testimonies from the USC Shoah Archive (at the MSU Library) show that the Nazis had as their fundamental goal the dehumanization of the Jews and others perceived as unworthy of life. That is where our presentation begins. It turns then to the conditions of suffering in ghettos, prisons, and concentration camps associated with forced labor, an instrument of dehumanization with extreme physical and psychological effects. But our presentation also shows the reflection of human nature in times of extreme suffering. Thus, the Archive also allows for learning about what some victims did, against all odds, to escape. And there are tales told too of what suffering meant for how victims understood the evolution of their political beliefs far into the post War years. For survivors in the Archive it became imperative to act in the present by adding to the historical record. Our research also features attention to the particular kinds of historical knowledge that comes from video and audio testimony. We ask important research questions of it, including: How does a living testimony offer insight into the past? What do survivors do to make their testimony powerful? Can we tell what makes any testimony distinctive in its contributions to the historical record?

THE EVOLUTION OF POSTINDUSTRIAL CITIES: HOW CULTURE, POLITICS, AND DEVELOPMENT HAVE RESHAPED DETROIT AND PITTSBURGH
Billy Wetzel
Poster: 365
Mentor(s): Louise Jezierski (James Madison)

The industrial might of Detroit and Pittsburgh formed the cornerstone of the Arsenal of Democracy that helped propel America to victory in World War Two. However, in the decades after the war both cities saw their fortunes reversed as their key industries– automobiles in Detroit and steel in Pittsburgh– and middle class began abandoning the city for their suburbs. This project seeks to compare the different responses that Detroit and Pittsburgh employed to fight the deindustrialization of their cities and how each city has attempted to adapt to the new American economy. By comparing civic cultures, relationships between the inner cities and their suburbs, and the effectiveness of urban planning, this chapter will use the history of each city to explain why Pittsburgh has reemerged as a regional leader and why Detroit had stagnated in terms of development.

HISTORY, POLITICAL SCIENCE, & ECONOMICS
POSTER PRESENTATIONS, SECTION 3
BALLROOM, 1:00 – 2:30 PM

HOW HAVE JUDICIAL POLITICS CHANGED OVER TIME FOR INCOMING (AND OUTGOING) PRESIDENTS
Shannon Cartwright
Poster: 368
Mentor(s): Ian Ostrander (Political Science)

How do presidents prioritize judicial nominations and how long does it take to fill vacancies? To answer, we examine judicial vacancies of first term presidents that exist at the moment of a transition. We look to see how many vacancies the past President left, how long those positions had been vacant for, how long the new President took to nominate their first replacement, and if the nomination succeeded. With this data we can compare Presidents from Reagan in 1981 to Trump in 2017. Altogether, we examine over 400 cases. Our findings indicate that presidents have been inheriting more vacancies over time for positions that have been empty longer and furthermore that these positions are taking longer to fill. We also find that presidents tend to prioritize their nominations, working on more important positions before filling others.

THE TRAVELS OF PRESIDENT TRUMP
Nicholas Demerly
Poster: 369
Mentor(s): Ian Ostrander (Political Science)

Over the course of the year I have collected data on President Trump's international travel. I have compiled a list of all such trips over the course of his first year in office. Notable similarities and striking differences between my data and that collected during the first years of previous presidents have stood out over the course of this project, concerning such areas as the frequency of Trump's international travels, the places he has visited, and the types of trips he has taken. My presentation will explore and compare the foreign travel of President Trump and other presidents, noting significant points such as his unusually light travel schedule and his atypical lack of travel to North American countries.

INTERNATIONAL ARCHIVES: THE CLASSICAL WORLD'S IMPACT ON THE FOUNDING FATHERS
Garrett Jones
Poster: 370
Mentor(s): Thomas Summerhill (History)

How were the framers of the Constitution and the early republic influenced by Greek and Roman visions for democracy and republicanism? While the rest of the Western world viewed America's revolution for self-governance as radically progressive, America viewed its new nation as the rightful heirs to the ancient tradition for democratic virtue. America's political experiment in mixed government is a solution to aristocratic and monarchial regimes, inspired by the classical traditions of Athens and Rome. While Enlightenment ideals are given due credit, the Athenian tradition for democracy and Roman spirit for Republicanism deserve proper recognition for fostering the American spirit for self governance. Constitutional debates on democracy, liberty, and the role of a unitary executive can all be traced back to the tradition of antiquity.

IMPORT SUBSTITUTION EFFECTS IN THE EUROPEAN SOCCER LABOR MARKET
Zachary Kuloszewski
Poster: 371
Mentor(s): Lawrence Martin (Economics)

In the European club football landscape, importing a high quantity of players born in foreign countries, usually referred to as "expatriate players," has become increasingly common among top-tier clubs over the past two decades. While clubs are responsible for fielding quality teams and generating revenue, national football associations, such as the English FA, are tasked with managing and overseeing the development of a competitive and successful team for international competitions. Concerns that foreign players are taking squad spots from developing domestic talent have sparked debate in countries with a high presence of expatriates. This analysis regresses multiple proxies for national team quality, such as FIFA World Rankings, on lagged percentages of expatriate players in each country's top tier club league as well as controls for time and national wealth. Although there is a significant negative correlation for all countries, it happens that this effect is largely driven by Europe's "Big Five" leagues. In those nations, an increase in expatriate club players has a significant negative impact on future national team quality.

COURTING CONFIRMATION: JUDICIAL NOMINATIONS UNDER OBAMA AND TRUMP
Anthony Luongo, Jack Scullion
Poster: 372
Mentor(s): Ian Ostrander (Political Science)

In the post-nuclear era, the balance of power has shifted to allow the majority party in the Senate greater control over the nomination process. Judicial appointments remain some of the most impactful actions of presidents due to their length of office and difficulty of removal; thus, they are often contested during the confirmation process. Our research examines presidential judicial nominations during two time periods: the 114th Congress under President Obama and the 115th Congress under President Trump. We aim to consider the differences between what might be considered worst and best cases for presidential political ambit: an outgoing President with an opposite-party Congress and an incoming President with congressional support, as well as capture the current landscape of judicial nomination politics. To do this, we will use data on over 200 judicial nominations in the 114th and 115th Congresses, examining variables such as duration of time between nomination and confirmation, success rates, and committee censorship.

REALITIES OF AUTHORITARIANISM: ETHNIC AND SECTARIAN TENSION IN IRAN AND SYRIA
Sumaya Malas, Eric Gerson
Poster: 373
Mentor(s): Linda Racioppi (James Madison)

In both Iran and Syria, authoritarian regimes utilized hegemonic control as a means of coping with ethnic and sectarian differences. In Iran, the Kurdish people are part of a divided nation without a state. Construction of Iranian Kurdish nationalism is centered around the struggle for autonomy, collective memory, and defense, and they prey on decentralization and chaos in Tehran to push for greater self-rule. Today, Iranian Kurds have yet to achieve real autonomy within the confines of the Iranian state. In Syria, the Assad regime lasted by superficially mitigating sectarian divisions through hegemonic control of the Sunni majority. The regime co-opted the Sunni elites by allowing them limited access to lower military rankings, economic prosperity, and state instituted revitalization of Sunni Islam, while also coercing them through powerful security apparatus. However, economic grievances and repressive rule led to the boiling point of the Arab Spring. The following response by the regime exacerbated sectarian tensions and devolved into a violent civil war. These authoritarian regimes in Iran and Syria ensure hegemonic control through both coercion and co-optation of less powerful groups. However, this control has led to tension and conflict with these groups resisting the regimes for greater autonomy and power.

HEALTH AND MOBILITY IN THE U.S. AND MICHIGAN
Silas Olson
Poster: 374
Mentor(s): Matt Grossmann (Political Science)

The research assembled seeks to demonstrate how health expenditure per capita across the United States is correlated with the percentage of people not covered by health insurance. Comparative analyses of health expenditure per capita versus the percentage of people uninsured, and health expenditure per capita versus the median age of the population show evidence that there are significant correlations amongst these variables. The accompanying poster, charts, and essay exhibit these correlations so that they can be better understood. Data was gathered from the U.S. Census, and The Kaiser Family Foundation. Data and the trends that resulted were compiled and examined using spreadsheet software.

The essay and trends seek to answer the question: To what extend do health care expenditure per capita and the median age in each state affect the percentage of people that live without health insurance? The goal of this research and analyses is to understand why such a large uninsured population persists in the U.S., and to provide ideas for how to lower that percentage.

HUMANITIES & PERFORMING ARTS

ORAL PRESENTATIONS, SECTION 1
MSU ROOM, 11:00 – 12:45 PM

BUILDING HYDROPHONES: MUSICAL APPLICATIONS OF UNDERWATER SOUND RECORDING

Charlie Cooper
Time: 11:00 AM
Mentor(s): Mark Sullivan (Music)

The invention of the hydrophone – a microphone used to record underwater sounds – made it possible to record underwater environments for a variety of scientific, commercial and artistic purposes. From Dr. Roger Payne's famous album "Songs of the Humpback Whale," to the US Navy's use of complex hydrophone systems to assist in research of sonar and ultrasound, the hydrophone has become an important tool for exploration of underwater environments. For this research project, I focus on the various musical and artistic applications of underwater sound. Using a homemade hydrophone system, I have recorded in lakes, rivers, swimming pools and kitchen sinks. With these recordings I created outdoor geo-located sound walks for mobile devices, music for underwater performance, electro-acoustic music and installations that combine sound with images. I will discuss in my presentation the challenges posed by recording in natural and man-made environments, using passive recording techniques and active sound production methods, and the different musical applications of the recordings obtained through these techniques. The underwater acoustic environment presents sonic limitations but also possibilities that are not available in other environments. As underwater environments continue to change, so will their acoustic signatures, making them a vast source for sounds that do not exist elsewhere. From this, it is clear that underwater sounds are applicable to a variety of musical processes, creating a unique type of music that lies at the intersection of art, science and technology.

SINGING IN THE DARK TIMES: THE ROLE OF PROTEST POETRY IN CREATING CHANGE

Grace Carras
Time: 11:15 AM
Mentor(s): Anita Skeen (Arts & Humanities)

"In the dark times, will there also be singing?" Famed poet Bertolt Brecht answers his own question beautifully: "Yes, there will be singing. About the dark times." The goal of this project was to encourage writers of all backgrounds to write about the dark times that all of us are currently facing, on the individual, national, and international levels. We have attempted to reach this goal by constructing a creative writing curriculum that focuses on selected works of political and protest poetry, as well as several well-developed writing prompts that will encourage participants to use their voices to sing about their own dark times. We will explore the work of modern and classic poets, including but not limited to Mary Oliver, Carolyn Forché, Terrence Hayes, Andrea Gibson, and Ocean Vuong. This curriculum will be put to use at Ghost Ranch, an education and retreat center in New Mexico that offers creative classes of all kinds to adults, many of which focus on issues of social justice, environmental justice, and individual empowerment. Creative expression is of the utmost importance in times of hardship; given the current state of affairs in the United States, as well as the recent developments here on Michigan State's campus, it is crucial that people feel empowered and inspired to speak their truths.

CIVIC ENGAGEMENT

Norrlyn-Michael Allen
Time: 11:30 AM
Mentor(s): Kevin Brooks (Arts & Humanities)

I experienced a 16-week field-study civic engagement course in which eight weeks were devoted to actively working with minority youth in a low performing elementary school. Each member of the course was assigned one or two students in which we were to actively engage with while tutoring in reading, writing, and mathematics. This course required a presentation regarding three moments in the semester contributing to our growth in perspective pertaining to citizenship, identity, love, privilege, reconciliation, recovery, and whiteness. This presentation recognizes the impact of

my youth, Zion, and the course readings that allowed me to discover how identity is connected to the portrayal of one's self through social norms, natural and human resources, media, and environment. Utilizing

DEEP CHANNELS: MAKING MUSIC WITH ICE
Charlie Cooper
Time: 11:45 AM
Mentor(s): Mark Sullivan (Music)

Deep Channels is an electronic work for live performance using melting ice and Max/MSP. Max/MSP is a music coding language that allows users to create and manipulate a variety of audio and visual signals in real time. It is often used for live performance of electro-acoustic music (music that combines traditional acoustic instruments with electronic components). For this piece, ice cubes are set in a bowl of water onstage that contains a hydrophone – a microphone used for recording underwater sound. The hydrophone captures the sounds of the ice and sends the signal to Max/MSP for live processing through a series of loops, filters and delays. The audio processing simultaneously highlights the various components of this particularly complex sound – including bubbling, popping, squeaking, stretching and colliding with other ice cubes – and reimagines them in an artistic context as musical material. By expanding the musical qualities of ice through Max/MSP, Deep Channels reveals an alluring sonic environment that exists underwater. This, I hope, will encourage listeners to challenge the notion that the world underwater is a silent world, and to consider what other mysterious and beautiful sounds may exist beneath the surface of other underwater environments such as lakes, rivers and oceans.

SHARK THE MUSICAL: AN EXPLORATION OF THE EFFECTS OF AUDIENCE INTEGRATION AS A NARRATIVE ANTAGONIST ON THE HERO'S JOURNEY NARRATIVE STRUCTURE.
Jason Dernay
Time: 12:00 PM
Mentor(s): Alison Dobbins (Theatre)

Shark! the Musical is a production utilizing the research on audience interaction devised in Theatre Engine: an experimental form of performance that provides observers with a technological interface to control the performance. In Shark! The audience will control and alter the plot line of the narrative. Similar to the cult classic Jaws, Shark! the Musical centers around a rampant leviathan, but, as a new take of the Hero's Journey plot technique, the audience is in complete control of the shark itself: in control of who lives and who dies. The audience guides the antagonist, their choices directly shape the plot points of the Hero's Journey, thereby creating a unique, self-regulated story-line that emphasizes different themes accordingly. Although modern performance is often focused on using the concepts of realism to evoke an emotional response by providing a relatable and/or authentic performance to the viewer, to facilitate this interaction, presentational acting styles are being explored.

CONCRETENESS IN LITERATURE AND POETRY
Emily Vaughan
Time: 12:15 PM
Mentor(s): Natalie Phillips (English)

In writing and literature, words can be scaled on a level of concreteness. Words that are considered more concrete are things that are tangible and physical objects. Words that are less concrete are things that are more intangible and abstract. Readers react differently to a word based on how concrete it is. These reactions have been studied over the course of two different studies within the Digital Humanities and Literary Cognition Lab (DHLC). The first study 18 PhD candidates read a chapter of Jane Austen's Mansfield Park. Interestingly, the participants showed a common trend of using concrete examples, physical objects in Austen's narrative, to connect to the emotions or qualities, which are less concrete, of the characters in their post-scan literary essays. A more recent study within the DHLC focuses on the aesthetic pleasure of sonnets. Participants were asked to rank the aesthetic pleasure of the 16 sonnets they read. When the concreteness of the words within the sonnets were compared to how aesthetically pleasing participants found them, it was found that there was a correlation between the two. Participants found sonnets that were more concrete were also more aesthetically pleasing. This notion of concreteness and how readers react to it is intriguing as it could affect how reading and analysis of literature is taught.

SUBJECTIVE LISTENING EXPERIENCES AND THE STORIES WE HEAR IN MUSIC
Salvatore Antonucci
Time: 12:30 PM
Mentor(s): Natalie Phillips (English)

It is often said that music is a "universal language," but does that mean everyone hears the same thing when listening to a particular piece of music? More specifically, do some pieces of instrumental music make all listeners imagine an unfolding story as they listen, and if so, is it safe to assume that everyone is imagining the same story? Of course not. But, in this project, I will explore how the nuances of a listeners' subjective listening experience affect the stories that they imagine while they listen. This investigation will draw from the data collected from an interdisciplinary experiment ran as a collaborative project between Michigan State University's Digital Humanities and Literary Cognition (DHLC) and Timing, Attention, and Perception (TAP) labs. In this study, 357 undergraduates were told to listen to a five-minute-long excerpt of a Western, orchestral piece

HUMANITIES & PERFORMING ARTS
ORAL PRESENTATIONS, SECTION 2
MSU ROOM, 1:30 – 3:15 PM

CULTURAL CONSUMPTION: WHAT COOKBOOKS REVEAL ABOUT THE THEATRE AND THEATRE GOERS
Briana Beeman
Time: 1:30 PM
Mentor(s): Ann Folino White (Theatre)

This project examines the cultural ties between food and theatre. Specifically, it asks how theatre cookbooks foster a relationship between theatre and the theatre-goer, as well as the celebrity and fans. I have synthesized information from types of recipes, celebrity anecdotes, forewords, and other narrative materials from celebrity, theatre-themed, and community theatre cookbooks, dating back to 1916. Together, the cookbooks reveal shifts (and what has remained the same), regarding public interest in celebrities' personal lives, gender roles, and theatre history and culture. The production and consumption of celebrity cookbooks since the early 1900s perpetuates the notion that there is little difference between famous figures and the common person because they share the same tastes. Additionally, community theatre and theatre-themed cookbooks offer the idea that cooking and theatre-making similarly nurture the soul, because both activities are creative and communal in nature.

GENDER REPRESENTATIONS IN VIDEO GAMES: GAME PLAY AND THE RESPONSIBILITY OF THE PLAYER
Ronny Ford
Time: 1:45 PM
Mentor(s): Kate Fedewa (Writing, Rhetoric, and American Cultures)

Video games have come under increasing scrutiny in their representations of gender and sexuality, as scholars and critics are looking at games while considering the greater context of the society in which they were created. The presentation will briefly introduce the video game that serves as the subject of the research, Legend of Zelda, Breath of the Wild, and how this game represents gender. This question aligns with the increasingly political lens in which video games are being viewed. In the presentation, I will examine how the representation of gender in the game forces the player to hold a certain level of responsibility in adhering to the in-game gender customs, as well as how some players subvert these customs. Short scenes will be examined to unpack the gender representations in the game, specifically regarding gender queer and transgender non player characters (NPCs) and how they are referred to by other NPCs. I will use these scenes to examine the responsibility that the player holds in regards to respecting the gender oriented customs of the Gerudo people. I will examine how the main protagonist's canon in-game gender as well as any gender superimposed onto the character by those role playing the game affects whether or not entering the male-exclusionist Gerudo city is a violation of a safe space. My research will expand the discussion of gender representation in video games to include the identities and choices of the player.

MOOD IN MUSIC: SENTIMENT ANALYSIS OF THE STORIES WE HEAR IN MUSIC
Sarah Geist, Eiryn Hodges
Time: 2:00 PM
Mentor(s): Natalie Phillips (English)

This study looks at the relationship between classical music and the perceived positivity and/or negativity of the stories that we hear in the music. The original Music and Narrative study conducted by the Digital Humanities and Literary

Cognition lab had participants in Arkansas listen to eight classical music excerpts, and then write down any story or elements of a story that they envisioned while listening to each piece. It was found that people tended to think of similar stories when listening to the same piece, and that when given the story and told to match it to a piece of music, participants were relatively successful. Assessing the narratives from the previous study using the Sentiment Analysis tool developed by the Stanford Natural Language Processing Group, ratings of positivity and negativity are generated for each story. These ratings help determine mood for each narrative. Comparisons between the average mood of the narratives for each piece of music and elements of the excerpts (such as major and minor keys) create a deeper understanding of the ways people perceive music. The use of Sentiment Analysis part of an effort to develop a measure of narrative convergence in a larger cross-cultural study about the stories heard in music.

GLORY AND THE GLORIFICATION OF VIOLENT "NONVIOLENCE"
Sariah Metcalfe
Time: 2:30 PM
Mentor(s): Kevin Brooks (Arts & Humanities), Austin Jackson (Arts & Humanities)

This paper is an exploration of the uses of African American Cultural Symbols in the form of Black Vernacular English in a Pop Cultural depiction of Racial Justice work. The lyrics and awards performances of the song Glory by John Legend Ft. Common is an example of the use of religious imagery and call and response. The paper asserts that the urgency that is built up around the Pop Culture references while impactful lacks historical and contextual backing and thus further encourages young organizers today to make poor strategic decisions in their own justice work.

COMMUNITY ENGAGED RESEARCH IN PALMICHAL, COSTA RICA
Camri Nelson
Time: 2:45 PM
Mentor(s): Kevin Brooks (Arts & Humanities), Vincent Delgado (Arts & Humanities)

Palmichal is rural community that hosts important environmental programming in Costa Rica. The town experienced a nature disaster impacting youth in the community. This is a case study of a community participatory research project that sought to help the community understand youth needs in developing community resilience in the face of climate change. A music and poetry project focused on building youth environmental and civic responsibility was used to collect youth input on their needs and concerns followed up by surveys of adult community members to get their input around youth. The community, hit by more frequent climate disasters, should develop an environmental educational program for youth that focuses on and utilizes cultural empowerment methodologies.

THE QUESTION OF AFRICAN AMERICAN PHILOSOPHY: RECOVERY AND CORRESPONDANCE
Ramon Wright
Time: 3:00 PM
Mentor(s): John McClendon (Philosophy)

We are fundamentally concerned with the question of philosophical inquiry, as it relates to the histories of Black and African-Americans in philosophy. Is there such a thing as a Black philosophy? What does it entail and what type of merit is involved in its centralization or decentralization inside or outside of academia? Using this philosophical inquiry, we examine and define the relationship between the philosophy of history, philosophy of the Black experience, and finally philosophy and the Black experience. Our findings confirm its existence and seek to identify the correspondence between the social, economic, and political effects that posit a unique black experience using a definitive critique and analysis of African American philosophy.

HUMANITIES & PERFORMING ARTS
POSTER PRESENTATIONS, SECTION 1
2ND FLOOR ART GALLERY, 9:00 – 10:30 AM

THE ART OF INFERTILITY PROJECT
Juliette Givhan
Poster: 719
Mentor(s): Robin Silbergleid (English)

The ART of Infertility is an international art, portraiture and oral history project that explores the often-unspoken reality of infertility issues and reproductive rights as they affect the lives of people around the world. Since the organization's inception project leads have conducted over one hundred interviews, curated innovative art exhibits in Pennsylvania,

Wisconsin, Michigan and Utah (to name a few) and designed engaging curricula through writing and art workshops. They have also hosted creative readings and conference panels, as well as curated a multi-media blog. These activities have built a body of research on how individuals represent their experiences with infertility through creative outlets such as writing, art, or other multi-modal means. Working at the intersections between creative arts, medicine, and communication the project's goal is to generate public awareness and assist medical professionals to better understand the human struggles that occur for infertility patients. As a student researcher my role has been to help the expansion and success of the project; from participation in local writing and art workshops meant to solicit additional work on the reproductive experience, to helping conduct a review of existing material on infertility in order to develop a call for papers, with the ultimate goal of shaping this final collection into a book proposal to send to publishers. The finished anthology will be used as a more permanent and accessible archive that speaks to the diversity of the human experience when it comes to dealing with infertility and reproductive rights.

RESILIENT MONROE GREEN MAP INITIATIVE: PROMOTING ENVIRONMENTALISM WITH DESIGN
Larissa Moyer
Poster: 720
Mentor(s): Kelly Salchow MacArthur (Art, Art History, & Design)

Working with the River Raisin Institute, "a nonprofit that strives to improve environmental, social, and economic health of the local and global earth," the basis of this project was to bring awareness to green living sites, nature, and cultural resources such as local food, recycling, and eco organizations through the introduction of green mapping in the Monroe, Michigan community. Green mapping uses a system of universal iconography to plot community resources to promote sustainable living. The project stimulates environmental awareness and engagement through the design of a system including a mapping kit, personal booklet, plywood medallions, and large scale interactive maps which will be displayed at three libraries in the Monroe area. The system utilizes type, image, and material to create a cohesive design across all collateral to be used by the community. In my presentation, I will discuss how these elements came together to leave a lasting impact on the area.

CRITICAL COMICS
Amy Hair, Vidi Aziz, Meghan Petipren, Anthony Vacante
Poster: 721
Mentor(s): Matthew Handelman (Linguistics and Germanic, Slavic, Asian and African Languages)

Using the Michigan State University Library's Comic Art Collection, the largest in the nation, this digital project aims to critically analyze and showcase the development of the modern comic. Expanding on a project first started in the Spring of 2017, Critical Comics seeks to digitize 15 early-twentieth century comics, use digital tools to analyze trends in early comic culture and apply critical theory to analyze materials traditionally discounted in academic research. The first portion of this project focused on digitizing a small sample - a total of 5 early twentieth century comics to showcase digitally. The second phase of our project includes using a data set of 5,000 comics obtained from the MSU Library to analyzed and observe trends related to publication location, year, language usage, and other various aspect that can analyzed using digital humanists tools. Our goal is to make these comics more accessible to the public and to use digital tools to shed new light on the rise of comics as they helped shape the modern media landscape.

RED CEDAR REVIEW ARCHIVES
Molly Moline
Poster: 722
Mentor(s): Robin Silbergleid (English)

The Red Cedar Review is Michigan State University's undergraduate-managed literary journal, which accepts submissions from undergraduate writers across the country. This semester, RCR interns focused on expanding the journal's social media presence, publicizing its archives while exploring and broadcasting the journal's rich history. Interns read and reviewed past issues, looking for notable contributors, staff members, and publications to highlight on social medias. Concurrently, interns continued to work with professionals from MSU's Digital Scholarship Lab to develop an intuitive, publically-accessible online archive of all past RCR issues. Both the social media and online archive projects were designed to engage public interest, grow the reach of the journal, and publicize the historical value of RCR, the nation's longest-running undergraduate-managed literary journal. RCR interns' UURAF presentation will highlight notable pieces of the archive, focusing on the system of meta-data that will guide members of the public through the online archival database and how it will facilitate both general perusal and more concentrated research. Additionally, recent social media posts will be presented and analyzed in terms of their design and content, focusing on how they encourage public interest in and interaction with the journal's archives. This research will establish strategies for making

valuable stocks of literature accessible to the public, and these strategies may be employed by other publications to disseminate content and grow public reach.

SUSTAINABLE FASHION
Rachel Brunhild
Poster: 723
Mentor(s): Theresa Winge (Art, Art History, and Design)

In this research project, I address the topic of fashion and sustainability, specifically in relation to fabric. This work looks at sustainable fabric and alternative materials that should be considered when creating any textile-based product. The fashion industry is one of the leading causes of pollution, waste, water contamination, and climate change. Most fashion companies often choose to use the most easily available fabric and throw away any waste. I intend to look deeper into the alternative fabrics choices available and how they could be used in order to promote a more environmentally conscious industry. Within my research, I examine plant-based materials, synthetic materials, and blended synthetic materials, and discern what is helpful versus hurtful for the push towards sustainable design.

INTEGRATIVE & ORGANISMAL BIOLOGY

POSTER PRESENTATIONS, SECTION 1
BALLROOM, 9:00 – 10:30 AM

COMPARISON OF TUATARA (SPHENODON PUNCTATUS) BEHAVIORS IN CAPTIVE AND SEMI-NATURAL ENCLOSURES: IMPLICATIONS FOR TRANSLOCATIONS
Katelan Saunders, Haley Dole, Nikole Dushane, Kayla Gilstorff, Lainey Selkirk
Poster: 377
Mentor(s): Jeanette McGuire (Integrative Biology)

Sphenodon punctatus, the tuatara, is the only extant species of the once dominant order Sphenodontia, which was abundant alongside dinosaurs 200 million years ago. The species is endemic to New Zealand, where it historically thrived living in the absence of mammalian predators. This herpetological wonder is now listed as at risk due to invasive mammalian predators and life-history characteristics such as delayed sexual maturity, low reproductive output (females reproduce on average every 2-4 years), and slow reproduction (e.g., prolonged vitellogenesis stages and long incubation periods). Tuatara are now restricted largely to offshore islands and a few “mainland island” locations where invasive mammal eradication programs are combined with captive breeding programs. The goal of many of these captive breeding programs is to build up sufficient populations to release into new locations. However, captivity and head-start programs may result in alterations of behaviors relative to wild populations that may negatively affect reproduction and survival. This study serves first to create a behavioral ethogram of tuatara behaviors, and then compare these behaviors between tuatara in full captivity at Victoria University in Wellington, New Zealand to tuatara in a semi-natural enclosure (partial captivity) at Zealandia (also in Wellington, New Zealand). We predicted that there will be behavioral differences based on 1) the rearing status and 2) current enclosure conditions of tuatara. These findings will have practical implications for identifying barriers to translocation success as well as solutions to create successful tuatara release programs in order to promote the growth of the species.

COMPARISON OF METHODS TO TRACK THE MOVEMENT OF LARVAL YELLOW PERCH
Noah Dean
Poster: 378
Mentor(s): Cheryl Murphy (Fisheries and Wildlife)

Chemical contaminants can affect the swimming behaviors of fish, specifically, we are investigating the behavioral effects of methylmercury (MeHg) and 3,3′,4,4′,5-Pentachlorobiphenyl (PCB 126) on larval yellow perch (Perca flavescens) in concentrations of 0μM, 0.001μM, and 0.1μM for MeHg and 0ppm, 0.01ppm, and 1ppm for PCB 126. We recorded free-swimming behavior of the larval fish for five minutes, and this analysis is focused on determining the best method to track the movements of the fish. The first method is to track the fish using a plugin for the program ImageJ called Manual Tracking. This method involves extracting a random 30-second clip from each video and manually clicking on each fish every five frames throughout the clip. The second method for tracking uses a program called CTrax that automatically tracks the fish and any errors the programs makes are fixed using the "Fixerrors" MATLAB toolbox made

by the developers of CTrax. This method allows for the entire five-minute video to be tracked, but the overall process takes longer than manually tracking the 30-sec subset. Additionally, we compared the accuracy of the manual verses automatic tracking to find which one gives the best data for the time spent collecting.

SEASONAL HABITAT USE OF EUROPEAN STARLINGS IN CENTRAL MICHIGAN
Haley Gmutza
Poster: 379
Mentor(s): Catherine Lindell (Integrative Biology)

European starlings (*Sturnus vulgaris*) are invasive birds that have expanded their range throughout the United States. These birds wreak havoc as a non-native species, spreading fungal disease and *E. coli*, eating cultivated fruit crops, as well as outcompeting native cavity-nesting species for nest sites. In this study, we looked at the landcover use of starlings in the Ingham county area during the winter. We predicted that starlings would be more abundant in urban and suburban landcovers in the winter months, and more abundant in agricultural landcovers in the summer months. Using counts we conducted along 2-km transects, we investigated the abundances of starlings in different landcover types (urban, suburban, agricultural and campus) throughout the winter months. Starlings were sighted in large numbers in the urban ($\sigma_{\bar{x}}$ = 107.09, x = 59.5, n = 6) and suburban ($\sigma_{\bar{x}}$ = 18.80, x = 12, n = 6) areas, in small numbers on the campus transect ($\sigma_{\bar{x}}$ = 0.8, x = 0.4, n = 5) and not at all in the agricultural area. Every starling observed was seen using a utility wire or in a tree. Urban habitats in the winter provide food resources, increased warmth and/or sanctuary from predators. Starlings may be using urban habitats as winter safe havens, which could explain the maintenance of their large populations which then move to agricultural habitats in the summer.

MECHANISMS UNDERLYING VARIATION IN MATERNAL RANK INHERITANCE DURING DEVELOPMENT OF SPOTTED HYENAS CROCUTA CROCUTA
Ashley O'Toole
Poster: 380
Mentor(s): Kay Holekamp (Integrative Biology)

Spotted hyena Crocuta crocuta cubs, like the offspring of many cercopithecine primates, usually rank in positions similar to their mothers in the clan's dominance hierarchy. This process is known as maternal rank inheritance and preliminary evidence suggests that variation in maternal rank inheritance can cause a decrease in their overall fitness. Previous studies have shown that genetic heritability cannot explain the process by which maternal rank is established, so here I investigated possible behavioral mechanisms underlying variation in the maternal rank inheritance process. In both primates and hyenas, presence and coalitionary support from kin plays an important role in the development of rank. To measure the process of maternal rank inheritance, I used the Elo-rating method, which continually updates the dominance scores of competing individuals after each interaction. All data on agonistic interactions were collected from wild spotted hyena cubs in the Masai Mara National Reserve in southern Kenya between 1989 and 2016. I determined the deviation from expected rank inheritance by comparing the observed Elo scores of developing cubs to the scores expected according to maternal rank inheritance. Thus, these 'deviance scores' represent the magnitude and direction of variability in maternal rank inheritance for each cub. In this presentation, I will investigate whether sibling presence, maternal presence, and coalitionary support during aggressive interactions predict the Elo deviance scores of developing cubs. My research will provide insight into the mechanisms underlying variation in early developmental processes that can have long term effects.

AVIAN USE OF MICHIGAN CHERRY ORCHARDS: ABUNDANCE, SPECIES RICHNESS, AND DISTRIBUTION
Paul Sullivan
Poster: 381
Mentor(s): Catherine Lindell (Integrative Biology)

In 2016 the Michigan cherry industry was valued at approximately 144 million dollars. Given its economic importance, it is vital to understand the ecosystem serveries and disservices provided by the many avian species that visit these orchards. Birds have the potential to be of service to agricultural systems by consuming potentially damaging invertebrates and/or by eating fruit fall which can act as a refuge for pathogens. However, while services are being provided, disservices such as fruit consumption by the birds, can also be prevalent. Understanding the balance between services and disservices is fundamental to creating agricultural management plans. The question I posed was how did the avian abundance, species richness, and use of the orchard change throughout the growing season? I hypothesized that richness and abundance would peak with fruit ripening, and that birds would use the orchard differently over the ripening season. Point counts were conducted and took place over 8 weeks in the summer of 2017. The counts comprised eight 10-minute observation periods (4 in tart cherries and 4 in sweet cherries), approximately three time per week. Each sample area consisted of approximately ten trees in about 200 square meters. After observations had concluded, raw bird counts were converted to rates of detections per hour. The results showed moderately high correlation between fruit ripening and species richness (r-squared value of .5462 in sweets cherries and .3246 in tart cherries), and fruit ripening and abundance (r-squared values of .6994 for sweet cherries and .2567 for tart cherries).

RISKY BEHAVIORS BY SPOTTED HYENAS (CROCUTA CROCUTA) IN THE PRESENCE OF LIONS (PANTHERA LEO)
Abigail Thiemkey
Poster: 382
Mentor(s): Kay Holekamp (Integrative Biology), Kenna Lehmann (Integrative Biology)

Risky behaviors are those that have a high likelihood of incurring major costs, such as injury or death. These behaviors are generally avoided unless the potential rewards outweigh the potential costs. Spotted Hyenas (Crocuta crocuta) particiapte in risky behaviors during direct competition with lions (Panthera leo). Lions are larger and stronger than hyenas; performing risky behaviors near lions could result in the hyena's death. The goal of this research project is to determine what influences hyenas' risky behaviors when lions are present. We hypothesize that hyenas will perform riskier behaviors further away from lions. We define the following behaviors as risky: 1) greetings: two hyenas each lift their back legs and sniff the anogenital region of the other, 2) pasting: depositing anal scent gland secretions on grass or other substrate, and 3) social sniffing: multiple hyenas pressed together, sniffing an area, usually with their tails bristled. We also hypothesize that higher ranking hyenas will take more risks (i.e. get closer to lions) because they are more likely to gain rewards. To test these hypotheses, data collected in the Masai Mara National Reserve, Kenya from 1988 to 2013 was analyzed using R, Microsoft Access and Microsoft Excel. We will conclude whether distance from lions or rank affects a hyena's behavior. Understanding risky behaviors can help us determine what costs and benefits affect hyena behavior.

INTEGRATIVE & ORGANISMAL BIOLOGY
POSTER PRESENTATIONS, SECTION 2
BALLROOM, 11:00 AM – 12:30 PM

GREATER COMPETITIVE ABILITY IN PHYTOLACCA AT LOWER LATITUDES: A TEST OF THE BIOTIC INTERACTIONS HYPOTHESIS
Carolyn Graham
Poster: 385
Mentor(s): Marjorie Weber (Plant Biology)

Biotic interactions are hypothesized to be stronger closer to the equator, which would help explain the heightened biodiversity at lower latitudes. Past studies have investigated latitudinal patterns in a broad range of interaction types. However, few studies have sought to investigate how competitive ability varies across multiple latitudes. Here we compare competitive ability for plant populations in three regions: the northern United States, southern United States, and Costa Rica. We predict that plants originating from lower latitudes are better adapted to competitive environments due to the dense biodiversity present there, and thus would grow more effectively in the presence of a competitor than those from northern populations. To investigate this, seeds from Phytolacca americana populations in Michigan and Florida, and Phytolacca rivinoides from Costa Rica were planted with and without a competitor in a greenhouse. We selected Phytolacca as our system because of its broad latitudinal range, and Lolium multiflorum as the competitor due to its fast growth and invasive nature. After 46 days, the plants were harvested, and aboveground biomass was

determined. Preliminary results indicate that the Phytolacca plants obtained a lower aboveground biomass after the growth period when subjected to competition, and that this difference was greater in the Michigan population than the plants from Florida and Costa Rica. This indicates that Phytolacca plants native to Michigan may not have the same competitive advantages Phytolacca plants from southern climes have evolved. Thus, we have found evidence to support the biotic interactions hypothesis.

EFFECTS OF EVOLUTION ON DIVERSITY WITHIN BIOLOGICAL RESERVES
Sarah Johanknecht
Poster: 386
Mentor(s): Charles Ofria (Computer Science)

Deciding where to place reserves within an ecosystem is a key decision for conservation biologists. Often, maintaining biodiversity is a motivating factor in that decision, and it has been debated whether several small regions of reserves or one large reserve is more effective at accomplishing this. While the short term effects have been studied extensively, the long-term effects of evolutionary factors in the context of different reserve placements has received less attention. We addressed this question using Avida, a program for digital evolution research, because it gives us the ability to study evolution in an experimentally tractable time-frame, with perfect control over when adaptation can happen. We looked at how diversity changed in eight different reserve patterns, ranging from one large reserve to nine hundred small reserves spread evenly across the ecosystem. Previously, we found that a larger number of small reserves promoted the evolution of more diversity within the environment. In contrast, we observed the opposite result in the absence of adaptation. However, this original work implemented reserves in a very simplistic way. Here, we expand on this work with a more biologically-plausible reserve implementation, and a wider variety of reserve placement schemes.

INFLUENCE OF MATERNAL CARE ON THE SURVIVAL OF SPOTTED HYENA CUBS
Karee Lesko
Poster: 387
Mentor(s): Kay Holekamp (Integrative Biology), Zach Laubach (Integrative Biology)

Young mammals depend on maternal care for resources to grow and for protection early in life when risk of mortality is high. Given that there is considerable variation in the amount and style of maternal care between mammalian species, an important question in evolutionary biology is to understand the effects of maternal care on offspring fitness. Spotted hyenas (Crocuta crocuta), which care for their offspring until cubs reach maturity at around age two, provide an opportunity to examine determinants and consequences of maternal care in long-lived and social mammals. I hypothesized that greater maternal care, measured as the time mother and cub spent nursing and in close proximity, would improve cub survival to two years of age, and that high-ranking females, which have priority access to resources and the communal den, would provide superior maternal care to their cubs. To test my hypotheses, I used behavioral data collected as part of Dr. Holekamp's long-term field study of Spotted Hyenas in the Masai Mara Reserve, Kenya. I quantified maternal care variables from focal animal survey data, and I used demographic and behavioral data to measure survival to two years, life history milestones, and social rank. There was no significant association between amount of maternal care received and odds of survival to two years. Interestingly, low-ranking mothers spent more time with their cubs than mid and high-ranking mothers. Taken together, these results suggest that higher maternal care from low-ranking females may buffer the effect of social status on offspring survival.

SPLITTING HAIRS
Carolyn Miner
Poster: 388
Mentor(s): Per Askeland (Composite Materials & Structures), Carl Boehlert (Chemical Engineering & Materials Science)

Hairs are one of the most misunderstood types of evidence in forensic investigations. Hair can be quite useful as it is durable and can survive for years, thus preserving the biological evidence, such as DNA, within it. Animal hairs can sometimes prove just as useful as human hairs, and they can provide strong investigative information about an environment. In this project, the hairs from multiple animal species and breeds, including dogs, cats, rabbits and guinea pigs, will be examined and compared in order to identify what features are specific to a given species or breed. The hairs will be examined using scanning electron microscopy. Both the macroscopic and microscopic characteristics and features of the hairs will be compared.

LATITUDINAL PATTERNS IN FLORAL TRAITS ACROSS A WIDESPREAD NORTH AMERICAN PLANT, POKEWEED
Lucy Schroeder
Poster: 389
Mentor(s): Marjorie Weber (Plant Biology)

Why plant and animal diversity increases towards the tropics is a fundamental paradox in evolutionary ecology. The "biotic interactions hypothesis" proposes interactions between organisms are stronger closer to the equator because the abiotic environment is less challenging, which could contribute to the pattern of greater biodiversity at lower latitudes. Many mutualisms show greater prevalence in tropical communities, but little is known about latitudinal patterns in the importance of mutualism within species, especially across a wide range of latitudes and climatic zones. This study tested the biotic interactions hypothesis by comparing floral morphology and pollinator visitation to Phytolacca americana and Phytolacca rivinoides from northern US, southern US, and tropical regions. This wide geographic distribution makes Phytolacca a useful genus for studying latitudinal gradients. We predicted that plants at lower latitudes would have higher visitation rates, greater floral attractiveness, and more rewards for pollinators. We tested these predictions by growing 81 plants in a common garden and tested for the presence of latitudinal trends in pollination traits. Comparing the floral traits of northern US populations to the tropical species, our predictions were supported, but analysis of the southern US population was complex due to phenological differences. Visitation did not differ between northern and southern plants, but was positively correlated with larger floral display. Tropical plants were not included in the visitation analysis because of delayed flowering. Our results show that at broad spatial scales the biotic interactions hypothesis is supported, but it is not supported within a temperate species.

INTERPRETING FOSSILS--IS THERE A RELATIONSHIP BETWEEN CONCRETION SIZE AND FOSSIL SIZE?
Abigail Wolff
Poster: 390
Mentor(s): Danita Brandt (Earth and Environmental Sciences)

The 300-million-year-old Mazon Creek fossil fauna from the Pennsylvanian Period, found in northern Illinois, is famous for exceptional fossil preservation within ironstone concretions. The formation of these concretions is not well understood other than they form around decaying organic material. Some fossils have similar dimensions as their concretion, so the ratio of these fossils to their concretions would be approximately 1:1. Other concretions have "underfit" fossils as their ratio of the fossil to concretion is < 1, meaning that the area of concretion is greater than the area of fossil. We hypothesize that the "underfit" fossils indicate an "excess" of decaying organic material compared to closely fit fossils, creating a larger preservation halo around the decaying organism. The hypothesis also makes the prediction that this ratio would be consistent within a taxon. To test this hypothesis, we measured the fossil : concretion ratio for one group of the Mazon Creek fauna, the fossil vertebrate taxa (fish and amphibians). Our findings will contribute to our overall understanding of concretion formation for this fauna.

INTEGRATIVE & ORGANISMAL BIOLOGY
POSTER PRESENTATIONS, SECTION 3
BALLROOM, 3:00 – 4:30 PM

SPOTTED HYENAS (CROCUTA CROCUTA) VOCAL ONTOGENY
Paige Barnes
Poster: 393
Mentor(s): Kay Holekamp (Integrative Biology), Kenna Lehmann (Integrative Biology)

Many species use vocalizations to signal to conspecifics. Spotted hyenas (Crocuta crocuta) are social carnivores, and are highly vocal, with a broad range of vocalizations: groans, whoops, squitters, giggles, growls, and alarm rumbles. However, we know very little about the ontogenetic development of these vocalizations. Using field notes from various hyena clans in the Masai Mara National Reserve, in Kenya, we have complied any instances of hyena cub vocalizations to determine the age at which cubs begin emitting each vocalization. This study will expand our understanding of the ontogenetic development of vocalizations in this species.

HUMAN DISTURBANCE AND ITS IMPACTS ON MATERNAL CARE IN THE SPOTTED HYENA (CROCUTA CROCUTA)
Emily Bernhardt
Poster: 394
Mentor(s): Kay Holekamp (Integrative Biology), Zach Laubach (Integrative Biology)

Spotted hyenas (Crocuta crocuta) are highly social carnivores with extended periods of maternal care. Hyenas have a protracted period of development when cubs are dependent on their mothers for food and protection for the first 12-18 months of life. However, as populations of spotted hyenas are exposed to increasing levels of human disturbance, mothers must trade-off time spent caring for offspring with the risk to mothers and their cubs imposed by potential threats, particularly human pastoralists. We hypothesize that mothers living closer to human settlements, who are exposed to higher levels of human disturbance, will modify their maternal care behaviors to ensure the success of their young while also mitigating costs from exposure to humans. To test this hypothesis, we will use scan data from four clans of spotted hyenas from the Mara Hyena Project. We will use linear regression to examine the association between anthropogenic disturbance and maternal care behaviors such as maternal attendance, nursing frequency, and time spent in close proximity to cubs. Maternal care behaviors are quantified from observational data collected while the cubs are restricted to a communal den, and also from den-independence until early adulthood. We predict that mothers from disturbed habitats will exhibit less maternal care while their cubs are at the communal den, and spend less time together with their cubs after den-independence, than mothers from undisturbed habitats. If our predictions are correct, then these data will provide evidence of behavioral plasticity in the spotted hyena in response to human disturbance.

COMPARISON OF ISOLATION BY DISTANCE PATTERNS IN MARINE SPECIES OF THE NORTHWESTERN ATLANTIC WITH VARIED REPRODUCTIVE STRATEGIES
Sarah Frocillo
Poster: 395
Mentor(s): Gideon Bradburd (Integrative Biology), Emily Puckett (Integrative Biology)

Patterns of genetic differentiation between populations can often be described by isolation by distance (IBD), with nearby populations being more genetically similar than populations that are farther apart. However, such IBD patterns can differ drastically between species as a result of variation in evolutionary histories and life histories. In order to better understand how variation in reproductive biology shapes spatial patterns of genetic variation across species, we performed a meta-analysis on genomic and geographic data from eight different marine families that currently populate the northern Atlantic coast of North America (the Scotian shelf). The chosen species represent a variety of reproductive methods, including broadcast spawning, brood hiding, and asexual reproduction. We analyzed patterns of genetic variation in each species using conStruct, and modeled the estimated rate of decay of relatedness within each species as a function of their specific reproductive biology. We hypothesized that species that utilize the currents of the Atlantic Ocean for gamete dispersal have the ability to spread their genes across greater geographic distances than those that do not. As a result, we predicted that such species are subject to weaker patterns of IBD, and are more likely to exhibit increased genetic similarities across populations.

PLAY PARTNER PREFERENCES IN SPOTTED HYENAS (CROCUTA CROCUTA)
Julie Javorka
Poster: 396
Mentor(s): Kay Holekamp (Integrative Biology)

Play is an important behavior in the lives of many young mammals. Spotted hyena cubs (Crocuta crocuta) interact with their mothers and siblings at the natal den, during which time cubs exhibit decreasing rates of aggression and increasing rates of play. After about one month, cubs leave the natal den for the communal den, where they interact with other clan members. At the communal den, social play is the most common type of play, and females and higher-ranking cubs play most frequently. However, the adaptive function of play at the communal den is not yet understood. Here, I examine differences observed at the communal den in the frequency of play with siblings versus non-littermates, including cubs of other female hyenas. I use scan data from observations of spotted hyenas in the Masai Mara National Reserve in Kenya from May 2015 to September 2017. I hypothesize that, as spotted hyena cubs often play with their siblings at the natal den, cubs will play more frequently with unrelated individuals once at the communal den. This trend would suggest that play helps the young cubs to bond with other members of their clan, which may be important in maintaining relationships in the hyenas' fission-fusion society. This project will help elucidate the functions of play in social mammals.

ANALYZING THE DYNAMICS OF THERMAL EVOLUTION IN A MARINE DIATOM
Ayley Shortridge
Poster: 397
Mentor(s): Danny O'Donnell (Zoology)

Life as we know it would not exist without phytoplankton: they support ocean food webs and provide roughly half the oxygen we breathe. Climate change poses a novel challenge to these important marine flora, and may drive rapid adaptation to rising ocean temperatures. In all microorganisms, population growth rates increase with temperature up to a thermal optimum, then decline rapidly. This results in a stereotyped asymmetric, unimodal curve: the thermal reaction norm. D. O'Donnell has maintained replicate populations of the marine diatom Thalassiosira pseudonana at 16 and 31°C for 500 generations. After 350 generations, T. pseudonana showed significant divergence between the 16-and 31-selected strains in thermal optima and other traits. In this experiment, we compared thermal traits again after 500 generations to determine whether, and to what extent, evolution would persist. We monitored optical density over time to estimate population growth rates at 10 different temperatures, spanning the thermal niche of the diatom. Results indicate that the thermal optima of 31-selected strains increased dramatically between 350 and 500 generations, indicating that thermal adaptation was ongoing. This research will improve scientific understanding of how algae evolve in response to higher ocean temperatures. It will inform predictions about how climate change may impact marine phytoplankton and the living systems that depend on them.

PREDATOR DETECTION AND COAT VARIATION OF LEOPARD (PANTHERA PARDUS) IN RELATION TO HABITAT
Genevieve Redgate, Allison Chojnacki, Katelyn Gutwein, Zachary Woloszyk
Poster: 398
Mentor(s): Zachary Laubach (Integrative Biology), Tracy Montgomery (Integrative Biology), Eli Strauss (Integrative Biology)

Predator coat patterns evolved to provide camouflage contingent on habitat type, such that pattern and coloration are adaptive for prey capture. Previous studies used computer imaging to find a correlation between coat pattern and habitat type. We tested the relationship between coat pattern and habitat type in a natural environment. We hypothesized that our focal predators, leopards (Panthera pardus), have coats that are camouflaged in the environment where they hunt most frequently. Leopards hunt primarily in areas with dense vegetation, and tend to avoid hunting prey in open grassland. To test the effectiveness of leopard camouflage in different environments, we examined the behavioral response of a prey species to a mock leopard that we presented in grassland and bushland habitat. Based on the leopard's coat pattern, we predicted that their prey species, topi (Damaliscus lunatus), would detect leopards more frequently in grassland than in bushland. We recorded the frequency of detection of the mock leopard by conducting focal animal surveys on randomly selected individuals within each exposed group. Detection was determined when the topi had raised its head above its shoulders with its ears forward and its gaze directed toward the leopard. We also recorded antipredator behavior exhibited by the topi prior to detection to control for any baseline vigilance unrelated to the leopard. We found a significant difference in the frequency of mock predator detection, with detection rates higher in grassland than bushland. This supported our hypothesis that leopards are better camouflaged in bushland, where they usually hunt.

KINESIOLOGY

ORAL PRESENTATIONS, SECTION 1
ROOM 40, 8:30 – 9:30 AM

SPORT-RELATED CONCUSSIONS; INJURY RISK AT DIFFERENT TIME-POINTS DURING AN ATHLETIC EVENT
Maddie Baker, Keegan Coles, Joshua Gall
Time: 8:30 AM
Mentor(s): Tracey Covassin (Kinesiology), Kyle Petit (Kinesiology)

There are 1.6-3.8 million sport-related concussions (SRC) annually, accounting for 9% of sport-related injuries. Previous research has shown increases in injury rates during the second half of athletic events. However, research fails to identify which time-point during an athletic event student-athletes are most susceptible to SRCs. The purpose of this study was to determine the clinical incidence of SRCs during the start, middle and end of practice and competition among high school athletes in the state of Michigan. This was a descriptive epidemiology study that utilized the Michigan High School Athletic Association (MHSAA) Head Injury Reporting System during the 2015-2016 academic year. Time of SRC

was reported by athletic trainers, coaches and administrators as either beginning, middle or end of an athletic event. Relative Risk (RR) was calculated to determine which time-point possessed the greatest risk of injury. When analyzing all combined events, the middle yielded the highest risk as compared to the beginning (RR=4.90; 95% CI, 4.44-5.41) or end (RR=1.50; 95% CI, 1.40-1.60) of practice or competition. Student-athletes were 5 (95% CI, 4.22-5.94) times more likely to incur a SRC during the middle than beginning of practice and 4.85 (95% CI, 4.29-5.48) times more likely during the middle of competition than the beginning. Possible explanations for these results include fatigue, increased competitiveness and unanticipated hits to the head. This study suggests medical personnel attentiveness should be increased during the middle of athletic events for optimal athlete safety. Further investigation should include a more diverse sample spanning multiple athletic seasons.

COMPARISON OF PHYSIOLOGIC RESPONSES BETWEEN PRACTICE AND GAMES IN A DIVISION I COLLEGE FEMALE FIELD HOCKEY TEAM

Jane Groetsch

Time: 8:45 AM

Mentor(s): James Pivarnik (Kinesiology), Ashley Triplett (Kinesiology)

Heart rate (HR) monitoring, GPS tracking, and accelerometry are used to evaluate players' activity levels during competition. However, few data are available from NCAA varsity women's field hockey. We determined descriptive information related to players' game performance and compared game physiologic responses to practices. We collected and evaluated data from a single team (N=20) who participated in 8 games and 14 practices. Differences were evaluated with independent sample t-tests. Prior to the study, HRmax was determined through a continuous graded treadmill test. Variables analyzed were time spent in HRzone4 (80-90%HRmax) and HRzone5 (>90%HRmax), maximum speed achieved, total distance, and number of sprints performed. Players spent significantly more time in HRzone4 (30%) and HRzone5 (50%) during games compared to practice (16% in HRzone4 and 17% in HRzone5) ($p<0.001$). Significant differences were seen between distance traveled (m/min) in games (101.8±12.6) versus practices (45.7±5.7) ($p<0.001$). Players performed more sprints per minute in games (0.55±0.19) compared to practices (0.24±0.05) ($p<0.001$). Maximum speed between games (26.2±1.8 km/hr) and practices (26.3±2.0 km/hr) was not significantly different. Heart rate data show that field hockey is an intense aerobic sport, with high burst interval runs being performed throughout competition. Our data suggest that game intensity is higher than practice intensity. Coaches can use these results to help tailor practice schedules and game strategies.

EXAMINING RELATIVE RISK AND CLINICAL INCIDENCE OF SPORT-RELATED CONCUSSIONS BETWEEN TWO ATHLETIC SEASONS

Lauren Jackson, Shelby Weaver

Time: 9:00 AM

Mentor(s): Tracey Covassin (Kinesiology), Jennifer Savage (Kinesiology)

Sport-related concussions (SRC) are a growing concern of high school athletic administrators. In efforts to understand SRC occurrence in high school events, the Michigan High School Athletic Association (MHSAA) implemented a Head Injury Reporting System (HIRS) to record SRCs. The purpose of this study was to determine clinical incidence (CI) and relative risk (RR) of SRCs between the 2015-16 and 2016-17 seasons. This was a descriptive epidemiology study, which included high school athletes participating in MHSAA events. Certified athletic trainers, school administrators and coaches from the MHSAA input SRC data into the HIRS for two seasons. SRC was defined as a head injury resulting from participation in a practice or competition and required removal from participation after exhibiting symptoms of a SRC. Total number of athletes and SRCs were recorded for all sports. A total of 4,452 (284,227 athletes) and 4,144 (283,679 athletes) SRCs were reported in the 2015-16 and 2016-17 seasons, respectively. There was no increased risk (RR=0.9,0.85-0.93) for participating in 2016-17 (CI=1.40,1.35-1.44) compared to 2015-16 (CI=1.57,1.52-1.62). The sport with the greatest CI for SRCs in 2015-16 and 2016-17 was football (CI=4.90,4.72-5.16; CI=4.50,4.29-4.72). There was an increased risk in girls' lacrosse in 2016-17 (RR=1.81,1.16-2.18) compared to 2015-16, while other sports remained stable. Other than girls' lacrosse, the risk of sustaining a SRC remained stable.

THE EFFECT OF INTERVAL TRAINING ON EXERCISE CAPACITY IN MICE GROWTH RESTRICTED IN EARLY LIFE

Olivia Lord

Time: 9:15 AM

Mentor(s): David Ferguson (Kinesiology)

Growth restriction caused by early life undernutrition increases the risk of cardiovascular disease (CVD) later in life with little evidence for therapeutic countermeasures. It is hypothesized that exercise training could mitigate CVD risk. PURPOSE: To evaluate the effects of treadmill training on improving cardiac function in mice growth restricted by early life undernutrition. METHODS: Using a cross-fostering model, pups were undernourished during gestation (GUN) n=13,

lactation (PUN) n=16, or both (GUN+PUN) n=16 by feeding mouse dams a low protein (8%) diet. The control (CON) group n=13 was fed an isocaloric diet (20% protein). At PN21 (21 days post-natal), all mice were weaned and fed the control diet. To evaluate exercise capacity, maximal work on a TM was performed. At PN41, half the cohort was interval trained on the TM 5 days/week for 8 weeks. The remaining cohort (sedentary) walked on the TM 3 days/week. Echocardiography was performed after the 8-week training period to evaluate cardiac function. RESULTS: TM training increased exercise capacity (TM+5.0±3.9 Joules (J)) vs sedentary groups (+2.5±6.0J) (p=0.03) as a result of increased cardiac output (TM: 12.81±0.43µl, Sedentary: 11.51±0.43µl) (p=0.0487). However this training effect was not observed in the PUN and GUN+PUN groups which had a reduced CO (CON: 13.34±0.66mL/min, PUN: 11.71±0.56mL/min, GUN: 13.32±0.62mL/min, GUN+PUN: 10.73±0.57mL/min) (p=0.0168) and exercise capacity. CONCLUSION: Nutrient restriction during PN1-21 prevents growth of the myocardium which limits exercise capacity and increases CVD risk.

KINESIOLOGY
POSTER PRESENTATIONS, SECTION 1
BALLROOM, 9:00 – 10:30 AM

COMPARING TRUNK DISPLACEMENT IN DIFFERENT REACHING CONDITIONS, AND IMPLICATIONS FOR STROKE REHABILITATION

Tucker Aichin, Sydney Brief
Poster: 400
Mentor(s): Rajiv Ranganathan (Kinesiology), Aimee Tomlinson (Kinesiology)

Stroke survivors often experience 'hemiparesis' after the stroke, which is characterized by muscular weakness and partial paralysis of one side of the body. This condition leads to trunk compensation while reaching, which can be detrimental to motor recovery. However, there is a difference between normal trunk displacement versus trunk compensation, as even healthy individuals sometimes move their trunk during reaching. The goal of this study is to evaluate the typical trunk movements during reaching, and how a healthy individual's trunk movements can be affected by a change in reaching target location and in use of reaching devices. We predict that there will be higher magnitude of trunk displacement when objects are further away from the participant, but that utilizing a grabbing device will lessen the amount of trunk displacement. Understanding how healthy individuals modify trunk motions when moving to different objects is critical to understanding deficits in stroke survivors, and developing new strategies for motor recovery.

THE EFFECT OF MOTOR OVERFLOW ON INTERFERENCE IN ASYMMETRIC HAND MOVEMENTS

Jessica Cummings
Poster: 401
Mentor(s): Alexander Brunfeldt (Kinesiology), Florian Kagerer (Kinesiology)

When we move both hands in asymmetric movements, like reaching for two different objects, one hand can interfere with control of the other. A previous study in our lab suggested that increased force demands placed on movement increased the level of interference. The purpose of the current study is to determine if the interference is due to the co-activation of homologous muscles, motor overflow, or to a shared representation of the sensory-motor relationship (i.e., internal model). Right handed participants performed a bimanual center-out reaching task on a KINARM endpoint robot. Participants controlled two cursors displayed on a screen occluding their hands. They were assigned to one of three groups that experienced different restoring forces (0 N/m, 30 N/m, or 60 N/m) anchored at the home positions. Participants moved the two cursors to targets located either forward or backward from the home positions. Participants completed forty baseline trials: 20 with full visual feedback, and 20 with visual feedback removed for the left hand. After baseline trails, targets for the right hand were rotated +40^o about the start position for 120 trials. Initial directional error (IDE), the angular deviation from a straight movement path, and lateral endpoint error (EPx) were calculated to determine the amount of interference in the nonvisible left hand. If the interference is based on motor overflow, we expect to see the same or a greater amount of interference compared to our initial study. If less interference is observed, this suggests interference may arise from a shared internal model.

EFFECTS OF BOTULINUM TOXIN INJECTIONS ON ERECTOR SPINAE AND MULTIFIDUS MUSCLES IN A RABBIT MODEL
Alexis Dielman
Poster: 402
Mentor(s): John Popovich (Osteopathic Surgical Specialties)

Botulinum toxin type A (BTX-A) has been used to treat numerous conditions and musculoskeletal disorders, including low back pain. While BTX-A may be an effective treatment for low back pain in the short-term, the long-term effects of induced muscle weakness on the spine have not been well documented. To begin investigating the effects of experimentally induced muscle weakness on the spine, we aimed to determine the dose effect of BTX-A injections on lumbar paraspinal muscle cross-sectional area in a rabbit model. Furthermore, we are interested in the distant effects of BTX-A on the neighboring multifidus (MF) paraspinal muscles. Therefore, 21 New Zealand White rabbits were injected with two different dosages of BTX-A (Allergan, Dublin, Ireland), 3.5 Units/kg and 8.0 Units/kg, into the left and right erector spinae (ES) muscles. Magnetic resonance imaging (MRI) was performed at baseline, then every two weeks for an 8-week time period. ES and MF muscle cross-sectional areas were determined by tracing the muscles at three levels of the intervertebral discs using OsiriX image processing software (Pixmeo, Geneva, Switzerland). Left and right sides were averaged and the cross-sectional area was used as a measurement of atrophy. We compared cross-sectional area of both ES and MF muscles over an 8 week period between the 2 rabbit groups (3.5 Units/kg BTX, 8.0 Units/kg BTX). Future studies should be conducted to determine if BTX-A or lack of movement resulting from the injections is the cause of atrophy in surrounding muscles.

LEARNING DIFFERENCES BETWEEN CHILDREN AND ADULTS: REAL OR ILLUSORY?
Timothy Havern, Jenna Borchanian, Claire Sickon
Poster: 403
Mentor(s): Mei-Hua Lee (Kinesiology), Priya Patel (Kinesiology)

Contrary to popular belief, most research shows that adults actually learn motor tasks better than children. However, it is debatable whether these learning differences are real or a result of prior experience. True learning differences among children and adults should be measured using a novel motor task that eliminates confounding factors like prior experience and strength. Body Machine Interface (BoMI) is one such novel motor task. In this study, motor learning in children and young adults was compared, using a customized body machine interface (BoMI) where participants used their body movements to move a cursor to different targets on the screen. Results from our previous study indicate significant differences in performances of children and adults even when using the BoMI task. However, these differences may be result of inadequate practice. Thus, our present study examined if these differences between children and adults persist under extended practice. In a multiple day study, participants learned a motor task through 160 practice trials and 72 test trials per session and completed five sessions, every alternate day. Performance was measured by their speed and directness toward the target. Results showed that although there were initial differences between children and adults, with adequate practice, children performed just as well as adults on the last session. Understanding true learning differences between children and adults can help us improve the design of rehabilitation programs in children with various motor deficits.

THE EFFECTS OF SIMULTANEOUS VISUOMOTOR AND FORCE PERTURBATION ON INTERFERENCE IN BIMANUAL MOVEMENTS
Kayley Irwin
Poster: 404
Mentor(s): Phillip Desrochers (Kinesiology), Florian Kagerer (Kinesiology)

During complex bimanual movements, the action of one hand can influence the action of the other hand in a process called interference. Interference can be probed by using a visuomotor perturbation in the right hand and observing changes in movement in the left hand. Interestingly, studies have shown that when participants instead experience a force perturbation, they exhibit limited interference between hands. However, unimanual studies have demonstrated that simultaneous visuomotor and force perturbations show a synergistic motor response. The objective of the study is to explore whether simultaneous exposure to both visuomotor and force perturbations has a synergistic effect on interference between the hands. Participants will be randomly assigned to one of four groups: no perturbation, force perturbation only, visuomotor perturbation only, or simultaneous force and visuomotor perturbation. Participants will reach toward different targets using a robot. During the visuomotor perturbation, a cursor representing the right hand will be rotated 40 degrees, such that participants must alter their right-hand movement trajectory to hit the target with the cursor. During the force perturbation, the participants will encounter a force perpendicular to their movement that is proportional to their reaching velocity. The dual-perturbation group will be exposed to both perturbations simultaneously. Interference will be assessed in the left, non-perturbed hand by comparing directional error. If the

visuomotor and force perturbations act synergistically, combining them will result in more interference than either force or visuomotor perturbation alone. This study will have implications for understanding how complex bimanual movements are coordinated.

COHERENCE BETWEEN BRAIN REGIONS IN A BIMANUAL INTERFERENCE TASK
Bradley Miller
Poster: 406
Mentor(s): Alex Brunfeldt (Kinesiology), Phillip Desrochers (Kinesiology), Florian Kagerer (Kinesiology)

In bimanual movements, interference can occur when the motion of one hand is susceptible to influence from the other, particularly if the two hands are performing complicated, asymmetrical actions. Interference may be the result of increased communication between brain hemispheres, resulting in greater transfer of information between brain regions that control each hand. Neural communication changes during bimanual interference are largely unexplored. Coherence is an electroencephalographic (EEG) measure of functional connectivity between regions of the brain and is representative of communication between the regions. If interference is a result of increased interhemispheric connectivity, then inducing interference in a bimanual study should result in a greater coherence between points on different hemispheres. Twenty-four right-handed participants were randomly assigned to either a control or experimental group. Both performed a bimanual center-out task on a KINARM endpoint robot. Participants controlled two cursors on a screen, each representing one hand's position, projected on a horizontal display that obstructed view of their hands. After a baseline period, participants in the experimental group experienced a visuomotor rotation in which the right hand's visual feedback was rotated 40 degrees. The left hand's visual feedback was removed, leaving the left hand susceptible to interference from the right. This manipulation resulted in deviation in the movement of the left hand due to the perturbation in the right hand. Preliminary results support our hypothesis, showing increased coherence in early adaptation. Exploring the neural mechanisms of interference allows for the formation of more precise models of complex bimanual coordination.

MIND OVER MUSCLE: DOES YOUR PRE-WORKOUT ACTUALLY WORK?
Tiffany Nguyen, Lindsey Dick, Nick Grennell
Poster: 407
Mentor(s): Erica Wehrwein (Physiology)

Consumers psyche are easy prey for companies who rely on the placebo effect; positive, exaggerated marketing is utilized to sell products. We tested the hypothesis that the positive marketing tactics of C4 could increase athletic performance due to users psyche being swayed. Healthy subjects (n=7, ages 18-24) performed grip force tests in a laboratory setting using a grip force transducer. Respirations and ECG were recorded using a respiratory belt and ECG equipment. Subjects participated in a two day study to compare vitals, grip force maximum, and time to fatigue when given the same pre-workout but with neutral and positive prompts. We compared the average heart rate, respiratory rate, maximum grip force, and time to fatigue to the neutral and positive prompts using a one-way repeated measures ANOVA. Average grip force maximum after supplement ingestion increased from 370.03 +/- 71.55 N during neutral prompt testing, to 461.4 +/- 57.33 N after the positively reinforced prompt. Furthermore, time to fatigue increased from 28.66 +/- 5.18 s to 31.00 +/- 8.88 s across the same parameters. While there is an observable difference in averages for both max grip force and time to fatigue, further analysis suggests that our results are not significant ($p>.05$ for both statistics). Therefore, from our data, we can infer that positive marketing of pre-workout supplements may not increase athletic performance. This study also calls into question the overall efficacy of pre-workout supplements, a topic to be explored in further research.

KINESIOLOGY
POSTER PRESENTATIONS, SECTION 2
BALLROOM, 11:00 – 12:30 PM

MOTOR ASSESSMENT OF GNAO1 MUTATION IN HUMANS
Jennifer Brand
Poster: 409
Mentor(s): Alexander Brunfeldt (Kinesiology), Phillip Desrochers (Kinesiology), Florian Kagerer (Kinesiology)

A rare mutation in the human GNAO1 G-protein gene causes epileptic encephalopathies and disordered movement. Patients with this mutation sometimes experience choreatic movements and motor developmental delay. Our objective was to define the neuromotor control characteristics related to the movement disorder. We measured upper limb dexterity, gait, balance, reaction time, and leg strength. Two 12-year-old females (one with the mutation, one control)

participated in five behavioral tasks. In the Purdue Pegboard task, the participants' manual dexterity was tested for bimanual, dominant unimanual, and nondominant unimanual conditions. This is an established test of fine motor control, with which we can compare participants' data with accepted norms. For gait, we measured body segment kinetics and kinematics while participants walked in a straight line. To test balance, we measured the center of pressure variability on a force plate while the participants used either a two-foot or one-foot base of support stance. Participants' leg strength was tested using a biodex machine, measuring quadriceps strength through isometric leg extension. To measure reaction time, we used a dual-choice reaction time task; participants pressed specified buttons corresponding to a presented stimulus on a computer screen. Results from this study will help quantify motor deficits in GNAO1 patients. To our knowledge, these deficits have never been studied in this population. Through these tests, more specific studies on the aspects of a GNAO1 mutation can be pursued.

QUANTIFYING THE AFFECTS OF DEEP BRAIN STIMULATION ON MOTOR PERFORMANCE IN DYSTONIA: A CASE STUDY
Kate Cavataio
Poster: 410
Mentor(s): Alex Brunfeldt (Kinesiology), Philip Desrochers (Kinesiology), Florian Kagerer (Kinesiology)

Deep brain stimulation (DBS) is used to treat dystonia and other movement disorders. Dystonia is characterized by muscle contractions causing involuntary and abnormal postures and movements. DBS is a procedure in which a neurostimulator sends electrical impulses to basal ganglia to mitigate symptoms. As yet, movement modification by DBS in dystonia has not been quantified. Our objective was to evaluate how motor performance degrades when DBS is turned off, and how it recovers when turned back on. We tested six healthy right-handers (M_{age}=20.5 years) and one right-handed dystonia participant with a deep brain stimulator (M_{age}=23 years, male). Participants could not see their hands; however, cursors on a horizontal screen represented their location. One trial included tracing a circle (10 cm diameter) 15 times on a KINARM robot with their right hand, their left, then both. For the first five circles, participants were cued at 1 Hz by an acoustic stimulus. Once the stimuli stopped, participants continued circling, maintaining the tempo. In the first of four blocks, participants performed ten baseline trials. The next two blocks had 40 trials; block two with DBS off and block three with DBS back on. The fourth block served as a ten-trial post-test. To assess motor performance deterioration and recovery in the dystonia participant vs. controls, we evaluated frequency stability, circularity across each block, and relative phase between hands in the bimanual condition. These findings will help quantify the effects of DBS on motor performance in an understudied patient population.

RELATIONSHIP BETWEEN FEAR OF RE-INJURY AND SINGLE LEG CROSSOVER LANDING BIOMECHANICS IN INDIVIDUALS WITH A HISTORY OF ACLR
Caitlin Davis
Poster: 411
Mentor(s): Christopher Kuenze (Kinesiology)

Individuals with a history of anterior cruciate ligament reconstruction(ACLR) have increased risk of knee injury compared to their healthy counterparts. Persistent fear of re-injury may predispose an individual to high risk landing patterns, but these relationships have not been thoroughly studied. Therefore, the purpose of this observational study was to assess the relationship between fear of re-injury and single leg landing biomechanics in individuals with a history of ACLR. A total of 24 participants who had undergone ACLR were enrolled in the study (sex=8M/18F, age=23.7±5.3 years, mass=72.4±10.3 kg, height=1.73±0.10 m, Tegner=6.4±1.9). Each participant completed three single leg crossover landing from a 30cm box tasks bilaterally. Sagittal plane knee kinematics and kinetics were collected and processed using a camera-based motion capture system. Fear of re-injury was assessed using the valid and reliable ACL-RSI scale in which a lower score indicates greater fear of re-injury(ACL-RSI=58.9±31.5). Relationships between knee joint biomechanics and ACL-RSI were assessed using partial correlations controlling for sex. There were significant positive correlations between the ACL-RSI score and knee flexion excursion(r=0.70, p=0.00), peak knee flexion angle(r=0.67, p=0.00) and peak internal knee extension moment(r=0.56, p=0.05). Participants with a greater fear of re-injury presented with greater peak knee flexion angle, knee flexion excursion and peak internal knee extension moment. Individuals with a greater fear of re-injury demonstrate high risk landing patterns associated with knee injury risk. Future research should asses if high risk landing patterns in relation to fear of re-injury are associated with increased risk of re-injury in individuals with ACLR.

LOWER EXTREMITY MUSCLE LATENCIES AND TRUNK MOTOR CONTROL IN INDIVIDUALS WITH ACL RECONSTRUCTION
Michael Dube, Kimberly Cox
Poster: 412
Mentor(s): John Popovich (Osteopathic Surgical Specialties)

Anterior cruciate ligament reconstruction (ACLR) surgery is a common procedure to restore function following an ACL tear, and the incidence continues to grow. Unfortunately, despite having ACLR and returning to high levels of activity, deficits may still remain. Previous research has shown numerous risk factors for ACL injury, including lower extremity and trunk motor control; however, the relationship between these factors following ACLR have not been thoroughly studied. The purpose of this research study is to investigate motor control of the trunk and lower extremities in individuals with unilateral ACLR. Individuals with ACLR following a noncontact ACL injury were recruited for this study. Participants performed "quick release" tasks to assess muscle reflex response of the knee flexors, knee extensors, hip extensors and hip abductors. The "quick release" required participants to pull a cable attached to an electromagnet until a target load was achieved. After the target load was reached, the electromagnet was released, requiring the participant to react to the release/perturbation. Electromyography signals from the knee and hip muscles were recorded and the muscle latency (time from magnet release to muscle activity) was calculated. To quantify trunk control, participants performed a trunk position tracking task. We will compare the ACLR leg to the non-ACLR leg to determine if there are any differences in muscle latency. Furthermore, these finding will be compared to performance on the trunk motor control task. Understanding the effects of ACLR on lower extremity and trunk motor control may provide insight into future rehabilitation and prevention.

UNDERSTANDING HOW SYMBOLIC AND DIRECT CUING AFFECT INTERFERENCE IN A BIMANUAL REACHING TASK
Aubrey Haughn
Poster: 413
Mentor(s): Florian Kagerer (Kinesiology)

Multiple studies have shown that in bimanual reaching tasks, symbolically cuing targets interferes with coordination more so than direct cuing. To further these findings, we will be investigating how direct and symbolic cuing affect interference on the left hand in a bimanual reaching task when perturbation is applied to the right hand. Two groups of ten participants will perform a bimanual reaching task on a KINARM robot. Participants will control two virtual markers on a screen and will be instructed to move toward two targets, in either the “Up” or “Down” position. In the direct cuing group, movement will be initiated after the desired targets appear. In the symbolic cuing group, all four possible targets will be displayed and movement will be initiated after the letter “U” for up or “D” for down is presented. After a baseline of twenty trials, visual feedback for the left hand will be removed for another twenty trials, making it susceptible to interference. Then, a visual perturbation of +40 degrees to the participant’s right hand will be introduced for 120 trials. To determine the amount of interference, we will measure initial directional error (IDE) as the angle between the target direction and the initial movement direction, and lateral endpoint error (EPX) as the distance between the target location and hand location at movement offset. We expect to see increased interference in participants who are symbolically cued. Through this research, we hope to better understand the complicated coordinated movements we perform daily.

APPLIED BEHAVIOR ANALYTIC GROSS MOTOR AND ACTIVE SOCIAL PLAY SKILLS PROGRAM
Mackenzie Jones
Poster: 414
Mentor(s): Isabella Felzer-Kim (Kinesiology), Janet Hauck (Kinesiology)

Delays in gross motor and social play skills are present in children with Autism Spectrum Disorder (ASD). Previous therapeutic techniques such as physical therapy and behavioral therapy have addressed these issues separately. The following study examines a training program for preschoolers with ASD that targets both issues, within the applied behavior analytic (ABA) therapy setting, a common experience for children with ASD. The study addresses two research questions: 1) Does the program improve gross motor skills? 2) Does the program improve social skills? This presentation will present descriptive baseline data and study design methodology and rationale. Eventual results from this study will provide important information to professionals concerning incorporation of gross motor and active social play skill development into traditional ABA.

MOTOR LEARNING IN VISUOMOTOR ADAPTATION TASKS ACROSS THE LIFESPAN
Alexandra Janson
Poster: 415
Mentor(s): Phillip Desrochers (Kinesiology), Florian Kagerer (Kinesiology)

Each day we make complex movements with our upper limbs and must learn new movements to interact with our environment. Previous research has demonstrated that in older adults, motor learning is reduced compared to young adults. Whether similar motor learning reductions are already present in middle-age is currently not known. This study's objective is to assess unimanual sensorimotor control and motor learning in healthy young (ages 18-28), middle-aged (ages 45-55), and older adults (age 70-80). Participants will perform a reaching task while their movements are measured by a robotic device. Participants will reach from a home target to a peripheral target as fast, straight, and accurately as possible. They will be unable to see their hands, but each hand position will be represented by one cursor. Then, a visual rotation will be applied to the cursor, such that if they reach straight to the peripheral target from the home position, the cursor will deviate from the direction of the reach by 40 degrees. This will require participants to learn to move the cursor to the peripheral target under new visuomotor conditions. We will evaluate participant's initial directional error and lateral endpoint error between age groups. If middle aged adults have a reduction in adaptation learning that is similar to the older adults, then we expect higher error magnitude than young adults. This research will address the knowledge gap regarding motor learning in the middle-age group, and contribute to clinical rehabilitation by specifying motor learning parameters for the middle-age population.

AN ASSESSMENT OF SOMATIC SENSORY THERAPY AND SOMATO-EMOTIONAL RESPONSE: HOW ARE THEY RELATED?
Megan Lindsey
Poster: 416
Mentor(s): Karl Erikson (Kinesiology)

A common disconnect within the health profession is the one between physical therapists and intentional mental health promotion. An under researched area of this disconnect relates to point of care practices of somatic sensory therapy by physical therapists. A potential side effect of this therapy includes the verbal revealing of previous trauma experienced by the patient. Therefore, the purpose of this study is to better prepare future physical therapists to treat such events. It is crucial to understand the proper protocols that take place to support the patient mentally, emotionally, and physically. Due to the lack of scholarly research on this topic, this explaratory study will investigate these proper protocols. A small pilot study will be conducted via semi-structured interviews to examine commonalities and variation in the somatic-sensory therapy treatment. The resulting qualitative data will be analyzed to identify key practical recommendations, challenges the physical therapists faced, and serve as a starting point for future dialogue and research.

KINESIOLOGY
POSTER PRESENTATIONS, SECTION 3
BALLROOM, 1:00 – 2:30 PM

THE EFFECT OF A GLUCOSE CHALLENGE AND PHYSICAL INACTIVITY ON MUSCLE ACETYCARNITINE
Sarina Bassett
Poster: 419
Mentor(s): Jill Slade (Radiology)

Acetylcarnitine (AC) is a compound comprised of acetyl CoA and carnitine. Muscle AC content is highly correlated to insulin sensitivity suggesting that muscle AC may play a role in insulin resistance. Understanding the formation and metabolism of muscle AC may contribute to our understanding of insulin resistance. In prior work, this lab showed reduced muscle AC following an oral glucose challenge. In the current study, we are investigating the effect of acute inactivity compared to a glucose challenge with inactivity. Magnetic Resonance Spectroscopy was used to compare the time course of muscle AC changes in young adults under these two conditions.

DIFFERENCES IN RECOVERY TIME IN HIGH SCHOOL ATHLETES WITH AND WITHOUT A HISTORY OF CONCUSSION
Brandon Henry, Joel Erickson
Poster: 420
Mentor(s): Morgan Anderson (Kinesiology), Tracey Covassin (Kinesiology)

Sports related concussions (SRC) are a growing concern of athletes and sports medicine professionals. With this concern, research has been conducted to identify factors that influence recovery time. The purpose of this study was to compare recovery time in high school athletes with and without a history of SRC. Athletes that participated in high school sanctioned events between the years 2015-2017 were included in this study. SRC was defined as a head injury resulting from participation in a practice, scrimmage, or game and required removal from participation after exhibiting signs and symptoms. Recovery time was calculated as the days between the date of injury and the date of authorized return to play. The independent variable was history of SRC and the dependent variable was recovery time. A one-way ANOVA was used to evaluate differences in recovery time between athletes with a history of one or more SRCs and no history of SRC. Statistical significance was set to .05. There were 6869 athletes (2335 females, 4534 males). There was a significant difference in recovery time between athletes with a history of one of more SRCs (M = 14.23, SD = 11.72) and athletes with no history of SRC (M = 12.98, SD = 13.12; p =.008). Athletes with a history of one or more SRCs take longer to recover than athletes without a history of SRC. Sports medicine professionals should be aware of athletes with a history of SRC due to its impact on recovery time.

SEX DIFFERENCES IN THE PREVALENCE OF CONCUSSIONS IN MICHIGAN HIGH SCHOOL ATHLETES
McKenzie Kosiara, Kelsey MacDonald
Poster: 421
Mentor(s): Abigail Bretzin (Kinesiology), Tracey Covassin (Kinesiology)

Sports-related concussion (SRC) prevalence is well established in collegiate athletes, yet, little data exists in high school athletes. Additionally, it is important to investigate sex-differences in the prevalence of SRC, as well as time-loss from play and missed school days at this level. Therefore, the purpose was to identify sex differences in SRC clinical incidence, as well as missed school days, and time-loss from play in high school athletes. High school student-athletes (N=193,757; 60.1% male) participating in Michigan High School Athletic Association (MHSAA) sanctioned sports were included in this study. During the 2015-2016 school year, the MHSAA initiated the Head Injury Reporting System, requiring athletic administrators to report SRCs, missed school days, and time-loss from play. Clinical incidence of SRC was calculated by dividing the number of SRCs in a sport by the number of total sport participants. Relative risk ratios were calculated for sex comparable sports. One-Way ANOVA was used to compare sex-differences in missed school days and time-loss. Statistical significance was set to .05. The overall clinical incidence was 1.80(CI:1.75–1.87) per 100 player-seasons, and 1.4(CI:1.38-1.49) for male and 1.5(CI:1.32-1.55) for female athletes. Females had 1.94(CI:1.75, 2.16) times greater risk for SRC than males in sex comparable sports. Females had a significantly longer time-loss (13.8112.92) compared to males (12.0312.05)(p<.001). Average missed school days did not differ between sexes(p=.70). In conclusion, high school female student-athletes have a greater risk for SRC in sex-comparable sports, except in lacrosse. Additionally, time-loss for females was almost two days greater than males.

TRACKING HEMATOMA STAGES IN THE QUADRICEPS MUSCLES OF RATS
Rianna Pfau
Poster: 422
Mentor(s): Chunqi Qian (Radiology)

Muscle contusions occur when blood vessels are damaged as the result of a blunt force impact. They are very common in high impact sports. They can cause pain, edema, inflammation, hematoma, and limited mobility of the affected area. A hematoma occurs when blood pools in a localized area. The purpose of this study is to track the intensity and size of a muscle contusion injury with hematoma using T2 weighted magnetic resonance imaging (MRI). A sliding mass device was used to induce a contusion with hematoma on the quadriceps muscles of an adult rat. T2 weighted MR images were captured of the injured and uninjured legs immediately after contusion and 1,7,14d corresponding with 4 out of the 5 stages of hematoma: hyperacute, acute, early subacute, and late subacute respectively. The images were captured using a 7T horizontal MRI system. The hematoma did not form completely, so the stages were not present in the images. The contusion, however, remained. The Intensity of the signals from the contusion decreased over time. The size of the contusion increased from immediate injury until day one and then decreased over time.

SKILL BASED DIFFERENCES IN FUNDAMENTAL MOTOR SKILLS OF CHILDREN WITH AUTISM SPECTRUM DISORDER AND DOWN SYNDROME
Brianne Rajala
Poster: 423
Mentor(s): Janet Hauck (Kinesiology)

Fundamental motor skills (FMS) facilitate the ability of children to engage in physical activity opportunities. Those with developmental disabilities such as Autism Spectrum Disorder (ASD) and Down Syndrome (DS), show significant delays in FMS which may impede their ability to participate. The purpose of this study is to compare FMS in samples of children with ASD and DS. We assessed FMS in a sample of children with ASD ages 3 - 18, and children with DS ages 3 - 17 within the Lansing area using the Test of Gross Motor Development (TGMD III). The weight and height of each participant was measured, and the caregivers completed a demographic survey. We video recorded participants' assessments to perform standardized scoring according to TGMD III guidelines. After 90% inter-rater reliability was established, we scored TGMD III assessments to obtain locomotor and object control scores. This presentation will compare the locomotor, object control, and total TGMD III scores of each group. In addition, we will present a detailed examination of the character of particular skills within the TGMD III in each group of children. These findings will help identify specific areas and specific skills for intervention, and the children most likely to benefit from such interventions. Our findings may give insight to programs teaching FMS to children with ASD and DS.

A QUANTITATIVE ANALYSIS OF SEDENTARY BEHAVIOR IN CHILDREN WITH AUTISM SPECTRUM AND DOWN SYNDROME
Dominique Walker
Poster: 424
Mentor(s): Isabella Felzer-Kim (Kinesiology), Janet Hauck (Kinesiology)

Do you ever see kids in the store that jump around and just get into everything? Very often we reminisce back to childhood when we were active and full of energy. Naturally, kids are curious and energetic little beings that want to play all day, but improvements in technology have left the new generation begging to sit and play games on their tablets instead of running in the park. The skills learned and knowledge gained in youth influence their future behaviors as adults. There are several ill health effects including diabetes and cardiovascular disease that are attributed to sedentary lifestyles starting at a young age. However, little is known regarding sedentary behavior in children with disabilities or whether this health behavior is influencing disease risk. Therefore, the purpose of this study is to investigate sedentary behavior in children with Autism Spectrum Disorder (ASD) and Down syndrome (DS). We examine sedentary behavior of two samples of children with these diagnoses through the use of Actigraph wGT3X-BT accelerometers and subsequent sedentary analysis in ActiLife software. Statistical analysis includes comparisons in sedentary behavior between the groups. The results of this study will expand our knowledge on inactivity levels of atypically developing children and help us better understand the magnitude of sedentary behavior's impact on child development.

MECHANICAL PERFORMANCE OF DIABETIC SKELETAL MUSCLE
Anne Weitzel
Poster: 425
Mentor(s): Robert Wiseman (Physiology)

There is an increasing prevalence of diabetes in the United States often leading to heart disease, stroke, blindness, renal failure and peripheral limb dysfunction. To evaluate the effects of diabetes on muscle performance and exercise intolerance the Goto-Kakizaki (GK) rat was used for in vivo studies of isometric muscle contraction. We hypothesized that during isometric exercise within the aerobic range GK rats would have different contraction kinetics relative to control Wistar rats. Studies were performed under anesthesia and fixing the knee and while recording from the Achilles tendon using a force transducer. Muscle contractions were elicited by pacing of the sciatic nerve with electrodes. Twitch contractions were performed at stimulation frequencies of 0.5, 1, 2, and 4 twitches per second while measuring force for five minutes. Contraction kinetics were analyzed as rise time, peak force, relaxation time and time to fatigue and normalized to muscle weight. Initial analysis showed that at stimuli of 1Hz and below, the diabetic rats fatigue at a similar rate to controls but the kinetics of force production is more complex. Further analyses of the kinetics will be presented to address the effects of diabetes on contraction kinetics.

KINESIOLOGY
POSTER PRESENTATIONS, SECTION 4
BALLROOM, 3:00 – 4:30 PM

EFFECT OF MENTAL IMAGERY ON MUSCLE COORDINATION

Paige Cordts
Poster: 428
Mentor(s): Shanie Liyanagamage (Kinesiology), Rajiv Ranganathan (Kinesiology)

Many people who have survived a stroke will experience motor deficits that can lead to long-term disability. A stroke can cause muscle weakness and changes in muscle coordination patterns, which can affect their daily activities - from simply walking, to picking up a mug or putting on pants. The most widespread solutions to overcome these problems are physical and occupational therapy. However, these therapies are often expensive, time-consuming, and focus on a specific task. So, what else can we do to improve muscle coordination in stroke survivors? This goal of this experiment is to devise a technique that can be practised anywhere, anytime, and with little to no equipment needed. We believe that mental imagery is one such candidate. We will evaluate the effects that mental imagery can have on changing muscle coordination patterns using a myoelectric control reaching task. Eight different muscle groups in the arm and upper chest will be monitored via surface EMG, and activation of those muscle groups will cause a cursor on a screen to move. We will have two groups of subjects: a control group and a group that is given mental imagery to assist in the task. Both groups will consist of healthy undergraduate students to ensure the technique works before it will be applied to stroke patients. We expect to see an improvement in the reaching task outcomes with the use of mental imagery.

THE RELATIONSHIP BETWEEN MUSCULAR ACTIVATION AND POSTURAL CONTROL IN YOUNG ADULTS WITH ANTERIOR CRUCIATE LIGAMENT RECONSTRUCTION

Kimberly Cox
Poster: 429
Mentor(s): John Popovich (Osteopathic Surgical Specialties)

Anterior cruciate ligament (ACL) injuries are problematic and one of the most common injuries in sports. ACL injuries increase knee joint laxity and negatively impact motor control. ACL reconstruction (ACLR) surgery aims to restore the knee to normal function, though rehabilitation is crucial for individuals to return to sports at a high level. As such, it is important to understand how the muscles of the lower extremity (e.g., hip and knee) are affected after ACLR. The primary goal of this research is to examine the muscle activity during two postural balance tasks in a group of participants who have undergone ACLR as a result of a non-contact ACL injury and relate the measures to trunk motor control. Participants performed a modified Star Excursion Balance Test to measure their maximum reach distances. In addition, each participant completed a single leg balance test on a force plate and center of pressure (COP) was measured to determine his or her postural stability. While performing each balance test, muscular activity of the vastus lateralis, vastus medialis, gluteus medius, gastrocnemius, and hamstrings (medial and lateral) was collected using electromyography. Trunk motor control was measured during a position tracking task. Data analysis will compare reach distance, COP, and muscle activity between the injured and non-injured legs and the relationship between these variables and trunk motor control. This research aims to identify trends that may exist after ACLR which may prevent future injury and allow for a successful return to sport.

THE REID SCHOLARS STUDY: BARRIERS TO FITNESS CENTER AND GROUP FITNESS USAGE

Samantha Gregoire
Poster: 430
Mentor(s): James Pivarnik (Kinesiology), Kerri Vasold (Kinesiology)

The Daniel and Barbara Reid Foundation developed a scholarship in Spring of 2015 to award a waived recreational sports membership fee to students in the Spartan Success Scholars and FAME programs. However, renewal rates are low for this program because students do not meet usage requirements. The purposes of this study were: 1) describe barriers to scholarship usage and 2) describe differences in barriers between those who received a renewal and those who did not. An online survey was sent to students at the end of their first semesters. Students were asked to select all barriers they felt impeded use of the scholarship from a list of 20 items. Independent sample t-tests were used to evaluate differences in the total number of barriers reported and Fisher's Exact test was used to evaluate differences in frequencies each barrier was reported. The sample (N=125) was primarily female (69.6%) and African American (44.0%). Students who did not receive renewals reported significantly ($p<0.05$) more barriers (2.4±1.4) than those who did (1.6±1.4). Students who did not receive renewals reported time (72.7%), crowded facilities (25.5%), and lack of privacy (10.9%) more frequently than those who did (42.9%, 8.6%, and 1.4%, respectively). However, students who did receive

renewals selected “none of the above” more frequently than those who did not (18.6% to 3.6%, respectively). In order to improve scholarship renewals, the scholarship orientation administrators should address the various barriers through time management training and encouragement of use of facilities during non-peak hours.

DIFFERING RESPONSES TO GROSS MOTOR INTERVENTION OF TWO PRESCHOOLERS VARYING ON THE AUTISM SPECTRUM
Jessica Kahn
Poster: 431
Mentor(s): Isabella Felzer-Kim (Kinesiology), Janet Hauck (Kinesiology)

Children with Autism Spectrum Disorder (ASD) experience developmental delays in gross motor skills. These deficits play a role in the behaviors of those with autism and further contribute to both social and cognitive impairments. However, ASD encompasses a spectrum of severity, and therefore each child develops differently. This is often forgotten in the design of motor interventions for children with ASD. In order to better understand how children with ASD respond to such programs, the following study examines two children with ASD that vary on the spectrum and their development in both locomotor and object control skills. The study highlights the learning progress of the two cases within a larger applied behavior analytic (ABA) therapy of gross motor intervention for preschoolers with ASD. Both children receive the same gross motor program, but respond to various aspects of the program very differently. This presentation will provide data on the rates and quality with which these two cases learn particular gross motor skill targets. The results of this case series hold relevance for future gross motor interventions in this population.

SEX RELATED DIFFERENCES IN SINGLE-LEG HOPPING, QUADRICEPS STRENGTH, AND PATIENT REPORTED OUTCOMES AFTER ACL RECONSTRUCTION
Tess McGuire, Micaela O'Rourke
Poster: 432
Mentor(s): Chris Kuenze (Kinesiology)

Approximately 250,000 anterior cruciate ligament reconstructions (ACLR) are performed each year in the United States. Up to 30% of females who return to physical activity after ACLR will experience a secondary ACL injury within 2 years of surgery. The purpose of this study was to examine differences in performance on standard functional tests and patient reported outcomes between males and females with recent ACLR. Twelve males (age= 20.3±4.2yrs., BMI=28.0±8.9kg/m2, months since surgery=7.4±2.5mo.) and 24 females (age=20.3±6.2yrs., BMI=24.2±3.8kg/m2, months since surgery=7.5±3.6mo.) participated in this study. Participants completed single-leg, crossover, and triple hops for maximum distance (cm). Knee extension maximum voluntary isometric contraction (MVIC) was assessed using an isokinetic dynamometer. Patient-reported knee function was assessed using the International Knee Documentation Committee (IKDC). There were no significant sex differences for age (p = 1.0), BMI (p =0.08), or months since surgery (p=0.95). There were no significant sex difference for MVIC (males=2.15±1.27 Nm/kg, female=1.83±0.75 Nm/kg; p = 0.35, d = -0.34) or IKDC score (males= 83.7±9.1, females= 81.6±12.4; p=0.60, d =-0.19). Triple hop (males = 4.74±1.21 x leg length, females = 3.95±1.04 x leg length; p=0.05, d =-0.72) and crossover hop (males = 4.30±1.28 x leg length, female = 3.29±1.01 x leg length; p=0.01, d =-0.91) were significantly greater among male as compared to female participants. Females exhibited shorter hop distances when normalized to subject leg-length, which may indicate delayed functional recovery among females with ACLR. Females may require additional targeted rehabilitation to facilitate safe and healthy return to physical activity after ACLR.

DOMINANT AND NON DOMINANT HAND STABILITY DURING MOVEMENT OF THE OPPOSITE HAND
Akshay Seenivasan, Jung Hyun
Poster: 433
Mentor(s): Florian Kagerer (Kinesiology)

A commonly held notion is that the dominant hand is the ‘useful’ hand and the non-dominant hand is less skilled. However, when examining tasks that require the use of both hands, it appears that the control strength of the dominant hand is for reaching, and that of our non-dominant hand is for stabilization. For example, when hammering a nail, right handers typically hold the nail with their left hand and swing the hammer with their right hand. In order to further investigate this observation, we will conduct a study using a KINARM bimanual manipulandum to measure stability of a stationary hand while the other hand performs a reaching task. We are interested in how movement in one arm affects the stability of the other stationary arm. To do so we will use two conditions: in one condition the moving hand will experience no force and move without resistance. In the other condition the hand will move in a viscous force field. Right-handed participants will be required to use one hand to reach for multiple targets, while keeping the opposing hand stationary. Then the role of the hands will be reversed. This procedure will be used for both conditions; the

conditions will be counter-balanced. Based on previous studies, we predict that the nondominant, left hand will be better able to remain stationary in either condition than the dominant, right hand.

EXPLORING THE RELATIONSHIP BETWEEN AEROBIC FITNESS AND ACTIVATION OF THE LOCUS-COERULEUS
Caleb Sokolowski
Poster: 434
Mentor(s): Matthew Pontifex (Kinesiology)

Aerobic fitness has been associated with increased attention and memory, but the underlying mechanism behind this relationship is still unknown. As the locus-coerulus is involved in modulating arousal, attention, and memory function, the purpose of this study was to examine the association between aerobic fitness and activation of the locus-coerulus norepinephrine system. In order to measure this relationship, this study gathered pupillometric assessments of both tonic (i.e., baseline) and phasic (i.e., task-evoked) pupil activity as an index of activation of the locus-coerulus system in response to a modified flanker task in college-aged adults. Although findings showed superior inhibitory control for higher-fit individuals relative to lower-fit during the flanker task, no association with aerobic fitness level was shown for either baseline pupil size or task-evoked pupillary reactivity. These results suggest that the locus-coeruleus norepinephrine system is not related to the association between aerobic fitness and increased cognitive function.

LINGUISTICS, LANGUAGES & SPEECH

ORAL PRESENTATIONS, SECTION 1
ROOM 30, 9:45 – 10:30 AM

DOES LANGUAGE KNOWLEDGE HAVE AN EFFECT ON LISTENER'S QUALITY VOICE PERCEPTION?
Melissa Kleinfeld, Lizzy Gifford
Time: 9:45 AM
Mentor(s): Lady Catherine Cantor Cutiva (Communicative Sciences and Disorders), Eric Hunter (Communicative Sciences and Disorders)

The purpose of this study is to identify if language knowledge plays a role in perceptual assessment of vocal fry among bilingual English-Spanish speakers rated by monolingual English listeners and bilingual English-Spanish listeners. Two trained listeners (1 monolingual English, and 1 bilingual English-Spanish) listened to and rated standardized productions (reading) in English and Spanish of bilingual speakers with no history of organic voice disorders. Listeners performed the ratings in a quiet environment, using headphones and a personal laptop. The order of presentation of the productions were blinded and randomized.Preliminary results suggest a slightly higher intra-reliability in the bilingual English-Spanish listener (kappa coefficient=0.7) compared with the monolingual English listener (kappa coefficient=0.5). The preliminary results of this study indicate that language knowledge seems to play a role in the reliability of the perceptual identification of vocal fry among bilingual English-Spanish speakers. These results are of importance because every day SLPs work with bilingual individuals doing voice assessments using perceptual analysis methods. This study paves the way to the future of perhaps changing the way specialists perform perceptual analysis.

DIVERSIFYING I.D.E.A.
Jason Dernay
Time: 10:00 AM
Mentor(s): Deric McNish (Theatre)

In modern America, representation within media is at the forefront of the minds of many creators. The International Dialects of English Archive provides regional and demographic representations of speech for accurate portrayal for consumers of media, yet, it is strikingly lacking in certain demographics. The goal of our research is to expand and diversify the samples on the I.D.E.A. database for accuracy in media.

THE VIPS OF THE DISINHIBITORY CIRCUITRY FOR PROCESSING DYNAMIC SOUNDS
Emily Steffke
Time: 10:15 AM
Mentor(s): Michael Wehr (Psychology)

Amazingly, infants learn to associate meanings with temporally structured sounds such as speech. We investigated the neural circuitry underlying this phenomenon with a simplified model of speech perception in which mice detect brief

gaps in noise. To incorporate learning into this behavioral task, we pair gaps with shocks, after which mice show enhanced gap detection. It is unclear how emotionally salient auditory-paired stimuli such as a shock translate through neural pathways. We hypothesize that vasoactive-intestinal peptide (VIP) interneurons are critical drivers of auditory learning. We think shocks evoke cholinergic input onto VIP interneurons, which inhibit somatostatin (SOM) interneurons, thereby disinhibiting pyramidal neurons (PNs). To investigate this circuit, we recorded the spiking of cells within auditory cortex in awake behaving mice expressing the light-gated ion channel ChR2 in VIP cells. We optogenetically activated VIP interneurons and identified neighboring populations of neurons based on their response profiles. We identified three main groups of responses: directly activated, indirectly activated, and suppressed (putative VIP, PN, and SOM cells, respectively). To characterize these populations' sound responses, we presented mice with various auditory stimuli, including brief gaps in noise. We found VIP cells are largely unresponsive to sounds. Interestingly, PNs are less likely to be indirectly activated when light stimulation is presented within ongoing white noise. However, indirect activation is recovered in some PNs when stimulation and white noise is presented after a brief gap, indicating nonlinearity in our proposed circuit. Future studies will investigate how pairing sounds with emotional stimuli alters neuronal response profiles.

LINGUISTICS, LANGUAGES, & SPEECH
POSTER PRESENTATIONS, SECTION 1
LAKE HURON ROOM, 11:00 – 12:30 PM

THAT'S LIKE WHAT SHE SAID, OR WAS IT? A STUDY OF REMARKABLE LIKE HALLUCINATIONS IN UNDERGRADUATES

Savannah Feeley, Jared Kaczor

Poster: 437

Mentor(s): Sayako Uehara (Linguistics and Germanic, Slavic, Asian and African Languages), Suzanne Wagner (Linguistics and Germanic, Slavic, Asian and African Languages)

Previous perception studies have shown that listeners use social information in speech perception (Niedzielski 1999, Rubin 1992, Sanchez, Hay & Nilson 2015). In this study, we investigate whether listeners hallucinate remarkable LIKE when presented with a voice of someone who they expect to use LIKE frequently. Remarkable LIKE (rLIKE) is any LIKE that is not used as a verb. Uses of rLIKE is stigmatized and stereotyped as a speech pattern of young "basic" women. We employ a matched guise test using audio stimuli by Zaykovskaya (2018). We use recordings of Speaker1 and Speaker2, each 30-50 seconds long, that contains instances of rLIKE, and the same two recordings that removed instances of rLIKE to create a set of bare guise. Both are undergraduate women telling personal narratives: Speaker1 describes her future plans and Speaker2 tells a story about haircuts. In Zaykovskaya's study, participants profiled Speaker1 as studious and Speaker2 as a "party girl." Participants will be presented with either the rLIKE or bare guise of one of the speakers and asked to select features of the speech they hear and create a profile of the speaker. Participants will then be given the other speaker's audio with the guise they had not heard yet and again asked about features of speech and profile the speaker. Since rLIKE is associated with young "basic" women, we predict that participants will hallucinate rLIKE from Speaker2 and will report hearing rLIKE even in the bare guise of that speaker, more so than Speaker1.

METHODS IN PREPARING TRANSCRIPTS FOR SECOND LANGUAGE RESEARCH THAT INFORMS PEDAGOGY

Amanda Haag

Poster: 438

Mentor(s): Paula Winke (Linguistics and Germanic, Slavic, Asian and African Languages)

In foreign and second language acquisition, researchers often prepare transcripts of language learners' speech or transcripts of conversations that the learners had or that the learners had with researchers to fully understand how foreign or second language learning occurs. For my research project in the Department of Linguistics and Languages at Michigan State University, I worked on two transcription projects for two different studies on second language learning. In the first study, I transcribed short monologic recordings of non-native English speakers. In the second study, I transcribed interviews with non-native English speakers. The conventions I used for the transcriptions were different in that for the first study, I focused on actual language spoken and in the second, I focused on what the interviewee intended to say. In this poster presentation, I demonstrate the transcription conventions (and directions) that I used across the two studies, and summarize some of the best practices in this type of translation work so that future researchers can best understand how to transcribe for research that informs pedagogy.

C-CENTER EFFECT IN MANDARIN CHINESE
Sarah McCabe
Poster: 439
Mentor(s): Karthik Durvasula (Linguistics and Germanic, Slavic, Asian, and African Languages)

In Mandarin Chinese, initial onset consonant clusters do not exist, which are several consonants pronounced one after the other at the beginning of a word. However, we find that in English this is a commonly found pronunciation, in words such as “split” or “smack”. With this in mind, we searched to determine whether or not native Mandarin speakers’ speech would behave similar to that of a native English speaker, where the initial consonant cluster is anchored to the same consonant-centered point in the word, called the C-center. In theory, if native Mandarin speakers were unable to perfectly imitate the pronunciation of native English speakers, they would not have a C-center effect. However, if they are able to achieve this pronunciation that is foreign to their native tongue, they would show that non-native speakers of a language are indeed able to duplicate the speech processes of a native speaker, thanks to the C-center effect.

DETERMINING THE DETERMINER PHRASE STRUCTURE
Sarah McCabe
Poster: 440
Mentor(s): Alan Munn (Linguistics and Germanic, Slavic, Asian, and African Languages)

A determiner phrase (DP) is a noun phrase such as 'good student' with a determiner (pronounced or unpronounced) attached to it, as in 'the good student'. In French, some DPs undergo a process called liaison, in which the final consonant of a word is pronounced only when the following word begins with a vowel. However, liaison in DPs have particular constraints where it may be obligatory, impossible, or optional. For example, in determiner phrases, liaison is obligatory in *bons étudiants*, ‘good students’, but is impossible in *étudiant intelligent,* ‘intelligent student’, while it is optional in *étudiants intelligents*, ‘intelligent students’. One may notice that the word order of *étudiant* ‘student’ and its adjective, *bon* ‘good’ or *intelligent* ‘intelligent’, fluctuates depending on the adjective. In this study, I focus on the syntactic constraints of the DP, contingent upon the movement of items within the DP. I will contrast the syntactic analysis of movement within the DP in order to provide an analysis of its structure, depending on the presence or absence of the liaison. In return, this will provide us insight into how we understand determiner phrases, all depending on its syntactic structure.

F2 TRANSITION EXTENT DIFFERENCES IN CHILDREN WHO STUTTER AND FLUENT PEERS
Jacob Nitzkin
Poster: 441
Mentor(s): Gregory Spray (Communicative Sciences & Disorders)

Stuttering is a disorder that disrupts the rhythmic flow of speech, affecting 5% of preschool-age children (Van Riper, 1982). Up to 80% of children who stutter (CWS) recover naturally (Yairi & Ambrose, 1999); however, more research is needed to identify objective markers that can be used to differentiate children who persist (CWS-per) versus recover from stuttering (CWS-rec). One factor of interest is second formant (F2) transitions during speech, which are indicative to tongue placement and movement during the vocal production of vowels (Ladefoged & Johnson, 2014). Previous studies have investigated F2 transitions and determined that differences exist between CWS and children who do not stutter (CWNS) (Chang, Ohde, & Conture, 2002; Zimmerman, 1980). More recently, Subramanian, Yairi, and Amir (2003) found significant differences in the magnitude of F2 frequency change between CWS-per and CWS-rec close to stuttering onset. Therefore, this measure could reveal subtle differences in articulatory dynamics in CWS-per and CWS-rec. The current study investigated the use of F2 transitions in the speech of 40 CWS and CWNS (CWS=21 [CWS-per=14, CWS-rec=7], CWNS=19) to determine if F2 frequency transitions could predict future stuttering persistence or recovery. We hypothesized that CWS-per produce F2 transitions that are smaller in frequency change than CWS-rec and CWNS. Preliminary work was conducted on a total of 119 productions of the word “to” across all groups (CWS-per=44, CWS-rec=19, CWNS=56). A generalized estimating equations procedure for repeated measures showed significant F2 frequency transitions between the CWS-per and CWNS group ($p<0.001$).

PHONETIC AND MORPHOLOGICAL PROPERTIES OF LENITION IN CHILEAN AND RIOPLATENSE SPANISH
Mercedes Ramon, Samantha Blake
Poster: 442
Mentor(s): Hannah Forsythe (Linguistics and Germanic, Slavic, Asian and African Languages), Cristina Schmitt (Linguistics and Germanic, Slavic, Asian and African Languages)

Across dialects of Spanish, the plural /s/, as well as other non-plural syllable-final /s/'s, undergo a variable process called lenition that results in weakening to an [h] or even deletion ([ø]), which can affect children's comprehension of plurals (Miller 2007 and others). Chilean and Rioplatense (Buenos Aires) Spanish both have lenition (Lipski 1984), but children acquiring Rioplatense Spanish seem to acquire the plural much earlier. In this project we will examine whether this difference in learning outcomes correlates with differences between these two dialects in terms of the phonetic contexts and syntactic categories where lenition occurs. We hypothesize that the Rioplatense variety of lenition is more predictable and therefore easier to learn. We test this hypothesis by examining the effect of two different factors that have been shown to control /s/ lenition in Chilean Spanish (Miller 2007). Factor one is the syntactic category; specifically, we predict that the rate of lenition will differ greatly between determiners, nouns and adjectives. Factor two is the phonological environment. Specifically, we predict that the rate of /s/ expression will be highly dependent on the features of the preceding and following segments. Our data will be drawn from the Villa21 Corpus of parent-child interactions. We examine the speech from 5 mothers speaking Rioplatense Spanish with their children and other adults.

COMPARING [-S] LENITION IN THREE DIALECTS OF SPANISH AND ITS EFFECTS ON THE ACQUISITION OF NUMBER
Maggie Tucker
Poster: 443
Mentor(s): Hannah Forsythe (Linguistics and Germanic, Slavic, Asian and African Languages), Cristina Schmitt (Linguistics and Germanic, Slavic, Asian and African Languages)

In many dialects of Spanish, syllable-final [s] may be weakened and reduced to [h], or omitted altogether [ø]. This phenomenon also affects the plural /s/ morpheme and causes the plural to sound exactly like the singular [ø] in many cases. Miller and Schmitt 2012 hypothesized that the ambiguity causes by lenition may delay children's ability to use the plural in comprehension tasks. However, it has been observed that, although there is lenition in Argentinian Rioplatense Spanish, children exposed to this variety acquire the plural earlier than both Chilean and Paraguayan children (Brandani 2013). This leads us to hypothesize that either (i) the rate of lenition is significantly lower in Argentinian relative to Chilean and Paraguayan varieties or (ii) it is not the overall rate but the distribution of lenition across elements inside the noun phrase that differs between dialects. To test this hypothesis, we will compare the rates of [s], [h], and [ø] in determiners, adjectives, and nouns across the three dialects using naturalistic speech collected from each dialect (Miller Corpus and Villa21 Corpus). With these predictions, we hope to shed a light on the differences in dialectal and syntactic lenition and the effect it has on learning of the plural /s/.

DOES BARE ARGUMENT ELLIPSIS INVOLVE ELLIPSIS, OR…?
Samantha Woods
Poster: 444
Mentor(s): Alan Munn (Linguistics and Germanic, Slavic, Asian and African Languages)

Bare Argument Ellipsis is a construction in which part of a coordinated phrase appears disconnected from the rest of the conjunction. For example in (1a) where the phrase "perhaps the pie" is disconnected from the phrase "the cake" even though (1a) has the same meaning as (1b). a. Bill ate the cake last night, or perhaps the pie. b. Bill ate the cake or perhaps the pie last night. Reinhart 1991 analyzes (1) by creating a single constituent out of the two pieces at the syntactic level of Logica Form. In this research I focus on an unexplained ambiguity of Bare-Argument Ellipsis using Reinhart's remnant constituent analysis as show in (2). 2. You can talk about politics as much as you want, but not about linguistics. The phrase but not about linguistics can have two meanings: 3. a. You can talk about linguistics, just not as much as you want. b. You cannot talk about linguistics. Here the prepositional phrase [about linguistics] is the phrase that separates from the conjunct "about politics". Under Reinhart's analysis (2) should only have the meaning of (3a) but not (3b). I provide an analysis of sentences like (2) that accounts for the ambiguity, while still preserving the basic components of Reinhart's' analysis.

LINGUISTICS, LANGUAGES, & SPEECH
POSTER PRESENTATIONS, SECTION 2
LAKE HURON ROOM, 1:00 – 2:30 PM

WHY DO RIOPLATENSE SPANISH SPEAKERS CHARACTERIZE PARAGUAYAN SPANISH BY LENITION?

Bobby Felster, Virginia Smith

Poster: 447

Mentor(s): Hannah Forsythe (Linguistics and Germanic, Slavic, Asian and African Languages), Cristina Schmitt (Linguistics and Germanic, Slavic, Asian and African Languages)

Lenition is a process in which certain features of a given sound may variably weaken (or lenite) in certain phonological contexts. In many dialects of Spanish [s] can be reduced to [h] or even become completely unpronounced [ø] depending on a variety of factors, which have different weights in different contexts and dialects. When Argentinians living in Buenos Aires comment on Paraguayan Spanish the most cited feature is [s] lenition. Paraguayans "comen las [s]" [eat the -s]. This is somewhat surprising, since there is fair amount of -s lenition in Buenos Aires Spanish. Why is Paraguayan Spanish [s] lenition so salient to Argentinians? In this paper we examine lenition in Paraguayan Spanish in the plural /-s/ (ex. *perro**s*** 'dog**s**'), the second person singular /-s/ (ex. hablas 'talk-2S') but also in non-morphological -syllable final [s] (ex. *má**s*** 'more') in comparison to Buenos Aires lenition. One possibility is that lenition is just more frequent in Paraguayan Spanish but another possibility is that it is qualitatively different either in its phonetic realization or its distribution in comparison to Argentinian Spanish. To test these hypotheses, we examine naturalistic recordings of mother-child interactions in Paraguayan Spanish from the Villa21 Corpus (Schmitt et al., to appear). We extract 100 tokens each of plural /s/, 2nd singular /s/, and meaningless syllable final /s/ to measure the rates of realization as [s], [h], and [ø] for each and its phonetic and morphological properties.

AMBISYLLABIC CONSONANTS IN OHIO ENGLISH

Bobby Felster

Poster: 448

Mentor(s): Karthik Durvasula (Linguistics and Germanic, Slavic, Asian and African Languages)

Ambisyllabic consonants are consonants whose syllabic affiliation is unclear to native speakers. For example, speakers may disagree on the affiliation of the "m" in "gamma" or "limit". Previous studies on this topic have resulted in three different claims about the affiliation of these consonants. Some claim that they are bound with the first syllable, others claim they are bound to the second, and still others claim that they are simultaneously bound to both. In our studies on the topic, we have found that these ambisyllabic segments pattern only with word-internal syllable-initial consonants (onsets) in Michigan English, in both corpus studies and production experiments. We also found that an analysis of the Buckeye Corpus (Pitt, Johnson, Hume, Kiesling, & Raymond, 2005), a collection of Ohioan speech data from Ohio State University, yielded opposite results; ambisyllabics in this corpus patterned with word-internal syllable-final consonants (codas). To more completely compare these results to our previous work in Michigan, we ran a production experiment at Ohio State University on native speakers of Ohio English. To determine which syllable the ambisyllabic consonants affiliated with, their durations were compared to the durations of segments with known syllabic affiliations using Praat (Boersma & Weenink, 2017), a phonetic analysis program. The results of this production experiment show that ambisyllabic consonants in Ohio English do not pattern clearly with word-internal syllable-final consonants, as the Buckeye Corpus analysis would predict.

NULL SUBJECT REALIZATION IN PARAGUAYAN SPANISH

Daniel Greeson

Poster: 449

Mentor(s): Cristina Schmitt (Linguistics and Germanic, Slavic, Asian and African Languages)

In languages like English, the subject must always be included in the sentence. However, in many languages like Spanish, there exists what it is called a null subject. In other words, to Spanish speakers "went to the store" is a perfectly acceptable sentence and who went to the store will be determined by information on the verb (agreement features) and discourse properties. Languages allowing null subjects typically have rich subject-verb agreement, in that there are different forms for the verbs depending on the person/number of the subject. This is unlike English, which in the past tense for example has no changes on the verb ("I/you/he/they went"). Spanish subject/verb agreement's relative richness is believed to be correlated to the appearance of the null subjects. In Paraguayan Spanish, markers of agreement between subject and verb differ from other dialects of Spanish, specifically the Rioplatense Spanish dialect spoken nearby, in that subject verb agreement is obligatory in the Rioplatense variety but not in the Paraguayan variety. My object of study is whether these variable agreement markers affect realization of null subjects. Does optionality of

agreement reduce the number of null subjects when compared to Rioplatense Spanish? Does use of null subjects correlate with overt agreement or is use of null subjects in Paraguayan Spanish subject to different discourse rules?To answer these questions we will use the Schmitt corpus for Mexican Spanish and the Villa 21 corpus (Schmitt et al to appear) for Paraguayan and Rioplatense Spanish.

HUNGRY CATERPILLARS AND DESPERATE MICE: HOW CHILDREN'S BOOKS REFLECT THEIR UNDERSTANDING OF THE DISCOURSE INFORMATION
Abigail Jaroszewicz
Poster: 450
Mentor(s): Alan Munn (Linguistics and Germanic, Slavic, Asian and African Languages), Cristina Schmitt (Linguistics and Germanic, Slavic, Asian and African Languages)

In any conversation, there is a mixture of knowledge added by the speakers and knowledge that is implicit as part of the context (the common ground). Children and adults often have different strategies to determine the information that can be assumed to be in the common ground; for example, a child might say, "They ate lots of carrots," without realizing that the person they're talking to might not know who "they" refers to. Even when the antecedent of the pronoun is in the discourse, pragmatic principles are still required to connect the two. Parents and educators are becoming more and more aware that vocabulary is a predictor for school performance, and many children's books are marketed to different age groups in terms of number of unique words. Such word counts do not take into consideration the complexity of aligning pronouns and antecedents or other kinds of discourse-dependent grammatical properties. In this research we examine children's books in terms of the use of ellipsis [such as "John saw Bill and Mary did too. (=Mary saw Bill)" or "John bought a blue truck and Bill bought a red one. (=a red truck)"], use of pronouns [such as "John saw Bill and he saw Mary. (he=John or Bill)], and comparatives [such as "The red truck is the biggest. (=the biggest truck.)"] to investigate the role of discourse-dependent properties in books aimed at young children.

RELATIONSHIPS BETWEEN BEHAVIORAL PERFORMANCE AND NONLINGUISTIC AUDITORY PROCESSING IN YOUNG CHILDREN
Marisa Madynski, Lauren Caramagno
Poster: 451
Mentor(s): Amanda Hampton-Wray (Communicative Sciences and Disorders)

Auditory processing is critical for speech recognition and, thus, can greatly impact language development in children of a young age. While there is a rich literature on auditory processing, to date, our understanding of this skill in young children is limited. Furthermore, the relationships between nonlinguistic auditory processing and cognitive proficiencies, such as language and working memory, are unclear, especially in children. The current study aims to evaluate these relationships in preschool-age children. Typically developing four- and five-year-olds completed a battery of behavioral tasks, including assessments of receptive language, verbal working memory, and nonverbal intelligence. Neurophysiological data – event-related brain potentials (ERPs) – were acquired while children completed a passive oddball paradigm, listening to nonlinguistic, pure tone stimuli. ERP data will highlight specific aspects of auditory processing in preschool-age typically developing children. Comparisons between performance on the different behavioral assessments and the neurophysiological response to pure tones will reveal relationships between nonlinguistic auditory processing and multiple cognitive proficiencies. Results from this study will increase our understanding of early auditory perceptual processing and the role it may play in the development of cognitive skills in young children.

RELATIONSHIPS BETWEEN COGNITIVE PROFICIENCIES AND NEURAL PROCESSES FOR LANGUAGE IN PRESCHOOL-AGE CHILDREN FROM LOWER SOCIOECONOMIC STATUS BACKGROUNDS
Stephanie Nagy
Poster: 452
Mentor(s): Amanda Hampton Wray (Communicative Sciences and Disorders)

Language proficiency in children is associated with working memory and attention. Previous studies have revealed significant differential relationships between proficiency in different cognitive domains and the neural processes underlying semantic (N400) and syntactic (P600) processing. Children growing up in lower socioeconomic status (SES) households often exhibit reduced language skills compared to higher SES peers, differences that may persist into adulthood. However, the relationships between cognitive proficiency and language processing in children from lower SES backgrounds are unclear to date. The current study evaluates the relationships between multiple cognitive skills and neural processes underlying language in young children, aged 3-5 years, from lower SES backgrounds. Children were divided into high and low proficiency based on their nonverbal IQ and receptive language scores.Event-related brain potentials (ERPs) were elicited by sentences containing semantic and syntactic violations, as well as correct sentences.

We hypothesize that children from lower SES backgrounds will show stronger relationships between cognitive skills and semantic, compared to syntactic, processing. These findings have the potential to enhance our understanding of the ways in which semantic and syntactic processing may be differently associated with receptive language skills, which will enhance our understanding of individual aspects of language development in children from lower SES backgrounds. Additionally, these findings could lead to the identification of potential therapy targets for children from lower SES backgrounds.

ASSESSING MONOLINGUAL AND BILINGUAL CHILDREN'S PHONOLOGICAL AWARENESS SKILLS

Juwon Park, Nour Abu-Haltam

Poster: 453

Mentor(s): Sarah Goodwin (Human Development and Family Studies), Haruka Konishi (Human Development and Family Studies), Lori Skibbe (Human Development and Family Studies)

Children that show greater phonological awareness skills, or the ability to identify sounds structures of language, often display better later reading ability (Bishop, 1990). Research has shown that bilingual children who understand more than one language, compared to monolinguals, display delay in vocabulary, while research on phonological awareness is less clear. Some research suggests that phonological awareness is a skill that is transferable across languages, and therefore should have no difference in performance between monolinguals and bilingual children (Gottardo, 2001). The present study utilizes a computerized assessment called IPAAR that examines bilingual and monolingual children's comprehension of rhyming, blending, and segmenting skills. These tests were administered to typically developing monolingual and bilingual children between the ages of 3 to 7 years. We will compare IPAAR performance of monolingual and bilingual children. The work may add to the expanding body of research on bilingual children's literacy development.

INCLUSIVE OR EXCLUSIVE: FACTORS THAT DETERMINE CHILDREN'S INTERPRETATION OF 'OR'

Rachel Stacey, Bobby Felster, Adam Smolinski

Poster: 454

Mentor(s): Alan Munn (Linguistics and Germanic, Slavic, Asian and African Languages), Cristina Schmitt (Linguistics and Germanic, Slavic, Asian and African Languages)

The conjunction 'or' allows for two interpretations depending on context: exclusive, (one or the other, but not both), as in "the cat can eat tuna or salmon", or inclusive (one or the other, or maybe both), as in "the cat can't eat tuna or salmon". The exclusive meaning is derived through an inference process called "scalar implicature": if the speaker intended an inclusive interpretation, they would have chosen the 'and' alternative; the listener infers that the exclusive meaning was intended. The inclusive 'or' interpretation is almost obligatory in negative contexts. Past studies have shown that children have difficulty calculating implicatures (Noveck 2001), and use 'or' only with its inclusive meaning. These inferences can be further influenced by words like 'either'. 'Either' co-occurs with 'or', and often makes the exclusive reading of 'or' more prominent, as in "I saw either John or Bill". But negative contexts can override this distinction depending on the placement of the 'or' phrase with respect to it. When the 'or' phrase is in subject position, as in "Either John or Bill didn't leave", 'or' is interpreted exclusively. When it is in object position as in "I didn't see either John or Bill" 'or' is interpreted inclusively. In this project, we focus on the effect of 'or' phrase placement on children's and adults' interpretation of 'or' in negative sentences. Our results will help us to gain a better understanding of how young children learn the inclusive/exclusive interpretations of 'or'.

MICROBIOLOGY, IMMUNOLOGY, & INFECTIOUS DISEASE

ORAL PRESENTATIONS, SECTION 1
LAKE ERIE ROOM, 1:30 – 3:15 PM

USING FLUORESCENT REPORTER STRAINS TO DETERMINE IF ETHOXZOLAMIDE NEUTRALIZES THE PH OF THE MYCOBACTERIUM TUBERCULOSIS CELL ENVELOPE

Nana Anti
Time: 1:30 PM
Mentor(s): Robert Abramovitch (Microbiology & Molecular Genetics)

Ethoxzolamide (ETZ) is a drug originally used in the treatment of glaucoma. However, previous research showed that ETZ inhibits the growth of Mycobacterium tuberculosis (Mtb) in mice and macrophages by indirectly inhibiting the PhoPR regulon. The PhoPR regulon is induced at acidic pH and is essential for Mtb growth in the acidic environment of the macrophage phagosome. Because ETZ is a carbonic anhydrase (CA) inhibitor, we hypothesize that it disrupts the activity of Mtb CA enzymes and reduces acidification of the bacterial cell envelope, thus inhibiting the PhoPR regulon. This is most likely to occur in the cell envelope since the cytoplasmic pH homeostasis of Mtb is unaffected by ETZ. To investigate this hypothesis, Mtb clones that secrete ratiometric pH-sensitive fluorescent proteins, called pHluorins, into the cell envelope were created. The pHluorin gene was fused to Mtb protein secretion signal sequences from the genes blaC, plcB and mpt63, which will enable the secretion of the pHluorin by the Tat or Sec secretory pathways. We tested the functionality of the pHluorin fusions by imaging the strains by confocal microscopy and observing fluorescence at 410nm or 470nm (for excitation) and 530nm (for emission). The next step will be confirming the localization of the pHluorin in the cell envelope. Once the procedure for imaging and measuring the fluorescence of pHluorins in the cell envelope of Mtb is standardized, cells will be treated with different doses of ETZ and then used to determine the pH of the cell envelope.

DETECTION AND ISOLATION OF MURINE PLACENTAL EXOSOMES DURING PREGNANCY

Benjamin Collaer
Time: 1:45 PM
Mentor(s): Margaret Petroff (Pathobiology & Diagnostic Investigation)

Exosomes are nano-sized (30 - 150nm) membrane-enclosed extracellular vesicles that arise from inward budding of late endosomes. Exosomes contain proteins, nucleic acids, and lipids, which can be transmitted to distant cells in a route of intercellular communication. The placenta is a fetally-derived organ responsible for the exchange of oxygen and nutrients to the developing fetus. In humans and rodents, the placenta is in direct contact with maternal blood. Studies have shown that the human placenta secretes exosomes that enter maternal circulation and may therefore impact the function of maternal cells. The overall goal of our studies is to develop and validate a murine model in which the function of pregnancy-associated exosomes can be tested. We have shown that plasma exosome levels during murine pregnancy increase throughout gestation, peaking at gestational day (GD) 14.5 and falling rapidly after birth. In this study, our first goal was to test the hypothesis that the increase in plasma exosomes in pregnancy are placenta-derived. To this end, we used a transgenic reporter mouse model in which wildtype (WT) female mice were bred to a males constitutively and ubiquitously expressing green fluorescent protein (GFP), such that resulting fetuses and their placentas also expressed GFP. Exosomes were isolated from maternal plasma using a commercially available precipitation reagent (TEI, Thermo-Fisher). GFP was detected by Western blot in isolated exosomes, confirming the presence of fetus/placenta-derived exosomes in maternal plasma. We next sought to develop a culture system in which placental exosomes could be isolated in large, pure quantities.

CAMPYLOBACTER MOTILITY IN INTESTINAL MUCUS

Parker Kelly
Time: 2:00 PM
Mentor(s): Yann Dufour (Microbiology & Molecular Genetics)

Campylobacter jejuni is one of the most prominent foodborne pathogens affecting the United States. However, relatively little is known about how C. jejuni is able to penetrate mucus which protects the human gastrointestinal tract. We used video-microscopy and single-cell tracking to investigate if the unique corkscrew shape of this bacteria helps facilitate mucus penetration. We also characterize the rheological properties of mucus and various hydrogels to determine the physical constraints imposed on motile bacteria in the gut. Using this method, we have compared the motility of wild type C. jejuni to mutants, which under- and overexpress one of the primary proteins responsible for the curvature of the

cell shape, resulting in rod-shaped and hypercoiled mutants. Preliminary results have shown little differences in the diffusion and swimming speeds of the wild-type and mutated bacteria in chemotaxis buffer and in mucus, meaning that their navigation was unhindered by the morphological modifications of the cell populations. This implies that there may be other factors aiding C. jejuni's efficiency in penetrating the gastrointestinal mucus layer, potentially including flagellar rotation, flagellar positioning, or cell size.

EVALUATION OF NUCLEIC ACID ISOTHERMAL AMPLIFICATION METHODS FOR HUMAN CLINICAL MICROBIAL INFECTION DETECTION
Michael Nicholas
Time: 2:15 PM
Mentor(s): Brett Etchebarne (Osteopathic Medical Specialties)

In a current clinical setting, detection of bacterial pathogens typically requires days, or a four- to eight-hour growth phase followed by DNA extraction, purification, and PCR-based amplification. In days where the infection goes untreated, it can evolve towards sepsis, in which bodily functions begin to fail. We have developed a rapid method (70-120 minutes) of detecting these bacterial pathogens. Patient samples of urine, stool, blood, or saliva were tested for common infection pathogens using loop mediated isothermal amplification (LAMP). The infection pathogen targets are called the Infection Diagnosis Panel (In-Dx). This method utilizes filtration to rapidly concentrate bacteria in sample matrices with lower bacterial content in addition to direct LAMP amplification without DNA purification. With the combination of certain primers and corresponding DNA sequences, amplification is emitted from an individual well of a 64-well reaction plate. From the methods used in the lab, fluorescence was deemed the best technique for measuring amplification of the bacteria's genes. We are using different methods of testing the In-Dx panel to make the process faster, simpler, and equally effective. The two main methods of detection are a thermocycler fluorescent detection of LAMP amplification and a visual discrimination of color change post-amplification using Eriochrome Black T (EBT) dye. Advancements are being tested for increased convenience and applicability of detection methods. Results indicate the LAMP-based In-Dx panel allows rapid and precise diagnosis of clinical infections for point-of-care utilization. These direct amplification methods can be directed toward rapidly and accurately detecting clinical infections.

CHARACTERIZING TWO NOVEL GENOMIC ISLANDS IN THE MODERN PANDEMIC V. CHOLERAE
Christopher Rhoades
Time: 2:30 PM
Mentor(s): Geoffrey Severin (Biochemistry & Molecular Biology), Christopher Waters (Microbiology & Molecular Genetics)

The pathogenic bacterium Vibrio cholerae is the causative agent of cholera disease and is responsible for millions of infections and tens of thousands of deaths annually. There are two V. cholerae biotypes, Classical and El Tor, responsible for causing all seven recorded cholera pandemics. The current (7th) pandemic is exclusively perpetuated by the El Tor biotype, which supplanted the Classical biotype as the primary cause of modern day cholera. Genomic analysis has revealed that El Tor's acquisition of two novel gene islands, VSP-1 and VSP-2, represent the largest genetic difference between these two biotypes. Therefore, it is hypothesized that these islands are responsible for potentiating El Tor's displacement of Classical V. cholerae following the conclusion of the sixth pandemic. However, the fitness advantages gained by El Tor through maintenance of VSP-1 and VSP-2 have yet to be determined. El Tor and Classical strains are readily differentiated from one another using biotype specific phenotypes including antibiotic resistance, metabolic activity, motility, and biofilm formation. To begin identifying the contributions of VSP-1 and 2 to El Tor fitness, we are generating strains of El Tor V. cholerae with one or both of the VSP islands removed. We are screening these mutants under biotype differentiating conditions for phenotypic behaviors that differ from WT El Tor. The results of these gross VSP island characterizations will begin to reveal their contributions to El Tor V. cholerae fitness and the displacement of Classical V. cholerae in clinical and environmental reservoirs.

PLANT-MICROBE INTERACTIONS IN THE RHIZOSPHERE OF COMMON BEAN (PHASEOLUS VULGARIS)
Waseem Syed
Time: 3:00 PM
Mentor(s): Ashley Shade (Microbiology & Molecular Genetics), Nejc Stopnisek (Microbiology & Molecular Genetics)

Common bean is the most important legume crop for human and livestock food consumption worldwide. Extreme environmental conditions such as heat and drought can reduce bean yields and quality. Microbes play an important role in plant health, contributing to nutrient availability, pathogen resistance, growth promotion and stress reduction. To better understand interactions between the common bean and soil microbiota, we are investigating the root associated (rhizosphere) microbial community structure and activity over bean development. Two common bean cultivars, CELRK (California early light red kidney)and Eclipse, will be grown in soils collected from two different bean production fields in

Michigan until the flowering time (~5 weeks). Soil and plant samples will be collected at 3 time points. Microbial respiration rates and soil exoenzyme activities will be quantified to determine the changes in microbial activity due to plant development. Population sizes of dormant and active cells will be determined by combining live-dead cell staining and flow cytometry. To determine which plant metabolites are released and have a potential impact on changes in microbial community structure and activities, root exudates will be collected from plants growing hydroponically at comparable time points. During the experiment, microbes of the common bean rhizosphere also will be cultivated, identified and characterized for future studies. The results of this experiment will provide insights into the relationship between microbes and beans which then can be used to improve legume crop yield.

MICROBIOLOGY, IMMUNOLOGY, & INFECTIOUS DIESEASE POSTER PRESENTATIONS, SECTION 1 BALLROOM, 9:00 – 10:30 AM

CHARACTERIZING CYCLIC-GMP-AMP ACTIVATION OF THE PHOSPHOLIPASE CAPV IN VIBRIO CHOLERAE

Alyssa Corpus
Poster: 457
Mentor(s): Chris Waters (Microbiology & Molecular Genetics)

The bacterial pathogen Vibrio cholerae is the causative agent of the diarrheal disease cholera for which there have been seven pandemics in the past 200 years. The current pandemic (7th) is perpetuated exclusively by strains of the El Tor V. cholerae biotype. One of the greatest genetic differences between this biotype and those responsible for the previous six pandemics is El Tor's maintenance of the unique 15kb genomic island, VSP-1. While most of the genes in VSP-1 remain uncharacterized, a novel second messenger signaling network has recently been identified. The enzyme DncV synthesizes the cyclic dinucleotide (cdN) cyclic-GMP-AMP (cGAMP) which activates the phospholipase activity of the enzyme CapV. Ectopic expression of DncV results in the rapid degradation of the bacterium's membrane, leading to cell death in a CapV-dependent manner. However, the molecular mechanism by which DncV-derived cGAMP activates CapV has yet to be elucidated. Using a computationally-derived model of CapV, we have identified two unique residue loops which lie outside of the active site, suggesting they play a role in mediating substrate accessibility. The conspicuous location of these loops and the presence of arginine residues, often found in cdN binding sites, make this an interesting region to explore. We propose to identify CapV's cGAMP binding site by utilizing targeted site-directed mutagenesis to generate CapV loop variants for testing cGAMP-dependent activation. In general, knowledge of cGAMP signaling is in its infancy and characterization of this cGAMP-CapV interaction in V. cholerae will facility the identification of other cGAMP-dependent enzymes in bacteria, broadly.

POSSIBLE PROTEIN SECRETION VIA NATURAL TRANSFORMATION SYSTEM IN CAMPYLOBACTER JEJUNI

Joseph Hostnik
Poster: 458
Mentor(s): Victor DiRita (Microbiology and Molecular Genetics)

Campylobacter jejuni is one of the most common bacterial pathogens to cause enteritis in the United States with two million cases recorded annually. C. jejuni can discriminate and take up its own DNA from the external environment through a process called natural transformation. Some genes necessary for transformation are phylogenetically related to those that encode proteins for a specific secretion system (type II) found in other virulent bacteria, such as Vibrio cholerae. A type II secretion system is a complex mechanism frequently used by infectious bacteria to secrete proteins that enhance fitness in the host. These proteins are commonly toxins or degradative enzymes. My work is to test our hypothesis that C. jejuni uses its transformation system for both DNA uptake and protein secretion. I am using wild type C. jejuni 81-176 and mutant ctsE (which lacks a key component of the transformation system) to examine supernatants and determine if wild type cells secrete proteins that are not secreted in the ctsE mutant. Any such proteins will be examined for their roles in the biology and pathogenicity of C. jejuni.

SELECTION FOR A NOVEL BACTERIA WITH AN ABILITY TO DEGRADE DIOXINS

Gabby Huizinga
Poster: 459
Mentor(s): Lisa Boughner (Plant, Soil, & Microbial Sciences)

Dioxin compounds are highly toxic and naturally occurring (i.e. ball clay, and prairies) or produced through anthropogenic activities (waste incineration, and industrial activities). Currently, there is only one organism in pure culture (Sphingomonas wittichii RW1) that can utilize dioxin compounds as its sole carbon and energy source. Therefore, we presume there are other microbes that can utilize dioxin compounds. Isolating and characterizing these organisms

could help with bioremediation of affected areas. Soil/ water samples from prairies, near clay mines, and compost piles were taken and enriched with dibenzo-p-dioxin (DD) for three years. The enrichments were then subsequently diluted to isolate rapid growing organism(s) capable of utilizing dioxins as their sole carbon and energy source. Once the enrichments showed signs of growth, steps to isolate the organisms took place. Diluted enrichments were spread onto low nutrient plates and individual colonies were inoculated into small volume (2 mL) of low nutrient media. Once grown, the isolates were placed into small volume (2 ml) of minimal media and dioxin compounds as the sole carbon source. Once confirmed that the organisms can utilize dioxin compounds, the organisms were grown in high nutrient media to obtain a large sample for extracting genomic DNA. Post DNA extraction, 16S rDNA and whole genome DNA sequencing will take place. These sequences will help with characterizing and understanding the organism(s)' metabolism of the toxic dioxin compounds.

ISOLATING MYCOBACTERIUM SMEGMATIS MUTANTS RESISTANT TO A NOVEL TUBERCULOSIS ANTIMICROBIAL

Emily Juzwiak
Poster: 460
Mentor(s): Robert Abramovitch (Microbiology & Molecular Genetics)

Tuberculosis is caused by the bacterium Mycobacterium tuberculosis (Mtb) which slowly colonizes the acidic environments of macrophages or granulomas. This process is vital to Mtb's establishment as a chronic infection and its development of drug resistance. My project attempts to understand pH-dependent mechanisms that allow for a productive infection using a non-pathogenic strain related to Mtb, Mycobacterium smegmatis. Our lab performed a high throughput screen to identify novel antimicrobial compounds, such as AC2P017, that produce pH-dependent growth arrest. This mechanism was tested using half-maximal effective concentration (EC50) assays. I generated AC2P017 resistant M. smegmatis mutants and picked twenty-one resistant colonies. Then, I verified each mutant was resistant to pH-dependent growth inhibition using the EC50 assay in duplicate. The mutants that demonstrated significant growth arrest resistance were sent for whole genome sequencing. Analysis of the Illumina results indicated that the M. smegmatis gene 5340 (MSMEG5340) was associated with resistance to AC2P017. Therefore, my project will proceed by complementing this target gene to observe if the introduction of the wild type allele into mutant bacteria will produce susceptibility to the compound or if the addition of the mutant allele into wild type bacteria will produce resistance to AC2P017. Furthermore, functional studies of MSMEG5340 will be utilized to determine how the gene mediates resistance. CRISPR methods will produce a knock-down of MSMEG5340 to test if the resistance phenotype is a loss of function. Finally, Mtb mutants that are resistant to AC2P017 will be isolated and characterized to further elucidate the resistance mechanism.

IDENTIFYING FECAL CONTAMINANTS USING MICROBIAL SOURCE TRACKING AT LUNA PIER BEACH

Paige Larner
Poster: 461
Mentor(s): Joan Rose (Fisheries & Wildlife)

Fecal excretion and associated bacteria due to various animals contaminate public beaches and influence public health. Luna Pier Beach (Monroe County, MI) experienced 72 days of closure during summer months due to an increase in microbial pollution. This study was conducted to determine the source of the high Escherichia coli (E. coli) concentrations. This study was conducted to determine the sources using Bacteroidales-associated microbial source tracking markers. Water samples ranging from 65 to 250 milliliters were collected from five different locations along the beach and filtered on site. DNA was then extracted and processed using droplet digital polymerase chain reaction (ddPCR). Gull (qGull), dog (BacCan) and human-specific (B. theta) Bacteroidales-associated markers based on published primers and probes were used. Thirty water samples were collected between July and August 2017. E. coli counts ranged from 7 colony forming units per 100 milliliters (CFU/100mL) to 517 CFU/100mL. The B. theta human marker accounted for the highest count of positive samples, with 27 of the 30 total samples. Fifteen and zero of the samples tested positive for qGull and BacCan, respectively. The North and Central locations of the beach resulted in the greatest incidences of fecal contamination for both gull and human markers. B. theta ranged from 97 to 1100 gene copies (GC)/100mL and qGull resulted in 97 to 743 GC/100mL. One GC is equivalent to 1 cell. The results are being used to remediate septic tanks and sewage spills in the area.

β-ARRESTIN 2 REGULATES INKT CELL DEVELOPMENT AND FUNCTIONS

Kellie Mullany
Poster: 462
Mentor(s): Rupali Das (Physiology)

G protein coupled receptors (GPCRs) constitute a family of seven transmembrane spanning cell surface receptors that play a vital role in regulating several cellular responses in T cells. GPCRs expression and function is negatively regulated

by a family of adapter molecules called β-arrestins (β-arrestin 1 and 2) that cause desensitization and internalization of the receptors. β-arrestins can also act as signaling scaffolds to facilitate numerous effector pathways. Recent studies have shown that β-arrestins play a key role in inflammatory responses by regulating T cell activation, chemotaxis, and proliferation. In contrast, β-arrestin 2 negatively regulate NK cell cytotoxicity by mediating inhibitory signals. Invariant natural killer T cells (iNKTs) are a distinct lineage of lipid-reactive innate lymphocytes that share characteristic of both T and NK cells. Using β-arrestin 2$^{-/-}$ mice, we recently observed that β-arrestin 2 is not only required for iNKT development but also regulates iNKT cell functions in vitro as well as in vivo. These studies are significant, as they will provide new insights into the signaling mechanisms that regulate iNKT cell development and functions.

THE PILZ PROTEINS AND THEIR EFFECT ON MOTILITY OF VIBRIO CHOLERAE
Jeffrey Nader
Poster: 463
Mentor(s): Yann Dufour (Microbiology & Molecular Genetics)

Vibrio cholerae can transition between a motile and biofilm lifestyle as a behavioral response to changing environmental conditions. This process is coordinated in part by the secondary messenger c-di-GMP. V. cholerae has five proteins containing a PilZ domain (PlzABCDE), a receptor for c-di-GMP. However, their functions in regulating cell behavior are currently unknown. We used a reverse genetic approach to characterize the phenotypes of different plz mutants using soft agar motility assays and single-cell tracking. V. cholerae normally becomes more motile when the culture reaches the saturation phase during which the level of c-di-GMP is down-regulated. To investigate PilZ effector functions in mediating a behavioral response to high or low c-di-GMP level, we manipulated intracellular c-di-GMP levels in different plz mutants using inducible digunaylate cyclase (DGC) or phosphodiesterase (PDE), respectively. Motility behaviors in response to either high or low c-di-GMP level were measured by quantifying changes in the zone of spreading on soft agar or extracting swimming behaviors from single-cell tracking. Our analyses show that PlzB promotes motility, PlzD inhibits motility, and PlzE is involved in a more complex response. In particular, the absence of PlzB dampened motility response to low c-di-GMP concentrations, while the absence of PlzD enhanced motility response to low c-di-GMP concentrations. PlzA and PlzC had no effect on motility even after manipulation of intracellular c-di-GMP concentrations. Overall, PlZ proteins regulate motility in a c-di-GMP-dependent manner, but the interplay between positive and negative regulators of motility remains to be characterized.

MICROBIALLY MEDIATED PERENNIAL RHIZOSPHERE NITROGEN TRANSFORMATIONS
Zhenyao Ye
Poster: 464
Mentor(s): Cody Bekkering (Plant Biology)

Switchgrass has worked as a great biofuel crop in nowadays. This is because switchgrass is not only a perennial plant, growing year after year with being replanted, but also its environmental nutrition requirements are much lower than those for common other biofuel feedstocks, allowing switchgrass to

MICROBIOLOGY, IMMUNOLOGY, & INFECTIOUS DIESEASE
POSTER PRESENTATIONS, SECTION 2
BALLROOM, 9:00 – 10:30 AM

THE INFLUENCE OF A HIGH SATURATED ANIMAL FAT DIET ON THE ANTI-TUMOR IMMUNE SYSTEM RESPONSE IN MICE
Yun Cheng
Poster: 467
Mentor(s): Richard Schwartz (Microbiology and Molecular Genetics)

A diet enriched in animal fat is a potential factor influencing the development of breast cancer. However, it isn't clear how a high-fat diet (HFD) impacts the response of the immune system on tumor progression. Therefore, we investigated how HFD contributes to immune responses around tumor cells. Trp53-deficient mouse mammary tissue was chosen as a model for cancer studies. Normal BALB/c mice were transplanted with Trp53-deficient mammary epithelium. One group of mice was fed with HFD until it reached the end of puberty and then switched to a low fat diet (LFD). Another group was fed LFD during puberty and switched to HFD for the rest of the experiment. Control mice were fed LFD throughout the experiment. When tumors exceeded a diameter of 1cm, they were surgically removed, stained with hematoxylin and eosin, and then processed for histological analysis. Confirmed mammary tumor samples were stained with antibodies directed against CD4, CD8, and FoxP3 to analyze the types of T-cells recruited in immune responses toward tumor cells. Other studies in the laboratory have identified HFD induced increase in tumor promoting M2 macrophages associated

with tumors. These are a type of macrophage that can cause immunosuppression. Therefore, we hypothesize that HFD will lead to an increase in FoxP3+ regulatory T-cells that can prevent the immune system from attacking tumors, and perhaps a decrease in CD8+ T cells, which are critical in the immune response toward tumors. If this is confirmed, our studies would suggest HFD may promote the development of breast cancer.

CULTIVATION APPROACHES FOR IDENTIFYING COMPOSITION, FUNCTION, AND ADAPTATION OF THE OTIC MICROBIOME IN DIVERS
Hugh McCullough
Poster: 468
Mentor(s): Joo Young Lee (Microbiology and Molecular Genetics), Gemma Reguera (Microbiology and Molecular Genetics)

The goal is to identify whether the middle ear hosts a natural microbial flora and identify any functions it may hold. The middle ear cavity and the Eustachian tubes are secluded, not easily accessible, which has prevented scientists from coming to an absolute conclusion on whether there is a resident microbiome in this area. To sample the middle ear, we collected secretions from the middle ear into the oropharynx. To minimize buccal contamination, the participants rinsed their mouths with a saline solution. To increase the eustachian tube secretions, the participants yawned and swallowed, opening the Eustachian tube and draining the middle ear fluids. The samples from the Eustachian tubes were called lateral samples, since they were collected from the lateral oropharynx. We received samples from the lateral oropharynx, central oropharynx, and buccal samples to compare communities. Our hypothesis is that certified SCUBA divers have different microbiomes from non-divers, as they are trained in equalization techniques to drain the middle ear through the Eustachian tubes, which could result in a community of microbes adapted to increased cycles of patency. Since patency requires surfactant, we hypothesize that surfactant producing microbes would be common within the otic microbiome. To analyze the microbiome, we have applied isolation techniques and metagenomics to identify the communities both genotypically and phenotypically. If surfactant producers are seen widespread in the diver communities, and can assist in Eustachian tube patency, the next step is to develop probiotic treatments to prevent barotrauma in divers.

ISOLATION AND CHARACTERIZATION OF NEBRASKAN SHIGELLA FLEXNERI BACTERIOPHAGE
Hailee Perrett
Poster: 469
Mentor(s): Sarah Doore (Bio/computational Evolution In Action), Kristin Parent (Biochemistry and Molecular Biology), Jason Schrad (Biochemistry and Molecular Biology)

Increases in the emergence of antibiotic resistant pathogens have led to a growing interest in bacteriophage therapy in the Western world. These viruses selectively infect bacterial hosts and, through the continued screening of environmental candidates, may come to serve as an alternative treatment for traditional antibiotics. Most of the scientific literature to date investigates bacteriophage that infect Escherichia coli and Salmonella enterica; however, recent findings from samples isolated in Michigan suggest bacteriophage that infect Shigella flexneri may be more prevalent than initially thought. Accordingly, this study investigated environmental bacteriophage collected in Nebraska and compared them to those originally found in Michigan. Individual samples were purified and then tested to determine host ranges, efficiencies of plating, protein composition, and phage morphology.

CHARACTERIZATION OF NOVEL BACTERIA ISOLATED FROM A MOSQUITO TREE HOLE
Christian Smith
Poster: 470
Mentor(s): Kazem Kashefi (Microbiology and Microbial Genetics)

The focus of this study is to better understand the mosquito habitat for container breeders to aid in the vector control effort limiting the spread of disease. The mosquito breeding habitats were previously thought of as being nutrient limiting. The tree holes in which mosquitos lay their eggs are in fact not nutrient limiting but are reducing environments where electron acceptors are deposited into the environment via stem flow from the trees. An organism isolated from sediment samples obtained from tree holes in various wood lots on Michigan State University's campus has been shown to be novel based off 16s ribosomal RNA (rRNA) analysis. The rRNA was compared to a database containing known cultured organisms. The nearest match was the bacteria Geobacter psychrophilus. This organism was isolated using a selective iron gel anaerobic culturing method. For the characterization of this bacteria the anaerobic culturing technique was used to identify which electron acceptor yields the most effective growth. This electron acceptor will then be used to perform growth analysis of the bacteria with varying conditions in salt concentration, pH, and temperature. The goal of this study is to determine what role the Geobacter psychrophilus plays in the mosquito habitat for an increased understanding in the fight against disease.

ELUCIDATING THE ACTIVATION OF BIOFILM FORMATION THROUGH UNDERSTANDING VPSR/C-DI-GMP INTERACTIONS IN VIBRIO CHOLERAE
Hannah Smith
Poster: 471
Mentor(s): Meng-Lun Hsieh (Biochemistry & Molecular Biology), Christopher Waters (Microbiology & Molecular Genetics)

Biofilms are complex communities of bacteria that aggregate through the secretion of extracellular polymeric substances (EPS). Bacterial biofilm formation is tightly regulated by chemical signaling molecules driven by environmental cues. In Vibrio cholerae, the causative agent of the devastating disease cholera, regulation of biofilm production is controlled by several different chemical signaling systems. One of these signals is the molecule cyclic di-GMP (c-di-GMP), a universal and central second messenger in bacteria. C-di-GMP plays an important role in mediating lifestyle changes in response to fluctuating environmental conditions, and is known to activate biofilm formation in V. cholerae. Increased levels of c-di-GMP directly bind to a key transcription factor VpsR, the master regulator of biofilm formation, in V. cholerae. VpsR bound to c-di-GMP induces transcription of the polysaccharide biosynthesis operon. However, the molecular mechanism by which c-di-GMP binds to VpsR is not known. Random, non-biased mutations were made in vpsR and subsequently used in a high-throughput screen to identify VpsR proteins that no longer responded to c-di-GMP. Sequencing of these mutations identified amino acids in VpsR that are potentially necessary for binding to c-di-GMP. Single amino acid mutations of interest were re-created using site-directed mutagenesis and their phenotypes were confirmed using reporter luminescence assays. Synthesis of VpsR was confirmed by SDS-PAGE and its activity by using electrophoretic mobility shift assays. The ultimate goal of this research is to determine the amino acids in the c-di-GMP binding pocket of VpsR to better understand how c-di-GMP regulates biofilm formation in V. cholerae.

REPID
Joseph Grech
Poster: 472
Mentor(s): Karl Seydel (Internal Medicine)

Malaria causing parasites are microorganisms that belong to the genus Plasmodium. Of the five species known to cause malaria in humans, P. falciparum accounts for the vast majority of cases coming from Malawi. It is still unknown, however, in exactly what quantity additional Plasmodium species exist, if at all. 58 samples from a cohort study at Mfera Hospital that were confirmed positive for Plasmodium parasites by microscopy, however, negative for species falciparum by polymerase chain reaction (PCR) were taken for final speciation testing.The Mfera cohort samples will showcase P. ovale and P. malariae in high quantities. Real-time PCR was utilized using one set of generic primers targeting a highly conserved region of the 18S rRNA gene and species-specific probe sequences. Samples were first tested with the Plasmodium genus probe to determine if malaria causing parasites were present; followed by P. malariae and P. ovale probes in a multiplex assay, P. vivax probe in a monoplex assay, and finally P. falciparum probe in a monoplex assay. All samples were tested at least in duplicate. If no amplification occurred before cycle 40 (Ct 40), the sample was deemed negative. Results: Fifty-four samples were found to be negative for Plasmodium parasites, one sample was found positive for P. ovale and P. malariae, respectively, and two samples were found positive for P. falciparum. Non-falciparum Plasmodium species exist in low quantities in Malawi, Africa. Support: J.G. is a 2017 REPID Scholar, supported by NIH-5-R25-HL108864 award to E.C., REPID-Program Director.

BLINDING MYCOBACTERIUM TUBERCULOSIS: DOSRST INHIBITORY COMPOUNDS
Marilyn Werner
Poster: 473
Mentor(s): Robert Abramovitch (Microbiology and Molecular Genetics)

Mycobacterium tuberculosis (Mtb) uses regulatory systems such as DosRST to perceive changes in the environment and adapt accordingly. DosRST is a two-component system consisting of a sensor kinase (DosS/T) and response regulator (DosR). This pathway allows Mtb to respond to variations in oxygen levels, and thus inhibition of DosRST may shorten TB treatment by affecting Mtb's ability to tolerate current drugs. Three inhibitory compounds, HC104A, HC105A, and HC106A were hypothesized to modulate the heme group carried by DosS/T and prevent DosRST function. The heme must be in reduced form for DosS to be active, therefore, inhibitors that cause a shift of the heme from the reduced to the oxidized state may be inhibiting DosS function via a heme-dependent mechanism. To test this hypothesis, recombinant, his-tagged DosS was expressed from E. coli and purified via metal affinity chromatography. The protein was then reduced by treatment with dithionite under anaerobic conditions, and UV-Visible spectroscopy was performed to observe the effect of each compound on redox status. HC106A caused a partial oxidation of the heme, while HC104A and HC105A exhibited no impact on redox status. These results suggest that HC106A interacts with the sensor kinase's heme. However, lack of complete oxidation points to a direct binding between the compound and the heme, rather than

a change in redox status. This is supported by similarities between the UV-visible spectra of DosS treated with HC106A and DosS treated with carbon monoxide, which is known to bind directly to the heme.

THE TREATMENT OF CHRONIC INFECTION USING HONEYBEE DERIVED MELITTIN

Mitchell Zachos
Poster: 474
Mentor(s): Michael Maiden (Microbiology and Molecular Genetics), Chris Waters (Microbiology and Molecular Genetics)

Chronic wounds are clinically defined as wounds that fail to progress through a timely reparative process and persist anywhere from 4 weeks to 3 months. Treatment of chronic wounds are estimated to cost $25 billion dollars annually. A major factor in the recurrence of these wounds is the persistence of bacterial biofilms formed by Pseudomonas aeruginosa and Staphylococcus aureus. These organisms are multidrug-resistant pathogens that form antimicrobial tolerant biofilms. In response, therapeutics commonly involve topical antimicrobials that aim to prevent initial and further infection. Melittin, a major component of bee venom, has been found to possess antimicrobial properties. Therefore, we tested the potential of melittin to kill cells within biofilms alone and in combination with the commonly used aminoglycoside, tobramycin. We found a ~2 LOG reduction in the number of cells within 24-hr P. aeruginosa biofilms with melittin alone, and a ~3 LOG reduction when used in combination. My research aims to develop new therapies that eradicate chronic reinfections due to biofilms. Melittin, both alone, and in combination with commonly used aminoglycosides, could be used to treat persistent biofilm-based infections and help chronic wound patients heal.

MICROBIOLOGY, IMMUNOLOGY, & INFECTIOUS DIESEASE POSTER PRESENTATIONS, SECTION 3 BALLROOM, 11:00 – 12:30 PM

GENETIC ANALYSIS OF THE MECHANISMS THAT SUPPORT STAPHYLOCOCCUS AUREUS RESISTANCE TO TELLURITE INDUCED STRESS

Benjamin Brown
Poster: 477
Mentor(s): Phillip Delekta (Microbiology and Molecular Genetics), Neal Hammer (Microbiology and Molecular Genetics)

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

IDENTIFICATION OF THE MICRROBIOTA COLONIZING MICHIGAN STATE UNIVERSITY EYE-WASHER

Jia-Yi Chan Nicole Hermes, Don Nguyen, Samantha Perovski
Poster: 478
Mentor(s): Leonel Mendoza (Biomedical Laboratory Diagnostics/Microbiology)

According to national safety regulations, teaching and research laboratories are required to install eyewash stations in case harmful substances are exposed to the eye. Currently, there is a lack of data regarding the microbiota on these environmentally exposed devices. Our previous study found that 95% of surveyed eyewash stations on Michigan State's campus are contaminated with bacteria and fungi. To investigate the identity of the isolates recovered from the eye-washers, a new study utilizing molecular tools such as PCR and DNA sequencing, was conducted. Our preliminary data using DNA primers designed to amplify bacterial 16S and fungal ITS DNA sequences, showed that the identity of the BLAST interrogated DNA sequences at the National Center for Biotechnology Information corresponded to several opportunistic bacteria and fungi. This includes Bacillus pumilus, Methylobacterium sp., Microbacterium paraoxydans, Novosphingobium sp., Pseudonocardia carboxyvorans, Sphingomonas paucimobilis and others. We also identified

opportunistic fungi such as, Aspergillus ap., Penicillium sp., Cladosporium sp., and Candida sp. Several of the isolated bacteria and fungi in this study have been reported to cause infection in immunocompromised hosts. Thus, the presence of these microbes colonizing Michigan State University eye-washers is a major public health concern.

THE ROLE OF MUCIN ON NATURAL TRANSFORMATION OF VIBRIO CHOLERAE

Shaun Dunyak
Poster: 479
Mentor(s): Victor DiRita (Microbiology & Molecular Genetics)

Vibrio cholera, a bacterium typically found in aquatic reservoirs, is a human pathogen that causes the disease cholera. As part of its environmental life cycle, V.cholerae adheres to chitinous surfaces, such as the exoskeleton of zooplankton, and uses the polymeric N-acetylglucosamine substrate as an energy source for growth and as an activator for natural competency pathways. As part of its infectious cycle, V.cholerae colonizes the small intestines of humans, adhering to mucus secreted by a subset of intestinal epithelial cells. Mucin present in this secreted mucus is similarly composed of N-acetylglucosamine glycan chains, which has led us to investigate the induction of natural competency pathways by mucin. Three conditions must be present for natural transformation: high levels of intracellular cAMP, extracellular autoinducers involved in quorum sensing, and chitin degradation products required for competency gene expression. From preliminary data, V.cholerae was not naturally competent on commercially available mucin. We aim to investigate the effect of mucin on the conditions required for natural transformation.

IS NERVE INFLAMMATION ASSOCIATED WITH PAIN IN GUILLAIN BARRé SYNDROME?

Joe Faryean
Poster: 480
Mentor(s): Linda Mansfield (Large Animal Clinical Sciences)

Guillain Barré Syndrome (GBS) is the leading cause of acute paralysis in the U.S. and these patients often experience severe pain during the disease. NOD CD86-/- mice have been found to develop Spontaneous Autoimmune Peripheral Polyneuropathy (SAPP) after 20 weeks of age. Our lab has determined that SAPP mirrors one form of GBS and that mice with SAPP could serve as a model for GBS. In a small preliminary study mice that developed SAPP had increased inflammation in motor nerves and showed phenotypic signs of pain according to the Mouse Grimace Scale (MGS). Thus, we hypothesized that NOD CD86-/- mice with GBS that showed signs of pain would have increased inflammation in their nerves compared to control mice demonstrating more severe disease. To test our hypothesis, we studied: NOD WT (control) and NOD CD86-/- mice (experimental). The NOD WT and NOD CD86-/- mice were put through the open field test and their activities recorded on a camcorder for a minute and twenty seconds. These videos were analyzed for signs of GBS and were also analyzed using the MGS to determine whether mice showed pain during GBS and the pain levels demonstrated. After the mice were humanely euthanized, they were necropsied and the brachial plexus, dorsal root ganglion, and sciatic nerve dissected and embedded in cassettes. The cassettes were sent to the histology laboratory to be stained with hematoxylin and eosin. The nerve tissues were analyzed to determine levels of inflammation. The results of the study are currently being analyzed.

NHERF1 IS A NEGATIVE REGULATOR OF INKT CELL CYTOKINE PRODUCTION AND CYTOTOXICITY

Ryan Griffin
Poster: 481
Mentor(s): Rupali Das (Physiology)

NHERF1 (Na+/H+ Exchanger Regulatory Factor1) belongs to the PDZ protein family with important roles in immune cell functions and cancer progression. Although it is known that chemokine receptors regulate the development, tissue distribution and functions of invariant natural killer T cells [(iNKTs), innate T lymphocytes that recognize glycolipid antigens (αGC)], the mechanisms remain undefined. As NHERF1 regulates the functions of chemokine receptors and is abundantly expressed in the livers (organ with high iNKT cell incidence), we hypothesized that NHERF1 regulates iNKT cell development and functions. Our recent studies demonstrate that both iNKT cell development as well as tissue distribution is normal in *Nherf1*$^{-/-}$ mice. However, iNKTs in *Nherf1*$^{-/-}$ mice produce significantly reduced amounts of Th1/Th2 cytokines when challenged with αGC, *in vivo*. In contrast, sort-purified iNKTs from *Nherf1*$^{-/-}$ mice produce higher amounts αGC-induced cytokines *in vitro* as well as display more robust cytotoxicity when compared to wild-type iNKTs. Taken together, these studies reveal that while NHERF-1 is a negative regulator of iNKT cell functions, it may be required for antigen presentation *in vivo*. Studies are underway to gain mechanistic insights into how NHERF1 functions can be modulated to enhance iNKT cell anti-tumor responses.

THE NECESSITY OF A GADOLINIUM-BASED CONTRAST FOR MRI OF BREAST CANCER
Puneet Razdan, Trevor Kornaga, Lauren Miller, Matthew Smith
Poster: 482
Mentor(s): Chunqi Qian (College of Osteopathic Medicine)

The use of a contrast agent is very important when an MRI is performed. However, it has been shown that gadolinium, the most common contrast agent, has been building up in the brain with the effects currently unknown. This experiment's purpose is to see if there is a need of gadolinium as a contrasting agent. We used an injured rat model and injected it with a control agent, saline, and a gadolinium-based agent called MulitHance. The MRI's were ran and then compared to see if there was a noticeable difference between the two by looking at the intensity of the signals of the images. The expected results will show that the contrasting agent will make a significant difference in identifying and locating the injury and can significantly help diagnose it. This concludes that other, safer agents, such as the newly rising manganese-based agent Mn-PyC3A, should be given careful consideration as the long-term effects of gadolinium is still unknown to the body.

INVARIANT NATURAL KILLER T CELLS REGULATE CORTICOSTEROID RESISTANCE (CR) IN SEVERE ASTHMA
Omar Said
Poster: 483
Mentor(s): Rupali Das (Physiology)

Asthma is a chronic disorder, mostly managed by corticosteroids (CS), 2 agonists and anti-leukotrienes, but as many as 10-30% of patients do not respond to this therapy and account for about 50% of the healthcare costs of asthma. Given the essential role of invariant natural killer T cells (iNKTs) in the pathogenesis of asthma, coupled with their resistance to CS treatment, further understanding of the immunological basis for iNKT cell-mediated asthma progression is highly warranted. Our recent studies demonstrate that the immunoreceptor, CD2 is highly expressed on human iNKTs (hu-iNKTs) and lungs of asthma patients. In the presence of glycolipid antigen (GC), hu-iNKTs produce cytokines, which is significantly reduced in the presence of anti-CD2 blocking mAb but not in the presence of dexamethasone (DEX, a CS). However, when these cells are stimulated by GC in the presence of DEX and anti-CD2 mAb, cytokine production is greatly reduced, suggesting that CD2 contributes to the CR phenotype of hu-iNKTs. Collectively, our studies demonstrate that CD2 may serve as an attractive therapeutic target for the treatment of asthma patients that are recalcitrant to conventional therapies.

MICROBIOLOGY, IMMUNOLOGY, & INFECTIOUS DIESEASE
POSTER PRESENTATIONS, SECTION 4
BALLROOM, 11:00 – 12:30 PM

CHARACTERIZING MOTILITY PERFORMANCE AND BEHAVIOR ACROSS PATHOGENIC STRAINS
Lucas Werner
Poster: 486
Mentor(s): Yann Dufour (Microbiology & Molecular Genetics)

Bacteria can swim through various environments in a random fashion or walk. This walk is biased and follows gradients, allowing the cell to reach favorable conditions or escape harmful ones. It is in the cell's best interest to do this as quickly as possible, thus the most fit cells are the ones that reach that location the fastest. The reason for difference in swimming performance in a population is not well defined. We posit that cell behavior determines this swimming performance. We believe that swimming speed, probability of tumbling, and directional persistence determine cell performance, but we do not know in what way. We tested this using agarose swim plates, which create a mazelike environment for cells to swim through. We then picked cells from multiple locations on the plate to assess performance on a single cell level with a constant selective pressure. We continued to plate the cells to select specific performance types and compare them to the wild type. Thus far, we have seen a significant increase in performance at all locations from each tested strain compared to its ancestor. Some have also shown a significant change in swimming speed. These results beg further questions, why are cells that appear to have different performance levels performing exactly the same when isolated, and how do these phenotypes confer an advantage, questions which our future research will revolve around.

EFFECT OF LANTHANIDE INSOLUBILITY ON THE GROWTH OF METHYLOBACTERIUM EXTORQUENS
Amanda Godar
Poster: 487
Mentor(s): Cecilia Martinez-Gomez (Microbiology and Molecular Genetics), Paula Roszczenko-Jasinska (Microbiology and Molecular Genetics)

Lanthanides, a subset of the rare earth elements, exhibit unique magnetic, luminescent, and electrochemical properties. Lanthanides are essential components of modern technology including cellphones, computers, guidance systems, lasers, radio, sonar systems, and also function as some industrial catalysts. Reliance on lanthanides causes a high global yearly demand that is expected to increase. In the environment lanthanides are highly insoluble and scarce in pure form, requiring hazardous mining processes which creates toxic and radioactive byproducts. There are currently a few mines opened in the world (none being in the United States) and China accounts for 97% of the estimated world production. Biometallurgy, the recovery of metals by using biological organisms, promises an economical, sustainable, and environmentally friendly alternative to this process. Methylobacterium extorquens has recently been discovered to have lanthanide dependent enzymes. This is indicative of its potential for lanthanide recovery from environmental or electronic waste sources. This study determined that M. extorquens can use not only soluble forms of lanthanum (e.g. lanthanum chloride) as used in previous studies, but also the insoluble form of lanthanum phosphate increasing its bioremediation potential. Future research will focus on determining if differences on the chemical excreted profile occurs under different lanthanide sources in the growth media. These experiments will further our understanding of lanthanum transport and sensing system from M. extorquens, providing an platform for future research to improve lanthanum uptake by bacteria and optimize its bioremediation potential.

MECHANISM AND FUNCTION OF ETHYLENE-FORMING ENZYME
Nick Henning
Poster: 488
Mentor(s): Robert Hausinger (Microbiology and Molecular Genetics)

Ethylene, a gaseous hydrocarbon, is the world's most produced organic compound. It has a wide variety of uses ranging from fruit-ripening plant hormone to plastic polymer production. The bacterium Psuedomonas syringae pv. phaseolicola PK2, which is known for causing halo blight in the common bean, contains an enzyme that creates this compound as a reaction product. This ethylene-forming enzyme (EFE) is from the mononuclear nonheme Fe(II)- and 2-oxoglutarate (2OG)- dependent oxygenase superfamily. The enzyme converts 2OG into three carbon dioxide molecules and ethylene. It also catalyzes the hydroxylation of L-arginine, pushed forward by the oxidative decarboxylation of 2OG, into succinate and carbon dioxide. Our lab studied these reactions in order to determine their mechanism in more detail and confirm them utilizing X-ray crystallography. We also isolated the EFE from various mutants and ran both anaerobic reactions and headspace analysis via gas chromatography to determine their varying activity levels. The mutants were created with site-directed mutagenesis and helped to support the importance of a phenylalanine side-chain in the production of ethylene.

CMEIAS
Linghao Song
Poster: 489
Mentor(s): Frank Dazzo (Microbiology & Molecular Genetics)

In microbial communication and interactions, most microorganisms exist in diverse features of multicellular aggregates and arrangements. In order to analyze the digital micrograph images of microorganisms, cell aggregation results in overlapping cell contacts, and the massive conformation is difficult to analyze by either artificial or mechanical means. Also, the classification and diversity of cell shapes need to be assessed for individual cells at single-cell resolution. The Object Edit plugin of CMEIAS v. 4.0 is an image analysis tool designed to identify and spilt object overlaps of microbes in digital images. In this study, the accuracy of this plugin's auto splitting function is evaluated on 25 binary and 10 gray-scale digital microbiological images. In addition, it accuracy is compared to the Watershed segmentation algorithm, the gold standard tool of digital object separation, evaluated using the same group of binary images. The occurrence of two types of common segmentation errors is measured for both programs. The type 1 error occurs when adjacent touching cells are not split where they should be (erroneously decreasing the object count), and the type 2 error occurs when a cell is split internally where it should not be (erroneously increasing the object count). The results of this study indicate that CMEIAS is more stable and performs with greater accuracy (98.36% overall accuracy), compared to the 77.03% general accuracy of the Watershed algorithm. These results will be incorporated into the user manual of the final CMEIAS release ver. 4.0.

METHYLOBACTERIUM EXTORQUENS AM1, A PLATFORM FOR CRITICAL METAL RECOVERY
Adam Kibiloski
Poster: 490
Mentor(s): Cecilia Martinez Gomez (Microbiology & Molecular Genetics)

The Martinez-Gomez lab studies single carbon metabolism in the α-proteobacterium Methylobacterium extorquens AM1. Lanthanides are considered 'rare earth elements' not because they are difficult to find in nature, but because they are biologically unavailable. This is due to the fact that they are commonly found ionically bound to carbonates or phosphates. However, lanthanides are as abundant as copper and zinc. Current lanthanide mining techniques are hazardous both to the workers and the ecosystem. The extraction process requires the use of concentrated acid paired with high temperatures and pressure. Lanthanides typically coexist with radioactive elements such as uranium and thorium. Therefore, waste produced by these mines are both highly radioactive and acidic. These waste products can cause irreversible damage to both the environment and the workers. There are only two mines left open in the world, one in Belgium and one in China. It has been recently shown that M. extorquens AM1 can efficiently sense, solubilize, and store lanthanides. We are engineering M. extorquens AM1 to effectively recover lanthanides from used batteries and speakers to generate a safer and more economically viable technology for lanthanide supply.

THROUGH VIOLET-COLORED GLASSES: A STUDY OF JANTHINOBACTERIUM
Karmen Lange, Donna Ye
Poster: 491
Mentor(s): Terence Marsh (Microbiology & Molecular Genetics)

Janthinobacterium is a Gram-negative bacterium commonly found in sediment or water. The bacterium produces a violet-purple pigmentation (violacein) and can be tolerant of cold environments. The pigmentation is known to have significant biological properties, such as antifungal, anticancer, and antibiotic activities. 16S rRNA sequencing results indicated all the strains are Janthinobacterium and 3 strains were identified as Janthinobacterium lividum. Using 6 strains of Janthinobacterium isolated from the Red Cedar River, we examined the microbes' ability to produce biofilm and violacein as well as colony morphology and resistance to antibiotics. Level of violacein and biofilm production varied between strains and depended on temperature and media. The level of violacein production in the 6 strains was as follow: MN-18> MN-22 >MN-39>MN-03>MN-19>MN-04. Previous work reported that violacein and biofilm production by J. lividum was inhibited by glucose and enhanced by glycerol. Three of our six isolates produced more biofilm with glucose and the remaining strains showed no difference between glucose and glycerol. Violacein production was absent from biofilm. Additional environmental variables including nutrient and stressors (antibiotics and metals) will be tested for their influence on biofilm production. Our aim is to identify the environmental signals that stimulate biofilm production and to identify other properties of these isolates that could be used to contribute to better understanding of the ecology of Janthinobacterium.

USE OF HYPHAL IMAGE ANALYSIS AND MACHINE LEARNING TO CLASSIFY MUCOROMYCOTA SOIL FUNGAL ISOLATES
Julian Liber
Poster: 492
Mentor(s): Gregory Bonito (Plant, Soil, & Microbial Sciences)

Fungi belonging to the Mucoromycota are abundant in soil communities globally; these fungi are also important industrially for the production of lipids, and some isolates are known to harbor endobacteria. Isolation and identification of fungal strains from soil is an intensive process involving culturing, DNA extraction, PCR, and sequencing. Classification of filamentous fungi is typically dependent on reproductive structures; however, reproductive structures are not always present when isolates

MICROBIOLOGY, IMMUNOLOGY, & INFECTIOUS DIESEASE
POSTER PRESENTATIONS, SECTION 5
BALLROOM, 1:00 – 2:30 PM

DRUG DISCOVERY IN ISOLATED SOILS: THE FIGHT AGAINST ANTIBIOTIC RESISTANCE

Rebecca Badanjek, Lanay Clark, Michelle Dierker, Mallorie Downey

Poster: 495

Mentor(s): Jeanette McGuire (Integrative Biology)

Overuse and misuse of antibiotics has resulted in a loss of effectiveness of antibiotic compounds and a public health crisis on a global scale. The vast majority of our current antibiotics have been discovered using cultivation techniques, despite the challenge that less than 1% of bacteria can be cultivated in the laboratory. Discovery of new antibiotics has slowed, therefore the identification of novel antibiotic compounds requires investigating new locations and sources that have not been previously explored. Islands, such as New Zealand, are known for their unique evolutionary history, rare flora and fauna, extreme endemism, high biodiversity, and holds incredible potential for soil characterization. In one gram of soil there can be up to 10,000 unique bacterial species all living in their own microenvironments. Because of the numerous species sequestered in these environments resulting in extreme competition, bacteria have coevolved to produce antimicrobial compounds. Bacteria were cultured from the soil collected from varying locations across New Zealand's North Island and screened for actinobacteria (prolific producers of antibiotic and antifungal compounds). Potential antibiotic compounds were extracted using methanol, screened for antimicrobial properties, and tested for the presence of novel versus known compounds. Discovering new drug components is the first hurdle in battling the antibiotic resistance crisis in our constantly evolving world.

MAXIMIZING RECOVERY OF BACTERIAL DNA FROM ENVIRONMENTAL SAMPLES USING VARIOUS PAPER FILTERS

Mack McGinn

Poster: 496

Mentor(s): Eric Benbow (Entomology), Courtney Larson (Entomology)

Collecting environmental DNA (eDNA) is a valid technique that allows for the detection and quantification of species populations. Often with eDNA, small amounts of degraded DNA fragments are present for analysis. This makes maximizing recovery of eDNA a major priority. In this experiment, efficiency of various filter papers including mixed cellulose ester (MCE), cellulose nitrate (CN) and glass fiber (GF) were tested to determine the most effective recovery method for bacterial DNA from environmental samples. Samples that were tested were collected from different water sources with high and low turbidity to evaluate the efficiency of the filter papers under different conditions. The effect of the filter paper type and turbidity of the sample on bacterial DNA recovery was shown through filtration of the samples, followed by preservation and extraction. Extraction yields were evaluated using quantitative polymerase chain reaction looking to isolate 16s ribosomal RNA. Results from previous studies have documented the filtering recovery of bacterial DNA from environmental samples being maximized when treated with the cellulose nitrate filter and Qiagen DNeasy kit combination. Based on these conclusions, cellulose nitrate is predicted to be the most effective filter in this study for both high and low turbidity, when coupled with the Qiagen DNeasy extraction kit for maximum recovery of bacterial DNA.

INVESTIGATION OF EOSINOPHIL AND MAST CELL RECRUITMENT IN CANCER PRONE MAMMARY TISSUE IN MICE

Molly McSween

Poster: 497

Mentor(s): Sandy Haslam (Physiology), Anastasia Kariagin (Microbiology and Molecular Genetics), Juliana Lopes (Microbiology and Molecular Genetics), Richard Schwartz (Microbiology and Molecular Genetics)

Eosinophils and mast cells are important effectors during the inflammatory response, releasing cytokines at sites of injury, infection, and allergic response and they also play a role in mammary gland development. We have previously shown that a high-fat diet (HFD) increases eosinophil recruitment to the developing mammary glands of normal mice. Inflammatory processes are implicated in tumorigenesis and Trp53-knockout mice provides a useful model for mammary gland tumorigenesis. Therefore, we investigated how HFD affects the recruitment of eosinophils and mast cells in Trp53-knockout BALB/c mammary glands. Mice were given HFD and low-fat diet diet groups and terminated at 13-week of age, when mammary glands were collected. Mammary glands were formalin-fixed and paraffin wax embedded. 5 μm sections were stained with Astra Blue and Vital New Red. Eosinophils were stained pink, while mast cells were stained blue. After photomicrographs were taken at 40x magnification, the number of eosinophils and mast cells around epithelial structures were counted and recorded for each tissue sample. Based on previous experiments, we

expect that HFD causes increased recruitment of eosinophils and mast cells around Trp53-knockout epithelial structures. Our previous studies showed that HFD promotes Trp53-knockout mammary tumorigenesis. If the current study shows increased recruitment of eosinophils and/or mast cells in Trp53-knockout mammary gland exposed to a HFD, this potentially identifies part of the mechanism for HFD-induced tumor promotion. Because HFD may be a risk factor for breast cancer in humans, this may point to novel targets for intervention against the tumor promoting effects of HFD.

CHARACTERIZING INHIBITORY MECHANISMS OF LACTOBACILLUS MURINUS AGAINST CAMPYLOBACTER JEJUNI GROWTH
Keenan O'Dea
Poster: 498
Mentor(s): Linda Mansfield (Veterinary Medicine)

C57BL/6 IL-10 knock out (KO) mice are a laboratory model for investigating inflammatory bowel disease (IBD). When exposed to the foodborne pathogen Campylobacter jejuni the knockout of IL-10 blocks inflammation-suppressive mechanisms in the gut and IBD results. However, in a recent experiment where mice were inoculated with C. jejuni strain 11168, mortality rates in C57BL/6 IL-10 KO mice were low and histopathologic lesions were mild, suggesting that the mice had been protected from colonic inflammation. Coincident with this finding an unidentified bacterium appeared on TSA-CVA isolation plates cultured from the feces of both infected and sham-inoculated mice containing tryptic soy agar, defibrinated sheep's blood, cefoperazone, vancomycin, and amphotericin. It was hypothesized that the bacterium had probiotic effects, protecting the mice from C. jejuni-induced colitis by secreting an antimicrobial agent. Matrix-assisted laser desorption/ionization time of flight mass spectrometry identified the organism as Lactobacillus murinus. Primary Bolton agar plates were streaked and incubated for 48 hours at 37°C to produce isolated colonies of C. jejuni strain 11168. 40 colonies were suspended in 240 mL Bolton broth with 0.75% agar at 48°C and 20 mL were decanted into 10 petri plates. Supernatant from L. murinus broth cultures grown in De Man, Rogosa, and Sharpe (MRS) broth at 37°C for 72 hours was added to wells cut into the Bolton agar with C. jejuni. After incubation for 48 hours at 37°C, slight clearance was observed around the wells, suggesting L. murinus secreted an inhibitory compound. Funded by NIH Grant U19AI090872

CORRELATION BETWEEN FLAGELLA NUMBER AND SWIMMING PERFORMANCE IN SALMONELLA ENTERICA
Abigail Otwell
Poster: 499
Mentor(s): Yann Dufour (Microbiology and Molecular Genetics)

Flagellar motility is required for Salmonella enterica to infect its host. S. enterica typically produces 3 to 4 flagella, but in low-viscosity liquids, bacteria with multiple flagella swim no better than bacteria with a single flagellum. Why does S. enterica produce multiple flagella considering that flagella are metabolically expensive? We hypothesized that there is an advantage to producing multiple flagella when swimming in the host intestine. Multiple flagella may allow S. enterica to overcome the viscosity of the mucus layer. Using agar swimplates to simulate the visco-elastic environment of mucus, we quantified swimming performance as spreading on a plate. By controlling flagellar expression in a genetically modified strain, we examined swimming performance as a function of flagella number. Our results suggest that, despite the energy cost, multiple flagella are necessary to penetrate the mucus layer. To fully determine why S. enterica produces multiple flagella, we will combine swimplate assay results with data on the metabolic cost of flagellar synthesis and single-cell tracking analysis.

BAITING FOR BACTERIA WITH LIVING FUNGAL HYPHAE
Karissa Renberg
Poster: 500
Mentor(s): Gregory Bonito (Plant, Soil, & Microbial Sciences)

Fungi are important components of functioning ecosystems, and have important applications in medicine and agriculture. In natural systems, fungal hyphae interact with various bacteria. However, exactly which bacteria are recruited to the hyphae of different fungi, and the functional impact is largely unexplored. The more we know about fungal-bacteria interactions, the more efficiently we can apply and use these consortia to benefit society. The purpose of this study is to assess whether different trophic groups of fungi recruit different bacteria to their hyphae, and to determine if soil bacteria are specialized to specific hosts or generalists. The specific strains under study are Mortierella, a soil fungus in the phylum Mucoromycota; Morchella, an edible mushroom in the phylum Ascomycota; and Ganoderma, a wood-rot fungus in the phylum Basidiomycota. For our experimental set up, fungal hyphae were grown across microscope slides to provide a support for their growth. These colonized slides were then placed in a mesh bag and incubated in moist chambers of soil. After one week, the slides were removed, carefully rinsed, and then bacterial communities associated with the different fungal hyphae were examined both visually and through 16S rDNA amplicon

sequencing on the Illumina MiSeq platform. Bacterial isolates from the hyphae of each fungus were also made and identified through Sanger sequencing. We hypothesize that each phylogenetic group of fungi will preferentially recruit specific sets of bacteria from a common soil.

THE ROLE OF CYCLIC DI-GMP AND LIGHT IN REGULATING UV SURVIVAL IN VIBRIO CHOLERAE

Connor Riegal
Poster: 501
Mentor(s): Nico Fernandez (Microbiology and Molecular Genetics), Chris Waters (Microbiology and Molecular Genetics)

Vibrio cholerae is a pathogenic microorganism that causes disease in human hosts with symptoms including diarrhea and dehydration. V. cholerae uses the nucleotide second messenger cyclic dimeric guanine monophosphate (c-di-GMP), which regulates whether V. cholerae is motile or in a biofilm. V. cholerae exists frequently in aquatic environments exposed to (UV) irradiation, which damages DNA and leads to cell death. As evidence grows that c-di-GMP regulates other phenotypes, we hypothesized that V. cholerae strains with higher levels of c-di-GMP would survive better under UV stress than strains with normal levels of c-di-GMP. Interestingly, we observed an increase in survival post-UV exposure that was dependent on c-di-GMP and the presence of non-UV light. Photolyase is a protein that can repair DNA damage caused by UV light exposure. Additionally, it uses white light to facilitate DNA repair. Thus, we hypothesized c-di-GMP may be increasing photolyase gene expression in V. cholerae. Indeed, we observed an increase in photolyase gene expression in strains with high c-di-GMP. Lastly, we aimed to identify how c-di-GMP regulates the photolyase gene by examining photolyase gene expression in strains lacking machinery necessary for c-di-GMP regulated transcription. We hypothesized these mutants would have lower photolyase gene expression compared to the wild-type strain, however, we observed photolyase gene expression was higher in the mutant strains compared to the wild-type. Our future work aims to elucidate how c-di-GMP regulates photolyase gene expression and to determine how this pathway is different from non-c-di-GMP dependent pathways.

THE ISOLATION OF TELLURITE SENSITIVE MUTANTS OF STAPHYLOCOCCUS AUREUS FROM THE SPUTUM OF CYSTIC FIBROSIS PATIENTS

Jesse Rizor
Poster: 502
Mentor(s): Philip Delekta (Microbiology and Molecular Genetics), Neal Hammer (Microbiology and Molecular Genetics)

Staphylococcus aureus is a gram-positive bacteria that is found in the nose and on the skin of approximately 30% of healthy individuals. Cystic fibrosis is a genetic disorder that causes the production of abnormally thick and sticky mucus in the lungs. This abnormal mucus layer increases susceptibility to chronic and progressive bacterial infections. As a common microbial pathogen of cystic fibrosis patients, S. aureus often initiates this chronic microbial infection. Immune cells, such as neutrophils, produce large quantities of reactive oxygen species (ROS) as a mechanism to destroy invading pathogens. This influx of ROS produces an imbalance in the surrounding environment causing oxidative stress to the invading bacteria. Pathogens, such S. aureus, that are resistant to this imbalance avoid eradication and infection can proceed. S. aureus was isolated from sputum samples collected from a cohort of cystic fibrosis patients from multiple time points and tested for their ability to resist oxidative stress in the form of tellurite. Tellurite is known to induce oxidative stress in several species of bacteria. Wild type S. aureus is resistant to the toxic effects of tellurite through a poorly defined mechanism. We screened 68 S. aureus clinical isolates for increased sensitivity to tellurite and identified three isolates with abnormal sensitivity when compared to laboratory strains of S. aureus. By identifying and characterizing naturally occurring tellurite mutants we seek to identify novel mechanisms of oxidative stress resistance utilized by S. aureus.

MICROBIOLOGY, IMMUNOLOGY, & INFECTIOUS DIESEASE POSTER PRESENTATIONS, SECTION 6 BALLROOM, 3:00 – 4:30 PM

UNDERSTANDING THE PHOPQ SYSTEM IN ENTEROBACTER SPP.

Alyssa Abdelnour
Poster: 505
Mentor(s): Victor DiRita (Microbiology and Molecular Genetics), Natalia Martin (Microbiology and Molecular Genetics)

Enterobacter spp. are Gram-negative bacteria, belonging to the family Enterobacteriaceae, that are widely encountered in the environment and are part of the normal microbiota of the human gastrointestinal tract. They are opportunistic pathogens that affect immunocompromised individuals, infants, and the elderly. Enterobacter spp. cause a broad range of infections, often leading to sepsis. They have become resistant to almost all available antibiotics, which restricts

treatment in hospitals worldwide. The two component system PhoPQ contributes to bacterial virulence in other members of the Enterobacteriaceae by inducing expression of genes required for host colonization, including those required to resist host defense mechanisms, in response to environmental stimuli. The PhoPQ system has not been extensively studied in Enterobacter spp. My project focuses on characterizing PhoPQ-regulated mechanisms of virulence in Enterobacter spp. with the aim of identifying strategies to hinder their colonization.

THE ROLE OF SKAP55 IN INKT CELL FUNCTIONS
Ryan Mack
Poster: 506
Mentor(s): Rupali Das (Physiology)

Invariant natural killer T cells (iNKTs) are innate lipid-reactive T lymphocytes with emerging roles in host immunity. However, little is known about the signaling pathways that regulate iNKT cell development and functions. Our recent studies demonstrate that ADAP (Adhesion and Degranulation Adaptor Protein) is required for iNKT cell tissue distribution, activation and immunomodulatory functions. Interestingly, ADAP binds constitutively to SKAP55, a Src kinase-associated protein of 55 kD; however it is unknown whether ADAP mediates its function via SKAP55. We will employ overexpression and gene-silencing methods to investigate if SKAP55 is required for human iNKT cell functions. Based on prior studies in T cells, we propose that SKAP55 forms a SKAP55/ADAP complex in iNKTs. Using biochemical methods and confocal microscopy, we will test if SKAP55 functions downstream of, or in conjunction with, ADAP to regulate iNKT cell functional responses. These studies are significant as they will offer new insights into iNKT cell signaling and inform how iNKTs can be best activated to enhance host immunity.

THE ISOLATION AND IDENTIFICATION OF ACETAMIDE DEGRADING BACTERIA FROM COW RUMEN
Kevin Mok
Poster: 507
Mentor(s): Terrence Marsh (Microbiology and Molecular Genetics)

Michigan Biotechnology Institute (MBI) has developed a fiber expansion technology (AFEX) that can treat crop wastes, rendering them suitable for use as good quality cattle feed. However, when cattle are fed AFEX-treated wheat straw, a transient spike of acetamide was detected in the milk. Acetamide returned to undetectable or control levels after several weeks. From this we hypothesize that there are acetamide degrading bacteria in the cow's rumen, that are stimulated in AFEX-fed cattle, and consume the acetamide. Our goal is to identify naturally occuring acetamide degrading bacterium, that can be isolated and used as a probiotic on AFEX-treated crop waste, to reduce or eliminate the appearance of acetamide in milk. Our isolation strategies include direct selection of rumen content on minimal media containing acetamide or propionitrile as the sole carbon source. Propionitrile is used in addition to acetamide for isolation, because when degraded by bacteria it frequently has acetamide as an intermediate and these bacteria can also metabolize acetamide. We selected for acetamide and propionitrile degrading bacterium from rumen through classic serial enrichment techniques, using acetamide or propionitrile as the sole carbon source. We have isolated approximately 90 strains from direct plating and 10-20 strains through our enrichment protocol. These strains will be phylogenetically characterized and confirmed as efficient acetamide degraders and potential probiotics.

MITOCHONDRIAL DUAL-CODING GENES IN TRYPANOSOMA BRUCEI
Yanchao Pan
Poster: 508
Mentor(s): Donna Koslowsky (Microbiology and Molecular Genetics)

Trypanosoma brucei is a parasite that can infect a wide range of hosts. Inside its mitochondria, mRNAs need to go through a complicated RNA editing process before they can be translated. This process is facilitated by guide RNAs which direct insertion and deletion of U-residues to create new open reading frames. In this poster, I'm going to present mRNA evidences which would support the existence of dual-coding system inside the T brucei's mitochondria.

COMBATTING DRUG RESISTANT ENTEROBACTER CLOACAE
Ben Sims
Poster: 509
Mentor(s): Victor DiRita (Microbiology and Molecular Genetics), Natalia Martin (Microbiology and Molecular Genetics)

Gram-negative multi-drug resistant infections are a growing problem in healthcare settings. Carbapenem Resistant Enterobacteriaceae (CRE) is a specific group of pathogens which cause these infections. CRE are especially important as they have developed resistance to carbapenems, which are typically used as last line antibiotics. With currently available antibiotics, future infections with CRE pathogens may become untreatable. Development of new drugs to fight CRE

infections is hindered as the outer membrane of these Gram negative pathogens acts as barrier making it difficult for the drugs to enter the bacterial cells and reach their target. My research is aimed at understanding and targeting the membrane of the CRE pathogen Enterobacter cloacae (E. cloacae). E. cloacae is an opportunistic pathogen and common commensal bacterium from the human gastrointestinal (GI) tract. It is only pathogenic however, when able to invade the bloodstream and colonize sterile organs. The mechanisms by which E. cloacae does this are still largely unknown. I am analyzing transposon-induced mutants of E. cloacae isolated in a screen for membrane-related defects. To investigate these further, I am classifying their sensitivity to a range of antibiotics (Abx), as well as to the membrane-active compound sodium dodecyl sulfate (SDS). Mutant classes Abx-resistant (Abxr) and SDS-sensitive (SDSs) are being established among these generally membrane-defective isolates. Data from these assays, and knowledge of the of the transposon insertion site in each mutant will enable me to design and test hypotheses about underlying mechanisms of membrane integrity and antibiotic resistance.

DYSFUNCTIONAL ANDROGEN RECEPTOR FEMINIZES MAST CELL PHENOTYPE
Maddy Trowbridge
Poster: 510
Mentor(s): Adam Moeser (Large Animal Clinical Sciences)

Mast cell (MC)-associated diseases, such as irritable bowel syndrome, allergy/anaphylaxis, and chronic pain disorders are influenced by biological sex, with females at greater risk. The mechanisms determining this female predominance are not well understood, however, our previous studies demonstrated that female MCs store and release greater amounts of immune mediators, likely contributing to sexual dimorphism in disease. Therefore, the objective of this study was to determine the components of sex involved in the formation of sexually dimorphic MCs. Our hypothesis is that androgen signaling through the androgen receptor (AR) masculinizes the MC phenotype. To test this hypothesis, we utilized male rats with the testicular feminization mutation (Tfm), characterized by non-functional ARs, and insensitivity to their own androgens. We isolated peritoneal MCs (pMCs) from these rats and wildtype (WT) siblings and assessed histamine content. As anticipated, pMCs from female rats contained higher histamine levels than pMCs from WT male rats while pMCs from Tfm males had intermediate histamine content significantly different from both WT males and females (mean + SEM: 46,080 ± 1070 (WT male) vs. 55,252 ± 2762 (Tfm male) vs. 63,879 ± 2429 (female) ng/106cells). This finding supports the hypothesis that the AR plays a key role in masculinizing the MC phenotype, which could be protective for males in MC disease. To further test our hypothesis, we plan to evaluate tryptase in colonic mucosal scrapes from Tfm rats and their WT siblings. Understanding how the AR influences MC phenotype will provide insight into future treatment of MC-associated diseases.

THE CHARACTERIZATION STAPHYLOCOCCUS AUREUS ISOLATES FROM CYSTIC FIBROSIS PATIENT'S SPUTUM
Alicia Webb
Poster: 511
Mentor(s): Phillip Delekta (Microbiology and Molecular Genetics), Neal Hammer (Microbiology and Molecular Genetics)

Staphylococcus aureus is a gram positive cocci that colonizes the skin and respiratory tract of ~30% of healthy individuals, and can cause diseases ranging from skin infections to sepsis. Cystic fibrosis (CF) is a genetic disorder that primarily affects the lungs, and pulmonary infections are the leading cause of death for those diagnosed with CF. In the lungs of CF patients, the normally lubricating mucus becomes thick. The increased viscosity and abundance of the mucus in the lungs encourages microbial infections. One of the earliest microbes that colonize a CF lung is S. aureus, which leads to chronic pulmonary infections. S. aureus was isolated from sixty-six CF patient sputum samples from seven different patients across multiple time points. Multiple virulence factors were characterized in these clinical isolates of S. aureus. These clinical isolates demonstrated great variability in multiple virulence factors such as hemolytic activity, antibiotic resistance, sensitivity to oxidative stress, and lipase activity. These clinical isolates S. aureus will be utilized to further define the pathogenesis of S. aureus in future studies.

NEUROSCIENCE

POSTER PRESENTATIONS, SECTION 1
LAKE HURON ROOM, 9:00 – 10:30 AM

EVIDENCE FOR DYSFUNCTIONAL CALCIUM REGULATION IN SBMA ANIMAL MODELS.

Yazeed Haddad
Poster: 515
Mentor(s): Cindy Jordan (Neuroscience)

In our study we sought a better understanding of the calcium regulation pathway in skeletal muscle affected by the neuromuscular disease spinal and bulbar muscular atrophy (SBMA). SBMA is a male-biased, X-linked disease characterized by progressive muscle weakness, and atrophy in bulbar, facial, and limb muscles. In our experiment, we evaluated the state of calcium homeostasis in skeletal muscle of two mouse models of SBMA where muscle function is also impaired. The calcium regulation pathway within muscle fibers is controlled by the sarcoplasmic Ca2+ ATPase (SERCA) and the ryanodine receptor (RYR). RYR is responsible for releasing calcium ions into the cytosol from intracellular stores while SERCA transports calcium ions back into these same storage sites. Orchestrating both events is crucial since it allows muscle contraction and subsequent muscle relaxation. We focused on SERCA and its respective developmental mRNA isoforms; differential splicing events give rise to neonatal and adult isoforms with different Ca2+ uptake efficiencies. This splicing switch happens in rodents during early life. Previously, we found that adult muscle from SBMA mice is characterized by not only a decreased expression of SERCA mRNA overall, based on quantitative polymerase chain reaction (PCR). We are now using end point PCR to further characterize the change in neonatal isoform expression, predicting a decrease in the adult isoform and an increase in the neonatal form. This disease-related switch back to the developmental isoform likely contributes to the muscle dysfunction associated with SBMA and suggests a novel therapeutic target for improving muscle function.

UNDERSTANDING DEPRESSION: AN INVESTIGATION INTO THE EFFECTS OF ΔFOSB AFTER CHRONIC STRESS

Sadhana Chinnusamy
Poster: 516
Mentor(s): Alfred Robison (Physiology)

In mood-related illnesses like major depressive disorder, prolonged stress and witnessing of traumatic events is a prevailing risk factor. In addition, women represent the majority of those affected by major depression, but the relationship between stress and the development of these disorders is not fully understood in females (National Institute of Mental Health). A model to examine the effects of stress on mice that has many parallels to behaviors and symptoms indicative of mood disorders in humans, the witness chronic social defeat stress (WCSDS) model, may provide insight into the development and mechanisms behind stress-induced mood disorders in both males and females. In the NAc, the transcription factor ΔFosB, which is known to accumulate after chronic stimulation, promotes resilience to a chronic stressor (Vialou et al, 2010). The ventral hippocampus (vHPC) and nucleus accumbens (NAc) are intrinsically connected, and the reduced activity of the vHPC cells projecting to the NAc promotes resilience after chronic stress. In this study, the WCSDS model was used to induce stress in both male and female mice. Immunohistochemistry and Western blotting techniques were used to quantitatively measure ΔFosB induction in the vHPC and a control region. Differences in induction levels between stressed and control mice are expected, as well as possible differences between levels in male and female mice. This study provides insight into some of the mechanisms behind antidepressant action, as well as the effects of stress on females, an understudied yet necessary area of research.

MINDFULNESS BASED COGNITIVE THERAPY IMPROVES CLINICAL DEPRESSION BY INCREASING SELF-COMPASSION

Kaleb Howard
Poster: 517
Mentor(s): Marina Lopez-Sola (Anesthesia)

Major Depressive Disorder (MDD) is characterized by lasting pervasive feelings of low mood, guilt, and worthlessness. Mindfulness-Based Cognitive Therapy (MBCT) has been proven to significantly reduce rates of depressive relapse and recurrence among adults with MDD. We tested the hypothesis that the decrease in depressive symptoms after an 8-week MBCT intervention is mediated by increases in self-compassion scores. Participants in the study were separated into groups: healthy control and MDD patients (N=43). Both groups were subject to the same interviews, behavioral

tasks, online questionnaires, and MRI sessions before any intervention took place. Following baseline testing, the MDD patients underwent MBCT for up to 10 weeks while controls received no treatment. Both groups returned after or a post-MRI and behavioral session. Results showed that weekly Patient Health Questionnaire (PHQ-9) scores measuring depressive symptoms were significantly improved compared to baseline in MDD patients ($F = 8.105$, $p = 0.00425$). Additionally, both self-compassion ($F = 17.07$, $p = 0.000205$) and self-kindness ($F = 12.156$, $p = 0.00141$) scores were significantly increased in MDD patients compared to baseline, based on responses to the Self-Compassion Scale (SCS) questionnaire. Tying these results together, a mediation analysis found that self-compassion does indeed function as a mediator variable in MBCT treatment of MDD ($p = 0.0437$). These findings provide novel mechanistic evidence indicating that engaging on a more caring attitude towards one self is directly predictive of a clinically-meaningful reduction in depressive symptoms.

THE RELATION BETWEEN TEMPORAL NICHE AND STRENGTH OF SENSES
Raywa Mastl, Jeremy Cicak, Olivia Trombley
Poster: 518
Mentor(s): Barbara Lundrigan (Integrative Biology), Laura Smale (Psychology)

Temporal niche refers to the time of day a species is most active. Nocturnal species are most active in the nighttime, when it is dark, while diurnal species are most active during the day, when it is light out. Due to this, we hypothesized that nocturnal

CORNICHON HOMOLOG 3, A PROTEIN THAT MAY BE INVOLVED IN INDIVIDUAL OPIOID DEPENDENCE RISK, MODULATES AMPA RECEPTOR TRAF CKING AND SPINE MORPHOLOGY
Colin McCornack
Poster: 519
Mentor(s): Jose Moron-Concepcion (Anesthesiology)

Opioid misuse is one of the largest public health burdens currently facing the United States. Our lab is currently investigating the neural and biochemical dynamics that hinder users from becoming dependent on opioids, and we have identified a target gene that is correlated with protection against the progression of opioid dependence: cornichon homolog-3 (CNIH3). A recent collaboration (Nelson et al., 2016) identified novel single-nucleotide polymorphisms in the CNIH3 gene in nondependent opioid users that correlated with protection against opioid dependence progression, despite the misuse. CNIH3 is thought to be an AMPA receptor trafficker from the endoplasmic reticulum to the postsynaptic density (PSD). Trafficking of AMPA receptors to the PSD of hippocampal neurons has important implications in learning and drug-associated memory formation. Likewise, synaptic spine density changes are believed to be a part of learning and memory formation. Using a CNIH3 knockdown mouse model, our research aims to probe the proteomal and synaptosomal effects of the absence of CNIH3 in the hippocampus at a basal state, for later comparison with morphine-dependent biochemical effects. Preliminary data show significant decreases in AMPA receptor subunits GluA1 and GluA2 in the PSD of CNIH3+/- mice, and decreases in GluA2 subunits in CNIH3-/- mice. Additionally, a decreasing, but not statistically significant, trend was observed in spine density in CNIH3+/- mice. By studying AMPA receptor subunit and auxiliary protein levels in the PSD and measurements of synaptic spine morphological changes, we aim to provide a baseline for understanding learning and memory effects of CNIH3 in future studies.

SEX DIFFERENCE IN PHOTIC REGULATION OF HYPOTHALAMIC OREXIN NEURONS.
Faiez Samad
Poster: 520
Mentor(s): Lily Yan (Psychology)

Light has profound effects on mood and behavior, which are best exemplified in Seasonal Affective Disorder (SAD). SAD involves depressive symptoms recurring in winter when there is less sunlight. Our previous work has developed an animal model of SAD utilizing the diurnal Nile grass rats (Arvicanthis Niloticus), which has revealed that grass rats show increased depression and anxiety-like behaviors in a winter-like 12:12 hr dim Light-Dark (dimLD) condition compared to those in a summer-like bright Light-Dark (brLD) cycle (Leach et al, 2013). Using male grass rats, we found that the number of hypothalamic orexin neurons was higher in brLD compared to dimLD group, and inhibiting orexinergic signaling resulted in increased depression-like behaviors (Deats et al, 2014). The objective of the present study was to examine the effects of ambient light on orexin system in female grass rats and to explore any potential sex differences in light responsiveness of this system. Orexin A immunoreactive (OXA-ir) neurons were counted in the hypothalamus of female grass rats housed in brLD or dimLD cycle. In contrast to the effect of light on the number of OXA-ir cells in males, there was no significant difference between the brLD and dimLD group in females. Furthermore, the numbers of OXA-ir neurons are substantially higher in females compared to those in male grass rats. The results suggest a sex difference in

the role of orexin system in mediating the effects of light and in modulating emotional process. These findings will provide insights into sex differences in psychiatric disorders.

NEUROSCIENCE
POSTER PRESENTATIONS, SECTION 2
BALLROOM, 11:00 – 12:30 PM

REGULATION OF SOCIOSEXUAL MOTIVATION BY VASOPRESSIN NEUROSIGNALING IN MALE RATS

Ashley Chambers

Poster: 523

Mentor(s): Christina Reppucci (Psychology; Neruoscience Program), Alexa Veenema (Psychology; Neruoscience Program)

The neuropeptide vasopressin (AVP) mediates a variety of social behaviors including sociosexual motivation. Sociosexual motivation is important in mate-seeking behavior and to ensure species survival. In the current study, we examined whether the AVP system within a brain region called the bed nuclei of the stria terminalis (BST) modulates the expression of sociosexual motivation in adult male rats. After bilateral implantation of cannulae targeting the BST, rats received counterbalanced infusions of vehicle or an AVP receptor antagonist (V1aR-a) prior to exposure to the opposite sex preference paradigm. In this paradigm, the experimental male was placed into a three-chamber apparatus, where another male rat and an estrous-induced female rat were placed within corrals on opposite sides. Sociosexual motivation was indicated by the experimental male spending more time investigating the female than the male. We found that V1aR-a administration decreased a male rat's preference for the female and hence decreased sociosexual motivation. Next, we aimed to determine the source of AVP innervation within the BST. An AVP promoter-driven adeno-associated virus, which induces the expression of a fluorescent protein in AVP neurons, was injected into the paraventricular hypothalamus (PVH; one of the largest sources of AVP). We found that the virus infected PVH-AVP neurons. Our next step is to use this tool to determine whether these neurons project to the BST by conducting a fiber analysis. Overall, findings of this study will provide a better understanding of how the brain, via AVP signaling, regulates sociosexual motivation.

ADAPTATIONS OF SENSORY BRAIN STRUCTURES OF ORDER RODENTIA RELATED TO TEMPORAL NICHE

Allyson Conley, James Burtka Jr, Sonia Khalid

Poster: 524

Mentor(s): Barbara Lundrigan (Integrative Biology), Andrea Morrow (Zoology), Laura Smale (Psychology)

Temporal niche is the cycle of behavioral patterns over a 24 hour time period. Rodents exist in various temporal niches, ranging from high activity during the day (diurnal), to sporadic activity throughout night and day (cathemeral), to activity during dawn and dusk (crepuscular), to activity only at night. Over multiple generations, temporal niches of species evolve in response to availability of resources, competition, predation, and other biotic and abiotic factors. We investigate how evolutionary transitions in temporal niche impact the size of sensory brain structures, utilizing rodents as a model. We believe that in order to adapt to environmental changes, the sizes of brain structures change in accordance with the senses most used. Our hypotheses are broken down by activity patterns. For our nocturnal species, Onychomys torridus (grasshopper mouse), we expect minimal vision use and heightened auditory use, resulting in larger volume of auditory structures relative to visual structures. For our cathemeral species, Myodes gapperi (red-backed vole), we expect more equal use of visual and auditory structures, hence a proximity in volumes measured. For a third species, Microtus pennsylvanicus (meadow vole), which changes from nocturnal to diurnal seasonally, we expect auditory and visual structures to be even more similar than for cathemeral species. For our research, we used sectioned brain tissue of M. pennsylvanicus, O. torridus, and M. gapperi to measure volumes of visual structures such as the Lateral Geniculate Nucleus (LGN) and Superior Colliculus (SC), and auditory structures, including the Inferior Colliculus (IC) and Medial Geniculate Nucleus (MGN).

AMERICAN MEDICAL STUDENTS ATTITUDES' TOWARDS DIFFERENT MODALITIES OF NEUROENHANCEMENT

Aakash Dave

Poster: 525

Mentor(s): Laura Cabrera (Center For Ethics and Humanities in the Life Sciences)

The desire to improve oneself has shown itself to be an integral component of the human condition. However, modern advances that facilitate improvement have left many with ethical concerns surrounding their use. These interventions are better known as neuroenhancers because of their ability to improve specific aspects of brain function, such as cognition or mood. While several studies have assessed differences in public perception towards the moral acceptability

of pharmacological and device-based neuroenhancers, just a few studies have compared different types of neuroenhancers. In order to gain understanding on the public's attitudes when comparing different neuroenhancer modalities, we developed a survey to test public attitudes based on three different neuroenhancer modalities: neurodevice, pill, and herbal supplement. In this pilot study, 116 subjects were asked to read one of six possible vignettes describing a certain degree of improvement (therapy or above the norm) brought about by using one of the modalities. Subjects then answered three questions. Our data shows a greater acceptability for improvement above the norm using neurodevices compared to the pill. This finding is consistent both when participants were asked to report the acceptability for the character in the vignette, and whether they would engage in using the enhancer. A majority of participants prefer clinician intervention prior to any of the modalities being available in the marketplace. This pilot study provides novel insights into pressing neuroethical issues and warrant further studying.

EFFECTS OF PUP AND STRESS STIMULI ON MIDBRAIN DORSAL RAPHE NEURONAL ACTIVATION IN POSTPARTUM RATS
Monica Davis
Poster: 526
Mentor(s): Joseph Lonstein (Psychology)

During the postpartum period, mothers show a decrease in anxiety-like behaviors that are important for facilitating caregiving. This anxiolytic effect is driven by recent contact with pups, however, while prior studies have examined activation of areas of the brain involved in regulating anxiety during the postpartum period, little attention has been given to the serotonergic system. The most likely serotonergic nucleus in the control of postpartum anxiety-like behavior is the midbrain dorsal raphe (DR), which, supplies most of the forebrain projecting serotonergic fibers, contributes to anxiety-like behaviors in non-parous animals, and helps in integrating sensory information. Although a previous study in the lab found no differences in neuronal activation in the DR between postpartum females with and without their pups present, here we provide a thorough analysis of neuronal activation, using the marker c-Fos, in different subregions of the dorsal raphe. Increased c-Fos expression is expected in subregions of the DR that have been implicated in anxiety, such as the caudal DR and lateral wings. Six groups of lactating rats were used in this experiment. Control groups either had their litters removed for four hours or not to increase or maintain low anxiety, respectively. The other four groups had pups removed or not, followed by exposure to an anxiogenic stimuli of brief handling or exposure to an elevated plus maze. A more extensive examination of the sub regions of the dorsal raphe may show variation in c-Fos expression across groups indicating that they have a role in regulating postpartum anxiety.

DIFFERENCES IN SYMPATHETIC INNERVATION IN THE ANTERIOR VERSUS POSTERIOR CEREBRAL CIRCULATION THOUGH IMMUNOHISTOCHEMICAL, MRNA AND PROTEIN EXPRESSION ANALYSIS
Harini Gangur
Poster: 527
Mentor(s): Stacie Demel (Pharmacology & Toxicology)

Intracranial aneurysm (IA) is an outpouching of a cerebral artery wall that when ruptured results in subarachnoid hemorrhage (SAH). Posterior cerebral arteries are more susceptible to IA development in comparison to anterior cerebral arteries, but the mechanisms underlying this are not currently known. Tyrosine Hydroxylase (TH) is a rate-limiting enzyme that plays a critical role in catecholamine biosynthesis. Therefore, TH immunoreactivity is used as a marker of neuronal function and sympathetic innervation. We will test the hypothesis that TH mRNA and protein expression will be lower in the posterior cerebral arteries compared to the anterior cerebral arteries. The methods consist of 12-week-old male Sprague-Dawley rats euthanized and their cerebral circulation dissected. Middle cerebral arteries (MCAs) for the anterior circulation, basilar arteries (BAs), and mid-point posterior cerebral arteries (PCAs) will be collected. mRNA will be extracted and reverse transcribed into cDNA for gene expression analysis. Whole vessels will be stained for TH and florescence intensity analyzed. Based on our hypothesis, we expect to see reduced mRNA and protein expression of TH in the posterior cerebral circulation (PCAs and BA) compared to the anterior cerebral circulation (MCAs). Decreased sympathetic innervation of the posterior cerebral circulation may result in reduced vascular ability to respond to changes in hemodynamic stress. This lack of response to hemodynamic changes may be responsible for increased susceptibility of the posterior cerebral circulation to IA formation.

QUANTIFYING MIDBRAIN PROJECTIONS OF THE GROWTH HORMONE SECRETAGOGUE RECEPTOR
Delaney McPhail
Poster: 528
Mentor(s): Alexander Johnson (Psychology)

The gastric peptide ghrelin is the only signal originating in the periphery that promotes feeding behavior. In the central nervous, the ghrelin receptor, growth hormone secretagogue receptor (GHSR) is expressed in hypothalamic neurons and in regions of the brain that modulate the rewarding features of appetite control. In the current study, we were specifically interested in quantifying the projections of GHSR-expressing cells in midbrain cells of the ventral tegmental area (VTA). The VTA contains dopaminergic cells that have been implicated in addiction, motivation and reward learning. To examine projections of GHSR-expressing cells in the VTA, we used a knock-in mouse model, GHSR-IRES-Cre, in which Cre-recombinase is selectively expressed in GHSR-expressing cells. GHSR-IRES-Cre mice received injections into the VTA of the Cre-mediated anterograde tract tracer Ad-syn-mCherry. Through this approach, synaptophysin-mCherry fusion protein expresses itself both in the soma and in the projection sites. The labeling of synaptophysin-mCherry fusion protein from GHSR-expressing cells in the VTA were quantified using immunofluorescent microscopy. These findings provide insight into the brain systems that are modulated by this critically important gastric feeding signal.

NEUROSCIENCE
POSTER PRESENTATIONS, SECTION 3
BALLROOM, 11:00 – 12:30 PM

Effects of Estradiol During Puberty on Binge Eating Behaviors in Female Rats
Marissa Jacks
Poster: 531
Mentor(s): Cheryl Sisk (Neuroscience)

It has long been suspected that estradiol plays an integral role in the emergence of binge eating behaviors in females. However, previous research on this topic has shown that rats that have received OVX surgeries actually show higher rates of binge eating proneness in adulthood. To look at this in more depth, female Sprauge Dawley rats were used. They were divided into a sham group (ovary intact) or an OVX group (ovaries removed). The OVX group was given estradiol during puberty to mimic the natural hormonal cycle. To test for binge eating behaviors the rats went through a series of feeding tests using a highly palatable food. We hypothesize that the estradiol, when given during puberty, acts as a protective force against the emergence of binge eating behaviors in adulthood.

QUANTIFYING DOPAMINE CELLS IN THE VENTRAL TEGMENTAL AREA USING VIRUS EXPRESSION AND IMMUNOFLUORESCENCE IN TYROSINE HYDROXYLASE CRE MICE
Michael Kain, Andrew McLocklin
Poster: 532
Mentor(s): Alex Johnson (Psychology)

The precise role of the dopaminergic neurotransmitter system remains a contentious topic in the field of psychology and neuroscience. The ventral tegmental area (VTA) is especially rich with dopamine neurons and has been extensively characterized in studies of addiction, reward-seeking behavior, and learning. Our research sought to characterize the expression of dopamine neurons in the VTA. To achieve this, we used viral-mediated labeling of VTA dopamine cells in transgenic mice that express Cre-recombinase in tyrosine hydroxylase (TH)—rate limiting enzyme for dopamine synthesis. In addition, we used immunofluorescence to label protein expression of TH in VTA dopamine cells. Transgenic TH-Cre mice received injections of a Cre-dependent adenoassociated virus into the VTA, which labelled all dopamine-expressing cells with the fluorescent marker, eYFP. Subsequently this tissue was also labelled for protein expression of TH using a red fluorescent protein. The extent of colocalization of Cre- and protein-expressing markers for TH were quantified using immunofluorescence microscopy. Overall, these studies characterize the expression of dopamine cells in the VTA and determine the selectivity of the transgene in TH-Cre mice.

IS THERE A CHEMICAL BASIS FOR NEURONAL CO-TRANSMISSION?
Katarzyna Purzycka
Poster: 534
Mentor(s): Robert Root-Bernstein (Physiology)

Most neurons store and release more than one neurotransmitter. No one knows why some neurotransmitters are co-stored and co-released in particular pairs while most possible pairs are not observed. We propose that co-stored and co-released neurotransmitters chemically bind to each other, while pairs of neurotransmitters that are not found together do not bind to each other. The basis of this hypothesis is a broader observation made by Root-Bernstein and Dillon that molecules that bind to each other generally alter each other's physiological activity and, conversely, compounds that alter each other's physiological activity, generally bind to each other (Root-Bernstein and Dillon, 2007). Ultraviolet spectroscopy is used to obtain the absorbance spectra of neurotransmitters at varying concentrations. According to Beer's law, if there is no chemical interaction between chemicals, when they are added to each other, their combined spectrum will be an exact sum of their individual spectra. Differences from the predicted sum that vary by concentration can be used to determine chemical binding curves of neurotransmitters. The neurotransmitters to be studied in all of their varied combinations are: acetylcholine, ascorbate, dopamine, epinephrine, GABA, glutamate, glycine, histamine, melatonin, norepinephrine, octopamine, serotonin, adrenocorticotropic hormone, crustacean erythrophore concentrating hormone, endomorphin, met-enkephalin, neurotensin, substance P, thyrotropin releasing hormone, vasoactive intestinal polypeptide. Data from our experiments will be provided and our hypothesis tested by comparing our results to literature reports of cotransmission.

DETERMINATION OF THE RELATIONSHIP BETWEEN SGK1 CATALYTIC ACTIVITY AND PHOSPHORYLATION IN A MOUSE NEUROBLASTOMA CELL LINE
Cole Showers
Poster: 535
Mentor(s): Michelle Mazei-Robison (Physiology)

Opiate-related drug addiction and death has been on the rise in recent years within the United States. Unfortunately, despite the prevalence of opiate use and abuse, much remains unknown about the neuroadaptations induced in the brain reward circuit by opiate drugs. Our lab has previously identified key proteins that are upregulated upon administration of opiates within the ventral tegmental area or VTA, the initiator region of the reward circuit. One of these key proteins is serum- and glucocorticoid-regulated kinase 1 (SGK1). We have found that both SGK1 catalytic activity and phosphorylation at serine 78 (S78) are significantly increased following morphine administration. However, whether there is a relationship between SGK1 catalytic activity and S78 phosphorylation is unclear. Thus, the aim of my project is to determine whether SGK1 catalytic activity influences S78 phosphorylation, or vice versa. To do this, I have developed a cell culture model to study SGK1 regulation. I have used insulin and epidermal growth factor (EGF) to induce robust and reliable increases in SGK1 catalytic activity and S78 phosphorylation in a mouse neuroblastoma cell line (Neuro2A). I will use this protocol in combination with pharmacological inhibitors to decrease either SGK1 catalytic activity or S78 phosphorylation and determine the effect on the other parameter. Additionally, future experiments will utilize transient overexpression of SGK1 mutants to further investigate the relationship between S78 phosphorylation and catalytic activity. Importantly, these experiments will serve as a guideline for studying SGK1 regulation by drugs of abuse in mouse brain tissue.

ROLE OF SGK1 IN HIPPOCAMPAL DENDRITIC SPINE MORPHOLOGY AFTER CHRONIC COCAINE
Emily Steffke
Poster: 536
Mentor(s): Michelle Mazei-Robison (Physiology), AJ Robison (Physiology)

Drug addiction is a disease characterized by dependence and chronic drug seeking despite harmful consequences. Certain environmental cues can trigger relapse in addicts, and the hippocampus has been implicated in this process as it is critical for associations between contexts and salient experiences. In order to better treat addiction, it is necessary to understand the synaptic underpinnings of these hippocampus-driven associations. Serum/glucocorticoid-dependent kinase (SGK1) is regulated by cocaine and is involved in reward processing and spatial memory. Thus, changes in SGK1 expression may mediate alterations in synaptic connections that underlie drug-environment associations. I examined how altering hippocampal SGK1 activity can affect the dendritic spine morphology in the hippocampus. I injected mice with one of three viruses: green fluorescent protein (GFP) alone; GFP+wild-type-SGK1; or GFP+K127Q-SGK1, a catalytically inactive version of the protein. Mice were then sacrificed and confocal fluorescent microscopy was used to visualize dendritic spines. Using NeuronStudio software, I quantified the number and morphology of spines in the virally transduced cells. I found that decreasing SGK1 activity (K127Q-SGK1) in the CA1 region increased the total number of dendritic spines compared to GFP-only controls, driven by a significant increase in mushroom and stubby spines. As

mushroom spines indicate strengthened excitatory input, these data suggest inhibiting SGK1 may increase the strength of excitatory input onto CA1 neurons, and thus that SGK1 normally dampens these inputs. As the formation of mature synapses is a crucial component of leaning and memory, this indicates SGK1 is a promising target in the pathway underlying drug-environment associations.

NEUROSCIENCE
POSTER PRESENTATIONS, SECTION 4
BALLROOM, 3:00 – 4:30 PM

THE ROLE OF HYPERTENSION-RELATED BRAIN LESIONS IN THE DEVELOPMENT OF ALZHEIMER'S DISEASE

Mari Dowling, Madeline Bross

Poster: 540

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 pilot 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 resonances images (MRI). By utilizing MRI images 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. Our pilot study included subjects with a baseline diagnosis of Normal Cognition (NC) who either remained NC (n=17), or progressed to Mild Cognitive Impairment (MCI, n=10) or Alzheimer's Disease (AD, n=2). WMH volume of each subject was estimated using the Lesion Segmentation Tool (LST) implemented in the Statistical Parametric Mapping Version 12 (SPM12) software. Compared to NC subjects without hypertension (n=15), those with hypertension (n=14) showed a significantly higher rate of WMH volume increase ($p=0.022$) and a significantly higher WMH volume ($p=0.003$). These results imply that hypertension can lead to brain lesions, which in turn can potentially facilitate the development of AD. We intend to further examine the specific locations of WMH development and how they vary between patients with and without hypertension.

INVESTIGATING THE NEURAL BASIS OF AESTHETIC PLEASURE IN READING

Benjamin Horne, Caroline Baidoon, Brooke Devries, Derrick Dwamena, Do Young Seong, Addison Wood

Poster: 541

Mentor(s): Natalie Phillips Horne (English)

Understanding the neural bases of aesthetic pleasure across domains is a growing area of research within neuroscience (Cele-Conde et al., 2011). Much of this work has focused on the visual arts and music, while little is known about the literary arts (Burke, 2015). This interdisciplinary experiment fills this gap by investigating the neural structures involved in aesthetic pleasure—i.e. moments participants find "pleasing, powerful or profound"—for real-time poetry reading. Undergraduate English majors (n = 20) will read 16 sonnets, which are naturally controlled for rhyme and meter, inside an MRI scanner. Participants rate aesthetic pleasure (AP) for each poem, highlighting aesthetically pleasing moments in green and moments that were aesthetically displeasing in red. Using fMRI to study natural reading marks a necessary innovation in the field to understand pleasure in reading, yet introduces challenges that require novel solutions. Presentation of full sonnets as stimuli posed issues regarding standardized reading time. To manage this challenge, we used an fMRI-compatible mouse that allows us to collect real-time highlighting data to be matched with corresponding fMRI time-course data. Based on behavioral results, we hypothesize that brain regions activated during moments of high aesthetic pleasure (green) will differ significantly, not only from our control, but from those involved in moments of extreme displeasure (red). Pioneering this research in neuroaesthetics will allow us to map brain regions involved in aesthetic pleasure for poetry reading, and offer a crucial glimpse into the cognitive dynamics involved in why we like (or dislike) literature.

FIGHTING OBESITY WITH THE BRAIN: ACTIVATION OF DOPAMINERGIC NEUROTENSIN RECEPTOR-1 NEURONS IN THE VENTRAL TEGMENTAL AREA
Jillian Matasovsky
Poster: 542
Mentor(s): Gina Leinninger (Physiology)

Diet and exercise are the most prescribed treatment for obesity, but are difficult to maintain, so most individuals regain weight. Pharmacologic strategies to suppress feeding and promote physical activity would be useful to reverse the obesity epidemic. Since dopamine (DA) neurons in the Ventral Tegmental Area (VTA) can increase or decrease feeding and physical activity behaviors, we reasoned that there might be a group of VTA DA neurons supporting dual weight loss behaviors. Indeed, our lab identified a specific subset of VTA DA neurons that express neurotensin receptor-1 (NtsR1). Our long-term goal is to define the roles of VTA NtsR1 neurons and whether they can suppress feeding and promote activity to reduce body weight. To reach this goal, we will express excitatory Designer Receptors Exclusively Activated by Designer Drugs (DREADDs) in VTA NtsR1 neurons, allowing us to activate the neurons in vivo by treating with the DREADD-ligand clozapine-N-oxide (CNO). First, we confirmed whether DREADD expressing VTA NtsR1 neurons can be activated by assessing cFos (a marker of depolarized neurons) in the VTA of Vehicle or CNO treated mice. CNO treatment increased the amount of cFos specifically in VTA NtsR1 neurons compared to vehicle. These data confirm that we can use DREADDs to activate VTA NtsR1 neurons, and going forward we will use this technique to activate VTA NtsR1 neurons in vivo to determine how this specific population of neurons contributes to energy balance.

EFFECT OF SOCIAL ISOLATION AND HUNGER ON THE MOTIVATION TO SEEK SOCIAL CONTACT OR FOOD IN ADOLESCENT RATS
Suhana Posani
Poster: 543
Mentor(s): Christina Reppucci (Psychology; Neuroscience), Alexa H Veenema (Psychology; Neuroscience)

In most adolescent animals, including humans, there is a strong motivational drive to be among peers and seek social contact. However, at any one time, an animal's behavior is influenced by multiple motivational drives (e.g., motivation to seek social contact when alone versus the motivation to seek food when hungry) that often compete with each other. This study developed a novel paradigm to test the competition between two motivational drives, specifically the motivation to seek social contact and the motivation to seek food. We examined the effect of social isolation and hunger on the preference of male and female adolescent rats to investigate a novel rat or to investigate food. Rats were placed into a three-chamber apparatus where a social stimulus (an age- and sex-matched stimulus rat) and a food stimulus (standard laboratory chow) were located in corrals on opposite sides. Preference was determined by the relative time that the rat spent investigating the social stimulus compared to the food stimulus. We found that, regardless of social housing condition, both males and females showed a reduction in preference for the social stimulus when they were food deprived compared to when they were sated. This result demonstrates how the motivational drives of seeking social contact and seeking food can compete with each other. In future studies, using this paradigm, we aim to investigate the effect of neuropeptides implicated in both social- and feeding-related behaviors (i.e., orexin, vasopressin and oxytocin) on the competition between these two motivational drives.

STATUS-RELATED SOCIAL STRESS ALTERS REWARD CIRCUITRY GENE EXPRESSION
Audrianna St Germain
Poster: 544
Mentor(s): AJ Robison (Physiology)

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

DETERMINING WHETHER MORPHINE-INDUCED INCREASES IN VTA SGK1 S78 PHOSPHORYLATION ARE CELL TYPE SPECIFIC
Ali Stark
Poster: 545
Mentor(s): Michelle Mazei-Robison (Physiology)

Drugs of abuse cause neuroadaptations in the ventral tegmental area (VTA), and our lab has previously determined that chronic cocaine and morphine exposure increases catalytic activity and phosphorylation of the protein serum- and glucocorticoid-regulated kinase 1 (SGK1) at Serine 78 (S78). However, it is not known in which cell type the increase in SGK1 phosphorylation occurs, as approximately 60% of the neurons in the VTA are dopaminergic (DA) and ~35% are GABAergic. I will perform immunohistochemistry (IHC) to identify which cell population exhibits an increase in phosphorylated SGK1. I am performing IHC on brain sections containing VTA from mice treated with morphine or vehicle. To label DA cells in the VTA, I am using a tyrosine hydroxylase (TH) antibody and a second antibody that recognizes phospho-S78 SGK1. I will count the number of phospho-SGK1-positive cells that are TH-positive (e.g. DA cells) and TH-negative. I predict that morphine will increase the total number of phospho-SGK1-positive neurons in the VTA and that this increase will be mostly to due to increased labeling of TH-positive cells because of the critical role of dopamine in the reward system. However, I can also assess the number of phospho-SGK1-positive GABA neurons via vesicular GABA transporter labeling if my hypothesis is incorrect. In order to determine whether cell type-specific changes in VTA SGK1 phosphorylation are physiologically relevant, future studies will use transgenic mice (e.g. DAT-Cre) and Cre-dependent viruses to overexpress mutant SGK1 constructs and assess effects on drug behavior, such as the morphine two-bottle choice test.

PHARMACOLOGY & TOXICOLOGY

POSTER PRESENTATIONS, SECTION 1
ROOM 36, 8:30 – 10:00 AM

MIGRATORY ABILITY OF HUMAN TROPHOBLAST CELLS EXPOSED TO BISPHENOL S
Victoria Adomshick
Poster: 548
Mentor(s): Almudena Veiga-Lopez (Animal Science)

During a healthy pregnancy, first trimester placental (trophoblast) cells implant in the maternal endometrium to enable embryonic development. The migratory ability of these trophoblast cells is of great importance because improper invasion of the endometrium can lead to pregnancy complications such as a miscarriage or preeclampsia. Previous studies have shown endocrine disrupting chemicals (EDCs) can impair trophoblast cell function. Recent studies have demonstrated that gestational exposure to bisphenol S (BPS) can impair endocrine placental function and reduce trophoblast cell number. The goal of this study is to investigate BPS's effect on the migratory ability of first trimester human trophoblast (HTR8/SVneo) cells. Because BPS has been shown to increase intercellular communication, it is hypothesized that BPS will enhance the migratory ability of HTR8 cells. To test this hypothesis, a scratch assay was performed on the HTR8 cells. The HTR8 cells were exposed to BPS (0, 10, 200, and 1000 ng/mL) for five days before, followed by the scratch migration assay. Images were captured after 24 hours and 48 hours. Preliminary results suggest that BPS increases the migratory ability of HTR8 cells. To further assess the migratory ability of HTR8 cells treated with BPS, additional replicates will be performed, as well as gene expression studies to identify migratory markers such as vimentin, E-cadherin, and N-cadherin. An increase in the expression of these markers would indicate that exposure to BPS during pregnancy could have the ability to negatively affect trophoblast placentation and fetal development.

METHYLMERCURY CAUSES INTRACELLULAR CALCIUM DYSREGULATION IN SPINAL CORD SLICES FROM SOD1G93A MICE THAT IS REDUCED BY RILUZOLE TREATMENT
Brooke Brauer
Poster: 549
Mentor(s): William Atchison (Pharmacology & Toxicology), Jordan Bailey (Pharmacology & Toxicology)

Amyotrophic lateral sclerosis (ALS) is a neurodegenerative disease that affects upper and lower motor neurons (MNs). Mice that overexpress the humanized superoxide dismutase-1 gene mutation (SOD1^{G93A}) are used to model ALS; they reliably exhibit an ALS-like phenotype as they age. Previously we showed that methylmercury (MeHg) can hasten the onset of the ALS-like phenotype in these mice on measures of intracellular Ca²⁺

concentration [Ca²⁺]_iand motor function. Effects of MeHg have been examined previously on brain stem and cerebellum, but not the spinal cord. The purpose of this study was to examine a prospective gene-environment interaction with MeHg and the SOD1^{G93A} mutation in spinal MNs and to treat with riluzole (one of the only FDA-approved drug therapies for ALS) using this model. The mechanism(s) by which riluzole acts aren't clear, but it does reduce glutamate release, among other actions. We compared effects on [Ca²⁺]_iin MNs from spinal cords of SOD1^{G93A}, SOD1^{HuWT} and wild type mice of both sexes following MeHg exposure (20 μM). Additionally, a riluzole pretreatment (10 μM) commenced before concomitant MeHg + Riluzole treatment. As a function of exposure time, acute MeHg treatment increased calcium-mediated epifluorescence in lumbar spinal cord slices. Riluzole was most effective on spinal cord slices from the SOD1^{G93A} animals, where it significantly dampened the effect of MeHg to increase [Ca²⁺]_i. These data reinforce the hypothesis that MeHg interacts with the SOD1^{G93A} mutation to enhance neuronal dysfunction in spinal MNs, thereby reinforcing evidence of a gene-environment interaction relevant to the etiology of ALS.

IMMUNE MEMORY OF OZONE-INDUCED EOSINOPHILIC RHINITIS IS NOT DEPENDENT ON T OR B LYMPHOID CELLS
Elyse Eldridge
Poster: 550
Mentor(s): Jack Harkema (Pathobiology Diagnostic Investigation), James Wagner (Pathobiology Diagnostic Investigation)

Epidemiological studies suggest an association between elevated airborne concentrations of ozone, a common air pollutant, and activation of eosinophils in the nasal airways of children, a pathological feature of both allergic and non-allergic rhinitis. In previous studies, we found that mice develop neutrophilic rhinitis after a single 4h exposure to ozone, but develop eosinophilic rhinitis after repeated exposures for 9 days. In the present study we tested the hypotheses that: 1) mice will recover from ozone-induced eosinophilic rhinitis after exposure is discontinued; 2) eosinophilic rhinitis will reoccur rapidly in recovered mice upon re-exposure to ozone; and 3) this rapid recurrence of eosinophilic rhinitis triggered by ozone is not dependent on the immune memory of T or B lymphoid cells. Male C57BL/6 (lymphoid cell-sufficient) and Rag2-/- (T & B lymphoid cell-deficient) mice were exposed to 0 (air) or 0.8 ppm ozone (4 h/day) for 9 consecutive weekdays (2wks) and were sacrificed one day or 19 days post-exposure. Some exposed mice that had a 19-day recovery period were re-exposed to a single day of air or ozone. Nasal tissues were processed for light microscopy and morphometric analyses. Ozone-induced eosinophilic rhinitis was resolved after the 19- days post-exposure but returned rapidly after a single exposure to ozone in both T & B lymphoid cell-sufficient and -deficient mice. These results suggest that ozone-induced non-allergic rhinitis occurs rapidly in previously exposed and recovered mice, and that this memory response is dependent on immune cells other than T or B cells (e.g., innate lymphoid cells).

INHIBITION OF SRF:MRTF INTERACTION BY A NOVEL COMPOUND FOR MELANOMA
Shane Mecca
Poster: 551
Mentor(s): Erika Lisabeth (Pharmacology & Toxicology)

MRTF-A (Myocardin-related Transcription Factor) is a transcriptional co-factor whose activity is dependent on F-actin polymerization, thereupon translocating to the nucleus and binding to SRF (Serum Response Factor) and activating transcription. Depletion of either SRF or MRTF has been shown to reduce cell adhesion, motility, and invasion without affecting proliferation in melanoma and breast cancer cell cultures. Furthermore, induced MRTF knockout mice reduced bleomycin fibrosis and melanoma metastasis. The goal of this project was to develop a biochemical assay using ALPHA technology to observe this interaction using purified SRF and a biotinylated MRTF-A peptide. So far, we have run a small-scale chemical screen using three libraries of compounds, 2000 compounds total, and narrowed down our results down to 23 compounds that inhibited our interaction by at least 50% without interfering with the assay. We have tested the dose response of each compound to determine whether any of them inhibited the interaction at much lower concentrations. In the future, we would like to do further testing on these compounds in a Luciferase assay, especially those that were able to inhibit our interaction at lower concentrations. Further development of these compounds could potentially act as MRTF/SRF chemical probes and/or therapeutics for fibrosis and cancer.

SCREENING NOVEL REXINOIDS AS ANTI-CANCER AGENTS
Jessica Moerland
Poster: 552
Mentor(s): Karen Liby (Pharmacology & Toxicology)

Selective ligands for retinoid X receptors, known as rexinoids, possess anti-cancer properties. Bexarotene, the only FDA-approved rexinoid, is used to treat T cell lymphoma. Bexarotene and other rexinoids such as LG100268 are highly

effective in preclinical models for prevention and treatment of breast and lung cancer. Although LG100268 is more effective than Bexarotene, both rexinoids cause adverse side effects, primarily hypertriglyeridemia. The rexinoid LG101506 does not elevate triglycerides but is less efficacious than LG100268 or bexarotene. Our objective is to develop novel rexinoids that are as potent as LG100268 but do not raise triglyceride levels. Suppression of the inflammatory mediator nitric oxide (NO) correlates with in vivo efficacy in preclinical breast and lung cancer models. SREBP is a transcription factor involved in triglyceride synthesis. We measured 1) relative SREBP protein expression in HepG2 cells treated with 0.3 μM rexinoid for 24 hours and 2) iNOS in the media from RAW264.7 macrophage-like cells treated with 0.3 μM drug and stimulated with lipopolysaccharide for 24 hours. Compared to the vehicle control, SREBP levels were 75% higher in cells treated with LG100268 and bexarotene, while only minor differences (<10%) were observed with LG101506 treatment. Two new structurally related rexinoids did not elevate SREBP levels (similar to LG101506) and inhibited iNOS in a dose-dependent manner (similar to LG100268 and bexarotene). Treatment of RAW264.7 cells and HepG2 cells with 15 new rexinoids will be used to help design new analogs and to select compounds for in vivo efficacy studies.

DOCOSAHEXAENOIC ACID CONSUMPTION BLOCKS SILICA-TRIGGERED AUTOIMMUNE RESPONSES IN THE KIDNEYS AND LUNGS OF LUPUS-PRONE MICE.
Amy Freeland
Poster: 555
Mentor(s): Jack Harkema (Pathobiology Diagnostic Investigation), James Wagner (Pathobiology Diagnostic Investigation)

Systemic lupus erythematosus (lupus) is a chronic and debilitating autoimmune disease affecting ~1.5 million people in the U.S. Pulmonary exposure to crystalline silica dust (cSiO2) has been considered an environmental trigger of lupus. The present study was designed to determine the impact of the dietary omega-3 polyunsaturated fatty acid docosahexaenoic acid (DHA) on cSiO2 triggering of B lymphoid cell infiltration in the kidneys and lungs of mice genetically prone to develop lupus, as well as renal tubular proteinosis, another histopathologic feature of autoimmunity. Lupus-prone, female, NZBWF1 mice were fed diets supplemented with 0%, 0.4% or 1% DHA and maintained on assigned diet until sacrifice. The 0.4% and 1.0% DHA diets were equivalent to human consumption of 2 and 5g/day DHA, respectively, making them physiologically relevant. At 8wks of age, mice were intranasally instilled with 1mg cSiO2, or saline vehicle, once/wk, for 4 consecutive wks. Animals were sacrificed 13wks after the last cSiO2 instillation. Pulmonary and renal densities of B lymphoid cells (CD45R+) were immunohistochemically and morphometrically analyzed. Severity of renal tubular proteinosis was also assessed morphometrically in all the mice. Pulmonary and renal infiltrations of B lymphoid cells and renal tubular proteinosis were present in cSiO2-treated mice fed a 0% DHA diet. In contrast, cSiO2-treated mice fed a 0.4% or 1% DHA diet, had minimal or no B lymphoid cell infiltrates and no renal tubular proteinosis. These results suggest that dietary DHA may effectively prevent renal and pulmonary manifestations of lupus triggered by cSiO2 inhalation.

SEX-SPECIFIC EFFECTS OF GESTATIONAL BISPHENOL-A AND BISPHENOL-S EXPOSURE ON FETAL PANCREATIC ENDOCRINE CELLS
Madilyn Johnson
Poster: 556
Mentor(s): Almudena Veiga-Lopez (Animal Science)

Gestational exposure to bisphenol-A (BPA) exposure may cause insulin resistance and type 2 diabetes during adult life. However, no information is available on emerging bisphenol chemicals, such as bisphenol-S (BPS). We hypothesize that BPA, but not BPS, will result in a decrease in pancreatic beta cells and an increase in alpha cells. Pregnant sheep were given daily subcutaneous injections of corn oil, 0.5 mg/kg/day BPA, or 0.5 mg/kg/day BPS from gestational day (GD) 30 to 100. Fetal pancreas beta and alpha cell were detected on GD120 via fluorescent immunostaining using anti-insulin and anti-glucagon antibodies and cell areas quantified using Image J software. Preliminary results demonstrate that beta cells were twice more abundant than alpha cells in all studied groups. We observed sex-specific effects in the control group, with females having lower beta and alpha cell areas compared to males. Compared to the control group, BPA tended to have lower beta cell area in males (but not females). In males and females, BPA tended to increase alpha cell area. BPS exposure had no effect in either sex on beta or alpha cells area. These data suggest a sex-specific effect of gestational BPA exposure on fetal pancreatic endocrine cells, with males being more sensitive. These findings support postnatal defects observed in glucose homeostasis upon BPA exposure. The lack of effect by gestational BPS exposure suggests that these two bisphenols act via different pathways. Additional work is needed to assess long-term effects of BPS in the progeny.

WEIGHT GAIN AND INSULIN RESISTANCE IN MICE LACKING CANNABINOID-2 RECEPTOR
Emily Kurjan
Poster: 557
Mentor(s): Omayma Alshaawary (Epidemiology and Biostatistics), L Karl Olson (Physiology)

The discovery of cannabinoid receptors (CB1R and CB2R) has provided a platform for investigating of the health effects of marijuana. The CB1R is predominantly expressed in the central nervous system, whereas the CB2R is primarily expressed in the immune system. Activation of CB1R is associated with increased food intake and obesity. Epidemiological studies, however, have shown a decreased prevalence of obesity and type 2 diabetes among cannabis users. Here we use high-fat feeding (HFD, 45% of calories from fat vs. control LFD with 10% of calories from fat) to study the associated metabolic changes in male mice lacking CB2R (CB2-/-) when compared to wild-type (WT) C57BL/6 mice. After 12 weeks, WT mice gained an average of 20 grams on HFD compared to 9 grams on LFD (183% vs. 138% increase of basal weight). CB2-/- mice gained an average of 19 grams on HFD (173% increase of basal weight), and an average of 10 grams on LFD (134% increase of basal weight). Importantly, CB2-/- mice fed a HFD were glucose intolerant relative to WT-mice on HFD. No significant differences in the calorimetry parameters measured were detected. In summary, CB2R deficient mice when fed a HFD displayed impaired glucose metabolism despite the absence of significant weight differences, highlighting the potential role of CB2R in insulin resistance.

EFFECTS OF THE EMERGENT PESTICIDES, DIFLUBENZURON AND SPINETORAM, ON GAP JUNCTIONAL INTERCELLULAR COMMUNICATION, A BIOMARKER OF HOMEOSTASIS, IN A RAT LIVER EPITHELIAL CELL LINE
Nina Rackerby
Poster: 558
Mentor(s): Brad Upham (Pediatrics & Human Development)

Gap junctional intercellular communication (GJIC) is a critical cell process needed to maintain the homeostasis of tissues. The disruption of this cell signaling mechanism epigenetically alters gene expression linked to adverse health effects, including tumor promotion. Thus, GJIC is an excellent biomarker for determining toxic effects of environmental and food borne contaminants, such as diflubenzuron and spinetoram. Our objective is to compare the epigenetic effects of diflubenzuron and spinetoram to two legacy pesticides, lindane and DDT, as a function of GJIC, and determine the underlying mechanisms involved in the dysregulation of GJIC. A dye transfer assay in rat liver oval cell line measured GJIC. Pharmaceutical inhibitors, namely U0126 and D609, specific inhibitors of extracellular receptor mitogen activated protein kinase, kinase (MeK) and phosphatidylcholine specific phospholipase C (PC-PLC), respectively were used to determine if these signaling proteins were involved in pesticide-induced dysregulation of GJIC. Results indicated spinetoram, but not diflubenzuron, reversibly dysregulated GJIC that was dose and time dependent. However, spinetorum was over two times less potent than the legacy pesticides, DDT and lindane. Pre-incubation with either U0126 or D609 did not prevent spinetorum from dysregulating GJIC. In conclusion, the dysregulation of GJIC by spinetorum was independent of Mek and PC-PLC that are common signaling pathways by which many other environmental contaminants close gap junction channels, in that DDT and lindane close channels through PC-PLC and Mek, respectively. These results also indicate that these neonicotinoid pesticides are potentially less epigenetically toxic to mammalian systems than the legacy pesticides tested.

THE EFFECTS OF DIESEL EXHAUST PARTICLES ON HUMAN DERIVED NEURAL PROGENITOR CELLS AND MOUSE MODELS, THROUGH MARKERS OF NEURODEGENERATION
Sera Sermet
Poster: 559
Mentor(s): Colleen Hegg (Pharmacology & Toxicology)

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

knowledge can be used to better understand environmental health and help create new preventative strategies against AD.

PHYSICAL SCIENCES

ORAL PRESENTATIONS, SECTION 1
ROOM 36, 8:30 – 10:00 AM

MAGMATIC EVOLUTION OF THE KEWEENAW PORTAGE LAKE VOLCANICS

William Ray Davis

Time: 8:30 AM

Mentor(s): Tyrone Rooney (Earth and Environmental Sciences)

Continental flood basalt provinces (CFBPs) form by the extrusion of massive amounts of moderately evolved lava. These lavas do not resemble the primary melting products of the mantle and instead require significant processing in the lithosphere en-route to the surface. The stacks of lava erupted within CFBP allow us to probe these magma differentiation processes, however CFBPs typically suffer from poor preservation due to subsequent rifting and dissection. Failed rift environments, such as Keewenaw CFBP in the Mid-Continent Rift (Midwest US and Canada), arrest this dissection and preserve individual flows and their stratigraphic relationship. Here we examine the composition of a series of lava flows that erupted sequentially in the Keewenaw CFBP in order to probe the process of magma differentiation. We observe that the lavas are tholeiitic, but are unusually enriched in incompatible trace elements, an observation that cannot be accounted for by simple fractionation/assimilation. To resolve this inconsistency, we applied a recharge, evacuation and fractional crystallization model to lavas of the Portage Lake Volcanics, which represent the Keewenaw CFBP main stage volcanism. Our modelling finds that the inconsistency in incompatible element concentrations can be resolved by a series of recharge events into a partly differentiated magma chamber. Multiple recharge events are consistent with increased concentrations in Ni and Cr, buffered MgO, and the enrichment of incompatible elements within the flow stratigraphy. These results highlight the complex evolution of lavas in CFBP and demonstrate the need for the collection of stratigraphically controlled lavas in order to probe magma evolution.

OPTIMIZING LATTICE QCD CALCULATIONS BY SOLVING THE GENERALIZED EIGENVALUE PROBLEM

Maoshan Liao

Time: 9:00 AM

Mentor(s): Jack Dragos (National Superconducting Cyclotron Lab), Andrea Shindler (National Superconducting Cyclotron Lab)

Lattice QCD has been extensively used to understand the structure of nucleons and has become a fundamental field of particle physics. Using QCD, one can compute the energy states of a nucleon such as the mass of a proton. The state energies are calculated studying the Euclidean time dependence of specific correlation functions. These correlation functions are built with interpolating operators having the quantum numbers of the particles that one is interested in. For protons and neutrons, the large Euclidean time dependence is very difficult to study in lattice QCD because the error of the correlation function calculation increases exponentially with the Euclidean time itself. In this project, we study a method to project the ground state of the proton into smaller Euclidean times to circumvent the above-mentioned problem. In other words, the purpose of this work is to reduce the “noise” to better determine the mass of a proton. The method is based on the use of the General Eigenvalue Problem (GEVP). The GEVP essentially tries to find an improved interpolating operator that has a bigger overlap with the ground state, by reducing the impact of excited states. In this way, we reduce the need to wait large enough Euclidean times where error is large. By using GEVP, the mass of the proton can be estimated with higher accuracy. This method is general and can be used in determining the mass of other hadrons.

SIMULATING THE RESPONSE OF A NEW $BETA$-DELAYED PROTON DETECTOR

Michael Roosa

Time: 9:15 AM

Mentor(s): Christopher Wrede (Physics & Astronomy)

To better understand reactions of astrophysical importance, such as ^{15}O($alpha$,$gamma$)^{19}Ne and ^{30}P(p,$gamma$)^{31}S, a new gas filled detector of $beta$-delayed charged particles has been designed and built for use at the National Superconducting Cyclotron Laboratory. The Proton Detector has separate drift and proportional amplification regions provided by a flex-board field cage and a Micromegas structure, respectively. To

explore the detector's behavior we have developed multiple Monte Carlo simulations using Garfield++ and Geant4. The primary goal is to establish a reliable means of predicting the energy and spatial resolutions. The simulations provide information about the microscopic function of the detector too complicated to determine analytically and will help optimize its operation. This work is supported by the U.S. National Science Foundation under Award Nos. PHY-1102511 and PHY- 1565546 and the U.S. Department of Energy, Office of Science, under Award No. DE-SC0016052

BUILDING A GATING GRID OF NUCLEAR PHYSICS DETECTOR
Pranjal Tiwari
Time: 9:30 AM
Mentor(s): Christopher Wrede (Physics & Astronomy)

Our group has designed and built a Proton Detector that will be tested in a commissioning experiment at the NSCL this spring. The detector is filled with a gas that is used to stop a beam of radioactive ions. After the ions stop and undergo beta decay, they can emit protons moving at different speeds. The slowest-moving protons have astrophysical importance, but have never been observed in the past due to various experimental challenges that can be overcome with this new technology. When the detector is in use, the high-energy ions would damage some components that are needed to measure the protons. I built and tested a "gating grid" device that is effectively a strong electric flyswatter that should prevent this beam of ions from affecting the sensitive components when it is turned on. When the gating grid is off, we will be able to measure the energies of these protons. This will contribute to our understanding of the nuclear energy generation and nucleosynthesis in various astrophysical events.

ONE PLUME OR TWO: AN INVESTIGATION OF EAST AFRICAN MAGMATISM
Liam Peterson
Time: 9:45 AM
Mentor(s): Tyrone Rooney (Earth and Environmental Science)

Large Low Shear Velocity Provinces (LLSVP) are deep structures within the Earth's mantle underlying the Pacific and African plates. These structures are linked to magmatic upwellings, which manifest at the surface as oceanic hot-spot tracks or plume-related continental volcanism. Upwelled material from the African LLSVP erupted as flood basalts in East Africa.

PHYSICAL SCIENCES
ORAL PRESENTATIONS, SECTION 2
ROOM 40, 1:30 – 2:45 PM

EXAMINING THE SPIN TRANSITION IN BRIDGMANITE
Alison Farmer
Time: 1:30 PM
Mentor(s): Susannah Dorfman (Earth and Environmental Sciences)

As earth's most abundant mineral and the predominant mineral of the lower mantle, understanding the behavior of bridgmanite at high pressures is important to further our understanding of the mantle with regards to convection and seismicity. Previous studies agree there is a spin transition of Fe³⁺ in bridgmanite from high spin (HS) to low spin (LS), but haven't reached a consensus on the pressure range of this transition. Using energy domain synchrotron Mössbauer spectroscopy data of bridgmanite decompression for bridgmanites of two compositions, we examined this spin transition. From Mössbauer data, the oxidation and spin state of iron in the mineral can be identified. Both compositions showed development of a second HS Fe²⁺ site at higher pressures; however, a change in the intensity of the HS Fe³⁺ site or development of a LS Fe³⁺ site is not observed in either. The impact of the spin transition in Fe³⁺ on the physical properties of bridgmanite might be too small to be observed with these methods.

MELT GENERATION AND RESERVOIR CONTRIBUTIONS OF EAST AFRICAN RIFT BASALTIC ROCKS SPANNING THE PLIOCENE TO PRESENT
Carolyn Francis
Time: 1:45 PM
Mentor(s): Tyrone Rooney (Earth and Environmental Sciences)

Continental rifts—regions of plate extension—cause immense volcanism that eventually results in the formation of an oceanic spreading center. The magmas that feed rift volcanism are derived from melting of the upper mantle. As a rift

evolves, the plate is progressively thinning, facilitating the upward migration and melting of the mantle. This progressive decompression and melting of the mantle results in variances in magma composition that are imposed by pressure-dependent phase changes in the mantle, such as the garnet to spinel transition that impacts rare earth elements (REE). Here we focus on the East African rift and examine the geochemical composition of a suite of basaltic rocks that span the time period from 5 Ma to present. On the basis of the conceptual model presented above, we hypothesize that REE patterns in the rocks will reflect the progression from garnet to spinel in the mantle. However, this temporal pattern is not evident: the older rock units exhibit a geochemical pattern consistent with a shallower (spinel-containing) source, while the younger rocks exhibit a deeper (garnet-containing) source. These observations suggest that in this portion of the rift, decompression is not the main component contributing to magmatic compositional variation, and that other factors are involved in melt generation. We examine possible contributions from crustal melts or mantle plumes upwelling from the deep mantle. The results of this work add to the growing dataset in the region seeking to constraining the conditions of melt generation and contributions from different geochemical reservoirs.

GEOCHEMICAL ANALYSIS OF DEEP CARBON TRANSPORT AT THE 1.1 GA SEABROOK LAKE ONTARIO CARBONATITE COMPLEX
Noah Vriese
Time: 2:15 PM
Mentor(s): Tyrone Rooney (Earth and Environmental Sciences)

The deep carbon cycle, operating over geological time scales, serves to control long-term climate cycles on Earth via the sequestration of carbon at subduction zones, and atmospheric return via volcanic outgassing. Continental rifts—regions of crustal extension—represent a significant source of volcanic outgassing from the deep Earth to the atmosphere. The eruption of rare, carbonate-rich igneous rocks such as ultramafic lamprophyres (UML), and carbonatites in incipient continental rift environments provides a link between deep carbon and atmospheric return in these settings. A prominent new model suggests that deep carbon sourced from mantle outgassing may concentrate in unstable veins below continental lithosphere, where later melting, upward percolation, and pressure-related separation processes result in the emplacement of UML and carbonatite dykes in continental rift settings. It is these latter processes that are the focus of this study. Here we present petrographic analyses of a suite of UML, and carbonatite dykes erupted during rifting of the continental Superior Craton c. 1.1 Ga, in Seabrook Lake, Ontario. Geochemical bivariate analysis indicates a linear trend between the higher potassium (K), aluminum (Al), and silica content within UML, and lower concentrations within carbonatite dykes. This trend corresponds to the separation of carbonatite from the high-K and Al phlogopite-bearing UML at shallow crustal depths. This devolatilization trend, never before observed at Seabrook Lake, supports the current model of UML and carbonatite genesis. These observations have implications for establishing a direct vector of carbon transit from the deep Earth to the atmosphere in continental rift environments.

RADIUM ELECTRIC DIPOLE MOVEMENT EXPERIMENT
Jacob Wescott
Time: 2:30 PM
Mentor(s): Jaideep Singh (National Superconducting Cyclotron Laboratory/Facility for Rare Isotope Beams)

My name is Jacob Wescott, and along with Brian Hanley and Peyton Lalain, will be presenting about the Radium Electric Dipole Movement Experiment (EDM). This experiment involves the search for a permanent atomic electric dipole movement, which will measure the separation of charge in a neutral particle (in our case, Radium-225 isotope). The separation of charge measured by the EDM is an indication some laws of physics are different when the arrow of time is reversed. My area in this experiment involves High Voltage (HV) Conditioning with electrodes. This process includes applying high voltages between the electrodes to create a high electric field. The conditioning takes any imperfections on the electrode's surface and corrects them. It must be done in an environment free of particulate contamination. The result are electrodes were high voltages can be implemented effectively and safely. The conditioning process starts a pair of electrodes at low voltages, slowly increasing over time. During these conditioning runs, discharges between the electrodes along with the leakage current is observed and recorded. The components of the setup include a vacuumed chamber (where the electrodes are held), High Voltage Chamber (where the voltage is contained for safety), and other measuring components. My talk will involve all of these components and how they interact with one another in this experiment. This work is supported by Michigan State University and the U.S. DOE, Office of Science, Office of Nuclear Physics, under contract DE-AC02-06CH11357.

PHYSICAL SCIENCES
POSTER PRESENTATIONS, SECTION 1
BALLROOM, 9:00 – 10:30 AM

CONSTRAINING THE CRUSTAL STRUCTURE OF EASTERN SIBERIA USING PEACEFUL NUCLEAR EXPLOSION SEISMOGRAMS

Kaitlynn Burkhard
Poster: 562
Mentor(s): Kevin Mackey (Earth and Environmental Sciences)

The crustal structure of eastern Siberia is poorly known due to its inaccessibility and the sparseness of seismic stations and larger earthquakes. Peaceful Nuclear Explosions (PNEs), detonated by the former Soviet Union are seismologically significant because they are so-called Ground Truth events, where the depth and geographic coordinates of energy release (detonation) are precisely known and provide data sources for crustal studies. Seismograms from regional stations for PNEs in eastern Siberia were digitized from analog records, allowing modern processing techniques to be applied to the waveforms. Pn, P*, Pg, Sn, Sg, and unassociated phases were identified to investigate seismic velocities. Regional average velocities, dominated by paths within the Siberian Craton, are: Pn = 8.20 km/s, P* = 7.31 km/s, Pg = 6.17 km/s, Sn = 4.61 km/s and Sg = 3.58 km/s. Additional analysis of waveforms and amplitudes show that the crust SE of Lake Baikal has high attenuation (low Q) for Pn and Pg phases relative to low attenuation (high Q) for Lg phases. The crustal structure and attenuation properties have important implications for nuclear explosion discrimination and event locations. This study is being expanded following the collection of additional data and development of collaborations by the author in Russia in 2017.

PERFORMANCE OF A CRYOGENIC TEMPERATURE SENSOR FOR A SINGLE ATOM MICROSCOPE

Shatha Alabbad
Poster: 563
Mentor(s): Jaideep Singh (Physics & Astronomy)

Although the interior temperature of stars is extraordinarily high, the energy of individual atoms is relatively low and, for that reason, nuclear reactions are rare. One such reaction, $^{22}Ne(\alpha, n)^{25}Mg$, is a key source of neutrons for s-process nucleosynthesis. We aim to measure the probability of this nuclear reaction using a new detector, the Single Atom Microscope, which captures the Magnesium product atoms in a cryogenic thin film of solid Neon. The emission spectra of captured atoms is shifted significantly from the absorption spectra, allowing for optical detection of individual fluorescing Magnesium atoms by selective filtration. Noble gases are an attractive medium because they are transparent, easily purified, inert, efficient, and stable. The Neon, with a freezing point at around 8 Kelvin under vacuum, is grown on a sapphire substrate mounted to a pulse-tube cryocooler with a cooling power of 1.5 Watts at 4.2 Kelvin. It is critical to maintain stable temperature monitoring and control of the Neon film, as the trapping sites of Magnesium atoms and the transparency of the film are sensitively dependent on temperature. The temperature is monitored with a high precision Cernox sensor, and the temperature can be increased via a resistive heater. In this talk, I will present calibration and temperature controlling techniques for our system.

HIGH VOLTAGE ELECTRODE CONDITIONING AND MEASUREMENT OF THE PERMANENT ELECTRIC DIPOLE MOMENT OF RADIUM-225

Peyton Lalain
Poster: 564
Mentor(s): Jaideep Singh (Physics)

A permanent electric dipole moment (EDM) is an indication of the violation of time-reversal symmetry. Symmetry violations of this type are needed to explain the dominance of matter over antimatter in the universe. Due to its pear-shaped nucleus, the Radium-225 atom has an increased sensitivity to this symmetry violation. A uniform and stable electric field is applied to an ensemble of Ra-225 atoms in order to search for its EDM. We search for an EDM by building an atomic clock using magnetic fields and testing to see whether it is faster or slower under an electric field. We aim to increase the sensitivity of our experiment by increasing the electric field by at least a factor of three. To this end, we condition round Niobium electrodes to remove microscopic imperfections which allows us to achieve higher electric fields. Our progress is measured by monitoring the electrodes for discharges as well as steady state leakage current with increased potential difference between them. We define a steady state leakage current to a continuous current around 600 pico-amps while discharges are spikes on the order of 1 nano-amp in the leakage current. My poster will present our high-voltage conditioning procedure and how it works towards these goals. This work is supported by

Michigan State University, the Director's Research Scholars Program at the National Superconducting Cyclotron Laboratory, and the U.S. DOE, Office of Science, Office of Nuclear Physics, under contract DE-AC02-06CH11357.

BORON-DOPED DIAMOND CARBON PASTE ELECTRODES
Sandra McClure
Poster: 565
Mentor(s): Romana Jarosova (Chemistry), Greg Swain (Chemistry)

This research project is focused on evaluating the electrochemical properties of carbon paste electrodes formed with glassy carbon powder and glassy carbon powder modified with an overlayer of boron-doped ultrananocrystalline diamond. This was accomplished by studying the electrochemical response of the different powders using different redox systems in aqueous and ionic liquid media. The presentation will report on the designs of the different paste electrode architectures, cyclic voltammetric studies of the different redox system behavior, Raman spectroscopy to investigate the carbon powder microstructure and SEM to determine the powder morphology. The boron-doped ultrananocrystalline diamond overlayer is formed by subjecting the glassy carbon powder to a microwave plasma consisting of 1% CH4/Ar plus 10 ppm B for doping. The core-shell approach imparts the unique properties of diamond (wide potential window, excellent microstructural stability and weak molecular adsorption) to the substrate powder. Furthermore, the advantages and disadvantages of each material and each proposed electrode body will be addressed. This can be accomplished by looking at the large scale application of boron-doped diamond carbon paste electrodes.

ANTI-CORROSION PROPERTIES OF A NEW TRIVALENT CHROMIUM PROCESS (TCP) CONVERSION COATING ON ALUMINUM ALLOY 2024-T3
Jack Walton
Poster: 566
Mentor(s): Greg Swain (Chemistry)

This research focused on studying the anti-corrosion performance of a new trivalent chromium process conversion coating (TCP-NP) on aluminum alloy 2024-T3. Conversion coatings provide protection from corrosion by passivating the surface of the underlying metal. Hexavalent chromium conversion coatings have historically been used as part of a multilayer coating system to protect aluminum alloys from corrosion. Hexavalent chromium is highly toxic and environmentally unfriendly, so there is a need within the aerospace industry to develop “greener” conversion coatings. TCP is the leading replacement candidate. Unlike other TCP conversion coatings, the new TCP-NP can be formed by immersion without the need for a conventional deoxidation surface pretreatment. Electrochemical methods were used to assess the anti-corrosion properties of the coating in naturally-aerated 0.5 M Na2SO4 + 0.1% NaCl at room temperature. Polarization curve data revealed the coating suppresses anodic (surface oxidation) and cathodic (oxygen reduction) currents around the open circuit potential by ca. 10x. The breakdown or pitting potential was shifted positive by ca. 100 mV by the coating. All the electrochemical data indicate the TCP coating provides excellent stand-alone corrosion protection to the alloy. Accelerated degradation tests were also used to assess the corrosion resistance provided by the coating. These tests included full immersion (5% NaCl, 55 C) and neutral salt-spray (B117, 3.5% NaCl, 35 C). The corrosion damage was assessed using camera photos, surface contact profilometry and digital microscopy. This presentation will review the electrochemical and surface characterization data for the uncoated and TCP-coated alloys.

AN EXPLORATION INTO NEUTRON SENSITIVITY
Maya Watts
Poster: 567
Mentor(s): Stephanie Lyons (Physics & Astronomy), Artemis Spyrou (Physics & Astronomy)

Studying nuclear properties is useful for getting a better understanding of the nuclear processes that occur in stars. These stellar nuclear processes are responsible for forming the known elements in the universe. At the National Superconducting Cyclotron Laboratory, the Summing NaI detector, SuN, is used to measure various probabilities of capturing a particle. These reaction probabilities are referred to as capture cross sections. SuN is a large volume scintillating detector made of NaI crystals. It is used to observe gamma rays from various nuclear reactions being studied. However, in addition to the gamma rays, reaction data show that SuN may also have some neutron sensitivity. This neutron sensitivity is what is being examined in this project. It is being investigated through simulation and comparison with experimental data to determine the neutron information that we can extract from SuN data. Studying the neutron sensitivity of SuN is useful for verifying and developing a deeper understanding of past and future experimental data used for studying stellar processes

PHYSICAL SCIENCES
POSTER PRESENTATIONS, SECTION 2
BALLROOM, 11:00 – 12:30 PM

ANALYSIS OF IODINE ABSORPTION SPECTRUM FOR LASER FREQUENCY CALIBRATION

Nathan Everett

Poster: 570

Mentor(s): Kei Minamisono (National Superconducting Cyclotron Laboratory)

Collinear Laser Spectroscopy experiments are performed at the BECOLA facility at the National Superconducting Cyclotron Laboratory (NSCL) to further our understanding of nuclear structure of radioactive rare isotopes. Laser light and rare isotope beams are overlapped collinearly, and resonant fluorescence is detected as a function of laser frequency. An atomic hyperfine spectrum is measured, from which nuclear information can be deduced. Precise measurement of laser frequency is required for this extraction since the nuclear effect in the hyperfine spectrum is very small. In order to achieve a precise calibration of our laser frequency, a well-known transition in iodine molecules can be used as a reference. In the summer of 2017, an iodine cell was installed and the saturation spectroscopy technique was applied. Although the expected iodine absorption spectrum was obtained, undesirable broadening of the features was observed; the broadening was the result of inadequate temperature control of the cell. Here, results of the initial implementation of the iodine cell will be presented, and ongoing improvements and upgrades to the system will be discussed. This work is supported in part by NSF grant PHY-15-65546 and U.S. DOE under Award No. DE-NA0002924.

AUXILIARY DIPYRIDYLAMIDE LIGAND CONTROL OF DIMENSIONALITY IN COPPER 5-SULFOISOPHTHALATE COORDINATION POLYMERS

Abigail Meyers

Poster: 571

Mentor(s): Robert LaDuca (Chemistry)

A coordination polymer contains metallic cation inorganic centers connected by organic ligands. Hydrothermal reaction of copper nitrate, sodium 5-sulfoisophthalate (sip), and a long-spanning hydrogen-bonding capable dipyridylamide ligand afforded four coordination polymers whose dimensionality depends critically on the dipyridylamide tether length. The four new phases were structurally characterized via single-crystal X-ray diffraction. {[Cu8(sip)4(pbn)3(nic)(l3-OH)2(l2-OH)(l2-H2O)(H2O)4] 5H2O}n (1, pbn = 1,3-propanediaminebis(nicotinamide), nic = nicotinate) manifests an intriguing 2D slab structure featuring trimeric copper clusters containing bridging hydroxide ions and water molecules along with substantial crystallographic disorder. {[Cu3(sip)2(pbin)4(H2O)4] 14H2O}n (2, pbin = 1,3-propanedi- aminebis(isonicotinamide)) shows 1D chain motifs with curled conformation dipyridylamide ligands. {[Cu4(l3-OH)2(sip)2(hbin)] 2H2O}n (3, hbin = 1,6-hexanediaminebis(isonicotinamide)) features [Cu4(l- OH)2(sip)2] butterfly clusters connected into a 3D 3,8-connected network with (4.62)2(426187484) topol- ogy. {[Cu(Hsip)(hbn)(H2O)] 2H2O}n (4, hbn = 1,6-hexanediaminebis(nicotinamide)) exhibits a sawtooth (4,4) grid topology. Variable temperature magnetic susceptibility studies on 1 and 3 revealed antiferro- magnetic behavior (g = 2.079(6), J = 5.7(2) cm 1 for 1, g = 2.14(2), J1 = 19(1) cm 1, J2 = 35(2) cm 1 for 3). Thermal decomposition behavior of 1–4 is also discussed.

SITUATING DEBUGGING LITERATURE IN GROUP COMPUTATIONAL ENVIRONMENTS

Daniel Oleynik

Poster: 572

Mentor(s): Marcos Caballero (Physics & Astronomy), Paul Irving (Physics & Astronomy), Daryl McPadden (Physics & Astronomy)

Computational problem in physics classes are becoming more common as professors integrate it simultaneously with their physics teaching. This is occurring at the introductory level at Michigan State University, integrating the computation using minimally working programs. This combination of both code and physics allows students to have unique encounters with debugging as they encounter coding for the first time. However, current literature on debugging is inadequate to provide a working framework for how these students work through the programs. This research presented in this poster outlines ways that the literature has expanded on current interpretations of debugging, showing both faults in the current interpretation and possible solutions to the framework for future research.

DOUBLE EXPONENTIAL DECAY FILTER ALGORITHM
Jonathan Sheehan
Poster: 573
Mentor(s): Jorge Pereira (NSCL), Jaclyn Schmitt (NSCL), Remco Zegers (NSCL)

Radiation scintillator detectors are one of the most important tools in the fields of nuclear and particle physics, as they allow researchers to measure particles, such as neutrons. Scintillators convert deposits of energy by particles into light, and the attached photomultiplier tubes then convert this light into an electronic signal that can be recorded. Nuclear and particle scientists require such detectors to investigate a wide variety of processes that would otherwise be impossible to study. In modern detectors, the signals from the photomultiplier tubes are recorded by digital systems that record full wave-form traces. These traces are analyzed in mathematical filter algorithms to extract the useful information, such as a particle's energy. H. Tan *et al.* [IEEE Transactions on Nuclear Science, Vol 51, 1541 (2004)] proposed a fast digital filter algorithm based on exponential decay functions to describe the signal pulse. In the present project, we use this algorithm to extract energy information from neutrons detected in scintillators and compare the results with data obtained from other filters.

THE QUANTIFICATION OF VISUAL GRAIN FEATURES AND THEIR ROLE IN INVESTIGATING ERUPTION MECHANISMS
Lillian Slajus
Poster: 574
Mentor(s): Michael Velbel (Earth and Environmental Sciences)

The Phoenix Mars Lander arrived on Mars in May 2008, sending images of the Martian regolith back to Earth. Without chemical data or physical samples, quantification of Phoenix data must be determined through visual features. Using SEM images of analog grains from Mauna Kea and Pu'u Nene volcanoes in Hawaii, this project endeavors to quantify vesicle characteristics such as area, circularity, minimum and maximum axis, aspect ratio between major and minor axes, and roundness through the use of the ImageJ program. Quantification of such attributes has the potential to give insight into the water and volatile contents of magma during eruption. Not only can this information describe the type of volcanic eruption, but give insight into the magnitude and explosivity of the eruption. Hawaiian analogs allows for the evaluation of the data because many details about the Mauna Kea and Pu'u Nene volcanoes are known. The integrity of the quantitative vesicle data can be examined in relation to the known volcanic characteristics by determining whether or not the inferences from the data correlates to the known eruption mechanisms. Beyond the information regarding eruption characteristics, this research also has the potential to guide future endeavors into the quantification of visual features. Because quantification of vesicle characteristics through ImageJ is not a dominant investigation technique, this endeavor provides valuable knowledge on the validity of quantification through visual techniques and the practical application of ImageJ functions to both terrestrial and extraterrestrial volcanic research.

WIND-DEPOSITED SEDIMENT IN THE LEE OF LARGE SAND DUNES IN MICHIGAN'S UPPER PENINSULA
Sarah Thomas, Leslie Grove
Poster: 575
Mentor(s): Randall Schaetzl (Geography, Environment, and Spatial Sciences)

The purpose of this study was to explore the spatial distribution and textural characteristics of silty-sandy wind-blown deposits on the down-wind (lee) side of large dunes in the central Upper Peninsula. Innumerable small sand dunes occur on the wet, sandy floor of Glacial Lake Algonquin. Adjacent to bedrock uplands near the village of Germfask, these dunes become considerably larger, likely due to agglomeration and accretion of sand over time. Downwind, i.e. south and east, of these large dunes, thin deposits of silty-sandy sediment blanket the low uplands. We interpret these sediments as wind-deposited material called loess. Four large dunes were identified, and samples in their lee were examined for thickness and grain size characteristics. Soil maps, along with regression analyses and spatial statistics of these data, provide evidence of transport of both dune sand and loess on strong winds from the northwest. Sand contents in the loess decrease away from the dunes as silt contents increase, suggesting that the sands were derived directly from the dunes, blown over in low suspension. Such transport could only have been driven by strong northwesterly winds. Because the dunes contain almost no silt, the silts were likely transported in suspension from more distant sites on the lake plain proper, and deposited more uniformly across the uplands. This study is the first to examine post-glacial loess in the upper Midwest, and provides insight into early Holocene climate of the Upper Peninsula, which appears to have been dominated by strong northwesterly winds, at least occasionally.

APPLYING A STRUCTURE TO PLANNING IN GROUP WORK
Alyssa Waterson
Poster: 576
Mentor(s): Marcos Caballero (Physics & Astronomy), Paul Irving (Physics & Astronomy), Daryl McPadden (Physics & Astronomy)

With the growing field of group-based learning environments, instructors of these classes are in the practice of guiding students toward better self-learning habits. One of the most difficult areas of group work is the planning stage. Students not only need to know what the problem is asking for: they also need to make connections between the goal and the given information, while needing to utilize their collective knowledge base in a way that forwards their learning. These are few among several aspects that facilitators have to acknowledge when helping their students develop. This ongoing research project is dedicated to identifying and structuring the way that groups in group-based learning can effectively plan a solution to a complex physics problem. Presented in this poster is a comparative analysis of students' planning when tackling complex PBL problems before and after instructor guidance to assess the development of the practice of planning.

PHYSICAL SCIENCES
POSTER PRESENTATIONS, SECTION 3
BALLROOM, 1:00 – 2:30 PM

MASS MORTALITY, MASS MATING, MASS MOLTING, OR JUST A MASS? INTERPRETATION OF FOSSIL ARTHROPOD ASSEMBLAGES FROM THE MIDDLE CAMBRIAN BURGESS SHALE, BRITISH COLUMBIA, CANADA
William Burke
Poster: 580
Mentor(s): Danita Brandt (Earth and Environmental Sciences)

The Burgess Shale is a geologic formation in British Columbia, Canada, that is famous for its preservation of the fossils of large numbers of early marine organisms. These include the fossils of some of the first hard-shelled animals to appear on Earth, including early arthropods. These fossils may occur individually, or they may be found in large numbers contained within slabs of rock. These slabs may form when large numbers of organisms gathered together for ecological reasons, such as molting or reproduction, and then were suddenly buried together. Another way these slabs might form is when the geologic forces that lead to burial, such as a mud slide, collect previously separated organisms into a single area where they then fossilize. These two methods of formation imply distinct differences about the lifestyles of prehistoric animals, and it is therefore important to distinguish between the two when analyzing a fossil slab. Taphonomic analysis, or measurements of the preservation state of fossils and their distributions relative to one another and the sediment, can be used to differentiate between the two methods of formation. This study will use this analysis to compare the formation methods of two slabs containing fossils of Canadaspis, an early arthropod from the Burgess Shale, and analyze what that could mean about the lifestyle of this genus.

THE GEOCHEMICAL AND PETROLOGICAL EVOLUTION OF UPPER FLOWS FROM THE PORTAGE LAKE VOLCANICS
Mitchell Collins
Poster: 581
Mentor(s): Tyrone Rooney (Earth and Environmental Science)

Large igneous provinces (LIPs) are major sources of metallic ore and sulfide deposits such as platinum group elements (PGEs), copper, and pyrrhotite. The erupted sequences of a LIP offer a window into subsurface processes that predict ore genesis. Ore genesis is dictated by lithospheric degassing and fractionation processes related to magmatic evolution. Magmatic recharge events significantly affect these evolutionary processes and are essential to ore genesis within LIPs. The copper-bearing Keweenaw LIP preserves within it, a detailed flow-by-flow history of magmatic evolution of the LIP. The Portage Lake Volcanics series (PLV) is one of the youngest flood basalt sequences within the main stage of Keweenaw volcanism. This study focuses on the geochemical, petrographic, and stratigraphic analyses of its upper flows to clarify effects of magmatic recharge on the processes and evolution within the Keweenaw LIP plumbing system. The data presented indicates the occurrence of multiple episodes of higher flux interrupted by short periods of inactivity, or lower flux, from a primitive source. Within three temporally continuous flow groupings are multiple geochemical shifts from high to low Ti, Nb, and Zr. These geochemical shifts are accompanied by variations in plagioclase crystal size. The upper and lower groups contain consistently large plagioclase compared to the middle group. These observations, along with the presence of plagioclase cumulates, suggest multiple phases of replenishment

from a primitive source during the main stage of MCR volcanism. A more developed understanding of recharge events and consequential geochemical changes can help clarify ore genesis processes within LIPs.

IDEAL INJECTION PARAMETERS FOR GC-MS ANALYSIS OF IGNITABLE LIQUIDS
Caroline Colpoys
Poster: 582
Mentor(s): Ruth Smith (Criminal Justice)

Ignitable liquids such as gasoline are commonly used in intentional fires. Forensic fire debris analysis aims to identify these liquids in fire debris samples collected at a crime scene. To do this, the sample is analyzed by gas chromatography-mass spectrometry (GC-MS) and the chromatogram is compared to reference chromatograms of ignitable liquids. However, as reproducibility of chromatograms is critical to detection and identification of an ignitable liquid in the sample, it is important to understand the effect altering a variety of GC injection parameters has on retention times, peak areas, and abundances of compounds, particularly the more volatile compounds. Using a standard mixture of gasoline and diesel fuel, GC parameters such as injection temperature and injection mode (split versus splitless, pulsed versus non-pulsed) were varied to investigate the effects of each parameter on the chromatograms. The retention time, normalized area, and normalized abundance of characteristic peaks in the standard mixture were compared based on relative standard deviation to assess reproducibility. The parameters offering greatest precision were used to establish ideal injection parameters for future experiments involving the analysis of gasoline.

SPATIAL VARIATION OF MORPHOLOGY AND GEOCHEMICAL COMPOSITION IN KARISIMBI LAVA FLOWS.
Felix Ishimwe
Poster: 583
Mentor(s): Tyrone Rooney (Earth and Environmental Sciences)

Among non-explosive volcanic events, eruptions in highly alkaline volcanic systems are the most dangerous in the world. Highly alkaline volcanic systems generate non-viscous magmas that flow rapidly. This viscosity characteristic results from peculiarities in the magma chemistry, and in particular, the potential for alkali and other species to interfere with silica polymerization. We explore the relationship between the geochemical composition and lava flow morphology in order to improve predictive models for such systems. The Virunga Volcanic Province is a classic example of an alkaline lava field and is located in East African Rift system. This study compiles geochemical and remote sensing data gathered over the previous four decades to understand spatial variations within the province, with focus on Karisimbi, the largest active volcano. Karisimbi shows distinct geochemical and morphological variations from west to east. The western flank of the volcano is characterized by less viscous, silica-undersaturated lava flows measuring more than 20 km in length and less than 10m in thickness. Flows in this region cover several kilometers in width. The east side shows lava domes and flows enriched in silica with average thickness of 68 m and 45 m respectively; Lava flows measure less than 10km in length and 1km in width at the base. We found that lavas with low silica content form very fluid, long, thin and broad flows, while the silica-rich lavas form viscous, thick, short and narrow flows. It is important to know silica content in flows to determine areas exposed to dangerous non-viscous lavas.

DETAILED CHARACTERIZATION OF LOW BACKGROUND β-DELAYED PROTON DETECTOR
Molly Janasik
Poster: 584
Mentor(s): Christopher Wrede (Physics & Astronomy)

In order to determine the rates of two important reactions for the astrophysical rapid proton (rp) capture process, a segmented, low background β-delayed proton detector has been built at NSCL. A detailed characterization of the detector's Micromegas pad plane has been performed using measurements with a radioactive ⁵⁵Fe x-ray calibration source. A fitting routine has been developed to extract the energy resolution from the spectra. First results of detector resolution with P10 gas are reported.

THERMODYNAMIC MODELING AND IMPLICATIONS OF KEEWENAWAN RHYOLITIC TEMPERATURES
Halle Klockner
Poster: 585
Mentor(s): Tyrone Rooney (Earth and Environmental Sciences)

Continental flood basalt provinces consist of thick basaltic layers, with occasional intercalations of explosive tuffs. Significant flows of rhyolite are uncommon, typically occurring towards the top of the flood basalt pile when the supply of magma is waning. The 1.1 billion year old Keewenaw flood basalts (midwest US and Canada) display a different behavior. Within this province, thick accumulations of rhyolite are observed throughout its temporal development. Here we examine one rhyolitic horizon from the Mamainse Point area of Lake Superior. We focus on rhyolites above

deadman's cove conglomerate, and below group 7 of the Keewenaw event and probe thermo-chemical conditions under which these rhyolites developed. We find that these rhyolites contain β-quartz, a high temperature polymorph, suggesting unusually high temperatures during formation. We used Rhyolite-MELTS, thermodynamic modeling software for magmatic systems, in order to model the temperature and pressure of formation for these rhyolites. This modeling yieded an estimate of 900° C at 125 MPa, with a weight of 3% H_2O for a Mamainse Point rhyolites – significantly hotter conditions than would be anticipated through simple evolution of a rhyolite from a basaltic parent magma. We suggest that the unusual thermal conditions in these rhyolites is the result of the mingling between rhyolite magma and a basaltic magma that intruded the magma chamber. This is supported by petrographic evidence of magma mingling. Our results suggest that the increased incidence of rhyolite flows in the Keewenaw might, in part, be related to the mingling of these two magmas types.

RENORMALIZATION GROUP AND RESONANCES
Aaron Kruskie, Nathan Engler
Poster: 586
Mentor(s): Scott Bogner (Physics & Astronomy), Heiko Hergert (Physics & Astronomy)

Renormalization Group (RG) methods are a powerful tool for identifying the relevant degrees of freedom in quantum many-particle systems like nuclei. To describe exotic nuclei produced by the National Superconducting Cyclotron Laboratory (NSCL) and the future Facility for Rare Isotope Beams (FRIB), one must properly account for weakly bound states and resonances. We will discuss applications of RG methods to simple models that encapsulate the essential physics of such states.

PHYSICAL SCIENCES
POSTER PRESENTATIONS, SECTION 4
BALLROOM, 1:00 – 2:30 PM

ANALYSIS OF NEUTRON CAPTURE REACTIONS TO UNDERSTAND NEUTRON STAR MERGERS
Don Nguyen
Poster: 589
Mentor(s): Artemis Spyrou (Physics & Astronomy)

The periodic table lists 118 known elements. Each one owes their existence to extraterrestrial origin in the stars. Most of the heavier elements are formed through a stellar pathway called the r process. In this mechanism, neutrons are rapidly captured during the collision of two neutron stars. Nuclei become extremely neutron-rich before decaying to a stable nucleus. To investigate the r process, an open-source nuclear physics program called TALYS, was used to calculate neutron capture reactions for Molybdenum isotopes. For stable nuclei, there is experimental data of neutron captures. However, for unstable isotopes, there is a wider range of variation since no experimental constraints exist. Theoretical models are thus adjusted, based off already assumed experimental data. The present investigation looks to better grasp this variation. With the first detection of gravitational waves in 2016 and the observation of star mergers as a major source for producing these waves, understanding the r process plays a key role in providing a base for comprehending neutron capture reactions.

CATALOGING SURFACE FEATURES OF SAND GRAINS FROM THE SAGINAW LOWLANDS AS ANALOGS FOR COMPARISON TO MARTIAN SAND GRAINS
Amanda Northrup, Alena Bowman, Harrison Prater, Molly Robles, Seth Vincent
Poster: 590
Mentor(s): Michael Velbel (Earth and Environmental Sciences)

The goal of this research project is to examine sand grains from the Saginaw Lowlands of the Lower Peninsula of Michigan as an analog for a similar site on Mars. This analog will be compared to sand particles found on the surface of Mars. Scanning Electron Microscopic photographs of sand grains from the Saginaw Lowlands were digitally cataloged using an inventory system. Bulbous edges, as defined by Mahaney (2002), are prominent and rounded grain edges that take the shape of a parabolic curve. This characteristic is typically caused by the grains being moved by a fluid or wind. If bulbous edges are identified on many of the photographed grains, this would imply that many of the grain samples experienced movement through either wind or water. Meandering ridges, as defined by Vos(2014) are created through aeolian transportation in deserts or in littoral areas. They can be seen on grains as the intersection line between slightly curved conchoidal fractures. If there are meandering ridges found on the sand grains, then it would mean that they were exposed to wind that changed their surface. The sand grains cataloged in this research came from the Saginaw Lowlands region of the American Midwest. Based on known information about this location, the data collected should

resemble that of sand grains already cataloged in glacial or littoral dune environments. Final results and interpretations will be discussed.

PERPENDICULARLY MAGNETIZED FERROMAGNETS FOR CRYOGENIC MEMORY
Anna Osella
Poster: 591
Mentor(s): Norman Birge (Physics & Astronomy)

When a thin enough non-superconducting material is placed between two superconductors, a supercurrent can still pass between them. This device, called a Josephson Junction, can be used as part of a memory cell in superconducting supercomputers. If the non-superconducting material is a ferromagnet, a phase shift can be picked up between the electron waves coming into the first and out of the second superconductor, depending on the thickness of the ferromagnet. We are able to control this shift by inserting a second ferromagnet that can switch between magnetizing parallel or antiparallel to the first, acting as an extension of the first or cancelling out its effects. This phase difference can then be read as a zero or one and used for memory storage. If a third ferromagnet is added between them, with its magnetization perpendicular to the magnetizations of the other two, then a new type of supercurrent can pass through the junction with the advantage that its behavior is less dependent on the thicknesses of the magnetic layers. We are looking into ways to make the third magnetic layer with natural out-of-plane magnetization. We will report on the magnetic properties of palladium-cobalt and gold-cobalt thin film multilayers with the goal to optimize our Josephson junction memory devices.

A COMPARISON OF GRAIN SURFACE FEATURES ON TWO MARS ANALOGS FROM MAUNA KEA, HAWAI'I
Liam Peterson
Poster: 592
Mentor(s): Michael Velbel (Earth and Environmental Science)

NASA's Mars Phoenix Lander arrived at the northern plains of Mars with the objective of gathering evidence of the presence of water. The payload included an optical microscope which imaged regolith; regolith color, size, and shape were used to infer mineralogy and past environmental processes. However, the 4 μm pixel-1 resolution significantly hindered these inferences. On Earth, research has been conducted relating grain surface features (GSFs) to environmental processes. These studies examine quartz grains due their durability on Earth and their consequent ubiquity in terrestrial sediments. These properties allow for the development of terrestrial environmental reconstructions from GSFs. Later studies examine GSFs of basaltic tephra and volcanic ash to determine eruptive mechanisms, emplacement mechanics, and alteration of deposits. These same methods can be applied to terrestrial analogs of Martian regolith. In this study, spectroscopic and magnetic analogs HWMK600 and PH-07_CP are examined to determine GSF differences across an environmental gradient. This is possible due to the glacial history and current cold, dry environment at the sampling site of HWMK600, and the relatively warm, wet environment at the sampling site of PH-07_CP. We observe a contrast in GSF inventories, specifically, HWMK600 displays more primary morphological and mechanical breakage features, and PH-07_CP displays more polygenetic features. These observations correlate with the environmental differences at the sampling sites. Terrestrially, we conclude that young, cold, and dry basaltic deposits provide an appropriate basis for environmental reconstructions. We further hypothesize that grains of Martian tephra exhibit GSF similar to HWMK600 based on environmental similarities.

THE SPATIAL VARIATION OF EOCENE MAGMAS IN THE EAST AFRICAN RIFT SYSTEM
Rayn Phillips
Poster: 593
Mentor(s): Tyrone Rooney (Earth and Environmental Sciences)

The East Africa Rift System (EARS) represents one of the largest examples of intra-plate magmatism on Earth. Critical to the voluminous eruptions of is the interaction between continental rifting and upwelling material from deep in the mantle in the form of one or more plumes. Such plume(s) are derived from one of two massive mantle structures deep in mantle that have been termed Large Low Shear Velocity Provinces (LLSVPs). Thus, the composition of flood basalts erupted to the surface can be used to probe the composition of the LLSVP from which they are derived. Flood basalt magmatism in the EARS is broadly divided into an initial Eocene phase (45-34 Ma), and a subsequent Oligocene phase (33.9-27 Ma). The Oligocene phase exhibits zonation in the composition of erupted basalts that reflects heterogeneity it its source, however little is known about the spatial distribution of the Eocene phase. Here we present a study of a spatially dispersed suite of Eocene samples using inductively coupled plasma mass-spectrometry. Our major and trace element analyses show that there are similarities in the geochemistry of the Eocene and Oligocene age samples. However, the pattern of zonation observed in the Oligocene is not observed during the Eocene. These observations do not support a model of a single plume impinging beneath northern Turkana/Southern Ethiopia, in the Eocene and

migrating northward. An alternative model is supported whereby distinct pulses of material from the LLSVP might drive magmatism during these periods

MEASURING BETA DECAY OF PROTON-RICH NUCLIDES TO STUDY COMPACT STARS

Jordan Stomps
Poster: 594
Mentor(s): Christopher Wrede (Physics & Astronomy)

Beta decay of proton-rich nuclides can be measured using a detector, currently under development. The total detection system, and its corresponding experimental results, will be applied to the field of astrophysics, specifically to the rates of nuclear reactions driving explosions on the surfaces of accreting white dwarf and neutron stars in binary systems. The detection system consists of a new custom designed gas-filled charged-particle detector surrounded by the existing Segmented Germanium Array for gamma-ray detection. My research is concerned with developing an efficient system of data acquisition. Currently, measurements taken from the detector are collected in large data dumps from data acquisition infrastructure. The data can then be analyzed after experimentation. However, the capability to monitor the data during beam time at the National Superconducting Cyclotron Laboratory is essential so that researchers can make decisions based on preliminary analysis as data arrives during the commissioning experiment in early May and beyond. Using an in-house software called SpecTcl, we can utilize experiment specific traits to customize a system for acquisition and analysis.

NUCLEAR REACTIONS FOR ASTROPHYSICAL PROCESSES

Anna White
Poster: 595
Mentor(s): Artemis Spyrou (Physics & Astronomy)

Nuclear physics research has huge implications for astrophysics, as reactions take place in events such as supernovas. These magnificent events produce new elements and this is a process that scientists are very interested in. One type of process that creates elements is the "p process", which is a process responsible for producing proton-rich nuclei. The p process involves a type of reaction called "(p, γ) reaction" or "(proton, gamma)"; this involves the capture of a proton and the emission of gamma rays. One example of this is the (p,γ) reaction from 91-Niobium to 92-Molydenum. This can occur in the ground state of 91-Niobium or the isomeric (metastable) state, which is an "excited" state. What is unique about 92-Molydenum is that the current astrophysical models are unable to produce its abundance with accuracy. The reaction has a huge impact on the abundance of 92Mo, which is why it is a topic of interest. Therefore, the goal of this project is the investigation of the source of this issue, with an emphasis on the nuclear physics input in the astrophysical calculations. For the purposes of this project, we are interested in cross section (probability) comparisons between the metastable state reaction and the ground state reaction, since the metastable state isn't being included in current models. TALYS, which is an open-source nuclear reaction code, is able to produce cross sections for the reaction of interest, in this case 91Nb(p,γ)92Mo. This project will describe the results that were found during this study.

PHYSICAL SCIENCES
POSTER PRESENTATIONS, SECTION 5
BALLROOM, 3:00 – 4:30 PM

HEAVY ION-INDUCED ISOTOPE PRODUCTION RATES IN A WATER TARGET

Jason Hart, Marina Llewellyn
Poster: 598
Mentor(s): Gregory Severin (Chemistry)

The purpose of this experiment is to use experimentally measured radioisotope yields from ^{40}Ca heavy-ion irradiation of water at the NSCL to check the accuracy of yield calculations. The comparison between calculation and experiment was used to predict yields from future water-irradiations with ^{48}Ca and ^{78}Kr beams. To perform the experiment, a ^{40}Ca beam at NSCL was shot at a water target. The product radioisotopes were collected and their quantities were recorded. LISE++ software and theoretical cross-section data were used to predict the yield of isotopes. The predictions were compared to the experimental yields, and then were used to predict radioisotope yields from ^{48}Ca and ^{78}Kr beams that are planned for future experiments. If a water target is used at FRIB, this data will be helpful in determining what isotopes will be present in the water. It also shows how the calculated predictions vary from actual yields. Results have not been finalized but will be available at the time of presentation.

SIMULATION OF RADIATION INTERACTION IN AN INORGANIC SCINTILLATOR
Marcell Benkes-Toth
Poster: 599
Mentor(s): Sean Liddick (National Superconducting Cyclotron Lab)

This project focused on the use of a new CeBr3 scintillator to perform beta-decay studies on neutron-rich nuclei. A key requirement of these types of experiments is the ability to localize an emitted beta-decay electron to an area of a few millimeters. The better the localization in the scintillator the better the random background can be removed. Scintillators have the added advantage of a fast time response, enabling the lifetimes of individual nuclear states to be measured. The scintillator, a 4 cm by 4 cm by 3 mm wide crystal, will be read out using a 16 by 16 array of light detecting photomultiplier elements. Each of the pixels have a single output and allow for high accuracy positional resolution. Before testing began with the actual detector, simulations were performed using the GEANT4 framework. Billions of particles were simulated with starting points, ending points, and energy depositions all being tracked by the software. These simulated results were then processed to extract the position of the radiation interaction and the total energy deposited into the detector. The position distribution of the energy deposition was recorded in the simulation using a 256 pixel grid, mimicking the information that will be obtainable from the detector. Results on the accuracy of the position and energy determination will be presented.

LIGHT TRANSPORT SYSTEM FOR LASER SPECTROSCOPY EXPERIMENTS AT BECOLA/NSCL
Colton Kalman
Poster: 600
Mentor(s): Kei Minamisono (National Superconducting Cyclotron Laboratory/Facility for Rare Isotope Beams)

The BEam COoler and LAser spectroscopy facility (BECOLA) at NSCL uses collinear laser spectroscopy (CLS) to explore nuclear structure of radioactive isotopes. A new pulsed laser system was recently acquired to redistribute electronic populations to atomic energy levels favorable for CLS, allowing for a greater number of isotopes to be studied. BECOLA's laser systems are situated in a room away from the experimental area. The laser light must then be transported approximately 20 meters to the experimental area. The pulse laser system creates high energy pulses of deep UV light. Deep UV light can permanently damage an optical fiber in a process of solarization. Also coupling light into a fiber can be problematic due to the poor spatial profile of pulsed laser light, which leads to large power loss. As an alternative means to transport light, a new mirror transport system is under design to send the laser light between the rooms. Requirements for the transport system and designs of the new mirror transport system as well as tests for the viability of the fiber transport will be discussed. This work is supported in part by NSF PHY-15-65546 and US DOE DE-NA0002924.

ELECTROACTIVATED ALKYLATION OF AMINES WITH ALCOHOLS VIA BORROWING HYDROGEN METHODOLOGY
Gabriela Keeney
Poster: 601
Mentor(s): Benjamin Appiagyei (Chemistry)

C-H activation has emerged as a powerful tool in synthesis of medicines, industrial materials and natural products and has the potential to revolutionize organic chemical industries.¹ In this work, H/D exchange shows that C-H bonds adjacent to –OH or –NH2 groups can be electrochemically activated over catalytic electrodes. ¹ Though useful in their own right, these deuteration studies also uncovered a mild, electrocatalytic method for alkylating amines with alcohols. Methanol, primary, secondary, and bulkier alcohols such as cyclohexanol and benzyl alcohols all readily alkylate simple secondary amines such as pyrrolidine. Via alkylation of ammonia, lab staples triethylamine and N,N-diethylbutylamine are easily made from the corresponding alcohols. Many active chemicals, pharmaceuticals, herbicides, conducting polymers and components of organic diodes contain alkylamines. For many years, these class of compound is achieved via classical methods such as reduction, reductive alkylation, and electrophilic alkylation. These conventional methods have been improved over the years, however they suffered from several disadvantages: (a) the use of alkyl halides or strong reducing agent which are less benign to the environment, (b) the generation of equimolar mixture of wasteful salt as byproduct and (c) lack of selectivity which leads the formation of quaternary ammonium ions. Electroactivated reductive alkylation of amines with alcohol and water as solvent provides a new and a more benign approach for the synthesis of alkylamines.

DETECTOR REPAIRS TO STUDY THE NUCLEAR REACTIONS OF SUPERNOVAE
Andrew Mizer
Poster: 602
Mentor(s): Heiko Hergert (Physics & Astronomy), Remco Zegers (Physics & Astronomy)

Electron-capture reactions and beta-decays of atomic nuclei plan an important role in astrophysical phenomena such as the evolution of massive stars. Unfortunately, these reactions and their rates are very difficult to measure directly. However, information from which the reaction rates can be derived can be obtained from nuclear charge-exchange reactions. The specific charge exchange reaction of interest in this project involves a proton (p) taking the place of a neutron (n) in a nucleus, thus ejecting said neutron. By studying these (p,n) interactions, the Gamow-Teller strength distribution can be found, which can then be used to calculate the electron-capture and beta-decay rates. Many of the nuclei in stars are unstable and are not readily available on earth. At NSCL beams of these unstable nuclei can be produced, and to study the (p,n) reactions, experiments involving the beams are ran in inverse kinematics. To accomplish this, a beam of radioactive ions is fired at a liquid hydrogen target, and a neutron is ejected and detected in a low-energy neutron detector array, LENDA. NSCL has recently acquired a new set of larger neutron detectors from the University of Notre Dame, but they require some repairs and need to be characterized. They need to be checked for light leaks, which sometimes involves re-wrapping the entire detector. The PMT's also must be checked and re-glued if needed. The quality of these repairs will be evaluated via the timing resolution of the detectors post-repairs. A custom frame is also in development.

HYDROGEN BONDING EFFECT ON ELECTROCATALYTIC UPGRADING OF LIGNIN MONOMERS TO BIOFUELS
John Walch
Poster: 603
Mentor(s): Ben Appiagyei (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, which is that the complex mixture of monomers and dimers in bio-oil readily undergo acid or base catalyzed polymerization, especially upon heating. They may also mutually interfere in the catalytic reduction processes, so an understanding of such interactions is essential to success in moving from model systems to real bio-oil. This research aims to address this concern by exploring the mechanism of the electrocatalytic hydrogenation process. Building on Dr. Jason Lam's recent study of ECH of guaiacol 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 selectivities as a function of concentration are being used to study the effects of hydrogen bonding within and between substrate molecules. The general question to be addressed is whether the presence of one molecule can activate or inhibit the catalyst in reduction of another.

AN ANALYSIS OF THE EFFECTS OF BEARD PRODUCTS
Gopal Shah
Poster: 604
Mentor(s): Per Askeland (Engineering), Carl Boehlert (Engineering)

With an increasing number of people growing a beard, many companies have come out with a variety of products form shampoo to oil to shaving butter to special combs and brushes. It is important to be able to understand if and how each product affects beard hair. One's body produces a natural sebum oil which acts as a conditioner for hair and provides hair much needed nutrients as it grows. The sebaceous glands however, cannot produce enough oil to keep up with the beard growth and therefore, products such as beard oil can be used to aid a proper growth of the beard. A beard grown for two weeks without any products will be used as a control. Beard hair grown for a month using beard shampoo, conditioner, and oil in conjunction with each other will also be collected. All beard hair will be collected and dried prior to analysis. A Scanning Electron Microscope will be used to do the analysis; therefore, each hair sample will be coated in a 15-20 angstrom carbon filament. Secondary electrons will be used to analyze the topography of the samples. Energy Dispersion Spectroscopy (EDS) will be used to measure change in elemental concentration as beard products are used. Molecular changes will also be looked at under the electron microscope. The effects of dry shaving versus using shaving cream will also be explored. The findings will be reported in this paper.

PLANT SCIENCES

POSTER PRESENTATIONS, SECTION 1
2ND FLOOR ART GALLERY, 9:00 – 10:30 AM

IDENTIFICATION AND CLASSIFICATION OF RHIZOCTONIA SOLANI ON DRY BEANS

Amanda Griffin

Poster: 725

Mentor(s): Martin Chilvers (Plant, Soil, & Microbial Sciences), Janette Jacobs (Plant, Soil, & Microbial Sciences), Hyunkyu Sang (Plant, Soil, & Microbial Sciences)

Rhizoctonia solani is a virulent causal agent associated with seed, root, and stem rot of dry beans. Damage from Rhizoctonia solani infection can result in superficial stem lesions, root rot, plant stunting, or total lack of germination and emergence of seed. Michigan is the second leading producer of dry beans in the United States, accounting for 14% of the total bean production. The objectives of this study were to determine the genetic identity, phylogenetic relationship, and pathogenicity of Rhizoctonia solani isolates from a survey conducted from 2014-2017 of diseased dry beans in Michigan. Purified isolates were amplified to identify the nuclear ribosomal internal transcribed spacer (ITS) region, using polymerase chain reaction. Phylogenetic analysis of the ITS sequences was conducted using the GenBank sequence database. From the Rhizoctonia solani isolates collected, five anastomosis groups (AG) belonging to the multinucleate AG-2-IIIB, AG4, AG5, AG11, as well as a genetically distinct group, and one bi nucleate BR-(AG-A) were identified. The majority of the isolates belonged to the AG-2-IIIB group. A subset of isolates representing each anastomosis group identified was screened against red kidney “Red Hawk” and black “Zorro” dry beans, and soybeans “Sloan” in in vitro seed rot and seedling pathogenicity assays to evaluate their ability to cause seed, stem, and root rot, respectively. Isolates within AG-2-IIIB and AG-4 were found to be the most aggressive across the hosts. Results from this study contribute to a better understanding to the prevalence and pathogenicity of Rhizoctonia solani in Michigan.

THE SRNA ARCZ DIFFERENTIALLY REGULATES THE CATALASE GENES OF ERWINIA AMYLOVORA

Daphne Onsay

Poster: 726

Mentor(s): George Sundin (Plant, Soil, & Microbial Sciences)

Fire blight is a bacterial disease caused by Erwinia amylovora that infects apple and pear trees in a single season.When environmental conditions prove favorable, this organism rapidly moves through the vascular system of plants and infects flowers, shoots, and rootstocks. The entry of the pathogen into the plant tissue results in the formation of reactive oxygen species by the host as a defense response. Pathogen-induced enzymes, such as catalase, degrade reactive oxygen species. In this study, the contribution of E. amylovora catalases KatG, KatA, OsmC, and Tpx to virulence and survival in non-host environments was determined using catalase gene mutants. We found that ArcZ, a sRNA required for virulence, regulates some of the catalase genes.We generated catalase mutants to further understand their role and whether they are differentially regulated by the sRNA ArcZ.These mutant strains were tested along with wildtype and an arcZ mutant strain in the following phenotype assays: zone of inhibition, tobacco survival, and catalase activity assay. The results indicated that arcZ mutants yielded a reduced catalase activity. In addition, we found that KatA and OsmC are downregulated by the arcZ mutant, and Tpx is upregulated by the arcZ mutant. Also, we observed decreased survival of the catalase mutants in tobacco, increased susceptibility to hydrogen peroxide, and decreased catalase activity. The outcome of this study was to solidify our understanding of how ArcZ differentially regulates the catalase genes, and the role that ArcZ plays in oxidative stress of E. amylovora.

A BIOINFORMATICS APPROACH TO FINDING FIRING GENES IN FUSARIUM

Kasey Pham

Poster: 727

Mentor(s): Frances Trail (Plant Biology)

The fungus Fusarium graminearum causes the devastating disease Fusarium head blight in wheat and other cereals, inflicting millions of dollars in yield losses each year. As a sac fungus, F. graminearum reproduces by expelling spores from a sac-like perithecium. The fungus grows in the remains of wheat on the ground in a field, then shoots its spores into the air when the plant starts to flower, infecting the inflorescences and producing mycotoxins dangerous to humans. Spore firing is a key part of the fungus’ life cycle, but many parts of both the genetic and physiological mechanisms behind it are still unknown. Previous work has identified individual genes involved in spore firing through

the comparison of gene sequences of firing mutants and wild type strains. However, with the development of a well-annotated F. graminearum genome, we can now identify putative firing genes and compare F. graminearum to related spore-firing fungi before taking experiments to the lab bench. This study utilizes the genomes and transcriptomes of six taxa to identify putative spore-firing genes using a comparative phylogenomic approach in readily-available software. In addition, we use time courses of RNAseq data in three of those taxa over their life cycles in order to further filter putative genes. The resulting list will be used to choose genes for knockout experiments characterizing spore-firing mutants. Our work furthers the understanding of F. graminearum's reproduction, which is key to developing methods of combating its effect on agriculture.

FOREIGN SOIL EFFECT ON MICROBIOME SELECTION AND PLANT PRODUCTIVITY IN TRIFOLIUM SPP.
Madison Rabbitt
Poster: 728
Mentor(s): Colleen Friel (Plant Biology), Maren Friesen (Crop and Soil Sciences)

The plant microbiome is a complex community that consists of specialized microbes that are essential to the preservation of plant life on Earth. These communities have been a key causative of plant health, function, and productivity. Previous studies have suggested that microbial partners are selected on a genomic level. The goal of this study is to investigate whether the resident microbial community of an adapted soil of a certain species of Trifolium can form a symbiotic partnership with a different species of Trifolium, and whether this will influence plant productivity. It is hypothesized that the rhizospheric and endophytic communities will differ between each species, while within each species, the presence of an adaptive soil will yield higher plant productivity. To test this hypothesis, eight species of Trifolium from within a single ecosystem were selected from Bodega Bay, California. Soil selection was determined such that each species had two corresponding "adaptive" soils, and two corresponding "non-adaptive" soils. A soil was labeled as adaptive if it was collected from underneath the species in question, and labeled a non-adaptive soil if it was collected from a different location in the field. Plant productivity was determined using expanded leaf count and dry shoot weight. The microbial community structure was analyzed via DNA extraction and 16S rRNA analysis. A variance in plant productivity data between experimental groups indicates that soil origin plays a role, however future data from DNA extraction needs to be analyzed to gain more specific insight into the microbial communities involved.

INTRASPECIFIC VARIATION OF LICHEN CHEMISTRY
Syrena Whitner
Poster: 729
Mentor(s): Alan Prather (Plant Biology)

Lichens are a symbiotic association between a filamentous fungus and a photosynthetic partner (alga or cyanobacterium). However, recent discoveries suggest the presence of a third partner, at least in some lichens; that resides in the cortex of macrolichen thalli. Many lichens contain a diversity of secondary metabolites, which are frequently consistent enough that spot tests or other chemical profiling techniques can be used to delineate species. However, there can be variation in the amount or even presence of certain secondary metabolites in lichens. This study aims to investigate whether differences in the partners within the lichen symbiosis lead to intraspecific variation of lichen chemistry. To do so, we first examined the chemical profiles of 11 lichens species collected in the Pacific Northwest. Secondary metabolites were extracted from fragments of each lichen using acetone, then run on a thin layer chromatography plate in solvent C. Chemicals were identified using a standard reference through calculation of Rf values. In all, 42 different secondary metabolites were identified. Ranging from one to 12 metabolites within various species, Pseudocyphellaria crocata exhibited the most. There were also several instances where variation was observed within individuals of the same species. Furthermore, we plan to expand our sample size and range of locations by examining chemical profiles of lichen herbarium specimens. Lastly, isolated third partners (obtained through DNA extraction and polymerase chain reactions) will be sequenced to determine whether differences in partners within the lichen symbiosis correlate with differences in their chemical profiles.

PLANT SCIENCES
POSTER PRESENTATIONS, SECTION 2
2ND FLOOR ART GALLERY, 1:00 – 2:30 PM

WHY ARE SOME INDIVIDUAL PLANTS DEMOGRAPHICALLY IMPORTANT IN FRAGMENTED LANDSCAPES?

Paige Barnes
Poster: 731
Mentor(s): Lars Brudvig (Plant Biology), Christopher Warneke (Plant Biology)

We explored how habitat fragmentation and corridors impact plant recruitment dynamics through the study of six plant species, which were transplanted into a replicated set of fragmented experimental landscapes. These were founder populations, not already present in our experimental sites. During the past decade, relatively few of these founder plants have contributed disproportionately to recruitment of new individuals. However, there is a knowledge gap regarding the mechanisms that govern why these individuals have become demographically important, that is, that have contributed to the vast majority of recruitment, while others have not. We hypothesized that important factors for recruitment include: habitat fragmentation factors (edge effects, isolation effects, etc), variation in competitive neighborhood, canopy cover, parental performance, and soil water holding capacity (WHC). At each of 448 founder plant locations, we surveyed the competitive neighborhood and canopy cover. For the other factors of interest, we utilized preexisting data collected by other researchers within our same experimental sites. We used Structural Equation Modelling to examine which effects best predicted plant recruitment patterns. Results suggest that across most species, there are edge effects. However, these edge effects are often mediated through other factors, such as canopy cover, though the exact relationship is species-specific. Perhaps surprisingly, WHC and competitive neighborhood did not have any significant direct effect on most species recruitment dynamics. Overall, we find that habitat fragmentation impacts plant recruitment in both positive and negative ways, depending on the effect involved. This work has implications in ecological restoration and population management in fragmented landscapes.

CVNODULE: A TOOL FOR RAPID NODULE IDENTIFICATION

Aleksandar Bonev
Poster: 732
Mentor(s): Maren Friesen (Plant Biology)

Nitrogen (N) is essential for plant growth, and the need for nitrogen in agriculture is normally addressed using synthetic, N-rich fertilizers. Runoff of these fertilizers into the environment has dire consequences including loss of local species diversity and eutrophication of nearby waterways. Naturally occurring soil bacteria called rhizobia can supply this need for nitrogen by fixing inert atmospheric N into more bioavailable forms when associated with plants. Leguminous crops such as soybeans, alfalfa, and common beans utilize these rhizobia in specialized organs called root nodules. In these nodules, photosynthetically fixed carbon from the plant is given to the rhizobia in exchange for fixed nitrogen, and much of this nitrogen remains in the field post-harvest, mitigating fertilizer need in successive years. This has put nodulation at the center of plant breeding programs aimed at optimizing crop rotation. Difficulties in measuring nodulation phenotypes has resulted in a bottleneck at this stage. To address this, we present here CVnodule, a newly developed program for automatically counting nodules in root images. CVnodule utilizes computer vision libraries in Python and training via machine learning algorithms to rapidly detect nodules and root length in root images made using a simple desktop scanner. These measurements can be initiated and reviewed in an interface that is easily navigated, and their validity has been gauged using manual measurements. We seek to have CVnodule drastically reduce nodule phenotyping time and thus allow for more rapid artificial selection of leguminous crop varieties to address the nitrogen needs of global agriculture.

AQUAPORIN EXPRESSION IN BARLEY FOLLOWING PARTIAL ROOT EXCISION

Jillian Howland
Poster: 733
Mentor(s): Philip Strong (Lyman Briggs)

The purpose of this study was to investigate the changes in aquaporin gene expression when the transpiration pathway of barley, *Hordeum vulgare* L., was interrupted through partial root excision. It presents the essential relationship between leaf transpirational water loss and root aquaporin activity, to maintain water balance within the system of the plant. We hypothesized that with the removal of approximately half of the seminal root, the plant would increase the activity of aquaporins in the remaining root tissue to maintain the same volume of water passing through the plant for transpiration. This concept is assumed based on changes in plant transpiration observed from previous studies in literature. We found that when approximately half of the root system was removed, transpiration did not decrease, but

rather increased slightly by an average of 17.10%. This shows that the remaining roots must have taken more than twice as much water per unit root-surface-area (RSA) than before partial root removal. This increase in transpiration could have been achieved through up-regulation in AQP gene expression, which could have led to the increase in AQP activity.

VARIABLES AFFECTING POLLINATION IN RESTORED PRAIRIES
Alexandrea Peake
Poster: 734
Mentor(s): Jonathan Bauer (Plant Biology), Lars Brudvig (Plant Biology)

Many species of pollinators are facing continuously increasing amounts of habitat destruction, fragmentation and degradation, resulting in declines in population sizes and species abundance. Habitat restoration can be useful in rebuilding ecosystems, but often focuses only on plant community reestablishment and takes a "if you build it, they will come" approach to reestablishing non-plant communities. Since the restoration of plant-pollinator interactions is so understudied, we tested what variables affect pollination rates among restored prairies in southwestern Michigan. To do this we grew over 120 native plants (Chamaecrista fasiculata) in a greenhouse, and once they started flowering we put four out in each prairie we tested—two bagged plants as controls to prevent pollination and two unbagged plants. At the end of the week the plants were all collected and brought back to the greenhouse, and were taken care of until they produced seeds. Once they produced seeds the data was recorded and tested, so that we could see what variables affected the pollination between the restored prairies. From the 1,217 flowers monitored, we found that out of all 60 bagged plants, only one of their flowers produced a fruit—indicating that Chamaecrista requires pollinators to reproduce. Additionally, we found that floral cover was the most important predictor of fruit production ($p=0.049$) as well as for seed production, although for seed production it was even more closely related ($p=0.0001$). This indicates that in order for restored prairies to facilitate pollination, there needs to be open flowers.

DETERMINATION OF LEAF SPECIES USING CONVOLUTIONAL NEURAL NETWORKS
Dante Poe
Poster: 735
Mentor(s): Shin-Han Shiu (Plant Biology)

Advances in computational methods for plant species identification can be useful for plant biologists and plant enthusiasts. Here we develop a machine learning algorithm that predicts the species of a plant from an outline of its leaf. We used TensorFlow, an open source software library used for deep learning created by Google, to develop our predictive algorithms. Deep learning is a subfield of machine learning involving algorithms designed the mimic biological neural networks that use layers of neurons, or nodes, to learn to identify patterns in your data. We are using a type of deep learning called convolutional neural networks. Convolutional neural networks are uniquely able to identify patterns from multidimensional input data. This makes them very useful for image classification. To accomplish this task, we used a supervised machine learning approach, where the models are trained on images with species labels and then tested on images without labels. The models are then scored based on how accurately they classify the test images. The leaf outline data used for training the model was provided by Daniel Chitman. In this presentation, we will compare the accuracy of our model to other leaf species identification methods.

POPULATION DYNAMICS OF PRAIRIE SPECIES UNDER EXPERIMENTAL WARMING
Katarina Renaldi
Poster: 736
Mentor(s): Meredith Zettlemoyer (Plant Biology)

Since the Industrial Revolution, global temperatures have increased dramatically. Mean annual temperatures have risen 0.85°C since 1880, and will likely rise another 0.3-1.7°C by 2100. Warming is expected to influence plant communities by altering growing season conditions and length, species composition, and growth rates. Extinction risk is also expected to increase with future rising temperatures, which will result in decreased biodiversity which would lower the inherent value of an ecosystem. As such, we predict that warming may influence species declines in Kalamazoo County, MI. Studies show that extant species have faster growth rates relative to locally extinct species; these differences in growth rate likely contribute to population decline. Additionally, locally extinct species may demonstrate higher mortality and reduced growth in response to warming temperatures relative to extant species. Using an experimental warming array at Kellogg Biological Station, the differences in mortality and growth rate in confamilial pairs of locally extinct and extant species under ambient and warmed (+3°C) conditions were examined. Locally extinct species experienced significantly higher mortality (X²=8.61, $p=0.003$) and reduced growth rates (X²=11.92, $p<0.001$) regardless of temperature. Warming increased mortality (X²=35.24, $p<0.0001$) and tended to reduce plant growth, indicating that climate warming could potentially influence local population declines. Therefore,

overall climate temperature increase may contribute to species loss in Kalamazoo County. Predicting future extinction risk under warming climates will be critical to managing biodiversity.

PSYCHOLOGY

POSTER PRESENTATIONS, SECTION 1
BALLROOM, 9:00 – 10:30 AM

INVESTIGATING LINEAR ATTENTION EFFECTS ON WORKING MEMORY RECALL

Lindsay Ackerman
Poster: 607
Mentor(s): Susan Ravizza (Psychology)

It is known that attending to items increases the accuracy of recalling those items. Further, previous studies have suggested that directing attention using either proactive or retroactive cues increases the probability that a stimuli will accurately be recalled. However, no study to date has investigated if directing attention externally through proactive cues or internally through retroactive cues affects accuracy of recall linearly. In our previous studies, we have found that there is a linear effect on recall accuracy for proactive cues but not for retroactive cues. In the current experiment, we are testing whether this effect is due to the type of stimulus presented or due to the different mechanisms of attention for internal or external recall.

DIFFERENCES IN GUILT AND SELF-ESTEEM BETWEEN THE JUVENILE SEX OFFENDER AND NON-SEXUAL JUVENILE OFFENDER

Ashley Anderson
Poster: 608
Mentor(s): Caitlin Cavanagh (Criminal Justice), Erica Dalzell (Criminal Justice), Kaitlyn Rines (Criminal Justice)

Studies show that inadequate feelings of guilt and inflated self-esteem are associated with adolescent sexual offending (Callison, 2014). However, no studies have compared feelings of guilt or an inflated self-esteem between juveniles who have committed a sexual offense and non-sexual juvenile offenders. Utilizing the Youth Level of Service Assessment, the present study examines if inadequate guilt and inflated self-esteem are more prevalent in juvenile sex offenders compared to their non-sexually deviant counterparts. Gaining a better understanding of the youthful sex offender can improve future treatment plans, services, and resource allocation that benefit the juvenile and community.

COLLEGE STUDENTS' STRESS REACTIONS: ROLE OF EMPATHY AND SUBSTANCE USE

Brooke Bearden, Deepika Bandarupalli, Jake Sadilek
Poster: 609
Mentor(s): Alexandra Burt (Psychology)

Mental health is critically important on college campuses, with anxiety problems being the most commonly reported ailment among students. Anxiety often impacts many aspects of daily life in significant ways. Specifically, previous studies of adults have shown that people with anxiety are more likely to use substances as well as be less empathetic. The current study aims to extend these findings by examining these associations among college students (N=676), a potentially important extension given that college is a unique setting wherein substance use is very prevalent. Those who score highly on the stress reaction scale from the Multidimensional Personality Questionnaire (MPQ) tend to describe themselves as prone to worry and feeling anxious. Empathy, measured by Development of the Adolescent Measure of Empathy and Sympathy (AMES), is one's ability to understand or feel another person's perceptions or emotions, and has been linked to both successful careers and relationships. Based on previous findings, we predict that participants with high substance use and low empathy are more likely to have high scores for stress response.

MEANINGLESS TRAINING EXPERIENCES AND VALUE OF THE TRAINING PROGRAM
Alexandra Brozowski, Erin Elms
Poster: 610
Mentor(s): Robert Gray (Psychology)

This project builds on past research in meaningful job training and focuses on if meaningful or meaningless feedback influences ratings of a job training program. The hypothesis was that those who received meaningful feedback and an enthusiastic training program would rate the training as more valuable, and those who received meaningless feedback and a dull training program would see it as meaningless. The purpose of this study was to see if the type of feedback influenced training program ratings and how confident participants felt in the tasks they learned. This study was made up of 95 MSU Psychology undergraduate students, who viewed a training video on an email writing task, wrote one themselves to be scored and received feedback, and then completed a few short surveys on training meaningfulness and usefulness. The results of this study were that those in the meaningless feedback condition rated their training as more meaningful and felt more confident with the email writing skills, so the hypothesis was not supported. These results potentially imply that how training videos are presented and how feedback is given do not affect the utility or value of a training program.

EMPLOYEE ATTRACTION TO WELLNESS PROGRAMS: EXPLORING GENERATIONAL DIFFERENCES
Kate Den Houter
Poster: 611
Mentor(s): Danielle Gardner (Psychology), Ann Marie Ryan (Psychology)

With a significant increase in chronic disease and illness nation-wide, employers are feeling the burden of rising healthcare costs. To combat these costs, employers are turning their focus towards the improvement of employee health and well-being by instituting corporate health and wellness programs. However, participation in these programs vary, affecting their overall success. The aim of this study is to examine attraction to different forms of wellness programs and consider whether generational differences exist in levels of attraction. Two common variations on programs were examined, one with a greater emphasis on a healthy work environment through on-site resources, and one with an equal emphasis on health, but a greater use of online, referral, and off-site offerings. Participants were presented with a scenario in which they were comparing the health and wellness initiatives taken by two potential employers and then asked to rate the programs in terms of their attractiveness. Analysis found age to be unrelated to preference, with all generational groups preferring on-site programs. On-site programs were rated higher in terms of perceived organizational fit, company attractiveness, intention to apply for a job, and likelihood of accepting a job offer when compared to the online/off-site program.

EVALUATING THE EFFECTIVENESS OF POLICE OFFICERS' USE OF IDENTITY MANAGEMENT STRATEGIES
Kate Den Houter
Poster: 612
Mentor(s): Dia Chatterjee (Psychology), Ann Marie Ryan (Psychology)

Prior research has shown that policing is a stigmatized profession. A spate of news stories describing controversial interactions between police officers and members of public further perpetuates a stereotypical view of the profession. We use the stigma management communication model to assess whether police officers' use of certain identity management strategies may be considered efficacious or not by members of the public. Identity management strategies are behaviors that people use to navigate stigmatizing situations. Specifically, in this study we evaluated the effectiveness of four identity management strategies of accepting, avoiding, evading, and denying stigma that are used by police officers in situations where their behavior is being called into question. A newspaper article that describes a situation where an officer had to restrain an individual who was resisting arrest was presented to participants. In the article, the individual resisting arrest accuses the officer of using excessive force, and the officer responds using one of the aforementioned identity management strategies. Race of the officer and the individual were varied to see if race played a role in the perceived effectiveness of different identity management strategies. We aim to elucidate which of the identity management behaviors when enacted by police officers in stigmatizing situations may be perceived positively and which may be perceived negatively.

THE RELATIONSHIP BETWEEN PARENTING BEHAVIORS, PARENTS' ANTISOCIAL SYMPTOMS, AND THEIR CHILDREN'S INTERNALIZING PROBLEMS
Dalia Fragoso
Poster: 613
Mentor(s): Emily Durbin (Psychology), Allison Gornik (Psychology)

Young children's development of internalizing symptoms (i.e., depressive, anxious, and somatic concerns) is linked to a host of later negative maladaptive outcomes. While a substantial body of literature has examined connections between parenting behaviors and parents' own internalizing symptoms to these concerns, little work has been done to illuminate the effect of parents' antisocial behaviors on their children's symptom presentations. Utilizing a community sample of families with children aged 3-7, we examined maternal and paternal antisocial traits in conjunction with parenting behaviors to predict children's internalizing symptomology. Results indicated that greater maternal antisocial traits-- though not paternal antisocial traits-- correlated moderately with both maternal- and paternal-reported increased child internalizing problems. Although reported positive parenting slightly but significantly buffered against these effects, the presence of maternal antisocial traits continued to predict more internalizing concerns. In addition, several negative parenting practices served to intensify the effect of maternal antisocial traits, resulting in more internalizing concerns. Significant effects varied by informant report of parenting and children's internalizing behaviors. These results suggest that maternal (but not paternal) antisocial traits predict child outcomes more strongly than parenting behaviors, although parenting behaviors in the presence of maternal antisocial traits can influence these outcomes.

POLICE OFFICER TRAINING AND RACE BIAS IN WEAPON MISIDENTIFICATION
Valerie Kemp
Poster: 614
Mentor(s): Joseph Cesario (Psychology)

There is wide public concern that police officers are more likely to use deadly force against unarmed Black citizens compared to unarmed White citizens. One way of testing this is through controlled experimental laboratory tasks. Past research using computerized tasks has found that participants are indeed more likely to shoot unarmed Black targets compared to unarmed White targets. Weaknesses of this past work include (1) the use of untrained undergraduates as participants, rather than actual police officers and (2) the use of computerized tasks that do not resemble real-world decisions (i.e., that have low external validity). The present research addresses these weaknesses and tests the role of training in police recruit decisions. Police recruits from a large midwestern police force performed in a shooting simulator once before and again after their firearms training at the police academy. The shooting simulator presented recruits with videos of Black or White targets (males and females) quickly pulling out either guns or harmless objects from behind their backs. Recruits were instructed to shoot armed targets, using a modified handgun that recorded both whether the recruit fired and how quickly the recruit fired. In this way we could test whether officers were more likely to shoot unarmed Black targets and whether training impacted this bias. Results showed little to no race bias using this more realistic task and showed that training overall improved performance by reducing errors.

PSYCHOLOGY
POSTER PRESENTATIONS, SECTION 2
2ND FLOOR ART GALLERY, 11:00 – 12:30 PM

EFFECTS OF MEMORY STRENGTH, DECISION MAKING STRATEGIES, AND SLEEP ON EYEWITNESS IDENTIFICATIONS
Sundeep Dhanjal, Ritika Golechha
Poster: 617
Mentor(s): Kimberly Fenn (Psychology)

Eyewitness memory is notoriously poor. Therefore, identifying factors that influence eyewitness identifications is crucial. Prior research indicates that memory strength, decision making strategies (how eyewitnesses search through lineups), and sleep contribute to successful eyewitness memory. However, the influence these factors have on lineup identifications has been explored independently; thus, their relative contributions are unknown. The current study examined the effects of memory strength, decision making strategies, and sleep together in the same study. Participants watched a video of a mock-crime and, after a 12-hour retention interval that spanned a night of sleep (Sleep group) or a normal waking day (Wake group), attempted to identify the perpetrator from a lineup. Participants received either a target-present lineup (perpetrator present) or a target-absent (perpetrator not present). Eye-tracking was used to monitor eye-gaze within the lineup as an objective measure of strategy use. Afterwards, participants answered questions about their decision making strategies and completed a memory test about the video. For target-absent

lineups, we replicated prior findings that the Sleep group made fewer false identifications than the Wake group. Memory strength and decision-making strategies predicted lineup accuracy. Data collection for the target-present lineup is ongoing but preliminary analyses suggest that Sleep and Wake participants make similar numbers of correct identifications. Identifying factors that affect eyewitness identifications is important because it gives insight into the reliability of eyewitnesses. Our studies indicate that decision making, and memory strength may potentially be the best method of identifying false positives.

THE INFLUENCE OF LOSS AND GAIN ASSOCIATIONS ON ATTENTION
Andrew Dumont, John Bigham, Kaitlin Lord, Emily Torossian
Poster: 618
Mentor(s): Mark Becker (Psychology)

Recent findings suggest that associating a stimulus with reward results in the subsequent capture of attention by the rewarded item. It is less clear how associating a stimulus with loss will affect attentional capture. Some studies suggest that stimuli associated with loss capture attention, presumably because they are informative about consequence. However, others have found the suppression of attention by loss associated stimuli. Determining whether loss-associated stimuli capture or suppress attention has important implications for clinical interventions that train the suppression of attention to addiction related stimuli. To investigate this issue, MSU undergraduates participated in a training task in which attending to one color was associated with reward, attending to another was associated with loss, and a third had no reward contingency. In a subsequent test, color was irrelevant to the task. Even so, distractors that matched the previously rewarded color captured attention, negatively impacting performance. Distractors that matched the punished color had no impact on attention; performance was significantly better than with rewarded distractors and did not differ from the condition where the distractor matched the no contingency color. These results suggest that the mechanism responsible for producing attentional capture by reward is not driven by loss, raising concerns about the possible efficacy of training attentional suppression in clinical applications.

WHO SEES WHAT WHEN? COMPARING ADOLESCENTS' PROBLEM BEHAVIORS AS REPORTED BY PARENTS, TEACHERS, AND THEMSELVES
Nikki Ghazimorad
Poster: 619
Mentor(s): Emily Durbin (Psychology), Allison Gornik (Psychology)

As children progress through adolescence, they interact with a plethora of people, most commonly parents and teachers. As they mature, adolescents' behaviors and views of those behaviors evolve, as do the perceptions of their parents and teachers. Past literature has highlighted the emergence and progression of internalizing and externalizing problem behaviors during the stages of adolescence. Studying relationships between children's self-perceptions and perceptions of the adults most familiar with them provides a valuable tool in exploring how children's problem behaviors are perceived and evolve over time. The current study utilized maternal, paternal, teacher, and self-report assessments of problem behaviors in early, middle, and late adolescence. Results indicated that adolescents reported significantly greater internalizing and externalizing problem behaviors across the stages of adolescence; teachers reported significantly fewer of both; and parents reported similar mean levels to one another. Adolescents, parents, and teachers typically reported more externalizing behaviors than internalizing behaviors across all time points. Because the largest discrepancy was between adolescent self-report and teacher report, the relationship between the two was of interest. While there was no significant difference across reporters on the shapes of change for internalizing problem behaviors, there was a significant interaction between age and reporter for externalizing problem behaviors. That is, teachers reported progressively fewer externalizing problem behaviors while adolescents reported increasingly greater externalizing problem behaviors, over time. This study suggests that adolescents perceive themselves to have more problem behaviors than do the adults in their lives, regardless of developmental stage.

THE ASSOCIATION BETWEEN CYBER AGGRESSION AND ALCOHOL USE AMONG COLLEGE STUDENTS
Ashley Hetak, Emma VanderMeulen
Poster: 620
Mentor(s): Samantha Schires (Psychology)

It is well-documented that bullying perpetration among youth is associated with increased rates of alcohol use. Relatively less is known, however, about the relationship between alcohol use and cyber aggression, which is defined as intentional acts of aggression perpetrated through an electronic medium. A few recent studies have found a positive relationship between alcohol use and cyber aggression among middle and high school populations, but there is limited research examining this relationship among college students. However, given that college students display higher rates of alcohol use than middle and high school youth, it is important to understand how alcohol use relates to cyber

aggression among this population in particular. The current study used a multiple linear regression analysis to examine the association between self-reported cyber aggression perpetration and alcohol use among a sample of 358 college students. Additionally, given evidence that males are more likely to engage in alcohol use than females, the moderating effect of gender was examined. Results indicated that nearly 70% of students reported engaging in some form of cyber aggression perpetration, and cyber aggression perpetration was associated with increased rates of alcohol use. Gender did not moderate these associations. This study provides valuable information about the relationship between cyber aggression and alcohol use among college students and has potential implications for prevention and intervention strategies among this population.

AGE MODERATES THE RELATIONSHIP BETWEEN ANXIETY AND THE ERN IN YOUTH
Kathy Sem
Poster: 621
Mentor(s): Emily Durbin (Psychology), Jason Moser (Psychology)

Targeting potential markers of anxiety-related dysfunction during childhood is key to minimizing the impact of anxiety in adulthood. Research has indicated that poor cognitive control characterizes childhood anxiety. Past work utilized event-related brain potentials (ERPs) to better characterize this relationship. The error-related negativity (ERN), an ERP occurring within 100ms after the commission of an error, is a marker of cognitive control-related error monitoring. Among adults, there is substantial evidence of a relationship between anxiety and an increased ERN. The Compensatory Error Monitoring Hypothesis (CEMH) explains this relationship, proposing that anxious individuals require additional cognitive resources to refocus attention on the task after an error to perform comparably to non-anxious individuals due to distracting effects of worrisome thoughts during task performance. However, studies found that the anxiety-ERN relationship changes across development, suggesting that anxious young children show a decreased ERN whereas anxious older children show an increased ERN. These changes may be due to changes in cognitive control during development. As studies have shown that cognitive control increases with age, so too does the ERN; suggesting the increase in ERN across development is associated with improved cognitive control. Consequently, the aim of this study is to test age as a moderator of the anxiety-ERN relationship across a broader range of development in a larger sample than in past studies. Based on previous studies, older children with higher levels of parent-reported anxiety are expected to have an increased ERN, whereas a decreased ERN would characterize their younger anxious counterparts.

ARE THERE SEX DIFFERENCES IN THE RELATIONSHIP BETWEEN PARENT-CHILD CONFLICT AND HOSTILE ATTRIBUTION BIAS IN CHILDREN?
Ian Sorensen, Giovanna Cusumano, John Frank, Zehra Jaffar
Poster: 622
Mentor(s): Alexandra Burt (Psychology)

Hostile attribution bias (HAB) is the tendency for individuals to interpret ambiguous behaviors of others as aggressive. HAB is theorized to result from inaccurate social information processing, resulting in increased aggression, mortality, and domestic conflict in children and adults. Specifically, individuals with HAB have aggressive schemas, which may normalize aggressive behavior and lead them to misinterpret ambiguous situations as hostile. These schemas are thought to be formed by consistent exposure to aggressive behaviors during development. While a substantial amount of research has examined the effect of exposure to aggressive entertainment and social media, less is known about the effect of exposure to hostile family experiences. Additionally, sex differences in social information processing in childhood are rarely studied. Therefore, the current study assessed whether child sex moderates the relationship between parent-child conflict and HAB in children (N=2,060). Participants self-reported on parent-child conflict separately for each parent. HAB was assessed using a social information processing task in which participants responded to questions regarding hypothetical aggressive situations. Moderated regression analyses, conducted via multi-level modeling, revealed that mother-child conflict significantly predicted HAB, but father-child conflict, sex, and the interactions between parent-child conflict and sex did not. This suggests that familial risk factors like mother-child conflict may play a key role in the development of HAB. Therefore, expanding treatments for HAB to include parent-child intervention may improve outcomes via not only cognitive restructuring to create more positive schemas, but also reducing parent-child conflict to reduce exposure to aggressive responses.

PERSONALITY CORRELATES OF ATTENTION SHIFTS
Han Wang
Poster: 623
Mentor(s): Katharine Thakkar (Psychology)

Disturbance in a sense of self is a hallmark of schizophrenia (SZ). One empirically supported biological mechanism for this agency distortion is a disturbance in corollary discharge (CD) signals. CDs are "copies" of motor commands sent to

sensory areas and allow the organism to anticipate the sensory consequences of action. It has been argued that a mismatch between anticipated and actual sensory events results in the subjective experience that sensations are caused by an external agent, an experience reported by individuals with schizophrenia. In the current study, we are interested in the degree to which CD is used to enhance attention at a future gaze location (pre-–saccadic attention), because CD allows the subject to predict where the eyes will be, attention can be enhanced at that location. One possibility is that abnormal CD may contribute both to attention deficits and psychosis in SZ patients. More specifically, the goal of this study is to examine whether pre-–saccadic attention differs as a function of schizophrenia-like personality traits (schizotypy) in healthy undergraduates. To this end, subjects performed the pre-saccadic attention task while an eye-tracker tracked their eye movements. In this task, participants were presented with a movement cue (left/right) and instructed to shift their gaze in the direction of the cue. Shortly following the cue (50ms,100ms,150ms,200ms), participants were shown tilted lines either on the same side of the cue (congruent) or the opposite side of the cue (incongruent) for 35ms. Participants were instructed to report the direction of the tilt following each trial.

INTERSECTIONALITY BETWEEN RACE AND GENDER
Naomi Dawood
Poster: 624
Mentor(s): Danielle King (Psychology)

The representation disparity for women and minorities in leadership today may be due to a number of factors. We explore one potential barrier: differential reactions to women, minorities, and minority women, who employ suggested strategies in leadership interview. In this project, we examine the interplay between multiple social categories (i.e., intersectionality of gender and race) in influencing leadership selection outcomes, that is if they are hired. The first study explores this from the applicant's perspective with 20 participants (from 4 gender and race intersectional groups: 5 African American women, 5 African American men, 5 Caucasian women, 5 Caucasian men) who share their experiences. Participants detail their identity management strategies used when seeking leadership roles and whether their race and gender in combination may influence others' perceptions and reactions. The second study uses an experimental design to explore the effectiveness of identity management strategies in shaping selection outcomes, when gender and race are considered. 819 working adults with hiring experience viewed a video of an applicant interviewing for a leadership role. Applicants in the video belonged to one of the 4 intersectional groups (African American male, African American female, Caucasian male, or Caucasian female), and adopted identity management tactics (agentic: domineering and assertive; communal: nurturing and relational; or control: neutral) while pursuing a male- or female-dominated role. There were observable differences in outcomes for each identity management tactic, based on intersectional identity. This work highlights the importance of considering social categories in tandem in future theoretical and empirical work.

PSYCHOLOGY
POSTER PRESENTATIONS, SECTION 3
BALLROOM, 1:00 – 2:30 PM

INDIVIDUAL DIFFERENCES IN SLEEP-DEPENDENT LANGUAGE ACQUISITION
Adam Acker
Poster: 626
Mentor(s): Kimberly Fenn (Psychology), Kathy Kim (Second Langugage Studies)

Sleep is known to play an important role in learning and memory, skills which are crucial for the acquisition of language (Maquet, 2003). Specifically, sleep has been found to promote the consolidation of grammar generalization skills, which allow one to pick up and identify patterns in language (Frost & Monaghan, 2017). The question of whether or not skills such as these are obtained implicitly, or while the brain is "offline," is prevalent in the fields of psychology and second language acquisition today. However, there is still a lack of research comparing how the acquisition of such skills varies among individuals. Understanding how individual differences impact one's ability to consolidate memories would promote the development of more efficient language learning programs. The objective of the current study is to determine whether individual differences in working memory capacity (WMC), an indicator of intelligence, have an impact on one's ability to consolidate grammar generalization-related memory during sleep (Engle & Kane, 2004; Kyllonen, 1996). Participants' implicit retention of grammar rules was tested before and after a period of either wakefulness or sleep. The results hope to find significantly more improvement in accuracy in the sleep group than in the wake group. WMC was also tested using OSPAN and RSPAN tasks. It is expected that there will be a strong correlation between improvement of accuracy within the sleep group and an individual's WMC, with a higher WMC indicating a greater improvement in accuracy during sleep.

EXAMINING THE LIKELIHOOD OF RELAPSE AMONG OFFENDERS RECOVERING FROM SUBSTANCE ABUSE DISORDER
Kelsey Bees
Poster: 627
Mentor(s): Caitlin Cavanagh (Psychology)

The stresses of substance abuse and the demands of child care can create a volatile environment in which neglect or physical abuse can occur (Wells, 2006). Many parents who have substance use issues often end up being a part of Child Welfare Services, and the criminal justice system. With this in mind, understanding relapse among recovering parental drug users can help identify and prevent relapse behaviors. This study examines the predictive validity of a well-known psychological relapse prevention assessment, the Advance Warning of Relapse (AWARE), among sobriety mandated drug court attendees from a mid-sized Midwestern court. AWARE assessments were collected to identify relapse warning signs and the predicted likelihood of relapse among offenders. We hypothesize that scores on the AWARE assessment will effectively predict positive drug testing outcomes. Implications for future research will be discussed.

THE TEMPORAL CONTIGUITY EFFECT IS MODULATED, BUT NOT ELIMINATED, BY ORTHOGRAPHIC DISTINCTIVENESS
Lexie Brimmeier, Ryan Bean, Lauren Bernhardt, Riley Smith, Jacob Zerka
Poster: 628
Mentor(s): Karl Healey (Psychology), Mitchell Uitvlugt (Psychology)

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

IS SELECTION HISTORY DISTINCT FROM GOAL-DRIVEN ATTENTION?
Sara Brown
Poster: 629
Mentor(s): Susan Ravizza (Psychology)

Researchers have long acknowledged two modes of attentional control that are driven by top-down goal related factors and bottom-up externally induced factors. Other investigators have recently introduced a potential third mechanism of attentional control driven by prior experience known as selection history. In our research we explored whether this third mechanism exists separate from goal driven attention. Participants searched for a target horizontal or vertical line among diagonal distracter lines and reported its orientation. The target was presented in two possible colors. In the training phase, one color was more often a target and the other was more often a distractor. In the test phase, the target was presented equally in both colors to test whether participants showed a lingering bias to the high probability color. Participants responded to the targets in the high probability color more quickly only when they were aware of the probability differences. In a follow-up experiment we reduced the differences in probability between the two colors from 75/25 to 60/40 and found neither awareness nor attentional bias to the high probability color. Although we found no direct evidence for attentional bias from selection history, our results identified a confound of top-down attention wherein participants may explicitly attend to the color that is more likely to contain the target.

FREE WILL AND PUNISHMENT
Joshua Confer
Poster: 630
Mentor(s): William Chopik (Psychology)

The degree to which people ascribe agency to others frames their conception of the moral responsibility for other's actions. Although belief in free will is associated with retributive punishment, it remains unclear to what extent biological and environments circumstances impact these beliefs. To investigate this, participants were presented with a fictional vignette describing a crime that was committed. Conditions varied by providing additional information to either the perpetuator's biological makeup or environmental history, and whether these circumstances began in childhood or relatively close to the time of the crime. We found that these extenuating circumstances significantly decreased participant's judgements of the perpetuator's agency, and thus decreased the likelihood of retributive punishment. Compared to the environmental conditions, biological circumstances made a greater impact on perceptions of agency and guilt, such that biological conditions reduced perceptions of agency and guilt judgments. The timeline of when these circumstances first arose (early v. later in life) was unrelated to perceptions of agency and guilt. These results indicate that judgments of agency and the consequences of these judgments depend on characteristics about the people we judge.

TRACKING THE EYES DURING ASSOCIATIVE LEARNING
Aakash Dave
Poster: 631
Mentor(s): Katharine Thakkar (Psychology)

Schizophrenia is a debilitating psychiatric disorder that is associated with tremendous personal, and societal implications. Although absent from the formal diagnostic criteria, schizophrenia is associated with profound cognitive deficits, notably in learning and memory, which are more predictive of real-world outcomes than clinical symptoms. In addition to learning and memory impairments, individuals with schizophrenia have impairments in eye movement control, and consequently in what they are paying attention to. Using an associative memory paradigm in which participants must learn the association between an object and location in space, previous studies have noted that individuals with schizophrenia perform poorly. Our aim in the current experiment was to follow up on these clinical findings by investigating: 1) whether associative memory impairments were associated with schizophrenia-like traits (i.e. schizotypy) in healthy undergraduates; and 2) to investigate blink rate during task performance, as it is argued to be a proxy measure of central dopamine function, a neurotransmitter implicated in schizophrenia. In this experiment, healthy participants' eye movements were recorded while they performed an associative memory paradigm. Participants were also asked to complete a questionnaire measure of schizotypal personality traits. Our results demonstrate that eye blink rate during encoding and retrieval, as well as high cognitive-perceptual schizotypal personality measures, are correlated with task performance. These findings warrant further investigation to obtain a deeper understanding of the neural mechanisms underlying these specific domains of cognition to yield insight into treatment development.

LOW PREVALENCE EFFECT
Katelyn Hacker, Katie Anderson, Gaurav Gadgeel, Shiyu Zhang
Poster: 632
Mentor(s): Mark Becker (Psychology)

The low prevalence effect is the finding that searchers are more likely to fail to detect rare search targets compared to a target that occurs frequently. This effect may be partly responsible for the high miss rates observed in TSA baggage screeners and radiologists. Both occupations involve searching for low prevalence targets. Methods that reduce this effect could increase airport security as well as decrease misdiagnosis' in patients, however methods of improving rare target search have largely been unsuccessful. In this experiment we sought to evaluate whether increasing motivation via performance-based monetary reward and/or competition with another searcher would diminish the effect. Undergraduate students participated two at a time in a low prevalence (target present 10% of displays) visual search task.The participants were assigned to either a control, competition, reward, or competition+reward condition, in a 2x2 between-subjects design. Participants in competition were encouraged to score higher than the other participant, and were shown both participants scores half-way through the experiment. In the reward condition participants earned 1 point for each target correctly detected (hits) and lost 1 point each time they reported a target with none present (false alarms). Each point was worth 50 cents. If reward and/or competition are successful at reducing the low prevalence effect we expect to see them produce increased hits and decreased misses and false alarms. The reward+competition condition will allow us to determine whether these effects are additive (they have independent impacts on performance) or if they interact.

PSYCHOLOGY
POSTER PRESENTATIONS, SECTION 4
BALLROOM, 1:00 – 2:30 PM

THE EFFECTS OF ADOLESCENT AUTISM AND DOWN'S SYNDROME DIAGNOSES ON SOCIETAL PERCEPTIONS OF FAMILIAL LIFE SATISFACTION

Ballee Hall
Poster: 635
Mentor(s): Robert Gray (Psychology)

It is important to further investigate how societal perceptions of life satisfaction change with regards to certain disorders, specifically Autism Spectrum Disorder and Down's Syndrome. The current study aims to fill gaps in the literature by analyzing whether or not there is a relationship between perceived familial life satisfaction and the presence of either an autistic child or a Down's Syndrome child. The goal of this research is to prove that society's perception of one's life satisfaction is influenced by their perception of Autism and Down's Syndrome. If this is true, then participant's will rate families with an autistic or Down's Syndrome child lower in overall life satisfaction, and families that have children with no disability higher in overall life satisfaction.

UTILIZING THE MARRIAGE SATISFACTION INVENTORY- REVISED FOR IDENTIFYING COMMON DISSATISFACTION DISCREPANCIES IN COUPLES

Kamryn Holtz
Poster: 636
Mentor(s): Emily Durbin (Psychology), Allison Gornik (Psychology)

Dissatisfaction and conflict between marital partners is linked with a number of emotional and physical health concerns. However, there has been very little research done to determine whether there are patterns of perceived discrepancies of dissatisfaction between spouses, despite the importance of locating the realms in which discrepancies between partners is most likely to occur. To examine these discrepancies, we examined the Marital Satisfaction Inventory-Revised (Snyder & Aikman, 1999) in a sample of 118 heterosexual community families with young children as part of a larger longitudinal study. Based on previous studies and parenting literature, we hypothesized that there would be dissatisfaction discrepancies in role orientation, sexual dissatisfaction, history of family distress, and disagreements about finance. Through paired-samples t-tests, we found that husbands reported significantly more dissatisfaction than their wives in the amount of physical aggression and intimidation imposed upon them, their partners' ability to communicate and solve problems, the frequency and quality of sexual intercourse, and the amount of time they are able to spend with their wives. Wives, however, reported more dissatisfaction with the time their husbands spent with their children and how they disciplined them. While these findings were in contrast to our hypotheses, prior studies have not targeted community samples with young children. In addition to furthering research, the current study provides clinicians and couples alike with expectations of where average couples are less likely to agree on components within their marriage.

THE ROLE OF INTERPERSONAL AND CULTURAL VALUES IN INDIVIDUALISTIC AND COLLECTIVE SELF ESTEEM

Shea Howe
Poster: 637
Mentor(s): Xiaochen Luo (Clinical Psychology)

Interpersonal and cultural values are important for individuals to define their self-esteem. Previous studies suggested that individuals with high communal values (e.g., valuing connection and collectivism) reported higher collective self-esteem in their social groups. However, it is unknown whether individuals with high agentic values (e.g., valuing independence and autonomy) may endorse higher individualistic self-esteem independent from social groups. The current study examined this question among 166 college students (gender: female 63.5%, other 1.4%; age range: 18-31; race: 71% White, 9% African American,11% Asian, 8% multi-racial). Circumplex Scales of Interpersonal Values and the Individualism and Collectivism Scale were used to measure interpersonal values (defined on the dimensions of agency and communion) and cultural values (defined on the dimension of collectivism-individualism and horizontal-vertical power structure). The Rosenberg Self Esteem scale and Collective Self Esteem scale were used to measure individualistic self-esteem and collective self-esteem. Results replicated and extended previous findings in that individuals endorsing higher collective values and interpersonal values of communion reported higher levels of both individualistic and collective self-esteem. However, individualistic values and interpersonal values of agency did not predict individualistic self esteem. The results suggested the relative importance of communal and collective values to overall self-esteem in college students in the current sample. Our study also highlighted the potential importance to examine the nuanced impact of agentic and individualistic values on self.

PERSONALITY INFLUENCES ON REWARD-BASED DECISION-MAKING
Mitchell Isaacs, Jessica Fattal
Poster: 638
Mentor(s): Katy Thakkar (Psychology)

The Locus Coeruleus (LC), located in the pons in the brain stem, regulates reward-based decision making by modulating norepinephrine release in the brain. It has two modes of firing, phasic and tonic, that facilitate exploration and exploitation, respectively. Pupillary diameter is thought to be proxy for these exploitative (sticking with known rewards) and exploratory (looking for new rewards) responses of the LC. Research has indicated that exploitative behavior is related to phasic constriction of the pupils, whereas tonic activity results in tonic dilation. That is, by observing the change in pupil size, activity in the LC related to reward-based decision making can be inferred. Participants were instructed to perform the Diminishing Utility Task, in which increasingly difficult pitch discriminations are associated with greater reward. The completion of more difficult discriminations resulted in the reward of a larger number of points. At the start of each trial, participants had the option to forfeit the prospect of larger point gain and "escape" to the first, and easiest, round (for a lower reward). Participants completed the Schizotypal Personality Questionnaire and anhedonia subscales of the Chapman Questionnaire for assessment of personality traits. Based on previous evidence that individuals with schizophrenia produce exaggerated responses to losing expected rewards, our hypothesis was that students who scored higher in the schizotypy and anhedonia scales would choose to escape trials sooner and would show associated differences in pupil dynamics during task performance.

SPEAKING WHILE FEMALE: MANSPLAINING IN THE WORKPLACE
Megan Jursch
Poster: 639
Mentor(s): Ann Marie Ryan (Psychology)

As discrimination in the workplace shifts from conspicuous to more subtle and interpersonal, communication behaviors toward women begin to indicate a perception of lower competence from their peers. This study will focus on "mansplaining," a communication behavior that aids in the measurement of perceived competence. Mansplaining refers to the exhaustive explanation of a concept that a woman is already familiar with and is generally given in a condescending manner. The purpose of this study is to explore the link between mansplaining and competence perceptions and discuss in detail its detrimental effects on women. Data collection of the in-progress study involves a critical-incident survey concerning female participants' accounts of mansplaining behaviors. We will discuss the qualitative analysis of the incidents and compare themes across the anecdotes. Quantitative data will be collected on how participants felt towards the individuals involved in the incident and parts of the incident itself. This study intends to highlight behaviors that may suppress contributions of women in the workplace and hinder their career success, as well as discuss what further research is necessary in order to advance knowledge in the area of gender-based workplace discrimination.

PERSONALITY TRAIT CHANGE AFTER MARRIAGE
Madeline Lenhausen
Poster: 640
Mentor(s): Emily Durbin (Psychology)

There exists a fair amount of research on personality change and development throughout the lifespan and evidence shows that these changes in personality can be attributed to life events. One life event that has not gained as much attention as others, however, is the act of becoming married. To shed more light on the potential influences of this event, we are conducting research to assess what type of impact marriage has on personality. Currently, we are evaluating MPQ traits before and after marriage using the data from the Minnesota Twin Family and Sibling Interaction and Behavior Studies. Thus far, initial findings in these analyses have shown changes in the direction of better psychological adjustment after entering marriage. These results suggest that taking on the role of becoming married positively influences personality.

ROLE OF CU TRAITS ON THE RELATIONSHIP BETWEEN IN-PERSON AND CYBERBULLYING
Peiqi Lu Jinke Sun
Poster: 641
Mentor(s): Alexandra Burt (Psychology)

Aggressive behaviors are typically conceptualized through physical and social interactions with others and affect academic performance and interpersonal outcomes accordingly. Recent trends point to a surge in online aggressive behaviors with cyberbullying becoming an increasingly common and serious problem among students. Not surprisingly,

past research has found significant overlap between those who engage in in-person (social and physical) aggression and cyber aggression while also indicating that in-person and cyber aggression are two distinct constructs. Callous-unemotional (CU) traits are one of the factors that appear to increase both in-person and cyber aggression. It is not yet clear, however, whether CU traits affect the degree of association between in-person and cyber aggression. Specifically, we are curious whether the two forms of aggression are more strongly associated in the presence of high CU traits as compared to low CU traits. We will examine this question in a large sample of undergraduate students (N=1410). Based on previous findings, we hypothesize that CU traits would strengthen the associations between online and offline aggressive behaviors.

SLEEPINESS, COGNITION, AND MOOD: A STUDY ON ENERGY DRINKS
Sravya Mallajosyula, Briana Henderson, Riti Singh
Poster: 642
Mentor(s): Kimberly Fenn (Psychology)

Many college students believe energy drinks affect their sleepiness, mood, and cognition and consume energy drinks to increase alertness, increase cognitive ability, and reduce sleepiness. Some studies suggest that caffeine does not affect cognition, specifically learning and memory; however, there is a lack of evidence that B-vitamins or B-vitamins along with caffeine affect cognition, mood, or sleepiness. Furthermore, there are no studies that investigate the effects of B-vitamins or the interactions between B-vitamins and caffeine in healthy young adults. In this study, we investigated the effects of B-vitamins and caffeine on mood, sleepiness, attention, short term memory, and working memory. In a double-blind design, participants were randomly assigned to one of four conditions: placebo, B-vitamins alone, caffeine alone, or B-vitamins and caffeine together. Thus, both the researchers and participants were unaware of what each participant received. Results suggested that caffeine protected against sleepiness and increased positive affect. However, neither caffeine nor B-vitamins had a significant effect on working memory, short-term memory, or attention. Taken together, these results suggest that energy drinks may only influence subjective measures such as sleepiness and mood but do not affect memory or attention. Although energy drink companies may advertise increased overall attention, mood, and cognition, there is not much of an overall impact made by these drinks.

PSYCHOLOGY
POSTER PRESENTATIONS, SECTION 5
BALLROOM, 1:00 – 2:30 PM

THE RELATIONSHIP OF COWORKER SUPPORT AND WORK-FAMILY BALANCE: A TEST OF WORK ENVIRONMENT AND BURNOUT AS MEDIATORS
Leo Norling
Poster: 645
Mentor(s): William Chopik (Psychology), Anne Marie Ryan (Psychology)

Coworker support has been hypothesized to enhance work-life outcomes. However, the mechanisms underlying this association are unclear. Two studies examined how coworker support predicted work-life outcomes through mediation by positive work environment and burnout. It was hypothesized that coworker support enhances work environment, and that better work environment is associated with less burnout; in turn, reduced burnout would lead to less negative work-life spillover. In two large studies of working adults (total N = 5,666), we found support for our model—coworker support predicted work-family outcomes and this association was mediated by more positive work environments and reduced burnout. Study 2 was a short-term longitudinal test of the model. Results are discussed in the context of efforts to improve workplace climate to reduce turnover and improve employees' job satisfaction.

MINDFUL OF MISTAKES: PARSING THE POLYLITHIC NATURE OF MINDFULNESS IN RELATION TO ERROR MONITORING
Ling Peng, Skylar DeWitt, Will Eckerle, Kailna Foster, Megan Wright
Poster: 646
Mentor(s): Jason Moser (Psychology)

This study examined the relationship between the five facets of mindfulness and the early (i.e., ERN) and late (i.e., Pe) neural indices of error monitoring. Results revealed that acting with awareness and observing sensations and thoughts independently predicted ERN amplitude, whereas acting with awareness and nonjudgment predicted Pe amplitude. The inconsistent results of mindfulness-error monitoring studies may be explained by the varying degrees a single facet of mindfulness is drawn upon in relation to others. Our findings shed light on the intricacies stemming from the polylithic nature of mindfulness research.

CHILDREN AND ADULTS' SENSE OF TIME WHILE LISTENING TO EMOTIVE MUSIC
Nicholas Saad
Poster: 647
Mentor(s): Melissa Allman (Psychology)

There is current empirical interest in the effects of emotion on the subjective sense of time, and as music can evoke emotion, we asked participants to listen to 'happy' and 'sad' songs while performing two separate timing tasks: reproducing visual target durations (2, 4, 6, 10, 16-s); and estimating 10-s intervals (while counting). In both tasks, the music was not synced to the timing task but played on a loop -- for ~10 min during the reproduction task (during both encoding and retrieval phases). We first examined the effects of 'happy' and 'sad' music in children and it was observed that although both types of music resulted in an over-reproduction of durations shorter than 6-s, sad music tended to induce more over-reproduction (after 6-s they were equivalent and under-reproduced). The estimation task revealed that both types of music resulted in underestimation of a 10-s interval, but this was augmented by happy music. Within the scope of both tasks, sad music produced a relative lengthening of time relative to happy music. We are currently doing this study with adults, to see if they show the same pattern, and are including additional testing sessions in which music is replaced by metronome beats that correspond to the tempos of each song. We will present and discuss the findings of our study on adults and children.

THE POSSIBLE IMPACT OF POPULATION AND INCOME AFFECTING THE AMOUNT OF AUTISM SPECTRUM DISORDER PROVIDER TYPES IN MICHIGAN
Paige Tyldesley, Kirsten Kempisty, Yamani Vinson, Jaimei Zhang
Poster: 648
Mentor(s): Amy Drahota (Psychology)

Autism spectrum disorder (ASD)—affecting 1 in 68 youth in the United States—is a pervasive and lifelong disorder characterized by impaired social communication and restricted and repetitive behaviors and interests. Given the prevalence of ASD, there is a high demand for ASD treatments. Yet, questions remain about whether individuals with ASD are able to access available treatment services within their own communities. Areas with higher populations are likely to have a greater number of service providers for individuals with and without ASD. However, service access disparities have been found to exist in low income communities despite population. The purpose of this study is to evaluate the relation between the number of ASD service providers and (a) population as well as (b) income across Michigan. A thorough web-based search was conducted to record ASD service providers by County throughout Michigan. Additionally, we obtained census data from 83 Michigan counties related to population and median income in 2016. Using correlational analyses, we plan to examine the relations between the number of ASD service providers and (a) county population and (b) county median income. We expect a positive correlation between the number of providers and population, and we expect a strong positive correlation between the number of providers and income. Findings from this study will provide information about factors contributing to ASD access disparities in Michigan.

ROLE OF ORBITAL FRONTAL CORTEX (OFC) SUBREGION ACTIVATION IN A RODENT MODEL OF CUE-INDUCED DRUG RELAPSE
Shangari Varatharajan, Mansi Verma
Poster: 649
Mentor(s): Amy Arguello (Psychology)

Cocaine-use disorders are characterized by repeated relapse to drug-seeking and taking behavior following periods of abstinence. It is known that human drug users display increased activation of the OFC in response to drug cues. Similarly, this phenomenon is also observed in a rodent model of drug relapse. There is evidence that OFC subregions play distinct roles in reversal learning, but their role in drug relapse is unclear. Therefore, we aimed to investigate whether subregions of the OFC are differentially activated following exposure to cues that were previously associated with drug taking. To examine OFC subregional neuronal activation in response to drug-associated cues, rats were trained to lever press for cocaine infusions paired with a complex cue (two-hour sessions, at least 10 days). This was followed by extinction training in which lever presses did not result in cocaine infusions (two-hour sessions, at least 7 days). We then assessed lever responding to the previous cocaine-associated cue (one-hour, drug-seeking test). Thirty minutes later, rats were overdosed with a ketamine + xylazine cocktail and then transcardially perfused with 4% paraformaldehyde. Brains were extracted, cryoprotected in 30% sucrose, then serially sectioned, and stained with C-fos primary antibody and visualized using 3'3-diaminobenzidine. We found a trend for increased neuronal activation, as assessed by the number of C-fos positive cells, in the anterior OFC of rats that exhibited cue-induced reinstatement. Currently, we are quantifying neuronal activation in additional OFC subregions.

PERCEIVED "CORRECT" TEMPO OF A PIECE OF MUSIC IS DEPENDENT ON ITS STARTING TEMPO
Becca Vroegop, Paul Clancy, Audrey Drotos, Alison Eberle, Dean Wundrach
Poster: 650
Mentor(s): J Devin McAuley (Psychology), Leigh VanHandel (Music)

Tempo determination, the way one discerns the best tempo (speed) for a piece of music, is influenced by many factors including melodic contour, instrument timbre and an individual's preferred tempo (Boltz 1998, 2010; McAuley, 2010). In this study, we investigated whether the determined "correct" tempo of a melody depends on its initial presentation tempo. Participants listened to thirty-one isochronous melodies derived from unfamiliar literature and manipulated the tempo of the melodies in real time using an unmarked spin-wheel until they identified what they believed to be the "correct" tempo for each melody. The experiment was repeated three times with three different participant groups, where each heard a different starting tempo for the same set of melodies. In the first group, notes had a 600 ms inter-onset-interval (IOI), in the second, a 450 ms IOI, and in the final group, a 300 ms IOI. All three groups had significantly different average final tempos. Rather than converging to the same final tempo, the first group converged to 430 ms, the second group converged to approximately 400 ms, and the final group converged to approximately 280 ms. This indicates that starting tempo influences the determination of the "correct" tempo for a melody. Ongoing research is investigating the possibility of hypermeter, or the perception of meter at multiple levels, as an explanation for these findings.

FACTORS INFLUENCING AN INDIVIDUALS PREFERRED TEMPO
Jacob Zerka, Mitchell Borin, Jillian Jakubiec, Kylan Winchester
Poster: 651
Mentor(s): Devin McAuley (Interdisciplinary Cognitive Science Program)

Adagia is a website (www.adagia.org) developed by the Timing, Attention and Perception (TAP) Lab at Michigan State University that enables crowd-sourced data collection for multiple projects on a large scale. The present preferred tempo project uses adagia.org to explore individual differences in preferred tempo, the pace of mental activity that feels not too fast, or too slow, but just right. Understanding factors affecting preferred tempo is important because individuals have different experiences of time affected by their preferred tempo (everyone marches to their own drum). For example, although average preferred tempo in the population is around 120 bpm, previous research has found that preferred tempo generally slows with age (McAuley et al., 2006). One question is whether preferred tempo varies geographically– with individuals living in urban areas preferring a faster pace of activity than individuals living in rural regions. To investigate factors influencing preferred tempo, we shared the preferred tempo project via social media outlets to provide opportunities for any individual with internet access to participate. Age, gender, musical experience, and location were recorded from each participant. As hypothesized, the average preferred tempo was around 120 bpm and generally slowed across the lifespan. Females displayed a slower mean preferred tempo than males. Participants with more musical experience had a slower mean preferred tempo than participants lacking musical experience. On-going analyses are considering potential urban vs. rural differences in preferred tempo based on the collected geographical data.

IDENTITY MANAGEMENT OF MINORITY POLICE OFFICERS IN THE FACE OF PROFESSIONAL STIGMATIZATION
Qi Huang, Janani Senthilkumar
Poster: 652
Mentor(s): Dia Chatterjee (Psychology), Ann Marie Ryan (Psychology)

In recent years, people have ascribed different stigmas to the policing profession including physical, social, and moral taints. Policing has been perceived as dirty work (Chatterjee and Ryan, 2017). Moreover, minority police officers have found their jobs are getting more difficult and frustrating. For example, more than two-thirds of the African-American police officers in a study reported that relating with their White counterparts was a stressful experience for them (Toch, 2002). In the current study, we explore how minority police officers manage their identities, and how that can impact critical work outcomes. In this interview study, we gathered minority police officers' views on their job and also their opinions on how the perception of policing has changed in recent years given the sustained negative media attention on policing. One of the main purposes of this study is to explore how minority police officers may use various identity management strategies to cope with these changes. Based on the analysis of 10 interviews of minority police officers, we find that they express consistent themes of facing intense stress from being in ambiguous and dangerous work situations, and also frustration at being misunderstood by the public at large. In response to these stressors, and the devalued image of policing as a profession, we find that minority police officers tend to use mostly accepting, avoiding, isolating self, evading responsibility identity management strategies to cope with the stigma of being a police officer. Theoretical and practical implications of this work are also discussed.

PSYCHOLOGY
POSTER PRESENTATIONS, SECTION 6
BALLROOM, 3:00 – 4:30 PM

MITIGATING THE EFFECTS OF SLEEP DEPRIVATION ON PLACEKEEPING ABILITY WITH CAFFEINE

Madeline Bross, Virginia Smith

Poster: 654

Mentor(s): Kimberly Fenn (Psychology), Michelle Stepan (Psychology)

Sleep deprivation impairs cognitive functioning, particularly attention and vigilance. In a previous study, we found that sleep deprivation impaired placekeeping, or the ability to follow a series of steps in a particular order without repeating or skipping steps, despite interruptions. Maintenance processes retain task-relevant representations needed for successful placekeeping during interruptions and are particularly impaired after sleep deprivation. The current study investigates the extent to which caffeine mitigates the effects of sleep deprivation on placekeeping. In the evening, participants completed a placekeeping task and were randomly assigned to either sleep at home (Sleep, n=100), or stay awake in the lab overnight (Deprivation, n=150). Throughout the night, Deprivation participants received three capsules. One group received three doses of 100mg of caffeine (Sustained), another received two placebo capsules and a single 200mg dose of caffeine at 08:00 (Acute), and another group received only placebo. Sleep participants took a single capsule in the morning containing either 200mg caffeine or placebo. All participants then completed the placekeeping task. Data collection is ongoing, but preliminary analyses suggest we replicated prior findings: sleep deprivation increased placekeeping errors. After sleep deprivation, we predict the Sustained group will make fewer placekeeping errors than the Acute or Placebo groups because more consistent caffeine ingestion is expected to better sustain wakefulness. Given the widespread use of caffeine, it is important to understand its effectiveness, particularly with regard to placekeeping tasks, which are often performed by medical staff or night shift workers when under conditions of sleep deprivation.

ROLE OF BASOLATERAL AMYGDALA (BLA) SUBREGION ACTIVATION IN A RODENT MODEL OF RELAPSE TO DRUG-ASSOCIATED CUES

Rachel Butler, Aneesh Bal

Poster: 655

Mentor(s): Amy Arguello (Psychology)

Cocaine-use disorders are characterized by repeated relapse to drug-seeking and taking behavior following acute or extended periods of abstinence. Several brain regions are implicated in precipitating drug-relapse. We focused on the BLA since activity is this region is increased upon exposure to drug-related cues in humans and rodents. There is evidence that different subregions of the BLA play distinct roles in natural reward-seeking behaviors; however, their role in drug-seeking behavior is underexplored. Therefore, we aimed to determine whether BLA subregions are differentially activated following exposure to previous drug-associated cues using a rodent model of relapse. To examine subregional neuronal activation in the BLA in response to drug-associated cues, rats were trained to lever press for cocaine infusions paired with complex cues (two-hour sessions, at least 10 days). This was followed by extinction training in which no drug was available (two-hour sessions, at least 7 days). Lever responses were examined in a cue-induced reinstatement test lasting one hour. Thirty minutes later rats were overdosed with ketamine + xylazine, transcardially perfused, and brains were extracted and serially sectioned. BLA sections were slide-mounted, stained with C-fos primary antibody and visualized using 3'3-diaminobenzidine. We found that rats exhibited increased drug-seeking behavior in response to drug-associated cues. Currently, we are examining cue-induced C-fos activation in rostral and caudal areas of the BLA.

DYNAMIC POWER STUDY

Raven Dominguez

Poster: 656

Mentor(s): Rick Deshon (Psychology), Christopher Dishop (Psychology), Nick Hays (Managment)

Previous literature on power, choice, and control proposes that, although all three are related concepts, control is the basis for both of the other variables. Specifically, only when both power and choice are low will the need for control increase. The focus of this study is to evaluate the relationship between power, choice, and the underlying concept of control in a longitudinal design to unearth the dynamic relationship between them. Moreover, we evaluate a structural manipulation of power and choice by changing the task environment and then measuring perceived reports of the study variables from the participant. Doing so helps establish a realistic paradigm that can be used in repeated measures designs. We found that, contrary to prior work, power and choice do not influence control in a dynamic, longitudinal

assessment. Moreover, participant self-reports of the structural environment matched, and ultimately validated, our contextual manipulations.

INDIVIDUAL DIFFERENCES IN UNDERSTANDING SPEECH IN DIFFICULT LISTENING CONDITIONS
Audrey Drotos, Olivia Banach, Sarah Dec, Kelly Russell
Poster: 657
Mentor(s): Devin McAuley (Cognitive Science)

People vary in their ability to understand speech in difficult listening conditions. Although hearing acuity contributes to individual differences in speech-in-noise (SIN) ability, large individual differences persist for people with hearing thresholds in the normal range. Some recent studies have revealed a musician advantage in understanding speech-in-noise (Parbery-Clark, Skoe, & Kraus, 2009), while others have found no music training effect (Boebinger, 2015). One factor that may account for mixed findings in the literature is noise exposure. Because musicians represent a high-risk group for excessive noise exposure, they have the potential for hidden hearing loss, which is not sensitive to measurement with a standard audiogram and, thus, a factor that could counteract any advantage conferred by musical training. The present study compared SIN abilities of highly-trained musicians and non-musicians for a broad range of listening conditions that included identifying words and sentence in multi-talker babble and understanding both interrupted and time-compressed speech. For each participant, we also measured hearing acuity, rhythmic ability, verbal and non-verbal IQ, self-assessed noise exposure, and musical experience. Results reveal a heterogeneous pattern across the different SIN measures. Musicians tended to show a SIN advantage, but only for some measures. Musicians (vs. non-musicians), however, were also found to have better rhythmic ability, higher IQs, greater self-reported noise exposure. Controlling for these other factors tended to eliminate any musician SIN advantage. Individual differences in rhythmic ability, however, tended to remain robust when controlling for other factors.

THE ROLE OF CONTRAST AND ENCULTURATION IN NARRATIVE PERCEPTIONS OF MUSIC
Isabella Green, Gabby Kindig
Poster: 658
Mentor(s): J Devin McAuley (Psychology)

A long-standing mystery is how music, comprised of abstract sound sequences, conveys meaning. There is evidence that people hear stories in music, but what triggers stories in people's minds and the consistency of generated storylines is poorly understood. Here, we considered two factors that may influence the extent to which people perceive narratives when listening to a piece of music: musical contrast and topicality. Contrast is a structural feature of music that includes changes in dynamics, instrumentation, and tempo. Topicality is a construct that refers to extra-musical themes associated with particular musical motifs within a culture. To assess the extent to which amount of contrast and degree of topicality in a musical excerpt is associated with greater tendency to perceive a story (or elements of a story), we had naïve listeners make judgements about musical excerpts that varied in contrast and topicality. Western participants with little experience with Chinese music listened to 64 excerpts of either traditional Chinese or Western instrumental music, with varying levels of contrast and topicality, as determined by expert music theorists. For each excerpt, listeners indicated whether they imagined a story or elements of a story and then rated how familiar and enjoyable the excerpt was. Results show that both contrast and topicality independently predict narrative perceptions. Pieces with high (vs. low) levels of contrast and topicality were more likely to lead to stories in listeners minds. Implications of this study for understanding musical universals and the relation between music and language will be discussed.

EFFECTS OF DISTAL PROSODY ON WORD PERCEPTION: A COMPARISON OF NATIVE AND NON-NATIVE ENGLISH SPEAKERS
Shubhangi Sharma, Uliks Lulo
Poster: 659
Mentor(s): Carrie Kroger (Psychology), Ni La Le (Psychology), Devin McAuley (Psychology)

Speech prosody is important for spoken language understanding. Prosody can either be proximal (local) or distal, where distal means temporally removed from a target portion of an utterance. Research on distal prosody has shown that pitch and rhythm patterns help listeners segment speech into meaningful units (Morrill, et al., 2015). The goals of this study were to (1) examine the role of rhythmic expectations on listeners' segmentation of syllable sequences and (2) compare listeners' use of rhythmic expectations for native and non-native speakers of English. Participants first listened to 12 disyllabic (target) words from an artificial language. They then heard sentences in the artificial language and listened for a cued target word. The pitch pattern at the beginning of the sentence generated rhythmic expectations that were either congruent with the target word or incongruent with the target word. Half of the sentences replaced the target word with a non-word, made of a target word in reverse syllable order. Participants were asked to rate from 1-6 how well they heard the word in the sentence. If distal prosody generates rhythmic expectations about how syllables are

grouped, we hypothesized that participants would better recognize congruent words better than incongruent words. Results showed that native English speakers showed better recognition of congruent words compared to incongruent words, but non-native English speakers showed no difference in the recognition of congruent and incongruent words. Implications of the results for understanding the role of distal prosody in language processing will be discussed.

THE EFFECT OF A SINGLE SESSION OF MEDITATION ON TEST ANXIETY
Scott Smith, Isabel Carley
Poster: 660
Mentor(s): Robert Gray (Psychology)

Test anxiety can be a serious issue for some students. Finding an effective way to reduce test anxiety could help student a to student finally perform to their full potential. One increasingly popular way to decrease test anxiety is by practicing mindfulness meditation. We hypothesized that meditation would significantly decrease test anxiety in participants. To assess this, we measured students in the fall 2017 PSY 395- Research Design and Measurement class, which was made up of about 60% female students and 40% male students. We presented the experimental group with a 5-minute anxiety reduction mediation video. They then worked on GRE quantitative questions, some of which had no right answer in order to ensure a level of test anxiety. Participants then filled out a test anxiety questionnaire (Nist & Diehl, 1990). The control condition immediately started the GRE quantitative questions without any mediation, then filled out the same anxiety questionnaire. Our results did not confirm our hypothesis—that is, we did not find that meditation significantly reduced test anxiety. Although our results were insignificant, we still believe our hypothesis may be correct. Research on the subject of meditation and test anxiety is still highly important and needs to be continued in the future.

SOCIAL SCIENCES: GENERAL

ORAL PRESENTATIONS, SECTION 1
MSU ROOM, 8:30 – 10:15 AM

THE LIMITS OF LOCAL DEMOCRACY: MUNICIPAL BOUNDARY CHANGES AND RACIAL DISCRIMINATION AFTER THE VOTING RIGHTS ACT
James Dell
Time: 8:30 AM
Mentor(s): Noah Durst (Planning, Design and Construction)

Cities in the United States routinely expand their jurisdictional borders through the process known as municipal annexation and, as they do so, they sometimes exclude neighborhoods with high shares of racial or ethnic minorities, a process known as municipal underbounding. Although racial underbounding has historically been prohibited under the Voting Rights Act (VRA), the Supreme Court's recent invalidation in 2013 of Section 4 of the VRA has led to a nascent return to municipal underbounding. In this study, a Geographic Information System containing Place and Block data from the U.S. Census Bureau is used to identify changes in city boundaries between 2010 to 2017 – before and after invalidation Section 4 of the VRA. We then use "difference-in-differences" regression analysis to examine whether race-based annexation practices changed after invalidation. We also examine whether invalidation of Section 4 led to differing effects for cities with higher shares of white residents or in states allowing "popular determination" of annexation (i.e., where residents vote directly for or against annexation). The results provide robust statistical evidence suggesting that the invalidation of Section 4 has exacerbated the underbounding of black and Hispanic neighborhoods located on the fringe of cities.

A LEGACY OF STRUGGLE: SOCIO-HISTORICAL ANALYSIS OF ANNA JULIA COOPER
Dinah George
Time: 8:45 AM
Mentor(s): Jualynne Dodson (Sociology)

This research project will analyze the work of Dr. Anna Julia Cooper through core themes found in Black Feminism. This project will place a socio-historical lens on Dr. Cooper's life, with hopes of understanding her relationship to Black Feminist thought. This undergraduate research project is important because it reviews and understands the experience of African American Women in a sociological context of race and gender. The research will review primary and secondary sources on Dr. Anna Julia Cooper, include informal interviews with elders who have studied Dr. Cooper's life, and review collections on Black Feminist thought. In this presentation I will include my findings on the relationship

between Dr. Anna Julia Cooper and Black Feminist thought and how that relationship applies to the larger concepts of race and gender in Sociology.

EFFICACY OF A TRAVEL AWARD PROGRAM TO INCREASE DIVERSITY IN EVOLUTIONARY SCIENCE
Hollie Heape
Time: 9:00 AM
Mentor(s): Alexa Warwick (BEACON)

The field of evolutionary science has exceptionally low levels of racial/ethnic diversity; thus, programs have been developed in order to increase diversity in this field. The Undergraduate Diversity at Evolution (UDE) is a conference travel award program in which underrepresented undergraduate students attend the annual Evolution meetings to present a poster and participate in various activities. First run in 2001, anecdotal evidence suggests the program has successfully recruited underrepresented minorities (URMs) to graduate programs in evolution; however, no consistent data are available to assess the overall recruitment success. To collect these data, an evaluation survey was created which examined aspects of the program, how it influenced the participants, and its overall benefit to their careers. The survey was disseminated to two groups, the program participants and individuals who unsuccessfully applied for funds to attend the conference, as a way to compare the program's potential impact. In total, we obtained data from 170 individuals. We found that those awarded UDE funding were more likely to receive other awards. In addition, they were more successful in gaining and maintaining contacts from the conference. The program had a major impact on their own networking and decision making of their career path. Results of this study will be used to improve the effectiveness of the UDE and similar programs through targeting more precise factors that may influence URM student career paths and providing them with appropriate resources.

IPPSR -MANAGEMENT AND MIGRATION
Asia Hudson
Time: 9:15 AM
Mentor(s): Matthew Grossmann (Political Science)

The purpose of this research is to examine the relationship between the migration of Michiganders and the appointment of Emergency Managers. Emergency managers have been known to bring forth organization and stability, as well as drastic changes in times of financial crisis for municipalities; but does revitalization equate to gentrification? The restructuring of urban spaces has caused controversy across the nation but is there any correlation between shifting racial demographics and the appointment of an emergency manager? In order to better understand the circumstances from which movement is happening various articles covering the initial review of cities, the current cultural context of these cities, and the opinion of the public about the emergency managers, will be analyzed along with a timeline of population growth and a decline in the city and surrounding suburbs.

HAITIAN VODOU: AN ORGANIZING AND MOBILIZING TECHNIQUE IN THE BLACK RADICAL TRADITION
Matilda Kull
Time: 9:30 AM
Mentor(s): Rashida Harrison (James Madison)

In Cedric Robinson's Black Radical Tradition, people are always looking for freedom. Through Diaspora, both African and Haitian, Vodou transformed and spread, providing spiritual, physical and political freedom for previously enslaved Haitians and Louisianans. In this research paper, I argue that Vodou, and its Western practice, fits into the Black Radical Tradition as an organizing technique that seeks liberation. As Christianity provided Black Americans with community, organization, and a meeting place during the Civil Rights Movement in the 1960s, Vodou provides community and organizationing for Haitians and Louisianans to make social change. Theis power of Vodou in social change was exhibited in its ability to provide resistance for Vodouists against oppression itself during the Haitian Revolution and in its ability to provide resistance for Vodouists against oppression and in itsthe survival throughagainst continued attacks against the religion. Through the Haitian Revolution, and the 1915 U.S. Occupation, I illustrate how Vodou was used to organize and mobilize Haitians in opposition to oppression. Keywords: Vodou, Haiti, Voodoo, Black Radical Tradition, Diaspora

CRISIS COMMUNICATION: THE ROLE OF SOCIAL MEDIA IN MASS SHOOTINGS
Allia McDowell
Time: 9:45 AM
Mentor(s): Manuel Chavez (Journalism)

Social media has become an important and critical communicative device for its users. This is true for everyday events, as well as extraordinary and even tragic events. The United States has had more mass shootings than any country, and five of its most-deadly mass shootings have occurred since 2015. In June 2016, 49 people were killed in a nightclub in Orlando, Florida. In October 2017, 58 people were killed while attending a concert in Las Vegas, Nevada. In November 2017, 25 people were killed in a church in Sutherland Springs, Texas. And, most recently, 17 people were killed in a high school in Parkland, Florida in February 2018. This research examines the role social media played in communication during these events. Data will include content analyses of how social media was used during recent shootings, including a detailed look at how it was used by the victims as well as those in the midst of the attack. It also reviews responses by first responders, and those in the media and the public reacting to the crisis in real time. The analysis also includes a look at trending topics, general hashtags and keywords that were used on social media during and following the events.

THE EFFECTIVENESS OF VARIOUS INTERVENTIONS IN ALTERING PERCEPTIONS OF REFUGEES
Allison Pall
Time: 10:00 AM
Mentor(s): Amanda Flaim (James Madison), John Waller (History)

With the amount of refugees, asylum-seekers, and displaced people surpassing 65 million worldwide, humanitarian aid is becoming increasingly necessary. However, attitudes toward refugees in the United States, and other societies in countries able to accept those seeking asylum, have become increasingly negative as the crisis continues. This study aims to provide insight as to why people view refugees in a negative context, and to what effect these perceptions can be changed. My research is based on the work of previous Michigan State students who conducted a study with the goal of fostering more positive perceptions of refugees amongst those who participated. Through two interventions, a statistics sheet and a Humans of New York article, they found minimal differences in people's perceptions of refugees after interventions occurred. My goal is to conduct a study with the same objective, but with different interventions and survey questions. Survey questions will measure the degree to which certain attitudes and misinformation influence participants' perceptions of refugees through a Likert Scale in both a pre-intervention and post-intervention survey. Interventions will likely include a video narrative, written narrative, and statistics sheet, and will be conducted during the class time of a lower-level sociology course with 73 enrolled undergraduate students at Michigan State.

SOCIAL SCIENCE: GENERAL
ORAL PRESENTATIONS, SECTION 2
ROOM 36, 11:00 – 12:30 PM

"METH MOMS": LIFE STORIES AND ATTITUDES
Gabrielle French
Time: 11:00 AM
Mentor(s): Karen Holt (Criminal Justice)

Women who use drugs are stigmatized more so than their male counterparts. This is especially true for mothers who use. In order to understand this stigma and how it affects their lives, the researchers conducted interviews with mothers who were or are methamphetamine users in rural Alabama. Questions about initiation to drug use, family history, living situations, and their struggles with the Alabama Department of Human Resources' were asked to get a closer look at the world of "meth moms". The data collected gave insight into an otherwise overlooked world of why these women use drugs, and the harsh social climate that follows.

DEBT AND EXPLOITATION IN MICHIGAN: PAYDAY LOAN STORES
Grace Hough
Time: 11:15 AM
Mentor(s): John Waller (History)

Since they were first legalized less than two decades ago, payday loans have grown dramatically into a large and thriving industry (Stegman 2007). In Michigan alone, the practice of taking out loans costs families $103, 827, 786 annually. Despite the size and ubiquity of payday loan stores there have been few analyses which move beyond anecdotal information. The purpose of this presentation is to analyze the spatial distribution of storefronts in Michigan as

they relate to income distribution and racial characteristics. In addition, this study hopes to evaluate the extent of the debt trap created by payday loans in an attempt to shine light on the practice. This study comes at an important time as the Michigan Senate is considering an expansion to payday loans in SB 430-432 which would have a devastating effect on low-income families if it follows the pattern of other states.

COMPARING POLICIES, REGULATIONS, AND VOLUNTARY PROGRAMS IN THE LAKE ERIE AND LAKE CHAMPLAIN BASINS COMBATING POINT AND NONPOINT SOURCE POLLUTION

Emily Jenkins
Time: 11:30 AM
Mentor(s): Mark Axelrod (Fisheries & Wildlife)

Both nonpoint and point source pollution contribute to eutrophication in Lakes Erie and Champlain; excess nutrients like nitrogen and phosphorus run into these lakes and result in the growth of harmful algal blooms (HABs). This original dataset documents policies, regulations, and voluntary programs at federal, state, and local levels that aim to combat nonpoint and point source pollution. This research aims to determine number, type, strength, and incentive associated with policies and regulations pertaining to nonpoint and point source pollution. Government websites, legislation, and reports were searched, and officials were contacted, to create an extensive policy dataset. The United States federal government, the states of Ohio, Michigan, Indiana, Pennsylvania, New York, and Vermont, the provinces of Quebec and Ontario, and counties within states and provinces that fall within relevant watersheds were researched. The information was analyzed and categorized depending on type of policy, requirements, strength, and type of incentive. This research compares how governments address point and nonpoint source pollution. It reveals the prominence of stronger policies that combat point sources in comparison to policies that address nonpoint source pollution. This dataset will help those constructing new policies regarding point and nonpoint source pollution, as well as those evaluating current regulations and the policy-making process.

ARE WE THAT DIFFERENT? A COMPARISON OF PARENTS' AND TEACHERS' USE OF MENTAL STATE TALK WHEN INTERACTING WITH TODDLERS

Michaella McBratnie
Time: 11:45 AM
Mentor(s): Claire Vallotton (Human Development and Family Studies)

Mental state talk refers to explicit language about perceptions, thoughts, feelings, desires, and other internal states. Mental state talk influences children's language, social, and cognitive development (Meins & Fernyhough, 1999). In early toddlerhood parents focus their comments on children's desires, then shift to talk more about emotion and cognition in later toddlerhood (McBratnie & Rusher, 2017). Since teachers typically receive some training with regards to interacting with children to support children's development, they should have a greater knowledge of children's varying levels of cognitive and social abilities, and thus better hone their mental state talk to what is most developmentally supportive. For example, comparing teachers' and parents' talk with infants during a book-sharing task, teachers produce greater frequency of mental state talk with 12-month infants in comparison to mothers (Farkas, Strasser, Badilla, & Santelices, 2017). However, no published studies have compared parents' and teachers' mental state talk over time to see if these differences are stable, or how they may change. A sample of 62 parent-child and teacher-child dyads was followed throughout toddlerhood. Transcripts of caregiver and child talk were created from videos of 5-minute free play interactions when children were 12 and 30 months. Caregivers' and children's mental state speech was coded, including frequency and types of talk (cognitions, emotions, desires, etc.). I hypothesize that teachers will have more frequent mental state talk at both waves than parents, and that teachers will use a wider variety of types of mental state talk compared to parents.

BLACK MENTAL HEALTH AND THE PRISON SYSTEM

Arzelia Williams
Time: 12:00 PM
Mentor(s): Kevin Brooks (Arts & Humanities)

A person's deepest thoughts can be contained within a piece of paper. Expressive writing and its linkage with mental health specifically with the prisoner population has received increased speculation considering that over half of the adults sitting in American prisons have been labeled as functionally illiterate. Expressive writing written by prisoners along with those that have been addressed to them have served as an outlet when prisoners begin to work through anger and trauma in an effort to be mindful of future actions.There have been a handful of non-profit organizations across the United States that have established the relationship between prisoners and creative writing. The objective of the study therefore was to examine the contribution to the mind-state as well as coping skills prisoners have developed

in response to those writings. The analysis highlights that through expressive writing, prisoners are better able to approach self-awareness.

PROJECT HAMMOCK: MIXED-METHOD STUDY OF HAMMOCK USE ON MSU CAMPUS
Taylor Peterson
Time: 12:15 PM
Mentor(s): Jennifer Rivera (Arts & Humanities)

"Did you know that farming is about more than cows, plows, and sows? Farming embraces the spirit of community, relaxing, and playing in natural spaces. In this spirit, I proposed MSU adopt Hammock Farms. Even though I have a hammocking lifestyle and am aware of the benefits of hammocking, I wanted to know more about how other universities and how the MSU community perceives hammocks on campus. In this vein, I created a research project based on the literature of mental, physical, social health benefits of hammocking. First, I surveyed MSU community members to identify ways in which the use of hammocks on campus can contribute to positive community experiences. I then followed up with a focus group aimed on brainstorming and envisioning Hammock Farms on MSU green space. This performance art piece shares my findings, or what I refer to as—My Thoughts from a Hammock. "

SOCIAL SCIENCE: GENERAL
POSTER PRESENTATIONS, SECTION 1
BALLROOM, 9:00 – 10:30 AM

THE DECLINE OF INNER-RING SUBURBS AND HOW TO SAVE THEM
Connor Berdy
Poster: 663
Mentor(s): Matt Grossman (Political Science)

The Inner-Ring Suburbs of America have faced a collective decline over the past two decades. In this project I compare research and data on what lead to the this trend, and what cities ignore this trend and have had major comebacks despite the trend. Smart policy decisions on a local level have had major impacts on how Inner-Ring cities can sustain themselves against this trend of decline.

THE EFFECTS OF CHOICE ON DESIRE FOR POWER
Sabrina Bronni
Poster: 664
Mentor(s): Christopher Dishop (Psychology), Nicholas Hayes (Psychology), Richard DeShon (Psychology)

The central focus of this study was to examine factors influencing one's desire for power (i.e., a management role). Prior work has shown that both choice and construal level are important, such that individuals experiencing lower choice and higher mental representations of their environment (high construal) show greater preferences for power. There are a number of contrary positions, however, we wish to examine here. First, these studies examine power preferences after one choice experience despite the fact that everyday situations entail numerous opportunities for experiencing high or low choice. In the current study we explore power preferences after manipulating both cumulative and recent choice as individuals move through a variety of experiences. Second, prior work explains the construal effect with reference to the innate aspects of representing an object in a abstract way. We predict, to the contrary, that the influence of construal on desire for power is informed by the object itself. Results show main effects of gender and recent choice on power preferences, but no effects of cumulative choice or construal.

POLICY CHANGES GUIDED BY STATE REPUBLICAN LEGISLATURES SINCE 1990
Emily Jenkins
Poster: 665
Mentor(s): Matt Grossmann (Political Science)

Over the last thirty years, state-level Republicans have had significant political success. Thirty-four states currently have Republican governors, while thirty-three states are controlled by Republican legislatures. This dataset documents the policy changes pushed by Republican state legislatures across multiple states after the year 1990. This research aims to determine the social and political factors that may have shaped the success or failure of Republican policy proposals. Literature written about state politics published after the year 1990 were used for research; policy change data was extracted from this literature was added to the dataset. The policy itself, date of change, people involved, and other factors that may have influenced the policy at the time were analyzed. This research adds qualitative material to an

already extensive field of quantitative studies regarding Republican legislative efforts in recent decades. The data reveals numerous attempts to limit gun control, restrict abortion rights for women, and other aspects of a conservative agenda. It also captures the mostly nonpartisan policy changes spearheaded by Republican leaders and representatives. This dataset will help those researching the motivations behind changes in public policy led by Republican state legislatures, governors, and influencers.

WHAT WILL AUTONOMOUS VEHICLES DO TO MSU?
Sara Khodadost, Liam Flood
Poster: 666
Mentor(s): Mark Wilson (Urban and Regional Planning)

As cars become autonomous, urban planning becomes more important. Over the coming decades, the focus of planning will shift from what we need as drivers, to what we need as passengers in an automated system. This report strives to understand the changes that may occur in the built environment as a result of autonomous vehicles. As autonomous vehicles come onto the market this year, our communities have a lot to do to plan for a dramatic change in mobility. Elements such as parking garages, sidewalks, lane widths, building design, and road signage need to be analyzed to understand their current use as well as how they might change with autonomous mobility. To show the scale of change urban planners anticipate, we consider what these implemented changes would look like at Michigan State University. What will these vehicles do to our campus?

EMPLOYMENT BARRIERS FOR PEOPLE EXPERIENCING HOMELESSNESS
Brianna Lemon
Poster: 667
Mentor(s): Stacy Hickox (Human Resources and Labor Relations)

The project will focus on the connection between homelessness and unemployment. A literature review of studies from various disciplinary perspectives will provide the basis for field work at several homeless shelters in mid-Michigan. This research seeks to answer two questions: what is the effect of being homeless in obtaining gainful employment and what effective assistance do homeless shelters provide for homeless people to obtain employment. When analyzing these two questions, it was important to first identify and discuss the barriers to employment that homeless people face. Based on adversities such as substance abuse, incarceration, mental illness and various other barriers, those affected by homelessness have a harder time finding and keeping employment. This research will build on research conducted as part of an independent study in the summer of 2017 at three homeless shelters (Ozone House, Haven House, and Shelter Association of Washtenaw County), where interviews were conducted and surveys completed to gather information about residents' barriers to employment both before and during their residence at the shelter. These initial interviews and surveys indicate that there are three main contributing factors to the barriers: mental illness, substance abuse, and incarceration, all of which are connected and can overlap. The independent study also included interviews with a few shelter staff who help residents address their barriers to employment. This research will help to identify the barriers that are affecting homeless people and measure the success of various efforts of homeless shelters to address those barriers.

A TIMELESS TRADITION? MILLENNIALS' BELIEFS ON MALE CIRCUMCISION
Madeline MacLean
Poster: 668
Mentor(s): Nicole Buchanan (Psychology)

Before the 1900s, male circumcision was found only sparingly in the United States. It was mainly a religious practice, meaning that only those men raised in Jewish homes (and several remote tribes in central and southern Africa) were "cut". However, in the 1920s, the height of the Victorian era in our nation, circumcision became far more common, thanks to theories about health, cleanliness, and anti-masturbatory habits that had no basis in science whatsoever. Since this time, circumcision has become commonplace for the American man. A recent study found that about 79% of males in America are circumcised (Robinson et. al, 2012). Other studies done by medical journals have found that almost none of the ideas most people still hold today about circumcision are supported by science (Christakis et. al, 2000; Xu et. al. 2009; Matar et. al, 2015; Hay, 2013). My study seeks to answer the following questions regarding circumcision and attitudes towards it in young people: 1) Do the myths about cleanliness and health still persist in Americans' minds today? 2) Do young Americans see a difference between male circumcision and female genital mutilation (often euphemistically called "female circumcision" by those who practice it)? 3) Do young people have a preference when it comes to circumcision, either for themselves or for their partners? 4) If these young people ever have a son, will they circumcise him? These questions, when examined collectively, seek to discover whether attitudes about circumcision are changing in America with the younger generation.

BUILT TO FAIL: DO THE STRUCTURES OF CITIES LEAD TO FISCAL DISTRESS?
Joseph Micallef, Lucas Werner
Poster: 669
Mentor(s): Josh Sapotichne (Political Science)

Cities in Michigan are undergoing a great deal of fiscal stress, and the current stance of the state places much of the blame for that stress on the cities themselves. However, cities are mere subjects of the state, and it is unclear just how much control cities have over their finances in general, let alone how much they can affect their long-term fiscal standing. Using the fiscal health scale developed – and since abandoned – by Michigan State University in collaboration with the state we analyze the fiscal health of cities, attempting to determine if cities can be structured in such a way to prevent fiscal health. Structure is often a way the state goes about "fixing" a fiscal crisis – Flint is the prime example of this with significant charter changes during their stint in emergency management – but out analysis shows that, for the most part, these changes do not improve fiscal health. Virtually all the changes that were made with fiscal health in mind bore no correlation to improved fiscal health. The only positive result we found was in the budget preparer's proximity to the public – elected budget preparers oversaw the budgets of significantly less healthy cities than their appointed counterparts. These findings cast doubt on the power of a city to avert fiscal distress on its own, and bring into question the state's entire process for dealing with fiscal distress in cities.

SOCIAL SCIENCE: GENERAL
POSTER PRESENTATIONS, SECTION 2
BALLROOM, 9:00 – 10:30 AM

IT'S ALL IN THE ACT: HOW GENDER INFLUENCES PARENTS' AND TODDLERS' MENTALIZATION DURING PRETEND PLAY
Michaella McBratnie, Nikki Albee
Poster: 672
Mentor(s): Claire Vallotton (Human Development and Family Studies)

Knowledge of gender differences begins to develop around 2 years of age and is linked to the development of gendered behaviors (Zosuls et al., 2009). In addition, the toddler's growing knowledge of gender differences and stereotypes affect play routines, including pretend play (Jones & Glenn, 1991). Pretend play is a subtype of children's play involving simulative behaviors that impose an identity on objects and people (Pellegrini, 1985). Gender differences in pretend play include girls engaging in more person-fantasy play (e.g., feeding dolls) and boys engaging in more object-fantasy play (e.g., driving trucks) (Jones & Glenn, 1991). Pretend play draws out mental state talk (talk about perceptions, thoughts, feelings, desires, and other internal states) from both children and adults. Thus, it supports children's abilities to mentalize, to perceive others' thoughts and feelings. However, given the gender differences in the content of pretend play, there may be gender differences in associated mental state talk. A sample of 62 parent-child dyads was followed throughout toddlerhood. Transcripts of parent and child talk were created from videos of 5-minute free play interactions when children were 12, 18, 24, and 30 months. Pretend play was coded, including types of pretend play, objects acted on, and the initiating participant (parent or child). Parents' and children's mentalizations were coded, including frequency and type (cognitions, emotions, etc.). We hypothesize that pretend play will be associated with more frequent mentalization, and that child sex (male, female) will moderate this relationship, such that there is a stronger association for girls.

WE NEED TO TALK: HOW TODDLERS' COMMUNICATION CUES INFLUENCE PARENTS' MENTAL STATE TALK
Michaella McBratnie
Poster: 673
Mentor(s): Claire Vallotton (Human Development and Family Studies)

Parents' mental state talk - language about perceptions, thoughts, feelings, desires, and other internal states - influences children's language, social, and cognitive development (Meins & Fernyhough, 1999). Caregivers' mental state talk reveals their interpretations of the intentions behind children's behaviors, and motivates the child to communicate further (Buckley, 2003). In early toddlerhood parents focus their comments on children's desires, then shift to talk more about emotion and cognition in later toddlerhood (Taumoepeau & Ruffman, 2006). Child nonverbal communication, particularly gestures, influences parent's language (Goldin-Meadow et al, 2007). However, no study has looked at how children's nonverbal communication influences parents' mental state talk. This study looks at how toddlers' communication, including nonverbal cues, influences parents' mental state talk. A sample of 62 parent-child dyads was followed throughout toddlerhood. Transcripts of parent and child talk were created from videos of 5-minute free play interactions when children were 12, 18, 24, and 30 months. In addition to the frequency and variety of words used,

parents' mentalizations and children's nonverbal cues were coded. Child nonverbal cues were coded including gestures (pointing, showing, etc.), eye contact, and affect. Preliminary analysis showed that young toddler's vocalizations predicted fewer parent mentalization at the next wave; perhaps because of the child having the ability to communicate their own internal states which would decrease the need for parent labeling of internal states. However, I hypothesize that children's non-verbal communicative cues draw out parent mentalization, because these communicative cues implicitly demonstrate the child's thinking which parents then make explicit.

THE ANALYSIS OF GAZE PATTERNS FOR CHILDREN WITH DISABILITIES USING TOBII EYE TRACKING TECHNOLOGY

Darienne Moore, Christopher Yatooma
Poster: 674
Mentor(s): Lori Skibbe (Human Development and Family Studies)

Eye tracking technologies is an innovative way to study learning outcomes in children (Meng-Lung Lai et al., 2013). Although eye-tracking technology is popular for children with typical development, it can also help us to understand how children with disabilities learn and use educational materials. We aim to examine patterns of eye gaze for children with disabilities using The Inventory of Phonological Awareness using Alternative Responses (IPAAR). This is a new, innovative computerized test of phonological awareness for children with speech production difficulties as well as children exhibiting typical development, which requires only nonverbal responses and can be delivered via the internet. For this study, five to ten children will be assessed using Tobii 4C eye tracking technology while taking IPAAR. The Tobii technology works through corneal reflection, which allows us to track where children are looking on a computer screen and track their gaze over time (Morgante et al., 2011). IPAAR consists of 3 subsections of 30 question each done in 1, 2, or 3 sessions: segmenting, blending, and rhyming. As the children are engaged in the assessment, their pupils will be monitored and analyzed to demonstrate areas of interest for the child. These areas of interest will be recorded and a percentage will be given for the most time spent in looking into a specific area/quadrant (e.g., correct response). This will help researchers determine whether or not children are remaining focused on the assessment at hand and how their responses relate to their gaze patterns.

A COMPARATIVE ANALYSIS OF FACTORS AFFECTING WATER ACCESS IN DEVELOPED AND DEVELOPING COUNTRY CONTEXTS

Rachel Nanteza
Poster: 675
Mentor(s): Patricia Norris (Community Sustainability)

Reliable, accessible clean water is an achievable goal for all communities; however, access to safe, readily available water is a challenge for 2.1 billion people in developed and developing countries worldwide. Some experience scarcity not through natural causes but because of socio-political processes. Therefore using physical measures of availability to assess water access is inadequate. This study examines lack of water access in the 21st century as a product of sociopolitical and economic contexts of water management. Kampala, Uganda and Detroit, Michigan, USA, are endowed with abundant fresh water. However, approximately half of Kampala residents and 7% of Detroit residents have inadequate or no access to water. This study compares social, economic and political factors that influence universal access to water in Kampala slums and Detroit neighborhoods. Secondary data about study areas and qualitative data from interviews with stakeholders were used for the comparative analysis. Sen's Entitlements (examines the processes affecting access) and Capabilities (examines water user freedoms) framework was used as the basis for the qualitative analysis. Preliminary results suggest that affordability is a major barrier to access, but it manifests differently in both cities. Affordability of infrastructure development and maintenance is a barrier in Kampala slums, while affordability of publicly supplied water through available infrastructure is a barrier in some Detroit neighborhoods. The history of Detroit's government and settlement patterns have led residents to conclude that political support for universal water access is lacking. In Kampala, the informality of slum settlements limits political support for infrastructure investments.

MORE THAN JUST MILK: ARE THE EFFECTS OF BREASTFEEDING ON CHILD'S SOCIAL-EMOTIONAL AND LANGUAGE DEVELOPMENT MEDIATED BY MATERNAL SENSITIVITY MEDIATE?

Chuhao Nie
Poster: 676
Mentor(s): Claire Vallotton (Human Development and Family Studies)

Breastfeeding has significant effects on both the mother and the developing child (Drake, 2007). In prior studies, a positive association was found between the duration of breastfeeding and its sequelae including maternal sensitivity, attachment, and infant cognitive development (Tharner, 2012; Weaver, 2018). Further, maternal sensitivity predicts early child language outcomes (Hudson, 2015). In our study, we tested whether the associations between breastfeeding

duration and a child's social-emotional and language development are mediated by one specific aspect of maternal sensitivity: responsiveness. We proposed that maternal responsiveness mediates this relationship due to our previous findings that breastfeeding duration positively correlates with maternal responsiveness across cultures (Nie, 2017), and the extant literature showing that maternal sensitivity in general, predicts child language development. In our multi-country study, participants from U.S. and Chile were selected from childcare centers. Maternal sensitivity data was assessed via a 5-minute mother-infant free play at 12 months postpartum, which was recorded and later coded. The duration of breastfeeding was collected through a self-report questionnaire. Child's language and social-emotional outcomes were evaluated at 12 and 30 months of age using the Bayley Scale of Infant Development (Bayley, 2006). Two series of regression models were used to test whether maternal responsiveness mediates the relationship between breastfeeding duration and child development outcomes. The analyses controlled for potential confounds including maternal education, socioeconomic status, child gender, and country.

EXAMINING SYSTEMS THINKING PERSPECTIVES (IN THE OMO-TURKANA RIVER BASIN) USING FUZZY-LOGIC COGNITIVE MAPPING
Nate Olson
Poster: 677
Mentor(s): Jennifer Hodbod (Community Sustainability)

The Omo-Turkana Research Network (OTuRN) is an international research group concerned with informing stakeholders in the Turkana Basin about whether the changes occurring there support goals of equitable and sustainable economic growth. Some recent changes include the development of the Gibe III dam, irrigation of commercial crops from the Omo River, villagization, and political unrest. The research focuses of members span a wide variety of disciplines, but they usually work within their respective discipline. Because of this interdisciplinary approach, understanding how to effectively communicate information across different disciplines is of the utmost importance. Mental Modeler is a fuzzy-logic cognitive mapping software that allows users to model their mental landscape of a system by using components and connections. Components represent factors in the system (i.e. Gibe III) and connections represent a relationship between two components. These connections can be assigned positive or negative values and a relative strength. The goal of this research is to utilize a survey tool and Mental Modeler to assess the systems thinking of OTuRN affiliates over time. The study will allow us to track how participating in interdisciplinary research affects the systems thinking skills of previously disciplinary researchers. In the short term, this study is critical for the network to better understand how affiliates view the Turkana Basin system and the impact of various factors. A unique understanding of the differences between member's mental landscapes can reveal ways to improve communication within the network and give a broader systems thinking perspective to its members.

WEARABLE SENSOR TECHNOLOGY FOR MONITORING SOCIAL INTERACTIONS AMONG CHILDREN WITH ASD
Sarah Provencher, Hannah Schultheiss
Poster: 678
Mentor(s): Sarah Douglas (Human Development and Family Studies)

A wearable sensor system is being used to investigate a method for collecting quantifiable data on social interactions between children with Autism Spectrum Disorders (ASD) and typically developing children in a classroom setting. The objective of this project is to use these sensors to analyze the social interaction of these children in the classroom without having to rely on observational reports collected by the teachers of the classroom. The ultimate goal is that these sensors can be used to inform data based decision making and intervention for children with ASD. Data was collected from the Child Development Labs. Three children with ASD and nine typically developing children participated in data collection. Parental consent was obtained for all participating children. Each participant was asked to wear an index-card sized sensor placed in a customized t-shirt. The sensors collected data on face-to-face time, proximity, and physical movements of participants. The session was video recorded and the sensor data was validated using comparison with manually coded data. Data will be shared regarding the coding and validation process. In addition we will make connections to this project and current research with children with ASD.

SOCIAL SEISMICITY: ASSESSING THE USE OF SOCIAL MEDIA DATA IN ANALYZING MICHIGAN EARTHQUAKES
Eleanor Rappolee
Poster: 679
Mentor(s): Kazuya Fujita (Earth and Environmental Sciences)

In Summer 2015, there were two small earthquakes that occurred near Kalamazoo, Michigan. Michigan is generally thought to be an area of low seismicity; therefore, these events were significant and unexpected. Both earthquakes received a lot of attention in many forms of social media, which presented an opportunity to determine if social media platforms were a reliable data source that could be exploited. This study examines the two earthquakes using unfiltered

felt reports obtained from responses and observations from social media platforms (Facebook and Twitter) and news media merged with reports from formal reporting earthquake sites (emsc-csem.com, earthquake-report.com, etc.). The unfiltered felt reports were converted to intensity using the Modified Mercalli Intensity Scale and compared to the felt intensities collected and filtered by USGS Did You Feel It (DYFI). No statistical differences were found across the obtained felt intensities from social media and the USGS DYFI intensities. Overall, the felt reports gathered from social media provided additional information that could not be recorded or analyzed from the filtered USGS DYFI intensities. For instance, responses on social media recorded details on an aftershock event, while the USGS DYFI did not. These findings suggest that social media platforms can be used as a quick, extensive, and reliable source for obtaining intensity data, which is an integral part of a comprehensive dataset for areas of low seismicity. Developing this method could have broader implications for other regions of low seismicity similar to Michigan.

SOCIAL SCIENCE: GENERAL
POSTER PRESENTATIONS, SECTION 3
BALLROOM, 9:00 – 10:30 AM

VIDEO GAMES AND PARTISANSHIP
Eli Pales
Poster: 682
Mentor(s): Ryan Black (Political Science)

Video games rarely take a prominent role in the mainstream media. As a result many Americans may not think regularly about game media as a political issue. Yet, the video game industry is a massive one, raking in more than $23.5 billion in 2016 the US alone. The industry's primary lobbying organization, the Entertainment Software Organization (ESA), spends million lobbying congress each year. Despite the organization's relatively small name recognition, it outspends Google, Facebook, and even the NRA in congressional lobbying. However, despite its strong spending, it is unclear whether support for the video game industry is a partisan issue. In this project, I studied the partisan attitudes of lawmakers in Congress towards video games. This presents an important contribution to existing research because, despite the size of the video game industry and its influence in congress, no other study has looked at the partisan attitudes towards this entertainment medium. I hypothesize that lawmakers of both parties hold negative views on video games, but that the Republican party holds a more negative view due to its tendency to blame gun-related episodes on other factors. I also hypothesize that these views have shifted over time, especially as the Democratic party has gotten more liberal. To test my hypothesis, I examined the statements pertaining to video games of elected officials in Congress since the year 1996, coding each statements on a scale from positive to negative. I also charted gaming rhetoric along with NOMINATE ideological scores to see if ideology plays a difference.

THE IMPACT SUBSTANCE USE HAS ON RELATIONSHIPS AND HEALTH AMONG SEXUAL MINORITY WOMEN
Taylor Reid
Poster: 683
Mentor(s): Heather McCauley (Human Development and Family Studies)

Intimate partner violence (IPV), including physical and sexual violence and emotional abuse, is prevalent among young women and associated with poor health outcomes among this population. One important contextual factor influencing vulnerability to IPV is substance use, though mechanisms linking substance use and IPV are less clear. Understanding these links are particularly important for sexual minority women, who are more likely to experience IPV and more likely to report lifetime drug and alcohol use, compared to heterosexual women. Using grounded theory, we analyzed 25 semi-structured, in-depth interviews with young women who have sex with women recruited from reproductive health clinics to assess for the role substance use plays in their sexual relationships. The goal of this study was to categorize and identify prevalent themes from the transcripts for the purpose of creating meaningful links and generating theory regarding the important intersections of substance use and IPV. Participants described enduring increased aggression with intoxicated partners. This trend appeared most prominently when partners struggled with a co-occurring mental health disorder. However, these findings were almost exclusive to participants' relationships with men. With female partners, substance usage occurred recreationally, rather than as context for violence. These findings will contribute to enhancing current perceptions of the relationship adversities that disproportionally impact sexual minority women, with the overarching mission to educate health care providers regarding how to support to patients whose experiences diverge from heteronormative expectations.

LIMITING VISITS ENDANGERS MICHIGAN PRISONER REHABILITATION
Andrew Rockett, Nathaniel Penning
Poster: 684
Mentor(s): John Waller (History)

The relative and absolute backwardness of policy approaches in the American incarceration system have been well-established through decades of scholarship. Despite research findings that support many effective approaches to correctional systems, laws and policy directives today still frequently employ tactics known to be ineffective. One such directive, concerning inmate visitation rights, was recently introduced in Michigan prisons. Administrative Rule 614 Subrule 11 Section D states: "The director may permanently restrict all visitation privileges, except with an attorney or member of the clergy, for a prisoner who is convicted or found guilty of…Two or more violations of the major misconduct charge of substance abuse." Extensive literary review of primary and secondary data and literature suggests that this rule will be detrimental to inmates and their families. Recidivism data supports a negative correlation between visitation and recidivism, while literature supports many other positive benefits to visitation that apply to both inmates and their families. Research on prison disciplinary systems, meanwhile, reveals that the 'ticket' system of discipline is ineffective, and that successful rehabilitory approaches to substance abuse generally involve community support both inside and outside of prison. Limiting visits, meanwhile, fails to address the problem while also severing an inmate's link to the outside community. Finally, comparative analysis of numerous states finds that more open visitation policies are helpful for a prisoner's rehabilitation. Ultimately, evidence from numerous standpoints suggests that this administrative rule will be detrimental to prisoners, their families, and society as a whole.

HOW DOES STATE FUNDING PER STUDENT IMPACT THE FUTURE SUCCESS OF A STUDENT?
Rebecca Rranza, Zachary Barnes, Genevieve Brown, James Yen
Poster: 685
Mentor(s): Sarah Reckhow (Political Science)

The focus of our group's study is on public school funding and its impact on various factors such as school performance, variations between states and low-income areas as listed below. Our group all picked the same first choice in the surveys we took and are very interested in this topic due to our class discussions of "Does money matter?" While the popular rhetoric often discusses the constant need to increase funding, as our readings highlighted, there is not necessarily such a direct correlation between funding and improvements in schooling. We wanted to explore more deeply whether money truly matters, how it influences different factors, and the impact it has on students. The purpose of education and what a "successful" education system creates is clearly debated in the world of education policy. It can be argued that test scores, graduation rates, college attendance, or even immediate job placement can measure the success of a school. This is why the dependent variable in our research question is rather vague. We hope by looking at different definitions of success, we can find a clearer way state funding per student impacts the success of schools and the students themselves. Subtopics of our research project will include the impact of funding per student on test scores, graduation rates, and college attendance, and possibly other future job placements.

BOYS WILL BE BOYS AND GIRLS WILL BE EMOTIONAL: EARLY GENDER SOCIALIZATION THROUGH MENTAL STATE TALK
Emily Rusher, Angela Salerio
Poster: 686
Mentor(s): Claire Vallotton (Human Development and Family Studies)

Socioemotional developmental skills begin within the first 3 years of life, increasing overtime, and are influenced by parental socialization (Farkas et al, 2017), which may vary by child sex. Part of this socialization is the way parents talk to their children, including mentalization (the language of thoughts, feelings, and emotions; Chang et al, 2017). Parents tend to create and modify the child's environment based on gender norms according to the sex of their child. (Pomerleau, Bolduc, & Cossette, 1990). Toddlers start to generate gender stereotypes around the age of 2, but attention to gender can begin as early as 18 months (Johnston, Bittinger, Smith & Madole, 2001). It was found that girls show more internalizing emotions, such as sadness, anxiety, and sympathy, while boys show more externalizing emotions, such as anger (Chaplin & Aldao, 2013). The reasons for these differences is unknown, including the potential roles of parent's mental state talk in socializing these gender differences. This study examines variation in parent mentalization in relationship to child sex (e.g., female/male). Using transcripts from 5-minute free play interactions across 4 waves (12, 18, 24, and 30 months), we coded each mental state utterance into eight categories, e.g., cognitions, emotions, psychological attributes, desires, and physiological states. We hypothesize that the sex of the child will have an effect on frequency of parental mentalization across the 4 waves. We expect that there will be differences in the content of mental state talk used by the parent depending on child sex.

IDEOLOGICALLY-MOTIVATED CYBERATTACKS
Mattisen Stonhouse
Poster: 687
Mentor(s): Thomas Holt (Criminal Justice)

When considering the targets of terrorists and extremist groups, individuals are most often concerned with the risk of physical attacks. However, most all facets of modern society now rely heavily on computers and Internet connectivity. As a result, there is now potential for ideologically-motivated actors to engage in cyberattacks against these services to cause harm and force political or social change and spread fear among the general public. Although there is various literature on the extent of physical terrorist attacks performed by ideologically motivated actors, there exists a gap in research of cyberattacks performed by these same actors. This study will focus specifically on the scope of cyberattacks performed by individuals and groups associated with radical far left movements and the impact these attacks have on the public. This will be assessed by analyzing a database of ideologically-motivated cyberattacks collected by Drs. Holt and Chermak in the School of Criminal Justice. By examining the web pages, reports, and materials collected about each attack, this study will identify trends about the individuals and groups involved in each attack, the targets of the attacks, and the economic impact imposed on victims. By better understanding the frequency and forms of cyberattacks, we can improve our understanding of ideologically-motivated attacks on and off-line, and how to defend against and investigate them.

COALITIONS USE OF INTERSECTIONALITY FOCUSING ON THE WOMEN'S MOVEMENT
Madison Young
Poster: 688
Mentor(s): Maite Tapia (Human Resource and Labor Relations)

The Women's March was the largest single-day protest event in the history of the United States and the world. On January 21, 2017, about 5 million people marched in cities across the US as well as abroad. From Washington D.C to Lansing, Michigan, to Antarctica, to Argentina, and Thailand, women (and men) came out to advocate for a range of issues, including equal rights, racial equality, LGBTQ rights, and a clean environment. In our research, we focus on the Women's March as well as the Women's convention that was held in Detroit in October 2017. Specifically, we are interested in understanding how the WM has been able to bring together so many different groups of people. To do so, we focus on the concept of intersectionality. Intersectionality is a process of recognizing that individuals/groups are more than one marginalized segment of their lives. Working with people means that you have to understand how complex their issues are in order to properly fight for their rights. Through coding, participating in The Women's Convention, studying articles on The Women's March, and conducting interviews, we were able to categorize and define the key elements of "intersectional organizing." Throughout this research, we found that The Women's Movement has been a great example of intersectionality in action.

MARRIAGE-AGE PATTERNS ACROSS THE WORLD AND TIME
Whitney Zhou
Poster: 689
Mentor(s): Hanzhe Zhang (Economics)

While romantic to say that marriage is for love, marriage is foremost a social institution with great socioeconomic baggage. The age of a person's first marriage holds a strong relationship with their lifetime income. A preliminary survey of IPUMS data on US citizens during the 20th century has suggested that for men, the age of a man's first marriage is positively correlated with their lifetime income; graphs show an upward slope. This relationship has held throughout most of the century. For women, the preliminary survey graphs showed that women have a concave-down relationship between their age of first marriage and lifetime income, suggesting that women who marry especially young or old are economically less well off. Throughout much of human history, women have typically married earlier than men due to biological factors and cultural discrimination. These biological factors also feed into a woman's marital desirability: as a woman ages and becomes incapable of bearing children, her desirability decreases – this perhaps explains the differences between genders in the relationship between marriage age and income. The preliminary study also suggested that for more modern cohorts, the difference is diminishing and the graphs look more and more similar (perhaps as a woman's reproductive abilities is less tied to her marital status). However, the preliminary survey only observed data from the US. This study looks at marital and income data from multiple other nations to compare trends and see if the US's recent phenomena are an isolated movement towards egalitarianism between genders.

SOCIAL SCIENCE: GENERAL
POSTER PRESENTATIONS, SECTION 4
2ND FLOOR ART GALLERY, 1:00 – 2:30 PM

MOTHERS' AND FATHERS' RESPONSES TO TODDLERS' EMOTIONS: ASSOCIATIONS WITH PARENTAL EMOTION BELIEFS

Casey Campbell, Jaylen Gavle, Megan Maguire
Poster: 692
Mentor(s): Holly Brophy-Herb (Human Development and Family Studies)

Emotion socialization practices are the ways in which parents teach children about emotions. "Teaching" often occurs through modeling as parents respond to children's emotions. Little is known about how mothers and fathers of very young children socialize emotions and how their behaviors are related to their own emotion beliefs. This study hypothesizes that parents' responses to toddlers' emotions during a frustrating task are associated with parents' emotion beliefs. 109 mothers and toddlers (Mage = 26.14 months) and 83 fathers and toddlers (Mage =30.06 months) participated in the Toddler 5 and the Families and Children's Emotion Studies, respectively. Responses to toddlers' emotions were coded from a frustrating "lock box" task in which toddlers were asked to stop playing with an attractive toy which was then placed behind a barrier. Parental responses included three supportive types (affectionate touch, encouragement of emotion expression, suggesting strategies), one neutral strategy (distraction), and two negative responses: punitiveness and directives. Emotion beliefs (emotion coaching, dismissing and disapproving beliefs) were assessed via self-report. All parental responses have been coded. We will use descriptive statistics to examine associations between mothers' and fathers' emotion beliefs and their responses to emotions. We will examine differences in the types of supports that mothers and fathers use and how supports are related to toddler age. Results will shed light on links between beliefs and practices and on any differences between mothers and fathers in beliefs and practices. This information will be meaningful to parenting educators and to future research examining emotion socialization practices.

PURI DETROIT RESEARCH PROJECT

Kady Cox
Poster: 693
Mentor(s): Marya Sosulski (Social Science)

The purpose of this study is to examine and evaluate the influences of a community and its members. Some may argue Detroit has changed positively while some may beg to differ. Different factors have been manipulated in order to determine key influences. This research will focus specifically on census data and asset based community development to explain and provide characteristics within the Detroit community. Asset based community development is a strategy for sustainable community influenced development. ABCD is focused on linking smaller building blocks to the larger community. It also promotes sustainability for present communities in the future. By allowing social capital to be the foundation to beneficial community development, ABCD depends on the community to identify overlooked resources and assets to create an efficient economic advance for its community members. Surveys, interviews, and focus groups have been conducted to evaluate both community and individual impact. This research study will contribute to a larger portion of research in which plans to create a university-neighborhood will take place.

A DESCRIPTIVE STUDY ON MUTUAL GAZE IN SENEGALESE POPULATIONS

Pooja Dandamudi, Malik Hindawi
Poster: 694
Mentor(s): Yatma Diop (Human Development & Family Studies), Lori Skibbe (Human Development & Family Studies)

Research has demonstrated a significant correlation between the application of mutual gaze in parent-child relationships and success in early language development. This relationship has not yet been observed in Senegalese communities, where mutual gaze might be discouraged due to social norms (Zeitlin, 2011). Tostan, a local organization focused on community empowerment, launched the Reinforcement of Parenting Practices Program (RPPP) in an effort to foster parent-child interactions in early development, including child-directed speech and having eye contact. Videos of interactions between 60 Senegalese parents and their children were recorded for five minute windows, and were subsequently coded for variables including frequency and duration of eye contact, gaze initiation, and emotional context. These variables were coded using a software program called ELAN, and a reliability check was conducted with 20% of the videos with an inter-rater reliability for mutual gaze of 85.5%. Results indicated that on average parents initiated eye contact differentially by contextual settings, such as gender of the child and the emotional context. Mothers looked at girls more than boys, but generally engaged in positive interactions with all of their children. By publicizing

this knowledge to affected communities, parents can pass on parenting techniques to non-participants by word of mouth in order to further the administration of mutual gaze techniques which will prove effective in language development of children. Future research could include the effects of parenting interventions introduced by Tostan.

SETTING THE MOOD: HOW MOTHERS' DEPRESSION IMPACTS THEIR ENGAGEMENT AND ROLES DURING PLAY
Caroline Kane
Poster: 695
Mentor(s): Claire Vallotton (Human Development & Family Studies)

Parental involvement in child's play impacts cognitive, social, and language development, which is compromised when parents experience depression (Nokali, Bachman, & Votruba-Drzal, 2011). Parents' roles in children's play (e.g., parent-centered, child-centered, or co-player) influence future child behavior with peers (Russell & Saebel,1997). Parental depression has been linked to lower levels of engagement, warmth, and responsiveness, the effects of which are seen throughout a child's life. Most studies of the effects of depression on mother-child interaction focus on etic level micro-behavioral shifts (e.g., facial expressions, vocalizations); this study examines effects of depression on emic level roles mothers take in infants' and toddlers' play related to their levels of engagement. Mother-infant dyads (n=29) were observed during a 5-minute free-play and mothers reported their mental health (e.g., depression, stress) via the Parenting Stress Index. We coded the level of engagement and mothers' roles during play (director, facilitator, co-player, disengaged; Russell & Saebel, 1997). Preliminary correlations reveal relationships between mothers' perceived competence and the amount of time spent in directing versus facilitating play. Depression and life stress were associated with level of engagement and the roles mothers took during play. Further analyses will test whether depression and stress moderate the relationships between level of engagement and roles during play. We expect that depression reduces engagement in infants' play and moderates the relationship between engagement and roles, such that for depressed mothers, when they are engaged they are directing infants' play.

THE EFFECTS OF OBESITY ON FOOD-CUE TRIGGERED EATING IN THE ABSENCE OF HUNGER
Doris Olekanma
Poster: 697
Mentor(s): Alex Johnson (Psychology)

With industrialization and greater access to highly palatable food, prevalence of obesity has skyrocketed. However, the specific variables driving obesity rates remain to be identified. One potential trigger of obesity may reflect the prevalence of environmental cues that are associated with food (e.g., fast-food advertisements and logos). Research from our laboratory suggests in mice, food-paired conditioned stimuli (CSs) can drive overeating in the absence of metabolic need. In the current study, we examine whether dietary obesity enhances the vulnerability to overeating behaviors in the presence of food-paired CSs. Mice were first assigned to one of two groups and either provided ad libitum access to a high fat diet (HFD) or regular lab chow for a total of 12 weeks. This resulted in diet-induced obesity (DIO) in the HFD fed mice. Subsequently, mice were mildly food-deprived by restricting access of their maintenance diet to a single daily meal; and received training for Pavlovian conditioning, in which auditory CSs were either paired (CS+) or unpaired (CS-) with the delivery of a sucrose solution. Following training, mice were ad libitum fed for three days prior to the test. On the test day, sucrose intake was recorded under CS+ or CS- conditions. Surprisingly, both food sated DIO and lab chow control mice showed a similar increase in sucrose intake during the CS+ compared to the CS-. These results are discussed with respect to the potential influence of food-paired CSs on eating behaviors in the obesogenic environment.

MAPPING HEALTHY FOOD ACCESSIBILITY IN DETROIT
Lucy Schroeder
Poster: 698
Mentor(s): Leo Zulu (Geography)

Parts of Detroit are often referred to as a 'food deserts' due to limited options for grocery stores. Accessibility to fresh, nutritious food is further limited by income and racial inequalities that lead to a shortage of grocery stores in low-income, minority neighborhoods. The residents in these neighborhoods often lack vehicles and rely on walking or public transportation. When grocery stores are located outside walking distances or far from public transport residents in such communities cannot acquire nutritious food, which may undermine their health. One solution to increase access to healthy food has been establishing community urban gardens. This study identified areas of limited food accessibility in Detroit, Michigan, based on grocery location and measures of access, using spatially explicit datasets analyzed in Geographic Information Systems (GIS) software, ArcGIS. The study also identified vacant parcels zoned for community gardens using ArcGIS, to seek options for mitigating the food-desert problem. Findings showed that areas lacking grocery stores within a half-mile radius are primarily low-income neighborhoods. Furthermore, 246 vacant parcels were

identified as potential locations for community gardens to reduce the problem with some identified as a priority. The findings highlight the issue of food deserts and poor health in these neighborhoods. By locating suitable sites for community gardens, this project may help to improve access to healthy food, nutrition and health, among other options, in lower income communities in Detroit.

THE EFFECTS OF SOCIAL MEDIA AND NEWS COVERAGE ON PERCEPTIONS OF TRAGEDIES AND NATURAL DISASTERS
Chris Wentworth, Zoya Shevchenko
Poster: 699
Mentor(s): Christina DeJong (Criminal Justice)

The purpose of this project is to study the ways in which social media and news coverage influence the public's opinions on and perceptions of important issues, such as natural disasters and other tragedies. Results from this study should provide some insight in to the effect of a 24/7 news cycle, and the impacts of biased sources. Considering the current trends which can be seen in the coverage of current events, especially those which are highly politicized, this study will be particularly informative. The study, which will consist of a survey that will be administered to anonymous MSU students, will collect information on news sources that are used, public opinion on various issues such as immigration, disaster relief aid, and the memorability of certain events. By collecting information of these topics, this study may provide a new perspective on how perceptions of the same event can vary so greatly between individuals, and how those perspectives come to differ so greatly.

SOCIAL WORK

POSTER PRESENTATIONS, SECTION 1
2ND FLOOR ART GALLERY, 11:00 – 12:30 PM

AN EVALUATION OF THE EVIDENCE BASED TRAUMA TREATMENT CERTIFICATE
Katelynn Diepstra
Poster: 702
Mentor(s): Cheryl Williams-Hecksel (Social Work)

The Evidence-Based Trauma Treatment Certificate is offered to MSW students. It combines classwork, TF-CBT training, and specialized field placements to prepare students to effectively work with and treat childhood trauma. The Social Work profession deals frequently with trauma and understanding addressing trauma are important components of social work practice. Six cohorts of certificate graduates (n = 59) were surveyed to better understand their experience and outcomes. The results of the survey indicate that 86% of graduates who responded obtained a trauma related job after graduation and 80% believed the certificate was a key component to gaining that employment. These results demonstrate the importance and effectiveness of trauma education for social work professionals.

PERCEPTIONS OF COLLEGE STUDENT SERVICE PROVIDERS AND DECISION-MAKERS ON INTIMATE PARTNER VIOLENCE IN COLLEGE AND THEIR RESPONSES
Shavonna Green
Poster: 703
Mentor(s): Hyunkag Cho (Social Work)

Intimate partner violence (IPV) in a relationship, or dating violence (DV), is a large social problem affecting one third of girls and about one half of college-aged women in the United States. Intimate partner violence has many consequences for a survivor, such as mental health concerns, behavioral and physical health concerns, and higher chances of victimization later in life. Twenty-four interviews with various service providers in the field at MSU were conducted to gain their perspectives on DV among college students and if the service provided met the needs of students. The analysis of these interviews identified several significant factors in the experience of victims of IPV. Results of this study reveal that the experience of each survivor is unique and should be handled differently. Many potential factors influence the survivor's experience following DV and if they reach out to available sources, such as cultural differences and stigmatized shame associated with being a victim of DV. Furthermore, ethnicity, gender, sexual orientation, and providing victims self-determination of their own situation each play a key component towards the willingness to seek resources and their overall effect. The results yielded will help provide comprehension and understanding of major

elements affecting the experience of DV survivors, and allow service providers and policy makers to access information that may potentially allow them to alter services to better serve the community and victims of intimate partner violence.

MAKING THE FAMILY COURT SYSTEM EFFECTIVE FOR PARENTS WITH MENTAL ILLNESS: PARENTS' PERSPECTIVES
Myia Hall
Poster: 704
Mentor(s): Joanne Reibschleger (Social Work)

Mental illness stigma can be defined as socially constructed negative attitudes and beliefs that are extended toward people with a mental illness. These beliefs can lead to people with mental illness experiencing unwarranted disapproval from others, as well as exclusion from social events, employment barriers, and insufficient access to health and mental health care (Rusch et al., 2005). Many people with mental illness are parents of minor children. Some studies indicate that family court systems are more likely to label them as unskilled parents than parents without a mental health diagnosis (Lighthouse & LaLiberte, 2007; Sands, et al., 2004). Thus, custody decisions of minor children could be influenced by the parent's mental illness diagnosis versus observed parenting concerns (Lighthouse & LaLiberte, 2007; Seeman, 2012). There are few studies that explore family court experiences of parents with a mental illness. Their voices are missing from the limited studies that examine parental mental illness as a factor in decisions about child custody arrangements. This exploratory, thematic analysis qualitative study is guided by an overarching research question: "How do parents with mental illness describe their experiences with the family court?" The interview topic questions ask about family structures, court experiences, legal representation, supportive resources, and communication processes. Data are drawn from transcribed interviews with parents with a mental illness. A student-faculty team is beginning to use thematic analysis to identify emerging themes of the data, with suggestions for practice, policy, education, and research.

FAMILY CRIMINOGENIC RISK SCORES OF FEMALE OFFENDERS WHO ARE VICTIMS OF HUMAN TRAFFICKING
Anastasia Machasic
Poster: 705
Mentor(s): Caitlin Cavanagh (Psychology)

Girls facing dysfunctional family environments have higher risk of being involved in juvenile sex trafficking, and to engage in crime (Choi, 2015). This study compares family criminogenic risk factors for female juvenile offenders who are, and who are not, victims of human trafficking. Using data from a juvenile court, we obtained scores from the Youth Level of Service/Case Management Inventory to determine family criminogenic risk.Youth were classified as victims of juvenile sex trafficking by law enforcement or court practitioners. We hypothesize that trafficked youth will demonstrate greater family criminogenic risk compared to youth who are not trafficking victims.

REVISING THE MICHIGAN PARENTING TIME GUIDELINES
Erin Mattucci
Poster: 706
Mentor(s): Joe Kozakiewicz (Social Work)

Revise the Michigan Parenting Time Guidelines to modernize and improve the value and functionality for Michigan parents. This revision should have a focus on parents who are parties to a domestic relations case as the primary audience. These guidelines should enable parents to choose an appropriate parenting time schedule for their specific situation, and in so doing, reduce conflict between parents and resources necessary to litigate custody and parenting time issues.

THE INFLUENCE OF FAMILY DEPENDENCY TREATMENT COURT (FDTC) PERSONNEL AND PEERS ON REALIZING PROGRAM MILESTONES
Sadie Shattuck, Lyndsay Huey
Poster: 707
Mentor(s): Anna Maria Santiago (Social Work)

For over two decades, Family Dependency Treatment Court (FDTC) programs have supported child welfare system involved parents in maintaining their sobriety and reducing risks of child abuse and neglect. While previous studies suggest that FDTC program participants are more likely to realize program milestones than parents receiving traditional protective services or foster care interventions, little is known about the influence of FDTC personnel or peers on their success. This study examines the influence of relationships and interactions between participants, peers, and court personnel on successful completion of FDTC program requirements including sustaining sobriety, reunification with

children, and completion of educational and work-related goals. Data used in this study come from five months of observations of FDTC proceedings and public court records collected for 19 current FDTC participants from a medium-sized county in the Midwest. Coding and thematic analysis were conducted in order to assess the relationships and interactions between FDTC participants and court personnel. Preliminary findings suggest that FDTC court personnel play an important role in successful completion of program requirements. On the one hand, court personnel and peers play a positive role through their knowledge of sobriety, understanding of parenting woes, and nonjudgmental support of participants. On the other hand, the power dynamic between court personnel and participants may lead to negative interactions and program sanctions, which decrease the likelihood of successfully completing program requirements. We discuss ways in which study findings might be used to assist court personnel and community recovery programs to develop more effective programming.

SOCIAL WORK
POSTER PRESENTATIONS, SECTION 2
2ND FLOOR ART GALLERY, 3:00 – 4:30 PM

CHRISTIAN WATER JUSTICE
Anna Fedoronko
Poster: 710
Mentor(s): Stephen Gasteyer (Sociology)

The human-made water crisis in Flint, Michigan has highlighted the growing concerns about water justice in the United States, as well as globally. In response, there have been concerted efforts to advocate for water justice. In times of distress, many religious organizations and activists have played important roles in the civil rights movements. This research will build on the theories of Christian based social activism to explore the role of Christian organizations in response to the Flint water crisis. Specifically, we will interpret the role of the individual churches, religious institutions, as well as inspired congregants and leaders to respond to clear examples of environmental racism that violate terms of water justice. The implications of this research will help social movement researchers to understand how religious organizations fit into the development of coalitions around environmental justice. In a more practical sense, this research will shed light on the array of Christian religious organizations that have demonstrated environmental activism as well as identify some of the existing relationships and networks that have emerged.

DETROIT TRANSPORTATION: A QUALITATIVE STUDY
Joseph Ingall
Poster: 711
Mentor(s): Marya Sosulski (Social Work)

One thing that world class cities have in common are highly accessible public transportation systems. For the past several decades, Detroit, Michigan has been progressing toward a comeback through many dynamic changes. A key change to focus on is the city's transportation surrounding the historic Michigan State Fairgrounds, as it serves as a midpoint between Downtown and Midtown. The current transportation system is run by the Regional Transit Authority (RTA). When considering the movement through cities, it is important to consider everyone that uses public transportation. Specific groups that face barriers with regards to accessibility, often get overlooked. Detroit has received a negative reputation though the years, partially due to this issue for some demographics using public transportation. To remedy such an issue, the time has come where direct action must be taken. Actions that can be taken to improve transportation in Detroit vary in a number of ways and therefore, public opinion must be accounted for in order to reveal what is most important. This research focuses on the public's opinion of public transportation in Detroit, concentrating on 13 neighborhoods surrounding the Michigan State Fairgrounds site. Data for the study comes largely from the State Fairgrounds Area Neighborhoods Study (SFANS) with original data coming from a survey, focus groups, interviews, and maps created by community members that identify resources and assets, some being related to transportation. This study aims to reveal actions that stakeholders can take in order to make Detroit an accessible city for a multitude of people.

THE ENVIRONMENTAL IMPORTANCE OF THE DEVELOPMENT OF THE DETROIT STATE FAIRGROUNDS
Valerie Kowalski
Poster: 712
Mentor(s): Marya Sosulski (Social Work)

The Detroit State Fairgrounds has been on the forefront for agricultural growth and development for Michigan as well as for Detroit since the late 1800s. After the State Fair was shut down in 2009, the 160 acres on the Fairgrounds site were slated for redevelopment. But questions remain about how to develop the grounds, what the communities that surround the Fairgrounds want, and what the developers want. These different opinions are important because they can open up new, beneficial and sustainable possibilities for the city of Detroit. The State Fairgrounds Area Neighborhoods Study (SFANS) aims to answer some of these questions by partnering with community members to determine what they believe is important in the Fairgrounds redevelopment. Preliminary results indicate that one of the main categories of interest is energy and sustainability, which aligns with recent efforts in Detroit to clean up its surroundings and interior, such as the Belle Isle project, to make the city a cleaner and more sustainable environment. The Fairgrounds development can be a model for environmentally conscious development and sustainability, but to gain support for such change, we must understand where support lies and with whom, as well as what kinds of changes communities want to see. Using data from the SFANS survey, focus groups, interviews, community mapping, and participant observation, this research explores the differences among groups within neighborhoods about the importance for including environmental sustainability in the development of the Fairgrounds and what shape it should take for long-term growth and community benefit.

EVALUATING THE EFFECTIVENESS OF BYSTANDER INTERVENTION TRAINING
Ana Manzano, Melissa Wagner
Poster: 713
Mentor(s): Carrie Moylan (Social Work)

The purpose of this project was to assess if sexual assault bystander intervention training was effective at increasing students' intent to intervene in risky situations. Bystander intervention is a popular approach to preventing sexual assault on college campuses. Bystander training focuses on helping students identify situations that might pose a risk related to sexual violence, increasing student motivation to intervene in those situations, and building skills to support intervention. Using data provided by a community based rape crisis center that conducted bystander training on three campuses, we assessed if students had increased likelihood to intervene after attending the training, and whether the training was similarly effective with high-risk groups such as athletes and male students. Agency staff collected pre-test and post-test data from 855 students on three campuses between 2015-2016. Using the Bystander Attitude Scale Revised, students indicated their likelihood of intervening in 17 risky situations. Paired and independent sample t-tests were conducted to compare pre-test and post-test scores as well as to compare the scores of subgroups of students. Scores at post-test were significantly higher than at pre-test in the full sample. Both high-risk groups showed significantly lower scores than females or non-athletes at both pre-test and post-test, but showed equivalent improvement in scores after the training. Overall, we conclude that the training was effective at increasing students' likelihood of bystander intervention, but students in groups thought of as higher risk for perpetration continued to be less likely to intervene.

MSU EVIDENCE-BASED TRAUMA TREATMENT CERTIFICATE: TRAUMA EXPOSURE AMONG GRADUATE STUDENTS AND PREPAREDNESS TO WORK IN TRAUMA TREATMENT
Alexis Rea
Poster: 714
Mentor(s): Cheryl Williams-Hecksel (Social Work)

Using a mixed-method approach, graduates of the School of Social Work's Evidence Based Trauma Treatment Certificate were surveyed (n = 59). This survey explored respondents' experience of the certificate, as well as motivation to pursue the certificate, personal trauma exposure, preparedness to provide trauma-informed services, and job outcomes. Eighty-six percent of these graduates have had employment that is in some way related to trauma since completing the certificate. Trauma is also notably prevalent in the personal lives of certificate graduates. Eighty-five percent of participants reported at least one personal experience of trauma with a mean of six traumatic experiences in their lives. While preparation to actually work with trauma survivors was exceptionally high, preparation to manage exposure to secondary stress was not equally high. Ninety-one percent of respondents felt they were prepared or adequately prepared for a job in trauma treatment but only 72% agreed or strongly agreed that the certificate prepared them to manage exposure to secondary trauma.

BARRIERS AND FACILITATORS TO TYPE 2 SELF-MANAGEMENT IN OLDER AFRICAN AMERICAN MEN: MOVING TOWARDS A PILOT INTERVENTION
Kayla Schindler, Kenny Wirth
Poster: 715
Mentor(s): Jaclynn Hawkins (Social Work)

Today, 15.5 million (or 13.6%) men live with diabetes in the U.S according to the Centers for Disease Control. In recent years, the percentage of men diagnosed with diabetes increased at a faster rate than women and these numbers continue to rise. While diabetes prevalence rates increased for men in the U.S., research demonstrates that a significant rise in treatment rates, defined as physician visits, occurred among non-Hispanic white men, but not for African American and Hispanic men. While access to health care and preventive interventions plays an important role in delaying diabetes related complications, racial/ethnic and gender disparities in diabetes self-management still remain. The primary aim of this study was to advance our understanding of the intersection of race/ethnicity and gender on diabetes self-management among older African American men with T2DM. This study utilized data from focus groups conducted with older -African American men with T2DM. Twenty men were recruited from the Healthier Black Elders Participant Resource Pool (PRP) located at Wayne State University. Given the lack of research on African American men with T2DM, this project contributes to the literature by increasing our understanding of how gender and other factors influence diabetes self-management in this population, in addition to leading to the development of an adapted CHW diabetes intervention targeting older African American men with T2DM.

PROVIDER PERSPECTIVES: A QUALITATIVE STUDY ON WHAT MAKES AN IDEAL TRANSGENDER HEALTH CARE PRACTITIONER
Ashley Schnaar
Poster: 716
Mentor(s): Deirdre Shires (Social Work)

Transgender individuals, or those whose gender identity does not match their assigned sex at birth, face a number of barriers to accessing sensitive and appropriate health care services. These barriers include bias in healthcare settings, a lack of knowledge about transgender-specific health issues among providers and staff, and inadequate insurance coverage and availability of medical transition care. The focus of this study is on “bright spot” physicians – those who excel at providing care to transgender patients. We aim to recruit up to 15 healthcare providers across medical specialties to participate in a 45-minute semi-structured interview. The interviews aim to explore what makes an ideal transgender health care provider, how practitioners get their training in transgender-specific care, and what is to be gained by caring for this vulnerable population. Emerging themes from the first several interviews include: 1) the need for mentorship; 2) rewards of helping patients become their true selves; and 3) the importance of cultural humility.

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