



UNIVERSITY UNDERGRADUATE
RESEARCH AND ARTS FORUM

APRIL 7, 2017

MICHIGAN STATE UNIVERSITY

WELCOME

Welcome to the 19th 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 930 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, Matt Kulju, Emiko Blalock, and Gretchen Moretti 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 Anna Warbel, who is studying Advertising in the College of Communication Arts and Sciences. Anna is a member of the AIGA Detroit MSU student group.

We acknowledge President Lou Anna K. Simon and Provost June Pierce Youatt's continued support of undergraduate education and research at MSU. 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
U N I V E R S I T Y

AWARDS CEREMONY – April 12, 2017

Please join us on Wednesday, April 12th 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.

MSU'S BECKMAN SCHOLARS PROGRAM

The Beckman Scholars program cultivates promising research scientists through quality mentoring, unique research experiences, and academic recognition. Beckman mentors and their research teams prepare the scholars for a modern research environment that requires teamwork and multidisciplinary expertise. Each candidate participates in innovative and exceptional training experiences that make them strong candidates for graduate and professional programs. Students' research is conducted in one of four areas: Molecular Metabolism and Disease (MMD), Intestinal microbiome and its role in health and diseases (ERIN), Evolution and big data sets (BEACON), and Neuroscience. Beckman Scholars are selected through a competitive application process in early February. Dr. Laura McCabe, Professor of Physiology, directs the program. **The Beckman Scholars Program is funded by the Arnold and Mabel Beckman Foundation.**

2016-17 Featured Beckman Scholars

Kiera Fisher

DIABETES-INDUCED INCREASE IN IMMUNOGLOBULIN BOUND TO EXOSOMES CAN CONTRIBUTE TO COMPLEMENT ACTIVATION AND INFLAMMATION IN DIABETIC RETINOPATHY

Category: Biochemistry and Molecular Biology

Location: Ballroom, 11:00 AM – 12:30 PM

Mentor(s): Julia Busik

Audrey St. Germain

COCAINE DEPENDENT ALTERNATIONS IN SYNAPTIC MORPHOLOGY OF HIPPOCAMPAL PYRAMIDAL NEURONS

Category: Neuroscience

Location: Ballroom, 11:00 AM – 12:30 PM

Mentor(s): AJ Robison

Kristian Wilks

THE EFFECTS OF SOCIAL SHUFFLING DURING PUBERTY ON PUBERTAL CYTOGENESIS AND BEHAVIORS IN ADULTHOOD

Category: Neuroscience

Location: Lake Huron Room, 3:00 PM – 4:30 PM

Mentor(s): Cheryl Sisk

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

ORAL PRESENTATION SCHEDULE

8:30 AM – 3:30 PM

CATEGORY	SECTION	TIME	LOCATION
Agriculture & Animal Science	1	1:30 PM – 3:30 PM	Lake Ontario Room
Anthropology	1	8:30 AM – 10:30 AM	Lake Ontario Room
Biochemistry & Molecular Biology	1	11:00 AM – 1:00 PM	Lake Ontario Room
Biochemistry & Molecular Biology	2	1:30 PM – 3:30 PM	MSU Room
Business	1	8:30 AM – 10:30 AM	Lake Erie Room
Business	2	1:30 PM – 3:30 PM	Room 30
Communication Arts and Sciences	1	1:30 PM – 3:30 PM	Room 41
Digital Media	1	8:30 AM – 10:30 AM	Room 41
Education	1	8:30 AM – 10:30 AM	MSU Room
Engineering, Mathematics, & Computer Science	1	11:00 AM – 1:00 PM	MSU Room
Environmental Sciences & Natural Resources	1	8:30 AM – 10:30 AM	Room 30
Epidemiology & Public Health	1	8:30 AM – 10:30 AM	Lake Superior Room
Global & Area Studies	1	8:30 AM – 10:30 AM	Tower Room
History, Political Science, & Economics	1	8:30 AM – 10:30 AM	Lake Michigan Room
History, Political Science, & Economics	2	11:00 AM – 1:00 PM	Lake Michigan Room
History, Political Science, & Economics	3	1:30 PM – 3:30 PM	Lake Michigan Room
Humanities & Performing Arts	1	11:00 AM – 1:00 PM	Lake Erie Room
Humanities & Performing Arts	2	11:00 AM – 1:00 PM	Room 41
Humanities & Performing Arts	3	1:30 PM – 3:30 PM	Lake Erie Room
Integrative and Organismal Biology	1	11:00 AM – 1:00 PM	Lake Superior Room
Kinesiology	1	1:30 PM – 3:30 PM	Lake Superior Room
Microbiology, Immunology, & Infectious Disease	1	11:00 AM – 1:00 PM	Tower Room
Physical Sciences	1	1:30 PM – 3:30 PM	Tower Room
Social Science: General	1	11:00 AM – 1:00 PM	Room 30

POSTER PRESENTATION SCHEDULE

Session A: 9:00 AM – 10:30 AM

CATEGORY	SECTION	LOCATION
Agriculture & Animal Science	1	Ballroom
Biochemistry & Molecular Biology	1	Ballroom
Cell Biology, Genetics, & Genomics	1	Ballroom
Communication Arts & Sciences	1	Ballroom
Education	1	Ballroom
Engineering, Computer Science, & Mathematics	1 & 2	Ballroom
Environmental Science & Natural Resources	1	Ballroom
Epidemiology & Public Health	1	Ballroom
History, Political Science, & Economics	1	Ballroom
Humanities & Performing Arts	1	Ballroom
Integrative and Organismal Biology	1	Lake Huron Room
Kinesiology	1	Ballroom
Linguistics, Languages, & Speech	1	Lake Huron Room
Microbiology, Immunology, & Infectious Disease	1 & 2	Lake Huron Room
Neuroscience	1	Lake Huron Room
Physical Sciences	1	Ballroom
Plant Sciences	1	Lake Huron Room
Social Sciences: General	1	Lake Huron Room
Toxicology	1	Lake Huron Room

Session B: 11:00 AM – 12:30 PM

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

POSTER PRESENTATION SCHEDULE

Session C: 1:00 PM – 2:30 PM

CATEGORY	SECTION	LOCATION
Agriculture & Animal Science	3 & 4	Ballroom
Biochemistry & Molecular Biology	4	Ballroom
Cell Biology, Genetics, & Genomics	3	Ballroom
Communication Arts & Sciences	3	Ballroom
Engineering, Computer Science, & Mathematics	4 & 5	Ballroom
Environmental Science & Natural Resources	3	Ballroom
Epidemiology & Public Health	3	Ballroom
History, Political Science, & Economics	2 & 3	Lake Huron Room
Integrative & Organismal Biology	2	Ballroom
Kinesiology	2	Ballroom
Linguistics, Languages, & Speech	3	Ballroom
Microbiology, Immunology, & Infectious Disease	4 & 5	Lake Huron Room
Physical Sciences	4	Lake Huron Room
Social Science: General	4, 5 & 6	Lake Huron Room
Social Work	1 & 2	Lake Huron Room

Session D: 3:00 PM – 4:30 PM

CATEGORY	SECTION	LOCATION
Agriculture & Animal Science	5	Ballroom
Biochemistry & Molecular Biology	5 & 6	Ballroom
Business	1	Ballroom
Cell Biology, Genetics, & Genomics	4	Ballroom
Communication Arts & Sciences	4	Ballroom
Education	3	Ballroom
Engineering, Computer Science, & Mathematics	6 & 7	Ballroom
Environmental Science & Natural Resources	4	Ballroom
Food Science & Human Nutrition	2	Ballroom
Humanities & Performing Arts	2	Lake Huron Room
Integrative & Organismal Biology	3	Lake Huron Room
Kinesiology	3	Ballroom
Microbiology, Immunology, & Infectious Disease	6 & 7	Lake Huron Room
Neuroscience	3	Lake Huron Room
Physical Sciences	5	Lake Huron Room
Plant Sciences	2	Lake Huron Room
Psychology	5	Lake Huron Room
Social Sciences: General	7	Lake Huron Room

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. Use the links to view presentation abstracts online. A full, PDF version of the book is posted on our website and is accessible at <https://urca.msu.edu/uuraf>.

AGRICULTURE & ANIMAL SCIENCE

ORAL PRESENTATIONS, SECTION 1 LAKE ONTARIO ROOM, 1:30 – 3:30 PM

THE EFFECT OF GENETIC VARIANTS OF THE β -CASEIN PROTEINS IN MILK ON CHEESE PRODUCTION

Emma Blough

Time: 1:30 PM

Mentor(s): Zey Ustunol (Food Science and Human Nutrition)

Consumer trends act as the driving force behind the development that occurs in the food industry. Within the dairy industry, items like lactose-free, organic, and ultra-filtered milk continually become more recognizable items. A new specialty type of milk recently emerged on the market - A2 milk - which contains a different genetic variant of a specific casein protein. The aim of this research was to determine the impact that the protein difference has on the processing of A2 milk comparing three different milk types - A1A1, A1A2, and A2A2. Starter culture activity, cheese yield, and coagulation tests were all performed on the different milk types followed by processing into Monterey Jack cheese, proximate analysis, and sensory analysis. The A1A1 milk samples acidified more quickly and consistently, however had the longest coagulation time and lowest cheese yield and moisture content at 34.75% and 40.71% respectively. This is compared to a yield and moisture content for A1A2 of 41.55% and 41.98% and for A2A2 38.6% and 41.76%. A1A1 cheese also showed the highest fat content at 28.75% while A2A2 cheese contained 25%. In sensory analysis on the cheese samples, the A1A1 cheese samples showed the most ideal firmness, cohesiveness, and flavor. This study illustrated the variety of attributes including coagulation, yield, and sensory attributes that can be impacted by seemingly small changes in the milk used for cheese production. Different genetic variants of the milk proteins can have a substantial influence on the processing and final cheese characteristics.

FILTERING EFFICIENCY OF EASTERN ELLIPTIO MUSSELS (ELLIPTIO COMPLANATA) AT VARYING PH LEVELS

Christine Figueroa, Keenan Wong

Time: 1:45 PM

Mentor(s): Tomena Scholze (Fisheries and Wildlife)

Zebra mussels (*Dreissena polymorpha*) are an invasive species and pH has been shown to control their populations. In our study we wanted to see if we could use pH to control their filtration ability as well. However, due to the invasive nature of Zebra mussels, we were unable to obtain them for the project and used Eastern elliptio mussels (*Elliptio complanata*) instead. We tested to see if the filtering of detritus of Eastern elliptio mussels is affected by pH. Using pH levels of 7.0, 8.0 and 9.3, we predicted that mussels in more neutral pH levels would have a higher filtration efficiency while more alkaline levels would cause a decrease in filtration. In our study 12 mussels were equally divided among three 10 gallon tanks where each tank represented a different pH level. Turbidity was used to indirectly test for filtration and egg yolk was used as detritus mussels could filter. Turbidity levels were measured at the beginning and end of 24 hour trials and the difference was calculated as a proxy for filtration efficiency of the mussels in each tank. Mean differences in turbidity were compared using an ANOVA test and results showed that no significant difference exists between pH levels ($F = 0.27$, $df = 2$, $p\text{-value} = 0.769$). We failed to reject our null hypothesis and concluded that pH does not affect filtering efficiency.

THE EFFECTS OF SAMPLE COLLECTION TIME ON STRESS LEVELS IN MALLARD DUCKS (ANAS PLATYRHYNCHOS)

Marni Gutman

Time: 2:00 PM

Mentor(s): Amanda Dolinski (Fisheries and Wildlife)

The heterophil:lymphocyte (H:L) ratio is a good indicator of stress in animals such as Mallards (*Anas platyrhynchos*). Wild animals can become stressed with increased acute time exposure to humans. The objective of this research was to compare the H:L ratios of birds infected with low path avian influenza virus (LPAIV) to the time the blood was collected to see if the presence of the researcher significantly increased the birds' stress level. Blood was collected from 20 Mallards experimentally infected with LPAIV H5N9 on 5, 8, 11, and 15 days post infection. Time was recorded for each sample collected. Two smears per blood sample were made and then stained. The white blood cells were counted using a microscope at 1000X to determine the H:L ratio. Stress can suppress the immune system; therefore the timing of sample collection needs to be considered for future infection studies.

FEEDING THE FUTURE: APPLICATION AND INTEGRATION OF THE NEW ECOLOGICAL PARADIGM SCALE

Kera Howell, Maria Cotter

Time: 2:15 PM

Mentor(s): Matt Raven (Community Sustainability)

Food has shown great importance to the Residential Initiative on the Study of the Environment (RISE) community on MSU's campus. This study is a continuation of the "Feeding the Future" research project that began in 2012, which was initially designed to assess students' sense of community within RISE. The goal of our research was to define the various values food holds between contrasting communities, with an emphasis on RISE students. To do so the New Ecological Paradigm (NEP) Scale, which measures a person's ecological worldview and a food paradigm scale we previously developed was implemented. The score that the participant received from the food paradigm scale correlates to the amount of value they hold for their food. The survey results were compared using statistical methodology to determine the correlation of an individual's food value and ecological worldview. No other tool is currently developed that measures food values based on environmental, social and emotional, and health factors. This newly developed instrument can contribute to shared knowledge within these major subject areas. Overall, the tool is envisioned to advance new thoughts, questions, and discussion points for those who partake in it and to create a greater awareness of the food system they are a part of.

EQUINE BONE DENSITY AND MARKERS OF BONE FORMATION ARE NOT AFFECTED BY TREATMENT WITH OMEPRAZOLE

April Mehl

Time: 2:30 PM

Mentor(s): Brian Nielsen (Animal Science)

Omeprazole is used in horses to prevent or eliminate stomach ulcers by decreasing acid production within the stomach. Previous research has shown a reduction of calcium absorption in humans; therefore, our hypothesis was that a daily dose of omeprazole decreases bone density and bone formation in horses. During this trial, 10 Standardbred geldings were pair-matched by age, weight, and previous owner, then were randomly allocated to either a treatment (OM) or control (CO) group. OM was given omeprazole for 56 days while CO remained untreated. Horses were fed 2.5% of their body weight daily. Horses were housed in 3x3m stalls located at the Horse Teaching and Research Center. Horses were exercised on a free walker or turned out on a dry lot daily. Radiographs were taken of the third metacarpus on days 0, 28 and 56 to compare bone density. Three day total collections of urine and feces were executed at the same time points to determine calcium and phosphorus intake and excretion. Horses were weighed, body condition scored and blood samples were taken via jugular venipuncture for evaluation of bone metabolism bi-weekly. Radiographs of the left third metacarpus were analyzed using photodensitometry on the medial, lateral, dorsal, palmer cortices. There was no difference in bone density for any cortice analyzed. Blood markers of bone formation and resorption exhibited no statistical treatment by day interaction. The outcome disapproves that a daily dose of omeprazole affects bone density in mature, minimally exercised horses.

NEONATAL PIG SUPPLEMENT EFFECTS ON MORTALITY

David Scales

Time: 2:45 PM

Mentor(s): Gretchen Hill (Animal Science)

Pre-weaning pig mortality is approximately 12% (MetaFarms, 2015) with 40% of these losses occurring in pigs weighing < 1 kg at birth. Small pigs (SP) have a lower BW and intestinal weight and size (Widdowson and Crabb, 1976). It has been hypothesized absorption of energy at birth may improve survival. Therefore, the objective of this study was to determine the effectiveness of a pig supplement on pre-weaning piglet mortality and weaning weight. The oral supplement used contained glucose, a glutamate source, ascorbic acid, butyric acid, glycerol, dried milk, and flavorings. Pigs (n=577) were from 2 farms with differing parity distributions. Within 6 h of birth and within litter, pigs were weighed, tagged, and given 1.5 ml oral dose of the supplement treatment or only handled (control). At 14 d of age, pigs were re-weighed and mortality was recorded. Birth weight did not differ between farms ($P = 0.7$) or treatments. Weight at 14 d was different between farms ($P = 0.004$) but not between treatments, and there was no treatment x farm interaction ($P = 0.5$). At both farms, approximately 10% of the pigs born were SP. On farm TR, 60% of control SP died and 67% of treated SP died. No control SP from farm PR died and 13% SP receiving the oral supplement died. Under these commercial conditions, this oral supplement does not appear to benefit the newborn pig.

VIDEO RECORDING OF HUMAN AND MALLARD DUCK RESPONSE RATE WHICH INCREASE WITH HIGHER ENVIRONMENTAL SOUND FREQUENCIES

Davin Haml

Time: 3:00 PM

Mentor(s): Douglas Luckie (Lyman Briggs)

Acoustic environmental stimuli (sounds) can quickly and significantly alter the behavior of a wide range of organisms (McAlpine et al., 2001). An observational study was performed on local species of mallard ducks (*Anas platyrhynchos*) and humans (*Homo sapiens*) to determine if they react with more attentive behaviors when environmental sound frequencies increase. Based on the literature, our research group hypothesized that all subjects would respond with more agonistic, alert, and vigilant behaviors as audio stimuli increased in frequency (Brumm et al., 2005). In the study this was tested with variation in frequency of the sounds of rain, thunder, and human voices. Our data, upon using playbacks, supported that both species do indeed display increasing attentive behaviors when exposed to higher frequency sound stimuli ($x2 p < 0.05$; Goudie et al., 2004). Sight of speakers (silent or white noise) had no impact. This acoustical study was the first to document humans and ducks reacting similarly in the same environment. The elucidation of innate evolutionary-conserved behavioral responses in humans may be of particular interest beyond this field alone (Boehm, 1989). These findings were disseminated in the documentary film Channeling Jane Goodall (youtu.be/4XDIWbletlw).

ANALYSIS OF SWINE AGGRESSION WHEN STABLE GROUPS ARE MOVED TO NOVEL PENS

Grace Flynn

Time: 3:15 PM

Mentor(s): Janice Siegford (Animal Science)

Recent legislative changes and consumer demands in the United States are driving a drastic shift in the US pork industry away from housing individual gestating sows in stalls to housing groups in pens, to improve welfare. However, producers have encountered profit loss and management difficulty with group-housing due to aggression between pigs as they establish a social-hierarchy. Intense fighting typically subsides within 24 hours, but some groups display low-levels of continued aggression, causing stress and reduced feed intake and growth rate. This project tested the stability of established hierarchies by moving stable groups into new pens. Video was recorded when pigs were initially mixed into a new group, at 3-weeks post-mix in the same pen, and at 6-weeks post-mix when each group was transferred to a new pen. Group stability was determined by the amount of aggression occurring at each period. Aggressive behaviors were recorded using all-occurrence sampling for the first four hours of each stage. Frequency and duration of each behavior were summed for each stage and compared using an ANOVA. The study found a difference ($P < 0.05$) between amount of aggression at initial mixing compared with both 3-week post-mix and 6-week novel pens. However, no difference was observed between 3-week post-mix pens and 6-week novel pens. These results are beneficial to producers as they transition to group-housing systems because they indicate that producers can move stable groups of pigs to new pens if management practices require without fear of inciting more aggression and potential profit loss.

**AGRICULTURE & ANIMAL SCIENCE
POSTER PRESENTATIONS, SECTION 1
BALLROOM, 9:00 – 10:30 AM**

THE EFFECTS OF ALTERED RAINFALL PATTERNS ON NITROUS OXIDE REDUCTASE

Parker Anderson

Poster: 1

Mentor(s): Kate Glanville (Plant, Soil, and Microbial Sciences)

Agriculture is no easy task, and often involves the usage of aids such as fertilizers. Fertilizers often contain a form of the element nitrogen, which provides plants with necessary nutrients in order to grow properly. However, this comes at a price, as nitrogen can be a major source of atmospheric pollution, specifically the gas nitrous oxide (N₂O). Of the all the sources of anthropogenic N₂O emissions, the majority are from agricultural soils. Furthermore, there have been recent changes in the characteristics of rainfall patterns due to global climate change, such as lengthened intervals between rainfall and the intensity of rainfall events. This may cause different patterns of N₂O to be released into the environment. The purpose of this experiment was to determine the link between altered rainfall patterns and the release of N₂O into the environment. We hypothesized that an increase in time between rainfall events / more intense rainfall events will result in an increase in the amount of N₂O released into the environment. To test this, we created soils exposed to different rainfall patterns using rainout shelters in corn fields. We manually sampled gas using the stainless-steel chamber method. Soil was analyzed for nitrous oxide reductase via the Denitrification Enzyme Assay method. Through examination and comparison of the soil and gas samples, the data showed a positive correlation between the amount of time between rainfall events and the amount of N₂O released into the environment from the system.

PARAMECIUM AND MOSQUITO LARVAE INTERACTIONS

Elizabeth Flannery

Poster: 2

Mentor(s): Michael Kaufman (Entomology)

One of the main goals of the Insect Microbiology Laboratory (Walker, Kaufman lab), here at Michigan State, is to research the mosquito gut microbiome to better understand larval interactions with microorganisms and how this plays a role in the spread of mosquito-borne diseases. Mosquito larvae live and grow in both natural and artificial aquatic habitats, filled with thousands of microorganisms including bacteria and paramecium, a unicellular, ciliated protozoan. Food sources for mosquito larvae include mostly bacteria, yet it is thought that paramecium play a role in their food chain as well. Due to their large size (on a microbiology scale), it is thought paramecium are too large to be consumed by younger larvae in earlier instars, and therefore may outcompete larvae for resources. Older larvae in later instars are much larger and therefore may be able to consume paramecium. Dr. Dange Duguma from the University of Florida has colonized and researched paramecium, and has performed experiments to better understand these interactions, yet more work is needed to better grasp the relationship between paramecium and larvae. I am conducting several experiments in order to provide data and help better understand these interactions and how they influence mosquito larvae populations.

IDENTIFICATION OF PATHOGENIC BACTERIA IN SOIL MICROBIOMES AFFECTED POTATO CROP GROWTH

Arlé Fox

Poster: 3

Mentor(s): Noah Rosenzweig (Plant, Soil, And Microbial Sciences)

Soil health is imperative in the cultivation of successful potato crops, leading vegetable growth in the USA with \$4 billion industry. Evaluating soil microbiomes is part of an ongoing effort to identify pathogenic bacterium affecting potato growth. This is done through isolation of the 16s rRNA gene; a short gene with a conserved function among bacteria, making it a favorite for quick and inexpensive sequencing and identification of bacterial DNA. We hypothesized that successful identification of pathogenic 16s rRNA in bacteria aids in a healthier community of soil microbiomes. Three dated soil samples received from various potato growers across Michigan were used to verify success of pesticide treatment and concurrently monitor soil microbiome health. PCR assessments, cleanup, pooling and normalization of amplified PCR product to isolate bacterial 16s rRNA genes was conducted on all three dated samples producing a gene library. Followed by quality assessment of library before conducting Illumina MiSeq and bio-analysis of gene product for identification of bacteria. During this time, it was observed that populations of the 16s rRNA genes were present among all three dates as was visible in running gel electrophoresis; the product came out to 300 base-pairs being consistent with previous year's isolation of 16s rRNA genomic bacterial gene isolation's. We are in the process of sequencing and bio-analyzing 16s rRNA genes to detect levels of pathogenic bacterium across all three dates. It is

expected that populations of pathogenic bacteria have significantly decreased by the third date of soil microbiome testing.

LIVES UNEARTHED: THE WOMEN OF THE COLLEGE OF VETERINARY SCIENCE

Ashley Greenleaf

Poster: 4

Mentor(s): Danita Brandt (Earth and Environmental Sciences)

Women have played an important yet sometimes overlooked part in STEM at Michigan State University. In the college of veterinary science, there are now over 41 female professors, though this didn't use to be the case. In the early days of Michigan State's history, the faculty was almost all men, and the women who were on the payroll were listed as secretaries or typist. Even in 1960, there were 38 male professors and no female professors. This ratio of men to women started to change in 1960, and by 2000 there were 25 female professors for every 43 male professors. In Lives Unearthed we sought to uncover the women who have taught in STEM at MSU, and wrote biographies on their lives before, during, and after their time here. These biographies were formed using records found at the University archives. My study explores the lives of four elite professors at the college of Veterinary Science; Patricia O'handley, Gretchen Flo, Louis Calhoun, and Hilary Clayton.

ASYMMETRIC GENE EXPRESSION IN MOUSE OVARIES

Evan Pasternak

Poster: 5

Mentor(s): Brian Petroff (Pathobiology and Diagnostic Investigation)

When comparing the left and right paired endocrine organs it is generally assumed that they have identical function, even though research has shown that they can develop asymmetrically. The aim of this study was to identify a molecular signature of sidedness in the ovaries of mice. By establishing "normal" genes in molecular sidedness we can use changes as markers for disease. RNA was isolated from left and right ovaries of pre-pubertal C57B6 mice, assessed for quality, DNA contamination, and then sent to MSU genomics core for RNAseq (n=5 pairs). Nine mRNAs, out of 1700, were found to have a false discovery rate under 5% and a fold change of 4 or higher between the two ovaries: Nap1l2, Plekhg4, Ramp1, Rnf152, Rpl39, S100a6, S100b, Scarna2, Sema3d. Of these nine only three, Ramp1, S100a6, and S100b, have been studied in relation to the ovary. Ramp1 is necessary during the effects of adrenomedullin on ovarian steroidogenesis in the mouse. Ovarian Ramp1 increases with gestation in both rats and humans. S100a6 and S100b are calcium binding proteins. S100a6 has been shown to be localized to luteal cells and not found in oocytes, granulosa cells, or stroma cells in cycling mice. S100b supports the synthesis of phosphatidylethanolamine in past studies of CHO cells. These data suggest that there is basal asymmetry of ovarian gene expression prior to puberty in mice for a small subset of genes. Future work will need to assess the utility of this gene signature across species and in other paired endocrine organs.

RNF216 IS REQUIRED FOR SPERMATOGENESIS AND MALE FERTILITY

Alicia Predom

Poster: 6

Mentor(s): Chen Chen (Animal Science)

Spermatogenesis is a complex, multistep process in which the male germ cell undergoes meiosis to produce motile sperm. Problems at all stages of spermatogenesis can contribute to male infertility. Mutations in genes involved in spermatogenesis can produce sperm that are immobile, irregularly shaped, and/or low in concentration. RNF216 is a member of the ring finger domain family of E3 ubiquitin ligases that are involved in protein degradation. RNF216 gene mutations have been identified in human patients with neurodegenerative disorders and gonadal deficiencies. However, the physiological function of RNF216 and the causal links between RNF216 gene mutation and infertility remain unknown. To demonstrate the gene function of RNF216 we generated RNF216 knockout mice. Here we show that RNF216 is highly expressed in the testis, and RNF216 knockout mice exhibit a decrease in testis size. Histological analysis of RNF216 knock out mice reveal germ cell apoptosis and degeneration of the seminiferous tubules. Mature spermatozoa formation is impaired, which results in male infertility. These findings provide the first evidence of the physiological function of RNF216, and the importance of RNF216 gene in mammalian spermatogenesis and male fertility.

**AGRICULTURE & ANIMAL SCIENCE
POSTER PRESENTATIONS, SECTION 2
BALLROOM, 11:00 AM – 12:30 PM**

BASICS OF TERPENOID BIOSYNTHESIS IN PLANTS

Ballndile Motsa

Poster: 10

Mentor(s): Bjoern Hamberger (Biochemistry and Molecular Biology)

Terpenoids are a diverse class of natural plant products that have many functions. They are involved in the growth and development of plants and they help optimize the interaction between the plant and the environment. When isolated from plants they are used for example as commercial flavor and fragrance compounds and antimalarial or anticancer drugs. The problem is that terpenoids in plants are produced in very small quantities and extraction is consequently not very economically feasible. Even though they are structurally diverse, they share a common biosynthetic origin and follow similar pathways. The main aim of this project is to understand the basics of terpenoid production in two unique plant systems. In this project *Physcomitrella patens* (moss) and *Mortierella* (fungus) into soil plates were propagated and grown under sterile conditions for four weeks. After *P. patens* has reached maturity light and scanning electron microscope images will be taken to show how *P. patens* interacts with *Mortierella*. In addition to this light and scanning electron microscopy were used to analyze thin cross-sections of the *Chiococca alba* (snowberry) roots to see if I can identify similar specialized cell structures in this system as seen in the *Coleus forskohlii* (Indian coleus) root. This understanding can be used in the engineering of plant pathways to either increase the production of terpenoids or to express valuable terpenoids that can be used for industrial purposes. Terpenes are often found in specific anatomical structures and accumulate in response to plant microbe interaction.

COMPARISON OF WINTER MORPH TO SUMMER MORPH SPOTTED WING DROSOPHILA ALIGHTMENT ON ODORLESS COLORED DISKS

Megan Hell

Poster: 11

Mentor(s): Larry Gut (Entomology)

Spotted wing drosophila, *Drosophila suzukii*, is a fruit pest that has been devastating to farmers of cherries and other fruits. Laboratory tests were performed to determine *D. suzukii*'s response to 5 cm sticky colored disks with no fruit scent hung against a white background. We contrasted rates of summer morph to winter morph alightment on red, black, purple, white, and yellow 5 cm colored disks in both a choice and no-choice setting. Rates of male to female catch for each morph were also examined. Rates of catch for summer morphs were numerically higher than the rates of catch for winter morphs. The ratio of males to females for both the summer morph and the winter morph were not statistically different.

DESCRIPTIVE SURVEY OF AGRICULTURE, FOOD AND NATURAL RESOURCE EDUCATION PROGRAMS WITHIN THE STATE OF MICHIGAN

Kera Howell

Poster: 12

Mentor(s): Michael Everett (Community Sustainability), Aaron McKim (Community Sustainability), Matt Raven (Community Sustainability)

School based Agriculture, Food and Natural Resource Education (AFNRE) programs teach students the science and business of agriculture. The curriculum in AFNRE programs runs parallel to the needs of the community in which they are located. There is no recent research or data on school based AFNRE programs in Michigan. The purpose of this study is to determine the current status of school based AFNRE programs in Michigan in terms of infrastructure and how that infrastructure is being used in delivering curriculum. This is a descriptive research and utilizes an on-line survey to collect data. The research results from the study will help to inform the Michigan Department of Education, Michigan Department of Agriculture and Rural Development and Michigan State University administration to better understand what is going on in agriculture education programs within the State of Michigan, and what improvements can be made to the curriculum to better the knowledge of pre-service students preparing to go into the education field in the future.

THE IMPACT OF HUMAN PRESENCE ON BIRD DIVERSITY AND ABUNDANCE

Nicholas Kridler, Hannah Klsh, Cameron Moody, Jenna Putman

Poster: 13

Mentor(s): Matthew Rowe (Integrative Biology), Tomena Scholze (Fisheries and Wildlife)

Urban sprawl has changed many environments, altering the the range of a variety of species. Birds have been affected differently due to their added mobility of flight. Their high levels of mobility allowed them to coexist better with humans than some other animals. This is only true for some species of birds; other birds are too sensitive to changes in environmental factors to live in a changing, human-dominated environment. We used an observational study to record the abundance and diversity of birds in areas of differing levels of human disturbance on Michigan State University's campus. Our results did not suggest that there was an impact from human density on bird diversity, but there was a positive relationship between higher human populations and higher bird populations. This information allowed us to see that even in areas of high human density on Michigan State University's campus, birds were abundant and bird diversity was unaffected by human presence.

FEEDING LIQUID SWEET WHEY TO GROWING SWINE

Joseph Lutz

Poster: 14

Mentor(s): Dale Rozeboom (Animal Science)

Liquid sweet whey (LSW) is the by-product resulting from the manufacture of hard cheeses. Entrepreneurial artisanal cheese plants are too small to gain the attention of whey processors, leaving the cheesemakers with no other option than to release this whey into sewer systems. Whey has the potential to be a feedstuff for swine, which would prevent more whey from being released into the environment and give swine farmers the opportunity to access a low-cost feedstuff. This work was conducted to study the effects of feeding liquid sweet whey to growing pigs on growth performance and pork eating attributes. When weaned, pigs were allotted based on BW and birth litter to 1 of 2 experimental treatments: 1) Control (36 pigs), provision of corn soybean-diets and water in a wet-dry feeder; or 2) LSW (36 pigs), provision of corn soybean-diets and LSW in a wet-dry feeder. Average daily gain did not differ between the two treatments. Daily dry feed intake was less ($P < 0.01$) for pigs fed LSW but they consumed an average of 9.10 kg of LSW each day, resulting in those pigs have slightly greater ($P < 0.05$) average daily dry matter intake. A triangle taste testing was completed using a sirloin chop and results indicate that consumers detected a difference ($P < 0.05$) between pork harvested from whey-fed pigs and those fed typical commercial diets. Feeding LSW has potential to provide economic and environmental benefits for both cheese and pork production.

MICROBIAL COMMUNITY INTERACTIONS IN SOIL AND VERMICOMPOST AND HOW IT IMPACTS PLANT GROWTH AND PRODUCTIVITY

Megan Vanderploeg

Poster: 15

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

Fertilizers may contain all the nutrients plants needs to prosper, but it's missing critical components, a rich microbial community and organic matter. Vermicompost is produced through consumption of organic materials by worms, and is beneficial because it restores organic matter to soils and can eliminate pathogens harmful to humans. While benefits of vermicompost are well established, interactions of microbial communities in vermicompost with those in soils it supplements are relatively unknown. This study will assess how microbial communities in vermicompost and soils interact to impact plant nutrient availability and health. We collected vermicompost produced in a small scale plastic tote and soils from a field that has been conventionally managed row crop agriculture. We autoclaved soils and vermicompost to remove extant microbial communities. We grew green beans and cucumbers in greenhouses in different mixtures of vermicompost and soil: sterilized vermicompost plus unsterilized soil; unsterilized vermicompost and sterilized soils; unsterilized vermicompost and soil and; sterilized vermicompost and soil. To asses plant productivity we will use a Photosynq device to measure photosynthetic efficiency, perform chlorophyll extractions, and analyze plant tissue nitrogen content. To assess microbial community function, specifically nutrient mineralization, we will measure extracellular enzyme activities associated with nitrogen and phosphorus mineralization as well as soil nitrogen content. We hypothesize vermicompost and soil microbial communities will work synergistically. We predict that the unsterilized vermicompost and soil mixture will have the greatest photosynthetic rates, chlorophyll concentrations, and tissue N concentrations compared to plants grown in other treatments.

SMALL MAMMAL COMMUNITY DIVERSITY AS A VARIABLE IN RETENTION FORESTRY IN THE PACIFIC NORTHWEST

Clarissa Winters

Poster: 16

Mentor(s): Gary Roloff (Fisheries and Wildlife)

The homogeneity of vegetation structure within intensively managed forests tends to support a reduced biodiversity compared to unmanaged forests. This simplified forest landscape lacks diversity in tree species, density, age, and size classes. Retention forestry, however, provides a management opportunity to promote landscape heterogeneity, especially when retention patches are inherently diverse, thereby providing a suite of different species, stem densities, age classes, and mast opportunities. This heterogeneity in forest composition, therefore, is likely to promote use by multiple wildlife species, and potentially result in higher population densities. I investigated the effects of retention forestry practices following timber harvest in the Pacific Northwest region of the United States on small mammal communities. I compared small mammal diversity and abundance to retention patch vegetation characteristics, testing the hypothesis that more structurally and compositionally complex patches retain a more diverse small mammal community.

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

THE EFFECTS OF PORCINE ZONA PELLUCIDA CONTRACEPTIVE VACCINE ON EQUID OVARIAN ACTIVITY

Olivia Child

Poster: 19

Mentor(s): Dalen Agnew (Diagnostic Center for Population and Animal Health)

Porcine zona pellucida (PZP), extracted from pigs, is commonly injected into other mammals as a contraceptive. In equids, antibodies produced in response to the vaccine prevent fertilization. However, concerns have been raised in recent years as to the long-term effects of PZP usage on ovarian activity and function, particularly in wild equid species (Przewalski horses, zebras, onager, and others). In order to assess these effects, equid ovaries were microscopically examined for follicular development and other ovarian activity. Follicles in various stages of development (i.e., primordial, primary, secondary, Graafian) as well as other structures such as corpora hemorrhagica and lutea were identified and counted in each ovarian section. Comparisons were made between equids not treated with any contraceptives and those treated with PZP to determine differences in ovarian activity. Analysis of the long term effects of PZP usage in equids allows this contraceptive to be further considered as a tool in managing wild horse populations in zoos and managed wildlife areas.

ACTIVATION OF INSULIN-LIKE GROWTH FACTOR-1 RECEPTOR AND A DOWNSTREAM PATHWAY IN EQUINE LAMELLAR TISSUE BY HIGH CONCENTRATIONS OF INSULIN

Allison Davis

Poster: 20

Mentor(s): Patty Weber (Large Animal Clinical Sciences)

Equine laminitis is a disease in which the coffin bone and hoof wall separate due to lack of structural integrity in the lamellar tissue adhering the two entities. Equids with laminitis become lame and are oftentimes euthanized. The most common type of laminitis is endocrinopathic laminitis. A relationship between endocrinopathic laminitis and hyperinsulinemia has been discovered; however, the pathway for which insulin causes laminitis remains unknown. At high insulin concentrations, insulin is able to bind to its own receptor, as well as the IGF-1 receptor (IGF-1R). Previous work shows that IGF-1Rs are highly expressed in lamellar tissue. Therefore, our overarching hypothesis is that high concentrations of insulin activates IGF-1Rs in lamellar tissue, which then, activate molecules in the PI3K/Akt pathway, that eventually lead to a loss of structural integrity in the lamellar tissue. The objective of this current study is to determine if IGF-1R and Akt are activated through phosphorylation in lamellar tissue from ponies with high circulating levels of insulin and in lamellar explants incubated with varying concentrations of insulin. Immunoblotting analysis utilizing specific antibodies that recognize phosphorylated IGF-1R and Akt were used to semi-quantify activation of these proteins. IGF-1Rs and Akt are phosphorylated in pony lamellar tissue and phosphorylation of IGF-1Rs and Akt are increased with dose and time of insulin incubation in the explants model. Collectively, these data indicate that insulin's actions are, in part, mediated through the IGF-1R and that an IGF-1R signaling pathway inhibitor should be investigated as potential treatment for endocrinopathic laminitis.

LOADING FREQUENCY EFFECT ON NUTRIENT MANAGEMENT OF LAND APPLICATION OF FOOD PROCESSING WASTEWATER

Amanda Godar

Poster: 21

Mentor(s): Steven Safferman (Biosystems and Agricultural Engineering)

Land application of food processing wastewater is a sustainable alternative to a traditional wastewater treatment system as it reduces greenhouse gas emissions, utilizes significantly less energy, and saves agricultural costs associated with fertilizers and freshwater usage. Current use of land application techniques are based off of recommended hydraulic loading conditions solely, however other factors including frequency of loading, organic loading, types of soil, depths of soil, temperature, and microbial communities plays an significant role on the performance of land application treatment. Food processing wastewater irrigation can lead to leaching of nitrates and or certain metals into the groundwater which can lead to certain adverse various environmental and human health effects. This project investigates the role of loading frequency on preventing this as well as analyzes the corresponding microbial communities. Thus a column experiment to observe the impact of food processing wastewater dosing frequency on the performance of treatment has been designed and operated. Targeted soil nutrients are analyzed from collected samples. Measurement of Chemical oxygen demand, Total nitrogen, NH₄, NO₃, Dissolved oxygen, and Oxygen reduction potential on influent and effluent are conducted periodically. This study provides insight into a sustainable and economically advantageous practice.

A DAIRY LONG DAY LIGHTING SUCCESS STORY: MI DAIRY INCREASES PRODUCTION AND CUTS COSTS

Aryn Thomas

Poster: 22

Mentor(s): Aluel Go (Biosystems and Agricultural Engineering)

Research studies have consistently supported that long-day lighting (LDL) increases milk production of dairy cows by 5 – 9%. However, dairy farmers in Michigan have been unable to reproduce these results in their attempts to implement an LDL system. Designing and implementing a reliable LDL system increases production in dairy cows, cuts operating costs, decreases energy consumption, and reduces the emissions of harmful greenhouse gases, which incurs economic and environmental benefits for both the farmer and the state of Michigan. In cooperation with the MMPA, a long-day lighting project, funded by a grant from the Michigan Energy Office, was initiated by Biosystems and Agricultural Engineering Department researchers at MSU to address the technical difficulties Michigan farmers have faced in implementing a successful LDL system. Milk production data was collected in the two years preceding and following the installation of the LED LDL system at Wing Acres Dairy. During the system's first year, milk production increased by 6.74%, or by 149,674 lbs, compared to 2013. During the second year, milk production increased by 7.69%, or 170,780 lbs. Averaging the data collected from 2014 and 2015 shows a 7.22% increase in milk production compared to 2013. Using LED fixtures in place of traditional metal halide fixtures to implement an LDL system resulted in an energy savings of 25,627 kWh each year, and a reduced cost of over \$3,300 each year. Based only on milk production increases, the payback period was calculated to be approximately 1.2 years.

SPECIES INTRODUCTION AND ECOLOGICAL CONSEQUENCES: REDEAR-SUNFISH INTRODUCTION TO MICHIGAN'S LOWER PENINSULA

Marcos Holland

Poster: 23

Mentor(s): Mary Tate Bremigan (Fisheries and Wildlife)

Redear sunfish (*Lepomis microlophus*) is an exotic species in Michigan, having been intentionally stocked in several Lower Peninsula lakes to improve fishing opportunities. We are exploring the effects of Redear on native sunfish species, especially Pumpkinseed sunfish (*L. gibbosus*), which shares similar diet and habitat requirements with Redear. To evaluate if there is widespread evidence that Redear negatively affect Pumpkinseed, we are using a variety of information sources, including MDNR stocking records and fish surveying data, as well as GIS-based measures of morphometry and surface water connectivity of individual lakes. First we compared the prevalence of Redear populations between lakes stocked versus not stocked with Redear. Surveys in lakes previously stocked with Redear detected the exotic only in ~50% of the lakes, indicating that stocking had not always resulted in establishment of a Redear population. Surveys in lakes that had NOT been stocked with Redear collected the exotic in ~20% of the lakes, indicating that lakes have been invaded by Redear through mechanisms other than stocking. Next we will explore if presence/absence of Redear populations can be explained by lake morphometry and connectivity to other water bodies, and we will use fish abundance and individual size data to determine if Redear and Pumpkinseed populations are negatively correlated, as documented in a very limited number of lakes. A widespread negative correlation between the

species would imply that introduction of Redear, while good intention, in reality has further threatened aquatic ecosystems of Michigan's Lower Peninsulas.

DAILY FLUCTUATION IN VIRAL SHEDDING OF LOW PATH AVIAN INFLUENZA

Jared Emerson

Poster: 24

Mentor(s): Jen Owen (Fisheries and Wildlife)

Avian influenza virus (AIV) is wide spread and easily transmissible throughout bird populations and certain strains are lethal to humans. It is known that there is variation in shedding of AIV between birds; however, the individual diurnal variation is understudied and could impact the results of viral variation research. The objective of this study was to determine if there is individual variation in a 24-hour period. Blue winged teals (*Anas discors*) were infected with low path AIV (H5N9) and viral load was tested 3 times per day on 2, 3, 4, and 5 days' post infection. Significant diurnal variation in viral load was found. This variation in diurnal shedding needs to be considered for any future viral variation studies.

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

COMPARING DROUGHT RESISTANT TRAITS IN TRANSGENIC POTATO (*SOLANUM TUBEROSUM*)

Grant Billings

Poster: 27

Mentor(s): Dave Douches (Plant, Soil, and Microbial Sciences), Natalie Kirkwyland (Plant, Soil, and Microbial Sciences), Dan Zarka (Plant, Soil, and Microbial Sciences)

Potato is the third most important food crop, with over half of all production coming from developing countries. Evidence has shown that genetically modified (GM) crops have the potential to increase water-use efficiency (WUE) to meet the changing needs in cropping systems. In these preliminary trials, GM potato lines, each transformed with one of four putative abiotic stress tolerance genes, were grown in a growth chamber and subjected to terminal drought. The genes evaluated included: 1) aquaporin, regulation of which is linked to drought tolerance in common bean; 2) isopentyltransferase (ipt), shown to decrease susceptibility to water deficit stress in maize when driven by a drought-sensitive promoter; 3) mannose 6-phosphate reductase (M6PR), a transgene isolated from celery shown to increase salt tolerance in *Arabidopsis thaliana*; and 4) XERICO, a transgene isolated from *Arabidopsis* shown to enhance tolerance to salt and drought in rice. To demonstrate the differences between ten transgenic events and across genes, lines were scored on their ability to retain water and survive as compared to a non-transgenic commercial variety, Desiree. We anticipate that the transgenic lines will demonstrate decreased susceptibility to terminal drought stress as demonstrated by the assaying of leaf tissue from two terminal drought trials. In this poster, we aim to provide additional background information on the four genes studied in this experiment and explore how these genes may impact vegetative tissue in potato.

NO-HEAT PASTEURIZATION METHODS FOR PRODUCING OYSTER MUSHROOM SUBSTRATE

Bryan Rennick

Poster: 28

Mentor(s): Gregory Bonito (Plant, Soil, and Microbial Sciences)

This research explores the effectiveness of no-heat pasteurization methods of producing a viable substrate on which oyster mushrooms (*Pleurotus* spp.) may be grown. Standard pasteurization methods require the mushroom substrate be boiled before use, a requirement that can be a challenge in many developing countries where natural gas, propane, and wood are too costly or too scarce. The alternative methods of pasteurization utilized in this research involve the use of anaerobic conditions, agricultural lime, and hydrogen peroxide; each of the aforementioned treatments were able to produce oyster mushrooms with various degrees of success. The average yield (dry mass) of oyster mushrooms harvested using substrate pasteurized with agricultural lime was very similar to the control treatment (heat pasteurization), and nearly double the mean yield produced by either the anaerobic or hydrogen peroxide treatments. The results of this research indicate that agricultural lime is the best no-heat method to produce a viable pasteurized substrate to grow oyster mushrooms on, though, the anaerobic method should still be considered in situations where agricultural lime is in short supply.

FACTORS INFLUENCING SALE PRICE OF PERFORMANCE TESTED BEEF BULLS IN MICHIGAN

Kellie Rizzolo

Mentor(s): Dan Buskirk (Animal Science)

For business and breeding decisions, bull producers need information on the phenotypic and genetic qualities most demanded by their markets. This study utilized data from the Michigan Cattlemen's Association/Michigan State University Bull Evaluation Program, which evaluates bulls from farms throughout Michigan and Indiana, raising them in a central location for five months, while standardizing their environmental and feeding conditions. Factors influencing variation in sale price (SP) were analyzed for Angus, Simmental, and SimAngus bulls (n = 466) that sold through the program from 2010 to 2016. These factors included bull age, birth weight (BW), final weight (FWT), average daily gain (ADG), weight per day of age (WDA), frame score, intramuscular fat (IMF), ribeye area (RE) scrotal circumference, pelvic area, and Expected Progeny Differences (EPD) percentiles for calving ease (CE%), birth weight (BW%), weaning weight (WW%), yearling weight (YW%), maternal milk (MM%), marbling (MAR%), fat thickness, and ribeye area (RE%). EPD indexes (\$W and \$B for Angus, and \$TI and \$API for Simmental/SimAngus), were also included. For Angus, $SP = \$2017.39 - \$1057.39(CE\%) - \$790.07(BW\%) - \$1932.70(YW\%) - \$1943.89(MAR\%) + \$1303.92(MAR\%^2) - \$728.30(RE\%) + \$0.00067(FWT) + \$60.40(ADG^2) + \$121.64(RE) - 26.18(IMF^2)$. For Simmental, $SP = -\$15291 - \$832.21(CE\%) - \$758.18(MM\%) + \$348.55(BW) - \$2.20(BW^2) - \$2955.34(\$TI\%) + \$2055.26(\$TI\%^2) + \$0.00134(FWT^2) + \$154.82(WDA^2) + \$174.17(RE)$. By understanding the monetary impacts of individual traits on sale price, bull producers can focus on breeding objectives that either emphasize or deemphasize particular traits, based on demand.

EVALUATION OF SOIL MOISTURE SENSORS AS A MEANS TO DETERMINE CROP FIELD IRRIGATION

Davis Roeser

Poster: 30

Mentor(s): Lyndon Kelley (Extension Agriculture and Agribusiness), Steve Miller (Biosystems and Agricultural Engineering)

Timing of irrigation application is essential to provide optimal conditions for crop growth of any kind and efficient water usage. Crop growth is stressed as the field soil moisture level depletes to 50% field capacity. Farmers do not always use the most efficient methods to determine when their field is in need of irrigation. The research team decided to continue to look at the accuracy and economic feasibility of the use of different types of in-ground moisture sensors equipped with on-sight automatic data loggers to monitor moisture levels in fields of varying crops in Southwest Michigan and Northern Indiana. Solid state electrical resistance sensing devices and volumetric moisture content sensing devices were used at depths ranging from 6" to 36". The sensors provided readings that tracked the moisture profile of the field over time, showing how the various depths' moisture content increased and decreased. This data was compared to measured volumetric soil moisture contents and soil tension properties from samples taken throughout the growing season, utilizing pressure plate experimentation. Sensor readings were not within the range of soil moisture tension values determined using the pressure plates. However, the general trends in moisture content shown by the sensors proved valuable for irrigation scheduling. The methods of pressure plate experiments must be reviewed and modified for more accurate sensor calibration.

APRIL SOIL MOISTURE BRINGS MAY FLOWERS? AN ANALYSIS OF SEASONAL SOIL MOISTURE VARIATION IN NORTHERN MICHIGAN

Jacob Roush

Poster: 31

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

Soil moisture controls soil fertility, agricultural production, landscape characteristics, and soil biogeochemistry. For instance, crop yields in rainfed agriculture are strongly influenced by the amount of water present in soils during the growing season. We have been collecting soil moisture data from 25 data loggers across 11 different sites in Grand Traverse Bay area, Michigan for almost 10 years. Yearly variations in seasonal soil moisture have been observed, but not yet quantified in terms of how they relate to each other. Here, we investigate the question of how seasonal variations of soil moisture in winter months can be used to predict soil moisture in spring months. A connection between winter and springtime soil moisture may have implications in planning for the onset of the optimal growing season, which would be beneficial to farmers in Northern Michigan who have a relatively short window to take advantage of favorable agricultural conditions. Further research will use our soil moisture data in conjunction with other data sets of temperature, snow cover, and land use to investigate further questions of temporal changes in the landscape of Northern Michigan.

FRAGILE FIJI: CORAL INDICATOR SPECIES

Alex Tompkins

Poster: 32

Mentor(s): Gary Roloff (Fisheries and Wildlife)

Coral reefs are very important to the planet. They are often called the “rainforests of the sea”. Coral reefs house some of the most diverse fish and plant species in the world. In recent years coral reefs have been dying due to global warming. The disappearance of coral could be devastating for Fiji especially economically and environmentally. A transect line survey was conducted on three coral sampling sites in Fiji. Waitabu Marine Park, Coral Coast and Botira. After Cyclone Winston with its unnatural weather pattern went through Fiji twice. The data showed two out of the three sampling sites were severely negatively impacted. A management mitigation plan was proposed to help coral reefs recover and prevent future coral loss. Coral reefs could recover by restricting fishing, and having protected areas that are restricted from fishing. Also planting coral that is less likely to bleach when ocean water temperature increases. By planting coral that has a genome that is more tolerant to warmer ocean temperatures. Overall this could make a coral reef more resistant to bleaching. This would decrease coral loss in the future. Especially with climate change, and the ocean water temperatures starting to increase in different parts of the world.

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

EFFECTS OF VITAMINS E AND D ON PERFORMANCE AND ANTIOXIDANT ENZYMES IN NURSERY PIGS

Kaylee Copeland

Poster: 35

Mentor(s): Gretchen Hill (Animal Science), Jane Link (Animal Science)

Pigs are stressed at weaning, and we hypothesized that adding vitamins E and D to the pig’s intake would improve their antioxidant response and improve health. The pig’s antioxidant system includes the enzymes superoxide dismutase (SOD) and glutathione peroxidase (GPx), made endogenously. To study the influence of vitamins E and D supplementation in water, 150 pigs were weaned and allotted by sex, litter and weight into 30 pens of 5. Pigs from both treatments were fed nursery diets that met their requirements. Treatment pigs received Emcelle E-D3 liquid through the water system to provide vitamin E and vitamin D. Control pigs received water without added vitamins. Daily water consumption was similar between the control and treatment groups. Pigs were weighed and pen feed intake calculated at 11, 20, and 31 d post-weaning. Twelve randomly selected pigs from each treatment were bled at 31 d post-weaning for determination of RBC SOD and GPx. There was no treatment effect on overall ADG (0.46 vs. 0.45 kg/d; $P = 0.52$), ADFI (0.62 vs. 0.62 kg/d; $P = 0.98$), or G:F (0.75 vs. 0.73; $P = 0.16$) in control vs. vitamin treated pigs, respectively. However, SOD (362.86 vs. 324.17 U/ml; $P = 0.005$) and GPx activities (10,525 vs. 8105 nmol min⁻¹ ml⁻¹; $P = 0.0002$) in control vs. vitamin treated were reduced in the pigs receiving the vitamins. While there was no improvement in production parameters, antioxidant enzyme activities were reduced when additional vitamins were provided in the drinking water.

ALKALIPHILIC AND ALKALITOLERANT HETEROTROPHIC MICROORGANISMS

Lydia Hayes

Poster: 36

Mentor(s): Matthew Schrenk (Microbiology and Molecular Genetics)

Alkaliphiles are organisms that thrive in environments with pH greater than 9. Alkalitolerant organisms are organisms that can survive in environments with pH greater than 9 but thrive at more neutral pH levels. The object of this experiment is to test whether the organisms in the samples collected from high alkaline aquatic environments are alkaliphilic or only alkalitolerant. In this experiment these microorganisms have been grown from water samples on to yeast-peptone agar plates, and then isolated, to make freezer stocks. These freezer stocks will be used to test alkaline tolerance of the organisms. They will be tested by creating growth curves using liquid media of different pH levels. The growth will first be tested with a medium with a pH level of 11, and will range pH levels from 9-14. The growth will be measured using fixed slides and cell counts, and spectrophotometry. This experiment will give more information on the evolutionary and adaptive nature of these organisms, it will also show if these organisms only survive in high alkaline aquatic environments or if they are found in more neutral surrounding environments and travel to the high alkaline aquatic environments, and adapt to survive. In this presentation, I will present the findings of these growth curves to see which of these organisms are alkaliphilic, and which are alkalitolerant.

RETINAL FUNCTION OF THE DEVELOPING CNGB3-MUTANT CANINE RETINA

Halley Gosen

Poster: 37

Mentor(s): Christine Harman (Small Animal Clinical Sciences), Kristin Koehl (Small Animal Clinical Sciences), Andras Komaromy (Small Animal Clinical Sciences)

Achromatopsia is an orphan disease that affects about 1 in 30,000 people and results in complete color and day blindness. In a majority of cases, achromatopsia occurs when mutations are present in either the alpha (CNGA3) or beta (CNGB3) subunits of the cone photoreceptor cyclic nucleotide-gated channels. Our laboratory is studying these channelopathies and developing retinal gene therapy for achromatopsia in canine models. The purpose of this study was to measure the function of the developing CNGB3-mutant retina using electroretinography in order to gain a better understanding about the pathogenesis of achromatopsia. Electroretinography is a non-invasive clinical method that objectively measures retinal function following light flashes of varying intensities. We evaluated 32 mutant canines between 17 and 142 days of age and compared them to 15 age-matched wildtype canines. Preliminary results show that rod photoreceptor-mediated function recorded under scotopic, or dim light, conditions developed normally and reached stable, mature amplitudes in the mutant dogs between 40 and 60 days of age. In contrast, cone photoreceptor-mediated function recorded under photopic, or daylight, conditions also peaked between 40 and 50 days of age in mutant canines, but suddenly disappeared by 60 days, which is consistent with the achromatopsia phenotype. These findings reveal that CNGB3-mutant cones are functional initially, but then lose function. We are planning to find explanations for this early, transient cone function using molecular methods.

EFFECTS OF CAGE ENRICHMENTS ON MATERNAL WELFARE AND LITTER CHARACTERISTICS OF CAPTIVE CARNIVORES: MINK AS A MODEL SPECIES

Serenity Tyll, Monika Dziuba

Poster: 38

Mentor(s): Maria Diez Leon (Animal Biosciences), Jason Knott (Animal Science), Nathalie Trottier (Animal Science)

Despite most female mink reproducing successfully, about 5% of them remain barren and infant mortality can range between 5-30%. Barrenness and infant mortality are a potential animal welfare issue, as stress and/or behavioral impairments induced by the captive environment can compromise both reproduction, and maternal care and investment in her offspring. There are two main manipulations that can have an effect on maternal welfare and infant survivorship: the addition of a shelf-like structure in a cage (as is mandatory in Europe and now in Canada), and the type of nest and nesting materials provided to females. However, the link between cage/nest modifications, and maternal welfare and infant mortality is not always clear. This study aims to build upon previous findings on the effects of cage enrichment on infant mortality and litter characteristics by testing the relative effects of the enrichments. Implements to be tested included those utilized in the Canadian Code of Practice and additional nesting materials. Impacts on female welfare, offspring mortality, and other litter characteristics that might be impacted by maternal stress will be investigated. Maternal mink behavior, such as nest-building, will be observed and recorded, along with litter weights, numbers, and survival. Data will be compared between animals raised in enriched cages versus animals that were not provided with enrichment.

QUANTIFYING ASH CHARACTERISTICS AND THE IMPACT ON NUTRIENT AVAILABILITY AT A WISCONSIN PINE BARREN RESTORATION SITE

Becky Wildt

Poster: 39

Mentor(s): Jessica Miesel (Forestry), Kathleen Quigley (Forestry)

Many fire-dependent ecosystems have experienced long term fire suppression (200+ years) as a consequence of human settlement. Over time, fire suppression can result in changes in vegetation cover, as well increased fire intensity due to fuel accumulation. Within the Chequamegon-Nicolet National Forest (CNNF; Wisconsin, USA), ecologically important grassland habitats termed 'barrens' have significantly declined due to woody encroachment resulting from fire suppression. Ash produced by fires can provide a pulse of soil nutrients important for post-fire vegetation; however, the relationships among burn factors, fire behavior, and ash properties are poorly understood. Our key objectives were to (1) determine the chemical composition of ash produced during prescribed burns, (2) investigate relationships between ash and soil hydrology, and (3) understand how burn factors influence ash properties. In May of 2016, two experimental blocks within the CNNF were subjected to prescribed burns. Each block contained nested treatment plots (56 total) to investigate three specific burn factors: historic vegetation cover, current vegetation cover, and fuel load. We collected ash from all plots within 24 hours after the fire. Our preliminary results indicate that the fuel addition treatment resulted in increased fire temperature at conifer plots and increased ash production at both conifer and grassland sites. We also noted changes in the chemical composition of ash in response to burn factors. By understanding how vegetation cover

and fuel manipulations influence ash chemistry, we aim to inform land management decisions which optimize efforts to restore barrens ecosystems.

USING NEXT GENERATION SEQUENCING OF MITOCHONDRIAL GENOMES TO DEVELOP SPECIES DIAGNOSTICS OF RHAGOLETIS POMONELLA AND RHAGOLETIS ZEPHYRIA

Nick Zonca, Krista Dunger, Kelly Geith, Wanda Sankey

Poster: 40

Mentor(s): Jim Smith (Lyman Briggs)

Rhagoletis pomonella and Rhagoletis zephyria are both fruit flies which lay their eggs in the fruits of apple trees or hawthorn trees and snowberry bushes respectively. R. pomonella is considered a pest to apple orchards and can ruin an entire crop of apples if detected in the orchard. Finding a maggot from R. pomonella in a single apple will cause the entire crop to be quarantined, which results in crop loss. R. zephyria is not a pest, and orchards will not be quarantined if they are found in them. These two species are visually identical, which presents an issue in identifying the species of the fly when seen in the wild. The main focus of this project was to investigate the mitochondrial genomes of the two Rhagoletis species using Next-Generation sequencing techniques to find characteristic differences to define the two species. In doing this, we are hopeful to find distinct characteristics between the two species that would make identification of a Rhagoletis fly found in an orchard accurate and simple. With an easy identification method, farmers can identify if there is a pest present in their orchard and take appropriate action so as not to lose their crop. With the genetic data generated on these flies from this study, we can also analyze the evolutionary history of these Rhagoletis species. We can identify haplogroups within the two species which will tell us how R. pomonella and R. zephyria diverged from each other to form the two species.

ANTHROPOLOGY

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

CREATING A DATABASE USING 3D PHOTOGRAMMETRY TO DIGITALLY RECONSTRUCT HUMAN MANDIBLES

Peter Mercier

Time: 8:30 AM

Mentor(s): Gabriel Wrobel (Anthropology)

This paper details a project that seeks to construct a digital database of accurate, high-quality 3D models of human mandibles of the Maya people of Central Belize. The database will be made in MSU's Bioarchaeology Lab using 3D Photogrammetry on a program called Agisoft Photoscan. This repository will give anthropologists the opportunity to collect metric and nonmetric data that can be used to carry out numerous kinds of analyses pertaining to skeletal morphology. Using computer models will combat major issues facing bioanthropological research. These issues include accuracy, reproducibility, longevity, and accessibility. In this paper, I will explain how to make models on Agisoft Photoscan, discuss the types of data that can be derived from these models and analyses, and talk about the vast implications digital bioarchaeology will have on research, education, and community engagement. The future of anthropology is a digital one. Using computers to create a digital archive will eliminate human measuring errors, make accessing remains convenient, and create a permanent record where remains will not be subject to degradation.

QUALITATIVE RESEARCH METHODS IN TRINIDAD AND TOBAGO

Alec Manala

Time: 8:45 AM

Mentor(s): Jualynne Dodson (Sociology)

Cross-cultural, qualitative field research methods remain critical for sociologists seeking to understand meanings and processes in the social world of human beings. In preparation for graduate study in sociology, and to support the African Atlantic Research Team (AART)'s plans for a MSU Museum exhibition on the African Diaspora, in the Summer 2016 and with two other MSU students, I completed a seminar and study abroad training experience on qualitative research methods. This is an abstract to present findings from my experiences. Senior members of AART guided us through learning activities that included reading and discussion of texts, Lansing-area participant observation practice, and formal presentations on data findings. We carried the new understandings to Trinidad and Tobago where AART members attended, worked to support, and presented professional papers at the Sixth Annual Transatlantic Roundtable on Religion and Race. Students also used their skills of data-gathering methods for field research and conducted

practice sessions. The experience enhanced my development of such research skills as historical pre-research, gaining entrée, participant observation, conversational data gathering, writing field notes, and transcribing field notes.

BEYOND THE SHELL: GENDER REPRESENTATION AND RELATIONS IN GHOST IN THE SHELL

Christian OKeefe

Time: 9:00 AM

Mentor(s): Catherine Ryu (Linguistics, Germanic, Slavic, Asian, and African Languages)

Through visual analysis of recurring imagery in the 1995 Japanese anime “Ghost in the Shell” this project aims to investigate the film’s representation of gender. I will analyze Major Motoko Kusanagi’s characteristics as depicted in the film and as discussed in ongoing discourses regarding femininity in the context of Japanese animation in connection with gender roles in modern Japanese culture. Using “Ghost in the Shell”, an internationally acclaimed film, as a case example, I will illuminate representation of women in anime and how it offers deeper insight into changing cultural norms within Japan and beyond; especially as the anime invites the viewer to newly imagine gender relations with the advent of technologies that disrupt the traditional conception of gender.

HOW CONCEPTIONS OF GENETICS IMPACT PATIENT CHOICE FOR BARIATRIC SURGERY

Salman Pervez

Time: 9:15 AM

Mentor(s): Heather Howard (Anthropology), Linda Hunt (Anthropology)

As genetics emerges at the forefront of medical thinking, the idea that one’s genetic make-up pre-ordains health outcomes has become increasingly popular in understandings of disease susceptibility and treatment response. The conviction that genetics are at the core of disease development and management has opened the door for promoting certain procedures as a “quick fix” for chronic conditions such as diabetes. For instance, bariatric surgery, a procedure that dramatically reduces the size of the stomach, is marketed as the best solution for alleviating diabetes in patients with a body mass index above 35. While marketing may be effective in drawing people to such radical procedures, how the general public understands and thinks about their own genetic susceptibility and choices for disease management is not well understood. Interviews with patients from a large hospital-based weight management clinic show conflation made between genetics, family history, race, and culture, which may affect their choice to pursue bariatric surgery. In my presentation, I will analyze interviews with diabetic patients who have been offered bariatric surgery to control their diabetes, to understand their conceptions of genetics. By understanding the way people think about genetics, we can question why bariatric surgery is becoming an increasingly common treatment for diabetes patients.

TESTING SEED LONGEVITY VIA MSU CAMPUS ARCHAEOLOGY: APPLYING BEAL’S METHODS TO HISTORIC RASPBERRY SEEDS

Rebecca Albert

Time: 9:30 AM

Mentor(s): Lynne Goldstein (Anthropology)

In the summer of 2015, the MSU Campus Archaeology Program excavated a historic outhouse or privy located on MSU’s North campus. Diagnostic artifacts deposited within the privy, as well as the structure’s close proximity to Saints Rest, MSU’s first dormitory, dated the outhouse to the 1850s-1860s. Artifacts discovered within the outhouse’s night-soil include dishes, cups, oil lamp shades, two dolls, clothing related items, animal bones, and raspberry seeds. The experiment presented here tests the viability of the raspberry seeds by attempting to germinate the seeds in a controlled environment. This test is similar to Dr. William Beal’s seed longevity experiment, the longest running botanical experiment in the world! Dr. Beal’s experiment provided the inspiration to test if the raspberry seeds recovered from the outhouse might sprout when following the Dr. Beal’s protocols. Phase 1 involved placing 24 seeds on wet paper towel, inside a sealed Ziploc bag in a warm, dry place. None of the seeds germinated. For Phase 2, 50 seeds were placed in an Arabidopsis soil mixture and stored in a controlled growth chamber. The soil mixture was watered every 2-3 days for 6 weeks. No germination of the seeds was observed. In Phase 3, 50 seeds were placed in a sandy-soil mixture and stored in a controlled growth chamber. The soil mixture was watered every 2-3 days for 6 weeks. Phase 3 is ongoing. If successful, this experiment could shed more light on the possible longevity of uncarbonized archaeological seeds.

CRAFTING CHICANA/LATINA SPACES: A COMPARISON OF LIVED EXPERIENCE THROUGH CREATIVE EXPRESSION

Breanna Escamilla

Time: 9:45 AM

Mentor(s): Delia Fernandez (History)

This presentation is a comparative analysis of Chicana/Latina muralist in the 1970's with contemporary Chicana/Latina artist and their uses of new media for creative expression. The former utilized physical spaces to express their ideas of womanhood, experiences as women of color, and sociopolitical beliefs. Those same ideas motivate the latter group. For communities of color that are not aptly represented in the dominant white narrative, particularly for women of color, the production of counter stories and spaces through public art creates agency and a voice for these communities. In an examination of relevant literature, interviews, and various mediums of art, I argue that regardless of time and space, Chicana/Latinas produce art to express their gendered and racial/ethnic experiences through shifting sociopolitical landscapes. The works of the selected Chicana/Latina muralist and popular Chicana/Latina new media artists display the parallels in themes of gender, sexuality, social justice, and identity. The continuity across these mediums and time periods makes it evident that these artworks are for these artists of color to express their thoughts in relation to their communities. As globalization and technology allow for a greater interconnectedness with various peoples, these new media artists can reach wider audiences allowing for higher visibility and an equitable understanding of the past, present, and future of the Chicana/Latina experience.

A FEMINIST APPROACH: JEWISH WOMEN PRAYING AT THE WESTERN WALL

Elyssa Hurwitz

Time: 10:00 AM

It has been made apparent that in Israel, Jewish women still do not have the same religious prayer rights that Jewish men do. Women at the Western Wall in Jerusalem are not allowed to pray in the same fashion that the men are simply because of their gender. In this paper, I argue that in looking at Jewish law, Israeli law, patriarchal ideologies, and feminist framework, Jewish women should have the right to pray at the Western Wall. I further examine the lack of governmental support and sociopolitical undermining of Jewish women's participation in prayer at this fundamental Jewish holy site.

ANTHROPOLOGY POSTER PRESENTATIONS, SECTION 1 BALLROOM, 11:00 AM – 12:30 PM

A MICROBOTANICAL ANALYSIS OF THE CLOUDMAN SITE

Rebecca Albert

Poster: 44

Mentor(s): William Lovis (Anthropology)

The goal of this study is to determine the plant diet of the populations occupying the Cloudman site over 2000 years until European entry into the Great Lakes, as well as analyzing how plant diet changed over time at this site. The Cloudman site on Michigan's Drummond Island provides an excellent opportunity to explore this problem because of the large range of time during which the site was occupied. Ceramic rim sherds from the Middle Woodland, Late Woodland, and Protohistoric periods contained large amounts of carbonized food residue. Samples of the carbonized residue are currently being chemically processed and analyzed using optical microscopy for diagnostic plant phytoliths and starches. Preliminary results of this analysis have determined that maize (corn, *Zea mays* sp. *mays*) starches and wild rice (*Z. palustris*) phytoliths were present in the residues adhered to several Laurel Middle Woodland ceramics potentially as old as 2000+ years.

COMPARISON OF SEX RATIOS OF MEDIEVAL ISLAMIC AND CHRISTIAN CEMETERY POPULATIONS AT THE ARCHAEOLOGICAL SITE OF CAESAREA MARITIMA, ISRAEL

Alyssa Gray

Poster: 45

Mentor(s): Gabriel Wrobel (Anthropology)

Burials from the archaeological site of Caesarea Maritima, located in Israel, represent two groups that used the site during the Medieval Period: Christians and Islamic Bedouins. The Christian settlers lived in permanent agricultural communities, while Bedouins are nomadic and visited the site sporadically. This study sought to determine whether

differences in the culture of the two groups found at Caesarea had an effect on who was buried there. I focused specifically on sex, using standard morphological features of skulls and pelvises to determine the sex of the Caesarea individuals, who are currently curated in the MSU Bioarchaeology Laboratory. Using the skull, I looked at the skeletal features of the nuchal crest, mental eminence, supraorbital ridge, supraorbital margin, and mastoid process. When looking at the pelvis, the features to be considered were the greater sciatic notch, subpubic concavity, ventral arc, and medial aspect of the ischiopubic ramus. Based on archaeological indicators of burial treatment, individuals were placed into one of the following categories: Islamic, Christian or Unknown. For each group, I will present the relative frequencies of males, females, and unknown individuals. Discussion will focus on possible interpretations of the differences in the sex ratios found between groups.

RESTORING INDIVIDUALITY FROM ANCIENT BONES: A BIOLOGICAL PROFILE FROM THE CAESAREA MARITIMA

Jade Greear

Poster: 46

Mentor(s): Gabriel Wrobel (Anthropology)

This case study of a skeleton from the ancient port city of Caesarea Maritima in Israel presents a biological profile of the individual based on analyses that include estimations of sex, age, ancestry, and pathological findings such as disease or injury. Biological profiles play an increasingly important role in a plethora of disciplines including anthropology, biology, forensics, and archaeology, allowing researchers to reconstruct aspects of individuals' life histories. Excavations at Caesarea Maritima show that a large field south of the Crusader fortress was the main location for burials throughout the Islamic and Crusader occupation of the site. Although the specific lot from which this individual came is unknown, this project combines biological and cultural data to restore an identity to this person and provide deeper context to the entire archaeological site and society from which it came.

RACE, RISK AND RESPONSIBILITY IN A DIABETES CLINIC

Funmi Odumosu

Poster: 47

Mentor(s): Linda Hunt (Anthropology)

It is a common assumption, both within and outside of medicine, that genetic characteristics of certain racial and ethnic groups increase their susceptibility to certain diseases. Although many studies have shown that genetics cannot be used to identify race or ethnicity, racial-ethnic identity is commonly used as a proxy for determining individual risk for diseases thought to have a strong genetic basis, such as diabetes. Drawing on ethnographic interviews and participant observation conducted with patients and clinicians at a diabetes and weight management clinic, we will explore how the idea of genetic susceptibility is applied to and understood by members of diverse racial-ethnic groups. We analyze how clinicians discuss and use race in identifying individuals at risk for diabetes, and how patients discuss their risk and responsibility for managing diabetes. In this paper, we will discuss how racial and ethnic identity may be used by clinicians to determine individual susceptibility to diabetes, and how those concepts may in turn affect the patient's perception of responsibility in managing their disease. We will consider whether such racially based diagnosis could impact the overall health and wellness of these patients and patients like them.

ONE PERSON'S TRASH IS ANOTHER PERSON'S TREASURE: EXPLORING REFUSE DISPOSAL AT MORTON VILLAGE

Sarah Jane Potter

Poster: 48

Mentor(s): Jodie O'Gorman (Anthropology)

The purpose of this research is to explore if burning of faunal remains can help clarify the depositional episodes of Structure 26 and the behaviors associated with them. Structure 26 was a burnt domestic structure near the center of the occupied area of Morton Village, an archaeological site located in central Illinois that was occupied during A.D. 1300-1400. After burning, the structure was abandoned and the resulting basin was filled in some way. Using standard zooarchaeological methods and procedures, identifiable bones and bone fragments were separated into unburned and burned categories, with burned bones defined as being more than 50% burned. Bones were also separated into mammal, fish, bird, turtle, and general vertebrata categories in order to see if different types of animals were present between excavation levels. This research will help to generate more knowledge about household behavior, trash disposal, and formational processes at Morton Village.

INVESTIGATION OF THE RELATIONSHIP BETWEEN SKELETAL MICROSTRUCTURE AND DISEASE IN A DOCUMENTED ANATOMY SAMPLE

Jake Quarles

Poster: 49

Mentor(s): Amy Michael (Anthropology)

Bone is a dynamic tissue, and its structure varies as a result of many factors, including metabolic and hormonal changes, activity-related stress, sex, age, and disease. In forensic contexts, many studies have focused on related bone variations observed macroscopically, but have largely ignored microstructural variability. This study focuses specifically on the effects of diseases on bone from a histological perspective, observing femur sections from 11 individuals who were all suffering from disease at their time of death, including Chronic Obstructive Pulmonary Disease, Renal failure/Renal disease, Leukemia or Lymphoma, and Cancer. These diseases all affect the metabolism of an individual which would then affect bone maintenance. Microscopic features of the pathological bone, including osteon shape and count, will be compared to that of normal individuals. Changes in osteons due to disease can obstruct the traditional methods of using bone microstructure to age an unknown individual by potentially altering the osteon count and shape in unknown ways. It is important to note the effect of disease on the osteons so that when using a histological method of aging, it can be taken into account to suggest a more accurate age of the individual.

SEEING IN BLACK AND WHITE: THE USE OF BIOLOGICAL RACE IN PHYSICAL ANTHROPOLOGY

Erik Rose

Poster: 50

Mentor(s): Joseph Hefner (Anthropology)

Although mainstream anthropological theory posits race as a social construct grafted over variation in geographic ancestry, certain scholars in physical anthropology argue that viewing race as a biological concept is still a valid way of analyzing human diversity. Strains of research in physical anthropology dating back to the early 20th century claim that humans can be divided typologically into distinct races, each with their own unique set of traits. However, these ideal racial types do not always correspond to the reality of individual ancestry and ignore the variation within racial groups. Using cluster analysis of skeletal remains of individuals with records of self-reported race, we will demonstrate that the ideal racial types offered by supporters of race as a biological concept lack efficacy in describing human variation.

PREVALENCE OF DENTAL MODIFICATION AMONG ANCIENT MAYA GROUPS IN CENTRAL BELIZE

Lauren Rosenberg

Poster: 51

Mentor(s): Gabriel Wrobel (Anthropology)

Dental filing is a form of intentional cultural modification popular among the ancient Maya where teeth are shaped into different patterns. Modifications represent a social distinction such as ethnicity, or membership within a corporate group. Previous studies concluded that the modifications likely did not reflect social status, but there is debate about the meaning of variations in prevalence and form found between different groups. This study focused on the dental modifications in central Belize to identify the presence of distinct social groups. Modified teeth from a variety of mortuary contexts (rockshelters, caves, and surface sites) were classified using a popular typology developed by Javier Romero, and relative frequencies were compared to see if the prevalence and specific modification type varied based upon burial location. Discussion of the results will include possible meanings of the differential patterns of prevalence of the modifications based upon knowledge of previous archaeological investigations of the area.

VISUALIZING MSU'S CAMPUS ARCHAEOLOGY EXCAVATIONS WITH GEOGRAPHIC INFORMATION SYSTEMS

Jasmine Smith

Poster: 52

Mentor(s): Lynne Goldstein (Anthropology)

MSU's Campus Archaeology Program (CAP) works to learn from MSU's past by examining the archaeological record prior to development or changes in the landscape. Because of this mandate, CAP has excavated sites all over campus, finding artifacts that date to different times throughout the university's history, as well as finding prehistoric Native American artifacts that predate the campus. CAP has divided MSU's history into 4 time phases: Phase 1(1855-1870) - Beginnings, Phase 2 (1870-1900) - Foundation, Phase 3 (1900-1925) - Expansion, and Phase 4 (1925-1955) - Legacy. During the fall 2016 semester, I used a geographic information system (GIS) to visualize where on campus we have found artifacts from each of these four time phases. CAP uses a GIS to keep track of our excavations by plotting point data and polygons on an aerial image of campus. Point data represent shovel test pits we have completed and polygons

represent excavation trenches. This poster looks specifically at the distribution of artifacts found on campus from each of the aforementioned time phases, and tries to draw some conclusions about campus development and change.

BIOCHEMISTRY AND MOLECULAR BIOLOGY

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

NOVEL APPROACH FOR EXPRESSION AND PURIFICATION OF TGF- β LIGANDS

Kit Yee Chu

Time: 11:00 AM

Mentor(s): Erik Martinez-Hackert (Biochemistry and Molecular Biology)

TGF- β superfamily is a large group of structural related growth factor that plays an important role in animal physiology. It has 33 ligand genes and it consists of different subfamilies including BMPs, Activins, GDFs, TGF β s and Nodal. They have many cellular functions, especially in embryonic development. Also, they are associated with different human diseases like cancer, diabetes and muscle fibrosis. TGF- β ligands signal by binding to the type II receptor and recruit the type I receptor which then initiate a signaling cascade. Also there are many factors that can affect the TGF- β signaling, for example, there are coreceptors that will either promote or inhibit the ligand receptor binding. Therefore, it is important to understand their signaling regulations. However, it is difficult to obtain active purified ligands due to its structural complexity. Many have tried to express them in E.Coli, but refolding has been successful in a very small number or the ligands are ten-fold less active. Current project involves in establishing protocol for expressing two TGF- β ligands, Nodal and BMP4. Designed DNA constructs are cloned and transfected into Chinese Hamster Ovary cells (CHO cells). Multiple purification steps have been established to purify our target proteins. At the end, we tested the activity of the purified ligands using the Surface Plasmon Resonance to ensure they are active.

RNA POLYMERASE II MUTATIONS AND UTERINE CANCER

Jessica VanElls, Emily Neag

Time: 11:15 AM

Mentor(s): Zachary Burton (Biochemistry and Molecular Biology), Kaillathe Padmanabhan (Biochemistry and Molecular Biology)

Human cancers accumulate mutations in essential genes, and gene regulation programs are often altered in cancer. RNA polymerase II synthesizes mRNA. As a natural experiment, supported by a vast database, the human RNA polymerase II structure (PDB 5IYD) was therefore analyzed for the distribution of cancer mutations. Cancer mutations were collected from the cBioPortal for Cancer Genomics (Memorial Sloan Kettering; <http://www.cbioportal.org/>) database. Analysis of missense mutations indicates that alterations in RNA polymerase II subunits that contribute to cancer growth are typically moderate loss of function mutations. This conclusion is supported by identification of nonsense mutations and splice junction mutations that contribute to cancer. Most nonsense mutations would be expected, for instance, to inactivate a RNA polymerase II subunit and reduce the capacity for messenger RNA synthesis in the cell. No human genetic diseases have been identified carrying mutations in genes encoding RNA polymerase II, indicating that viability of the organism requires two functional copies of each subunit gene. Cancers, by contrast, can survive with mutations in RNA polymerase II, and some moderate loss of function mutations appear to encourage the growth and/or spread of the malignant tumor.

INVESTIGATING ANALOGOUS FUNCTIONS OF CYANOBACTERIAL MINC AND ARABIDOPSIS ARC3 IN CELL AND CHLOROPLAST DIVISION

Akua Acheampong

Time: 11:30 AM

Mentor(s): Katherine Osteryoung (Plant Biology)

Chloroplasts, the photosynthetic organelles of land plants and algae, arose from an endosymbiotic event in which a heterotrophic eukaryote engulfed an ancient cyanobacterium. FtsZ is a cytoskeletal protein that plays a key role in the division of chloroplasts as well as bacteria. FtsZ assembles the FtsZ ring (Z ring) at the middle of the bacterium or plastid and recruits other proteins to carry out the division process. Previous research in Arabidopsis thaliana has demonstrated that the regulator protein Accumulation and Replication of Chloroplasts 3 (ARC3) inhibits Z-ring assembly and aids in restricting the positioning of the Z ring to the mid-plastid. Synechococcus elongatus, a freshwater cyanobacterium, also accumulates the FtsZ protein at the midcell during binary fission. Escherichia coli MinC, a

divisionary protein, functions as a negative regulator of *E. coli* FtsZ ring assembly at the cell poles and therefore restricts Z-ring formation to the midcell. We hypothesize that *S. elongatus* MinC will function similarly as a negative regulator of Z-ring assembly in *S. elongatus*. Furthermore, *A. thaliana* ARC3 and *S. elongatus* MinC may exhibit analogous functions in view of the fact that they are involved in placement of the Z ring at the division site of the chloroplast and the cyanobacterium, respectively. This project aims to characterize the effect of *A. thaliana* ARC3 on *S. elongatus* FtsZ filament assembly and conversely to characterize the effect of *S. elongatus* MinC on *A. thaliana* FtsZ assembly. The findings may elucidate the evolutionary relationship between division systems in cyanobacteria and plants.

IDENTIFICATION OF CANDIDATE GENE(S) AFFECTING HISTONE METHYLATION AND DEVELOPMENT IN ARABIDOPSIS THROUGH GENOME SEQUENCING AND A COMPUTATIONAL APPROACH

Kalle Chiles

Time: 11:45 AM

Mentor(s): Steve Vannocker (Horticulture)

Proper gene regulation is dependent not only on DNA sequence but also how proteins package the DNA. This complex of DNA and proteins, called chromatin, allows different portions of the genome to be activated or inactivated. The major component of chromatin is histones, which are methylated in order to accomplish this regulation. Much is known about the structure of chromatin, but less is known about how the structure is associated with gene activation. The goal of this research is to identify new gene(s) that are functionally related to PAF, a transcription cofactor that participates in histone methylation. The approach is by high-throughput genome sequencing targeting a panel of 40 phenotypically similar mutants. For each, we generated bulked-segregant populations, pooled the DNA, and sequenced the genomes en masse. Computational methods were developed to pinpoint both the genomic regions containing the mutation and the mutation itself. This research will hopefully provide insights to how histone methylation leads to the activation or inactivation of certain parts of the genome.

PROTEIN DIFFUSION AROUND BACTERIAL NUCLEOID

Emma Ford

Time: 12:00 PM

Mentor(s): Asli Yildirim (Chemistry)

Protein structure and dynamics in cellular environments has become a recent focus since macromolecular crowding in cells has been found to impact biomolecules' structure and dynamics, and also their biological functions. Previous studies have mostly investigated proteins as crowding agents due to their high concentration in cells, however bacterial nucleoid also occupies large volume fraction in prokaryotic cells. In addition, it is not encapsulated by a nucleus as in eukaryotic systems, therefore its presence affects all of the components inside the cell. In this research, we have carried out Brownian dynamics simulations of coarse-grained model systems containing bacterial nucleoid and proteins to study the crowding effect resulting from nucleoid on protein diffusion. We have run simulations of the systems at different crowding concentrations and also we used different sizes of proteins. We have also run control simulations containing the same protein sizes and concentrations but without the nucleoid to compare the protein and nucleoid crowding effects. The analysis of these simulations shows that proteins diffuse slower when they are in higher crowding concentrations and are larger in size. In addition, it appears that proteins diffuse on average faster when they are in an environment without the nucleoid. These results give a deeper insight into how proteins diffuse around nucleoid.

UNDERSTANDING THE REGULATION OF IDH GENE BY RBF1 PROTEIN

Pamela Himadewi

Time: 12:15 PM

Mentor(s): David Arnosti (Biochemistry and Molecular Biology)

Over the past decades, scientists have been conducting research trying to understand the control mechanism of cell proliferation, which directed towards the analysis of oncogenic pathways associated with human cancer. These studies have revealed the importance of cell cycle pathway, which controlled by the activity of the retinoblastoma tumor suppressor protein (Rb) and in turn regulates the E2F transcription factor. Retinoblastoma-Like Family protein (Rbf1) is a drosophila homolog of the Rb family; whereas, isocitrate dehydrogenase (IDH) is metabolic enzymes which catalyze the interconversion of isocitrate and α -ketoglutarate in TCA cycle. In the previous studies of ChIP-seq profiles on Rbf1 binding target in the whole drosophila genome, IDH gene promoter is being bound by Rbf1 protein. Furthermore, abnormality in the level of IDH gene expression is linked to gliomas (brain tumor). In order to investigate whether Rbf1 regulates IDH gene expression, we are using luciferase reporter assay to assess the transcriptional activity in cells. Co-transfection of IDH reporter vector and overexpression of Rbf1 in the cells did not show any significant repression activity. However, creating E2F site mutation in the IDH gene promoter results in a significantly higher transcriptional activity after transient transfection into the cells. This results suggest that Rbf1 might have regulated IDH gene activity in

E2F-dependent pathway, but further studies need to be carried out to elucidate the functional significance of IDH gene regulation by Rb in vivo.

BIOCHEMISTRY AND MOLECULAR BIOLOGY ORAL PRESENTATIONS, SECTION 2 MSU ROOM, 1:30 PM – 3:30 PM

HOMOLOG DISCOVERY IN HOMO SAPIENS AND EQUUS CABALLUS BY IDENTIFYING THE ATP7B GENE VIA PCR AND GEL ELECTROPHORESIS

Davin Hami, Hannah Zawisa

Time: 1:30 PM

Mentor(s): Douglas Luckie (Lyman Briggs)

The ATP7B gene of the human chromosome 13 is linked to Wilson's disease (Van den Berghe et al., 2009). A target segment of ATP7B was amplified and analyzed using allele-specific PCR and gel electrophoresis, to determine the gene's presence in humans and its horse homolog. We hypothesized that with similar annealing temperatures and primers for the ATP7B gene, two similar 300-bp segments will appear by the template ladder, indicating homology of the gene in horses and humans (Amvrosiadou et al., 2015). Our results of amplification of the lambda Rz gene (a positive control) was a length of 400 base pairs, similar to the published finding of 394-bp, confirmed by a semi-log plot equation. The negative control was a PCR mix without dNTPs. We predicted the length of these base pair segments by manual comparison of horse and human genomes, with the length being the distance between the forward/reverse primers. ATP7B's presence in both homologs is scientifically relevant because it could prove an evolutionary similarity, potentially leading to advances in medical diagnostics and disease testing (Boehm, 1989). Wilson's patients exhibit abnormal behaviors, including dysarthria, or motor speech disorder (Huster, 2010). To understand these symptoms, a sociological experiment was conducted for 30 days. Dysarthric symptoms were emulated to determine the overall frustration of strangers to dysarthria. Using a Chi-square test of independence, it was predicted that strangers grew frustrated when exposed to dysarthria. These results are scientifically significant because they demonstrate how people with communicative behaviors could function within society's norms.

DISSECTION OF THE ROLE OF PLIPS IN SEED OIL BIOSYNTHESIS AND PLANT DEVELOPMENT WITH CRISPR-CAS9 TECHNOLOGY

Hope Hersh

Time: 1:45 PM

Mentor(s): Christoph Benning (Plant Research Laboratory)

Photosynthesis is a biochemical process that converts light to chemical energy. Photosynthesis takes place in the chloroplast thylakoids, whose membrane composition is highly conserved. Phosphatidylglycerol (PG) is the only phospholipid found in the photosynthetic membranes. Recently, a PG specific lipase, Plastid Lipase 1 (PLIP1), was discovered in *Arabidopsis thaliana*. PLIP1 is a phospholipase A₁, which hydrolyzes 18:3 (carbon: double bonds) acyl groups from PG and subsequently transports them to the endoplasmic reticulum for oil biosynthesis during seed development. *A. thaliana* genome encodes two putative PLIP1 homologs. In-order to circumvent the potential gene redundancy and to explore the physiological functions of *PLIP* genes, construction of a triple mutant is required, which is not achievable through conventional methods. Therefore, Clustered Regularly Interspaced Short Palindromic Repeats (CRISPR)-Cas9 technique was used to create the triple mutant plants. Detailed seed oil analysis and plant development assessment will be performed on mutant plants to investigate the function of *PLIP* genes.

DEVELOPING A HIGH-THROUGHPUT ASSAY FOR SCREENING NOVEL BICARBONATE TRANSPORTERS FOR CYANOBACTERIA

Ana Belza

Time: 2:00 PM

Mentor(s): Sandeep Gaudana (Biochemistry and Molecular Biology), Cheryl Kerfeld (Biochemistry and Molecular Biology), Sigal Lechno-Yossef (Biochemistry and Molecular Biology)

The vital role of inorganic carbon uptake in the cyanobacterial carbon concentration mechanism (CCM) is being explored as a strategy for boosting photosynthesis in prokaryotic and eukaryotic photoautotrophs. One of the model cyanobacterial strains *Synechocystis sp.* PCC 6803 (*Syn.* 6803) harbors 3 bicarbonate (HCO₃⁻) transporters: BicA, SbtA and BCT1 and 2 carbon dioxide (CO₂) uptake systems: NDH1-MS and NDH1-MS'. Studies have demonstrated that overexpression of BicA in *Syn.* 6803 leads to enhanced growth rates and biomass production. Unlike CO₂, HCO₃⁻ cannot cross the plasma membrane, therefore it must be actively transported into the cytoplasm. Consequently, we are

exploring the possibility of engineering rhodopsins, light-driven retinylidene proteins, into HCO_3^- transporters to conserve cellular energy, making photosynthetic organisms more productive. A high-throughput assay system for screening libraries of rhodopsin-based potential HCO_3^- transporters is a prerequisite for this project. For the said screening assay, 3 or 4 out of a total of 5 different inorganic carbon uptake systems in *Syn. 6803* were knocked-out, followed by analyzing if these knock-out mutants demonstrate a high CO_2 requiring (HCR) phenotype when grown in ambient air. Rescuing HCR by overexpressing a known HCO_3^- transporter in the cyanobacterial mutants will follow, to optimize a proof-of-concept assay. This will be employed for screening the rhodopsins for their ability to transport HCO_3^- by using light energy. The knockout and restoration of the CO_2 uptake systems should provide an efficient screening system in cyanobacteria for prospective work to enhance photosynthesis, which could also be propagated in algae and C3 plants.

DESIGN OF A CYTOSOLIC CYTOCHROME MATURATION PATHWAY

Donna Liebelt

Time: 2:15 PM

Mentor(s): Danny Ducat (Biochemistry and Molecular Biology)

Cytochromes are heme containing electron carriers typically matured in the periplasmic space of bacteria through the cytochrome c maturation (ccm) pathway. CcmE has been established as a crucial protein in the ccm pathway with the ability to attach heme to, and therefore mature, cytochrome c. Previous experiments within my project have shown that the removal of the transmembrane helix and periplasmic-targeting signal peptide from CcmE and thermostable cytochrome c552 respectively facilitates cytosolic maturation of cytochrome c552 in *E. coli*. Therefore, targeting CcmE to the cytosol of cyanobacteria *Synechococcus elongatus* PCC 7942 (*S. elongatus*) may be expected to enable cytosolic maturation of cytochromes. To test this hypothesis, cytochrome c552 and CcmE will be expressed in *S. elongatus* under an inducible promoter. The resultant proteins will be examined via gel electrophoresis, western blots, heme-staining, protein purification and/or spectroscopic techniques. Through comparison to negative controls, we intend to determine the ability of CcmE to mature cytochrome in the cytosol of cyanobacteria *S. elongatus*. Successful maturation of cytochromes in *S. elongatus* could enable metabolic engineering of artificial electron transfer pathways within cyanobacteria and other bacterial systems e.g. shuttling electrons between the thylakoid membrane and carboxysomes.

NONSENSE AND RUBBISH: CHARACTERIZATION OF CODON USAGE AND FRAGILE CODONS

Magle Williams

Time: 2:30 PM

Mentor(s): Steve Vannocker (Horticulture)

Proper growth and protein production relies on accurate transcription and translation of messenger RNA (mRNA). Accordingly, cells actively monitor mRNA structure to ensure that the mRNA has been synthesized correctly. In eukaryotic cells, one of the RNA surveillance pathways, called nonsense mediated decay (NMD), eliminates mRNAs containing premature termination codons. In previous work, we hypothesized that NMD could be especially important to monitor transcripts containing 'fragile' stop codons (normally encoding an amino acid, which are easily mutable to a stop codon with a single base change). We found support for this hypothesis in human cells, but not in the model plant *Arabidopsis*. To determine if fragile codon surveillance might be constrained to specific phyla or genera, we are evaluating codon usage relative to gene features for ~10,000 representatives of >1,000 distinct eukaryotic species. The results of this study will be presented.

MUTAGENESIS OF THE ETHYLENE-FORMING ENZYME FROM PSEUDOMONAS SYRINGAE PV. PHASEOLICOLA PK2

Anastasia Ritchie

Time: 2:45 PM

Mentor(s): Robert Hausinger (Microbiology and Molecular Genetics)

Ethylene is a simple gaseous alkene molecule that is commonly used in the commercial production of plastics and has attracted interest as a biofuel. Traditionally this molecule is obtained by steam cracking fossil fuels, however this method also produces CO_2 which has concerning effects on the climate and environment. The microbe *Pseudomonas syringae* pv. *phaseolicola* PK2 generates ethylene via the ethylene-forming enzyme (EFE). EFE is a mononuclear non-heme Fe(II) enzyme that couples the decarboxylation of 2-oxoglutarate with the hydroxylation of L-arginine (L-Arg) and forms ethylene, succinate, L-OH-Arg (which decomposes non-enzymatically into guanidine and L- Δ -1-pyrroline-5-carboxylate), and CO_2 . A library of EFE variants was created to (1) determine which residues play a role in the catalysis, (2) separate the formation of ethylene from the hydroxylation of L-Arg, (3) substitute selected residues with Arg in an effort to fill the L-Arg binding site to eliminate the need for this substrate. The library of EFE variants was created by site-directed mutagenesis of the *efe* gene. The proteins were successfully expressed in *Escherichia coli* and purified using affinity

chromatography. The variants were then characterized by various activity assays to assess for the production of ethylene and the other co-products. Herein we present our findings on the various EFE variants with respect to their enzymatic capabilities and describe the enzyme-substrate relationship.

BIOCHEMISTRY AND MOLECULAR BIOLOGY POSTER PRESENTATIONS, SECTION 1 BALLROOM, 9:00 AM – 10:30 AM

CELLULAR EFFECT AMPLIFICATION BY BLOOD GLUCOSE REGULATORY MOLECULES

Nahid Baghdadi

Poster: 55

Mentor(s): Dana Spence (Chemistry)

Diabetes mellitus, commonly referred to as diabetes, is a metabolic disease and has different forms. Most common types, type I and II, have been studied extensively for the past decades. Diabetes is usually caused by malfunction of a hormone called insulin, which is secreted from pancreatic beta cells, or inefficiency in the uptake of this hormone by body cells. Insulin is a hormone in charge of removing glucose from the bloodstream. C-peptide, a 31 amino acid peptide, is co-secreted from pancreatic beta cells along with insulin. It has previously been reported that C-peptide can enhance cellular effects, potentially leading to cease diabetes complications. One of these cellular effects is an increase in ATP release from red blood cells with a downstream effect of vasodilation and improved blood flow. Interestingly, in this study, we have shown that molecules with blood glucose regulatory effects have also shown to enhance these cellular effects.

UNDERSTANDING THE FUNCTION OF ACTIVE SITE RESIDUES AND AN ORDERED LOOP OF AN ORYZA SATIVA TYROSINE AMINOMUTASE TOWARDS PARSING ITS MUTASE AND LYASE ACTIVITIES

Devinda Wijewardena

Poster: 56

Mentor(s): Kevin D. Walker (Chemistry)

Discovery of MIO-dependent aminomutases on biosynthetic pathways of biologically active, medicinal compounds in plants and microorganisms enables further mechanistic studies on how they catalyze α -amino acid building blocks. These enzymes catalyze a chemically challenging α - to β -amino acid isomerization reaction. An *Oryza sativa* tyrosine aminomutase (OsTAM) from Japanese rice converts α -tyrosine to its β -isomer (75%), and its residual lyase activity makes *p*-coumarate (25%). OsTAM is the first TAM shown with slight phenylalanine aminomutase (PAM) activity. The active sites of OsTAM and TcPAM from *Taxus* plants differ by only two positionally-similarly residues (OsTAM:Y125/N446 compared to TcPAM:C107/K427) near the aryl ring of the substrate. Previous studies show the aminomutase active site is shielded by an ordered inner loop. We hypothesize the inner loop structure increases the residence time of the acrylate intermediate by capping the active site, allowing time for the NH₂-rebound to produce β -phenylalanine. Further, we believe the TcPAM active site residues improve the binding of phenylalanine over tyrosine. Here, we looked at how an OsTAM double mutant (Y125C/N446K) and quadruple mutant (Y125C/N446K/loop-T95A/T97I), to better resemble TcPAM, turned over various ring-substituted phenylalanines compared to wild type. Preliminary studies showed that the double and quadruple mutants surprisingly increased the total conversion of substituted α -amino acids to their cinnamate analogs as the major product (*p*-Cl and *p*-Br analogs made at 84% and 83%, respectively). These findings suggest that active site residues are involved primarily in substrate selection, while the inner loop function remains unresolved on how it helps partition mutase and lyase activities.

PLUG AND PLAY: INTRODUCING A FOREIGN ENZYME INTO BACTERIAL MICROCOMPARTMENTS USING PROTEIN DOMAIN FUSIONS

Cassie Dutcher

Poster: 57

Mentor(s): Cheryl Kerfeld (Biochemistry and Molecular Biology), Aiko Turmo (Biochemistry and Molecular Biology)

Bacterial microcompartments (BMCs) are proteinaceous organelles found in a wide range of bacteria. BMC shells provide a barrier between the cytosol of the cell and the lumen of the BMC, which provides protection from toxic compounds and prevents loss of metabolic intermediates. The BMC architecture is ideal for increasing the efficiency of metabolic reactions, as substrates and enzymes can co-localize within the compartment. Due to these properties, BMCs have attracted attention for their potential as biosynthetic nanoreactors. In our group, we are redesigning a BMC with a non-native enzymatic core, including the enzyme isoprene synthase. Based on the premise that protein domains (the "building blocks") have discrete structural and functional roles, we propose to engineer isoprene synthase through a

“plug and play” approach. We intend to integrate different BMC shell protein domains into isoprene synthase, with the goal of reassembling it into a previously characterized synthetic BMC shell. Here, I show generation of the protein fusions and the functionality analysis (isoprene production). The encapsulation of the naturally inefficient enzyme isoprene synthase in a BMC with substrate should improve overall enzyme productivity. Increasing the production of isoprene in a renewable way will help meet the demands of the pharmaceutical, nutritional, fragrance, cosmetic, biofuel and other novel biomaterial industries.

DEVELOPMENT OF HIGH-THROUGHPUT SCREENING METHOD TO IDENTIFY POTENTIAL GENETIC MODIFIERS OF 2,3,7,8 TETRACHLORODIBENZO-P-DIOXIN-INDUCED IMMUNOSUPPRESSION

Elizabeth Horn

Poster: 58

Mentor(s): John LaPres (Biochemistry and Molecular Biology)

Interindividual variability is not typically assessed within toxicological studies. Given the diversity within the human population, there are likely genetic variants that affect susceptibility to toxicant challenges. Previous studies in our laboratory have indicated that when B cells are isolated from unique individuals and exposed to increasing concentrations of a known immunosuppressant, 2,3,7,8 tetrachlorodibenzo-p-dioxin, substantial interindividual variability can be found in the immunoglobulin M (IgM) response. TCDD is known to activate a transcription factor, aryl hydrocarbon receptor (AHR), which leads to multiple downstream disease-states such as immunosuppression. Lymphoblastoid cell lines (LCLs) are being investigated as a potential tool to identify genetic modifiers leading to such interindividual variability. These cell lines were created from unique individual's B cells that were 1) immortalized with Epstein Barr Virus 2) sequenced to establish presence of genetic mutations and polymorphisms. The basis of this project is to develop methodology in which LCLs will be screened in a high throughput manner. This includes a dose-response using pokeweed mitogen to identify the concentration needed to activate the six different LCLs to secrete IgM. Following, the LCLs will be treated with a dose-response of TCDD. The six LCLs will be analyzed in multiple ways including an IgM ELISA to establish if TCDD affects IgM secretion and analyzing mRNA levels of known AHR-target genes. Such results will aid in the development of a high-throughput screen to assay >1,000 LCLs to identify potential genetic modifiers that may cause increased or decreased susceptibility to TCDD-induced immunosuppression.

DIMERS OF HUMAN CELLULAR RETINOL BINDING PROTEIN II EXHIBIT ORDERED FOLDING INTERMEDIATES

Kevin Kramer

Poster: 59

Mentor(s): Zahra Assar-Nossoni (Chemistry), James Geiger (Chemistry)

Domain swapping results from two identical monomeric protein chains exchanging part of their structure to form a dimer or higher-order oligomer. Human Cellular Retinal Binding Protein II (hCRBP II) is a member of the intracellular Lipid Binding Protein family (iLBP), it was thought that proteins within this family did not exhibit domain swapping. It was hypothesized that hCRBP II could exhibit domain swapping and this could be performed through creating a point mutation in Tyr60 which forms a hydrogen bond with Glu72. To test this hypothesis hCRBP II mutants were created by changing the amino acid at site 60 (we created several variants) and they were expressed in DH5 α E. Coli. Mutants were expressed and proteins were isolated using column chromatography and were examined using x-ray crystallography. hCRBP II separated in a monomeric form at 40mM NaCl and a dimeric form at 150mM NaCl. Crystal structures revealed that there was extensive domain swapped dimer. There was no interconversion between monomer and dimer at neutral pH and room temperature (up to one week). Overall these data suggest the monomer to dimer ratio is kinetically controlled by the amount of folding intermediate. hCRBP II is the first member of the iLBP family which has been shown to exhibit this trait. The goal of future research is to determine more mechanisms that are involved in domain swapping (specifically in the iLBP family).

UTILIZATION OF A SITE-DIRECTED MUTAGENESIS APPROACH TO UNDERSTAND THE SELF-ASSEMBLY OF A BACTERIAL MICROCOMPARTMENT SHELL PROTEIN

Sean McGuire

Poster: 61

Mentor(s): Clement Aussignargues (Biochemistry and Molecular Biology), Cheryl Kerfeld (Biochemistry and Molecular Biology)

Bacterial microcompartments (BMCs) are self-assembling organelles found within many bacterial phyla. They are composed of a selectively permeable protein shell encapsulating enzymes and other proteins that constitute a metabolic pathway. They are essential in anabolic (CO₂ fixation) or catabolic (carbon compound degradation) processes within the bacterium. The proteinaceous shell is composed of hexamers (BMC-H) and trimers (BMC-T, tandem-domain) which exhibit a similar fold, and pentamers (BMC-P) capping the vertices. Some of these shell proteins

are able to self-assemble into higher-order structures. We utilize a synthetic BMC shell system (HO shell) as a model to unveil the structural determinants of this self-assembly process: these shells are composed of seven proteins, one BMC-H, three BMC-T and three BMC-P proteins. When recombinantly expressed in *Escherichia coli*, BMC-H self-assembles into “swiss-rolls”, which, once purified, roll out into flat sheets. BMC-T1, in contrast, is completely soluble. By comparing the sequences and structures of the two proteins, we identified motifs potentially involved in the formation of protein architectures. To test our hypothesis, we designed a set of mutations that we inserted into BMC-H by using a site-directed mutagenesis method. A combination of in vivo (thin section transmission electron microscopy) and in vitro (solubility assays) approaches showed that point-mutations at key residues of BMC-H can lead to the formation of different architectures, or even abolish the ability to self-assemble. These engineered building blocks are ideal candidates as novel biological scaffolding frameworks and nanomaterials for potential use in biotechnology.

BIOCHEMISTRY AND MOLECULAR BIOLOGY POSTER PRESENTATIONS, SECTION 2 BALLROOM, 11:00 AM – 12:30 PM

THE ROLE OF PLAFP ON LIPID BINDING, LONG DISTANCE SIGNALING AND STRESS RESPONSE

Bianca Castaneda

Poster: 64

Mentor(s): Allison Barbaglia (Biochemistry and Molecular Biology), Susanne Hoffmann-Benning (Biochemistry and Molecular Biology)

For plants, it is difficult to escape harsh conditions due to their immobility. They have been able to adapt to their environment by developing detection, signaling and response mechanisms. These include the xylem, which transports water and nutrients throughout the plant and the phloem which serves as a major pathway for a range of proteins, metabolites and signals (Benning et al., 2012). Understanding the components of long distance signaling within plant phloem is essential to address future crop failure due to abiotic stress. A phloem lipid-associated protein, PLAFP, was one of several proteins identified that contributed to long distance signaling and mediated stress response. The function of PLAFP is unknown, however it is involved in long-distance signaling in a plants drought response (Barbaglia et al., 2016). The objective of this study was to determine the binding of PLAFP to lipids, the effect of stress on PLAFP expression, and changes in the phloem content due to the presence of PLAFP. The effect of PLAFP expression on root and vasculature development, plant growth and seed yield will be shown. Binding capabilities and which specific lipids are bound will be investigated to identify PLAFPs' specific mechanism and its association with lipids within the phloem.

DIABETES-INDUCED INCREASE IN IMMUNOGLOBULIN BOUND TO EXOSOMES CAN CONTRIBUTE TO COMPLEMENT ACTIVATION AND INFLAMMATION IN DIABETIC RETINOPATHY

Kiera Fisher

Poster: 65

Mentor(s): Julia Busik (Physiology)

Activation of pro-inflammatory and pro-angiogenic pathways in the retina contribute to progression of retinal vascular pathology in diabetic retinopathy (DR), a sight threatening disease with few therapeutic options. Exosomes are small (40-200nm) cell-derived vesicles that are secreted into the extracellular environment and have a role in transportation of signaling molecules such as lipids, proteins, miRNA, and can be found in various biological fluids such as blood or vitreous. Exosomes isolated from plasma of diabetic patients and animal models were shown to induce complement activation and upregulation of inflammatory signaling. The purpose of this study was to determine if an increase in exosomes may contribute to pathogenesis of DR in a mouse model. Exosomes in plasma of control or STZ-induced diabetic mice were isolated via ExoQuick purification methods. To determine the size and quantity of exosomes, Dynamic Light Scattering (DLS) and Static Light Scattering (SLS) were used. Electron microscopy and western blotting was also used to further characterize the exosomes. A method for exosome quantification was developed in this study using Zetasizer Nano ZS, and a standard curve was created using artificial exosomes. The standard curve was used to analyze data of circulated exosome samples from control and diabetic mice. Our data showed an increase in circulating exosomes in diabetic animals when compared to control animals, as well as an increase in immunoglobulin bound to the exosomes and subsequent activation of complement. This increase in number of exosomes could contribute to complement activation and activation of pro-inflammatory pathways in DR.

ELECTROCHEMISTRY OF HIGHLY OXIDIZED SPECIES IN METALLOENZYMES

Grant LeVasseur

Poster: 66

Mentor(s): Denis A. Proshlyakov (Chemistry)

Metalloenzymes play key role in a variety of life functions. For many redox-active enzymes the key catalytic step requires a highly oxidized metal complex at their active site. To understand the structure and function of such enzymes, they must be trapped and isolated; this is difficult because they are very reactive and exist only briefly. We have developed a method to study such metal centers in different enzymes using a novel spectroelectrochemical technique in which electric potential is applied to chemically mediated protein solutions. Our approach utilizes a 3D printed electrochemical cell that replaces a standard 1-cm optical cuvette for use with any spectrophotometer. The unique feature of this “thick layer” method is that it allows study of many more enzymes than a traditional “thin layer” approach and it allows manipulation of the sample mid-experiment. We have targeted two high-impact enzymes with intriguing properties of their highly oxidized species. First is Cytochrome c Oxidase from beef mitochondria, which has clear signatures of two oxidized intermediates, Peroxy and Ferryl, with yet unknown mechanism of proton pumping upon their interconversion. Second is bacterial enzyme TauD with a similar transient species, except that this species has never been detected outside its rapid reaction cycle. Establishing its redox and spectral properties is critical to understanding the reaction of this and many related enzymes. Our studies also include the well-characterized enzyme horseradish peroxidase which contains a heme iron metal center similar to that found in Cytochrome c Oxidase.

NADH DEHYDROGENASES CONTRIBUTE TO CURRENT PRODUCTION BY SHEWANELLA ONEIDENSIS MR-1

Cody Madsen

Poster: 67

Mentor(s): Michaela TerAvest (Biochemistry and Molecular Biology)

This project is motivated by the need for innovative approaches to fulfill the demand for clean, renewable energy and production of high-value chemicals. The bacterium *Shewanella oneidensis* MR-1 can be a part of these approaches, through its ability to interact with electronics. *S. oneidensis* MR-1 exports electrons across of its outer membrane, a capability that can be used to produce 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 NADH will vary depending on the type of electron donor used. This will be tested by measuring differences between the wild-type strain and four mutant strains, each with one of the four NADH dehydrogenases removed. Specifically, we will assess changes in current production, growth and metabolism in anodes of bioelectrochemical systems. We will observe these differences with lactate or N-acetylglucosamine as the carbon source. We expect to see greater differences in current production, metabolism and growth within the strains when N-acetylglucosamine is the carbon source because metabolism of this compound is predicted to be dependent on NADH.

EFFECT OF FIVE COMPOUNDS ON ADIPOCYTE DIFFERENTIATION IN AN IN VITRO MOUSE MODEL

Jordan Maust

Poster: 68

Mentor(s): Monique Floer (Biochemistry and 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.

USING CRISPR-CAS9 TECHNOLOGY TO KNOCKOUT MITOCHONDRIAL HELICASE IN DROSOPHILA

Yuk Kel Wan

Poster: 69

Mentor(s): Stacy Hovde (Biochemistry and Molecular Biology)

Mitochondria has its own genome and replication enzymes. The mitochondrial helicase unwinds the mtDNA double helix and involves in the replication and repair of the genome. Without its helicase, the mitochondrial genome cannot be replicated, which can lead to severe diseases in human. In this experiment, we utilized CRISPR, an efficient genome engineering technology, to knockout the mitochondrial helicase and also introduce point mutations in *Drosophila*. The CRISPR-Cas9 technology uses Cas9 a nonspecific nuclease and single-guide RNA as a sequence-specific DNA binding element to generate a double strand break, which is repaired by the homologous recombination(HR) pathway. Instead of using the homologous chromosome, the HR pathway can use a donor construct homologous to the target region as a template to modify the genome, which in this experiment, we substituted the mitochondrial helicase with DsRed a fluorescent protein producing a red-eye phenotype in *Drosophila*.

FUNCTIONAL CHARACTERIZATION OF PDR5 MEMBRANE PROTEIN MUTANTS

Taishu Wang

Poster: 70

Mentor(s): Susanne Hoffmann (Biochemistry and Molecular Biology)

PDR5 gene from *Saccharomyces cerevisiae* encodes a 160-kDa protein which composed of trans-membrane domains and ATP binding sites.(Leppert, G., McDevitt, R., Falco, S. C., Van Dyk, T. K., Ficke, M. B., and Golin, J. (1990) *Genetics* 125, 13-20) Studies shows that PDR5 protein has feathered a multi-drug resistant protein. This study focuses on 4 of the PDR5 gene mutants A666G, P596L, V656L, and S678Y. Functional characterizations such as drug resistance and transport activity assays were applied in this study.

BIOCHEMISTRY AND MOLECULAR BIOLOGY POSTER PRESENTATIONS, SECTION 3 BALLROOM, 11:00 AM – 12:30 PM

FROM STEM CELL TO MACROPHAGE: GLOBAL NUCLEOSOME CHANGES DURING HEMATOPOIETIC DIFFERENTIATION

Tyler Miksanek

Poster: 73

Mentor(s): Monique Floer (Biochemistry and Molecular Biology)

One of the most fundamental rules of genetics is that different genes create different phenotypes. However, just because the DNA encoding for a certain gene is present within the genome does not necessarily mean that gene will be transcribed and translated. Within the nucleus, proteins called nucleosomes determine whether or not a specific gene will actually be expressed. Higher nucleosome occupancy in a region prevents cellular transcription machinery from reaching the gene and transcribing the DNA, lowering gene expression. My lab's research shows how nucleosome occupancy changes during hematopoietic cell differentiation in a mouse model. Our results indicate that nucleosome occupancy increases globally during differentiation due to an increase in histone protein expression, meaning that transcription is more highly regulated by nucleosomes in differentiated cells than pluripotent progenitors. These results allow us to better understand the process of cellular differentiation and how epigenetic factors influence cell traits, creating stepping stones for applications in diverse fields such as stem cell therapy and tissue regeneration.

HOW TO MAKE ATOMS GLOW: CHARACTERIZATION OF DIFFERENT LED'S FOR THE DETECTION OF RARE NUCLEAR REACTION PRODUCTS

Kate Nezhich

Poster: 74

Mentor(s): Jaideep Singh (National Superconducting Cyclotron Lab), Jennifer Wenzl (National Superconducting Cyclotron Lab)

Rare nuclear reactions occur within stars in the galaxy and are crucial for the creation of the elements. We currently are developing an experiment to measure the reaction rate of those rare nuclear reactions. The product atom gets caught in a thin film of frozen neon and gets detected by using laser light. When light is shown on atoms, they absorb the light and become "excited" to higher energy levels out of the ground state. When going back to the ground state light gets emitted. For atoms being embedded in a solid this light has a different color than the excitation light. Oftentimes, instead

of going back into the ground state, the atoms go into what is called a dark state, where the atom does not go back to the ground state. In order to get the atom back out of this dark state, LED lights of specific wavelengths can be used to excite the atoms once again. My goal within this project was to test the LED characteristics and reliability. This was done by using a spectrometer to observe the wavelength spectrum of the LED light and then also using a power meter to determine the actual LED power. In my poster presentation, I will show a comparison between two LED's and how their different characteristics effect the efficiency detecting the product atoms of the nuclear reaction in the solid neon film.

SWITCH TO SWITCHGRASS:IMPROVING LIGNOCELLULOSIC DEGRADATION

Jadan Norman, Rachel Semaan

Poster: 75

Mentor(s): Aditya Bhalla (Biochemistry), Eric Hegg (Biochemistry)

Switchgrass is a perennial bunchgrass native to North America and has been researched as a source of feedstock for the biofuel industry. The presence of high amounts of recalcitrant lignin in its cell walls, however, makes its polysaccharides inaccessible for enzymes to depolymerize into monomeric sugars. Therefore, a pretreatment step is needed to alter its cell wall structure to improve digestibility. We previously demonstrated that alkaline hydrogen peroxide (AHP) treatment with a copper bipyridine (bpy) catalyst is effective at delignifying recalcitrant lignin in cell walls. Hybrid poplar is one such example of the effect of bpy as glucose yields drop from ~90% to ~50% if bpy is removed from the pretreatment process. However, bpy is costly and reducing or eliminating this reagent is therefore desirable. Our current hypothesis is that the bpy brings copper ions into the cell wall where the copper reacts with H₂O₂ to produce highly reactive OH[•] radicals. Interestingly, our preliminary results demonstrated that pretreating switchgrass with Cu-AHP even in the absence of the bpy resulted in high glucose yields; glucose yields of 78% were obtained with no bpy compared to 81% glucose yields in the presence of bpy, making this a very important finding that could substantially decrease the costs associated with Cu-AHP pretreatment. The mechanism for high yields of switchgrass compared to other recalcitrant biomasses in the absence of bpy is not currently known, and additional research is being conducted to address this question.

BIOCHEMICAL CHARACTERIZATION OF THE HUMAN ALKB HOMOLOG 1 (ALKBH1) PRODUCED AND PURIFIED FROM HUMAN CELLS

Sarah Struble

Poster: 77

Mentor(s): Robert Hausinger (Microbiology and Molecular Genetics)

Mammals possess nine homologs of the Escherichia coli DNA repair enzyme AlkB. Along with being involved in repairing alkylation-damaged DNA, these enzymes play roles in other cellular pathways. They have an effect on cell division and have been associated with obesity and different types of cancer. This presentation focuses on AlkB homolog 1 (ALKBH1), which has been associated with several biological functions such as demethylating DNA and RNA as well as cleaving DNA at apurinic/apyrimidinic (AP) sites. This latter enzymatic activity has been extensively characterized using the protein produced in and purified from E. coli, but questions about how this protein behaves in the human cell remain. Specifically, it is not known whether the protein possesses DNA-cleaving abilities or if it forms the novel protein-DNA product adduct previously found for the protein purified from bacteria. To study the activity, the human ALKBH1 gene was cloned into a maltose-binding protein-fusion vector and the gene was transiently expressed in HEK293T cells in order to produce the fusion protein. Here, we present the purification of MBP-ALKBH1 and describe its AP lyase activity, along with the adduct formation to the 5'-product. The results are compared and contrasted to previous findings obtained with the heterologously expressed protein in order to better understand the cellular role of ALKBH1.

APPLICATION OF AN INTERNAL CONTROL FOR USE IN DETECTING INHIBITION OF RESISTANCE GENES

Sarah Tresseder

Poster: 78

Mentor(s): Heike Schmitt (National Insitute for Public Health and Environment)

The purpose of this research was to identify and optimize an Internal Amplification Control (IAC) for use in detecting inhibition in qPCR assays. A number of factors had to be checked and validated in order to develop an appropriate IAC for use including the reliability, sensitivity, and consistency of qPCR assays of the IAC. This was done through a series of experiments, including multiple PCR optimizations for both the IAC chosen and the target DNA, and quantitative PCR assays to determine whether competition could be seen between the IAC and the target DNA and how sensitive the IAC chosen was towards detection of inhibition in target samples. In the end, a procedure for application of a noncompetitive internal control was created for use in detecting inhibition of resistance genes.

POTENTIAL EVOLUTIONARY SIMILARITY BETWEEN ADRENERGIC AND OPIOID RECEPTORS

Mlah Turke, Beth Churchill

Poster: 79

Mentor(s): Robert Root-Bernstein (Physiology)

Root-Bernstein and Dillon have demonstrated that adrenergic receptors in the human body have opiate binding sites that enhance adrenergic activity. Because of the similarity between the two receptors, it is hypothesized that one evolved from the other. We have found that along with sequence similarity in homologies, peptides derived from the extracellular region of the opiate and adrenergic receptors bind strongly to the same compounds such as epinephrine, norepinephrine, and morphine. We hope to be able to test these compounds for binding to intact receptors as well.

BIOCHEMISTRY AND MOLECULAR BIOLOGY POSTER PRESENTATIONS, SECTION 4 BALLROOM, 1:00 PM – 2:30 PM

MICROBIAL DIVERSITY AND ABUNDANCE IN SERPENTINIZATION-INFLUENCED GROUNDWATER AT THE COAST RANGE OPHIOLITE MICROBIAL OBSERVATORY

Dominic Aluia

Poster: 82

Mentor(s): Matt Schrenk (Earth and Environmental Science)

While much emphasis has focused on understanding complex geologic processes, much remains to be discerned about the important role microbial communities can have in influencing biogeochemical processes. To this end, this study seeks to understand how extremophile microbes within serpentinizing groundwaters can survive the anoxic, hyperalkaline (~pH 12), and hydrogen gas- rich groundwaters. In these systems, microbes can utilize sulfate, nitrate, and ferric iron as electron acceptors. To better understand the role these microorganisms play in nutrient cycling and how they survive in a fairly energy-limited system, groundwater samples from four representative wells were collected anoxically by team members at the Coast Range Ophiolite Microbial Observatory (CROMO) near Lower Lake, California. Laboratory enrichment culture studies were performed to measure the growth of microbial communities in the presence of specific iron, sulfur, and carbon compounds in a basic artificial media. Results of this year-long incubation study indicate that in the presence of different sulfur and iron compounds, not only were distinct morphologies present in each culture, but organisms replicated at varying rates depending on the amendment received, indicating these sulfur and iron compounds impact species in the system differently. Cell abundances in cultures ranged from $5.65E+05$ at the start to $2.43E+06$ at experiment-end. Metagenomic sequence data will be utilized to understand the specific microbial communities selected for in each culture, and isolation cultures will be constructed for these unique organisms. Information from this study can provide clarity to the aforementioned geobiological processes, including geochemical cycling, within worldwide ophiolite complexes.

IMPROVING THE THEORETICAL ESTIMATION OF PASSIVE MEMBRANE PERMEATION WITH IMPLEMENTATION OF HDGB METHOD

Stephanie Brocke

Poster: 83

Mentor(s): Bercem Dutagaci (Biochemistry and Molecular Biology), Michael Feig (Biochemistry and Molecular Biology)

Improvement of the accuracy and reliability of biophysical and mathematical models of passive membrane transport is crucial for understanding the dynamics of drug molecule insertion into a lipid bilayer membrane. In this study, Heterogeneous Dielectric Generalized Born (HDGB) model (J. Chem. Phys. 2005, 122, 124706) is applied to a set of drug molecules to develop a robust method for drug permeability calculations. HDGB method provides a quantitative picture of the energetics of drug partitioning into the lipid membrane environment. The free energy of insertion is first calculated by sampling the orientation of drug molecules along the membrane normal using HDGB model. Then, umbrella sampling molecular dynamics simulations are performed to more accurately provide membrane insertion energetics for the molecules being investigated. The transition free energy term obtained by the application of the HDGB model will be further used to calculate the permeability coefficients of the various drug molecules, based upon solubility diffusion theory. The results of this work will be compared with experimentally obtained values of aspects of membrane transport as well as with computational results based on molecular mechanics models reported by the group of Jacobson (J. Chem. Inf. Model. 2012, 52, 1621).

ALTERING RESIDUES NEAR THE ACTIVE SITE OF BACILLUS SUBTILIS SPOIVFB TO UNDERSTAND CLEAVAGE OF PRO- σ^K AND ENZYME-SUBSTRATE INTERACTIONS

Fiona Buchanan

Poster: 84

Mentor(s): Lee Kroos (Biochemistry and Molecular Biology), Daniel Parrell (Microbiology and Molecular Genetics)

Upon starvation, *Bacillus subtilis* cells divide into asymmetric compartments that experience differential gene expression, resulting in the engulfment of the smaller compartment and the formation of an endospore. An important event in sporulation after engulfment is activation of the transcription factor σ^K in the mother cell due to regulated intramembrane proteolysis (RIP) of Pro- σ^K by SpoIVFB, an intramembrane metalloprotease (IMMP). IMMPs are regulators of gene expression found in all domains of life; Archaea, Bacteria, and Eukarya all feature conserved IMMPs that cleave membrane-bound transcription factors. Previous work has demonstrated that SpoIVFB has two conserved loops close to its active site. The functions of amino acid residues in these loops are largely unknown. To study the residues, wild-type and loop-residue variants of SpoIVFB are being compared for efficiency of Pro- σ^K cleavage, and binding to Pro- σ^K in a pull-down assay with catalytically-inactive SpoIVFB. A novel plasmid co-expressing Pro- σ^K with SpoIVFB was generated. Loop-residue variants of SpoIVFB were designed using a sequence alignment of SpoIVFB orthologs from endospore-forming bacteria in the phylum Firmicutes and phylogenetic trees. The effect of SpoIVFB loop-residue variants on Pro- σ^K cleavage was quantified using Western blotting. Binding of SpoIVFB loop-residue variants that also contain a catalytically-inactivating substitution to Pro- σ^K , is being measured using cobalt affinity chromatography followed by Western blotting. The results are expected to reveal the potential roles of loop residues in RIP. Since the loops are broadly conserved in IMMPs present in diverse and important signaling pathways, the implications of our study are expected to be far-reaching.

UTILIZATION OF SYNTHETIC HETERODIMERIC COILED-COILS IN THE CARBOXY SOME

Jake Gonzales

Poster: 85

Mentor(s): Danny Ducat (Biochemistry and Molecular Biology)

Protein scaffolding is the process of utilizing a distinct protein component to spatially localize related function thereby coupling enzymatic pathways and effectively increasing output. Currently, engineering synthetic pathways with defined spatial localization in model organisms is desired in order to increase the yield or balance pathway outputs. Spatial localization is a natural strategy utilized extensively throughout life, and one particular example in bacteria are bacterial microcompartments (BMCs). BMCs are proteinaceous organelles that contain critical enzyme pathways, and one well studied example of a BMC is the carboxysome which shelters the principle enzyme responsible for carbon fixation. The proteins that comprise the carboxysome are of interest for bioengineering purposes because they form hexameric surfaces that would be ideal for scaffolding platforms. SYNZIPs are synthetic heterodimeric coiled coils that have been shown to associate specifically in both *in-vivo* and *in-vitro* biological contexts. The goal of the project is to determine whether SYNZIP coiled coil domains could be utilized for recruitment of target cargo to select carboxysome components for synthetic scaffolding purposes. If we successfully incorporate functionalized shell proteins without disturbing native function, the ability to use SYNZIPs to modify native structures will be demonstrated. Towards this, carboxysome shell proteins CcmO, CcmK2, and CcmP will be tagged with a SYNZIP domain, while a fluorescent protein with a complimentary domain is introduced to visualize a preliminary proof of recruitment.

EVALUATING THE USE OF CHEMICAL CROSSLINKS IN PROTEIN-PROTEIN DOCKING USING HADDOCK

Kasey Pham

Poster: 86

Mentor(s): Alexandre Bonvin (Utrecht University)

Chemical crosslinks detected by mass spectrometry can provide low resolution information on 3D protein structure. Our in-house software, HADDOCK, is capable of integrating crosslinks into its docking runs as unambiguous distance restraints. However, with the development of DisVis, a program which can evaluate the consistency of crosslinks and identify interface residues based on crosslink data, we have the opportunity to integrate crosslinks into the docking process in a novel and possibly better performing manner, by providing interface information as well as distance restraints to HADDOCK. We benchmarked 22 complexes of various docking difficulties based on CAPRI criteria to determine the optimal implementation of crosslink data for protein-protein docking in HADDOCK. Two different methods of integrating crosslink data performed well enough to be recommended for future use in HADDOCK. The first, using center of mass restraints alongside crosslinks, yielded a success rate of 54.6% for the top 200 structures returned by HADDOCK based on i-RMSD and a success rate of 68.2% when based off I-RMSD. The second method, using DisVis interface residue predictions alongside crosslinks, yielded a success rate for the top 200 ranked structures of 36.4% and

63.6% for i-RMSD and l-RMSD respectively. Both methods yielded similar i-RMSD values for their best structures among most complexes as well, indicating that the two methods strongly overlap in what information is provided to HADDOCK.

INTERACTION BETWEEN MOSS (PHYSCOMITRELLA PATENS) AND FUNGUS (MORTIERELLA)

Ballindile Motsa

Poster: 87

Mentor(s): Carl Boehlert (Chemical Engineering and Materials Science)

Terpenoids (isoprenoids) are a diverse class of natural plant products that have many functions. They are involved in the growth and development (general metabolism) of plants and they help optimize the interaction between the plant and the environment (specialized metabolism). When isolated from plants they are used for example as commercial flavor and fragrance compounds and antimalarial or anticancer drugs. The problem is that terpenoids in plants are produced in very small quantities and extraction is consequently not very economically feasible. *P. patens*, a non-vascular plant, has recently been proposed as a good production host for terpenoids. When grown together *P. patens* and *Mortierella* exhibit a symbiotic relationship that promotes the growth of the moss. Normally, endophytic fungi live symbiotically with the majority of plants by entering their cell. In the interaction between *P. patens* and *Mortierella* there is no indication of the fungus living inside the plant. To study this interaction *P. patens* and *Mortierella* were propagated into soil plates and grow them under sterile conditions for four weeks. After *P. patens* has reached maturity I will take light and scanning electron microscope images that will show how *P. patens* interacts with *Mortierella*. Understanding this relationship will give an insight into how *Mortierella* helps promote biosynthetic processes in *P. patens* including the production of terpenes.

ELEVATED TEMPERATURES INDUCE JASMONATE-REGULATED INSECT-DEFENSE PROTEINS IN TOMATO PLANTS

Michael Das

Poster: 88

Mentor(s): Gregg Howe (Biochemistry and Molecular Biology)

When animals attempt to prey on other animals, the prey fights back against its predator using a variety of tactics to protect itself. Similarly, when insects feed on a plant, the plant implements a variety of defenses against its predator. One common plant defense mechanism involves the production of proteins that inhibit insect growth, thus reducing damage and consumption of plant tissue by the herbivore. The hormone jasmonate (JA) is predominantly responsible for regulating production of these defense proteins. Understanding the molecular mechanism of JA signaling is crucial to research aimed at minimizing crop losses due to insect pests. An additional challenge is to understand how changing environmental conditions affect the JA signaling pathway. Here, we report the results of experiments aimed at assessing the effect of rising global temperatures on plant defenses. We show that the wound-induced production of the Proteinase Inhibitor-II (PIN-II) protein in cultivated tomato plants is markedly increased at elevated temperatures compared to normal temperatures. We used well characterized mutant lines of tomato to verify that the enhanced PIN-II response at elevated temperatures is dependent on the JA signaling pathway. We also found that *Manduca sexta*, a natural insect herbivore of Solanaceous plants, grows much faster at elevated temperatures, providing a plausible evolutionary reason for the upregulation of anti-insect defenses. Future experiments will characterize the molecular mechanism by which elevated temperature modulates the defense response of cultivated and wild tomato species to predation by insect herbivores.

BIOCHEMISTRY AND MOLECULAR BIOLOGY POSTER PRESENTATIONS, SECTION 5 BALLROOM, 3:00 PM – 4:30 PM

ANALYZATION OF ISOLATED TIGHT JUNCTIONS BY MASS SPECTROSCOPY

Kent Gamber

Poster: 91

Mentor(s): Julia Busik (Physiology), Nermin Kady (Physiology), Todd Lydic (Physiology)

Diabetes affects around 371 million people worldwide. Diabetes-induced metabolic abnormalities, including hyperglycemia and dyslipidemia, cause damage in multiple tissues, including vision threatening Diabetic Retinopathy (DR). Breakdown of Blood Retinal Barrier (BRB) and ensuing increase in vascular permeability are important initiating factors in the pathogenesis of DR. The role of dyslipidemia in BRB breakdown is unknown and represents the main goal of this study. To determine the role of dyslipidemia in BRB breakdown, it is important to determine the lipid composition of tight junctions in control and diabetic conditions. As the available tight junction isolation techniques use detergent for

tissue homogenization and solubilization, these techniques are not suitable for obtaining tight junction samples for mass spectrometry lipid analysis. To overcome this problem, we developed cryoisolation methodology where freezing under liquid nitrogen is used to solubilize the tissue and separate tight junctions. We used a cell culture model of outer BRB, a human Retinal Pigment Epithelial cell line (ARPE-19) to represent the (RPE), the outermost layer of the BRB. ARPE-19 cells were grown in a 50/50 DMEM/F12 mix media until cells were confluent. Cells were then homogenized, and centrifuged. Tight junctions were then separated by cryoisolation. Isolated tight junctions were immunoprecipitated using two different tight junction antibodies, Zo-1 and PKCZ. Tight junctions obtained by this method were suitable for mass spectrometry lipidomics analysis. This method was used for tight junction isolation of the control and diabetic retinal tissue to determine the role of dyslipidemia in tight junction composition and integrity.

THE ROLE OF OCT4 PSEUDOGENES IN EMBRYONIC DEVELOPMENT

Hannah Gulder

Poster: 92

Mentor(s): Alyson Lokken (Biochemistry and Molecular Biology), Amy Ralston (Biochemistry and Molecular Biology)

During the preimplantation stage of mammalian embryonic development, cells of the embryo differentiate into one of two tissue types: embryonic or extraembryonic. The embryonic cells give rise to the fetus, and the extraembryonic cells become the placenta and the yolk sac. Failure to properly specify these critical lineages can result in early pregnancy loss. Interestingly, the OCT4 protein is required for the differentiation of both embryonic and extraembryonic cell lineages. However, the mechanisms that regulate OCT4 in both lineages are still under investigation. Understanding the role of long noncoding RNAs (lncRNA) in gene regulation is an emerging field. Long noncoding RNAs have been shown to contribute to transcriptional and epigenetic gene regulation. A specific type of lncRNA is a pseudogene, which shows high homology to a functional, protein-coding gene. Eight OCT4 pseudogenes have been identified in humans and five specific OCT4 pseudogenes have been discovered in the mouse genome. I hypothesize that OCT4 pseudogenes are expressed at different levels in the embryonic and extraembryonic cell lineages, and that cell type-specific OCT4 pseudogene expression may contribute to the regulation of OCT4 activity in the different lineages of the early embryo. By using bioinformatic and experimental approaches, I examined how OCT4 pseudogene expression levels change in the embryonic and extraembryonic stem cell lineages of the mouse preimplantation embryo. Understanding how OCT4 pseudogene levels change during early development will allow us to test whether changes in pseudogene expression alter the activity of OCT4 in the embryo.

USE OF MACROMOLECULAR COMPUTER SOFTWARE IN CREATION OF A SCIENTIFICALLY USEFUL HUMAN RNAP I HOMOMOLOGY MODEL

Cole Showers, Gino Caruso, Alexis Hurley, Nick Ignatoski

Poster: 93

Mentor(s): Zachary Burton (Biochemistry and Molecular Biology), Kaillathe Padmanabhan (Biochemistry and Molecular Biology)

Computers have been used for numerous years to help comprehend various unknown concepts, these technologies can also be applied to understanding macromolecules too. The rationale behind this project was to be able to create a computer-assisted model of a human RNAP I enzyme. Ribonucleic Acid Polymerase I (RNAP I/ POL I) is an enzyme found in eukaryotes that is responsible for transcribing ribosomal RNA. While an overall final homology model was created, there were numerous different computer programs that were used for research, identification, organization, and fine-tuning of the model. Some of these Macromolecular Imaging Computer Programs included: Phyre2, Pymol, Chimera, Yasara, and Coot. After successfully creating a working model, it also provides an additional further opportunity to analyze the structure and function of the enzyme between species (such as *S. pombe* and *S. cerevisiae*). This gives a more in-depth insight into how the molecule has evolved over time. Future hopes for this project include additional fine tuning of the overall model and possible genomic research in relation to genetic disorders. One of such genetic disorders includes Treacher Collins Syndrome, where the individual can have a varying degree of deformity in their craniofacial region due to a mutation on POL I.

LARGE SCALE BIOCATALYSIS OF PHENYLSERINE ANALOGUES AND FURTHER CHEMICAL DERIVATIZATION TOWARDS POTENTIAL LAT-1 INHIBITORS

Brendyn Smith

Poster: 94

Mentor(s): Kevin Walker (Chemistry)

A 5-methylideneimidazol-4-one (MIO)-dependent phenylalanine aminomutase (*TcPAM*) from *Taxus canadensis* lies on the biosynthetic pathway to paclitaxel (Taxol®), a potent anticancer and therapeutic agent. *TcPAM* converts α to β phenylalanine using its MIO prosthesis as an electrophilic cofactor within the active site. *TcPAM* has been repurposed to

catalyze an amination reaction with surrogate cinnamate epoxide substrates. An amino group donor, l-styrylalanine, is used with TcPAM to produce analogues of phenylserine (β -hydroxy- α -amino acid), many of which are building blocks of medicinal molecules. A pilot study to explore scalability used TcPAM (0.06% catalyst load), cinnamate epoxide (0.6 mmol), and l-styrylalanine (0.52 mmol) to produce *erythro*-phenylserine (-10 mg, 10.8% yield). These initial results led us to slightly increase our catalyst loading to 0.2% relative to substrate, while also increasing the concentration of catalyst and substrate. To scale-up the biocatalysis, heterologous enzyme production in *E. coli* was increased using Studier's auto-induction media in batch fermentation. Using a host of 3'- and 4'-substituted cinnamic epoxide substrates, 12-35 mg quantities (11-35 % converted yield) of various phenylserine analogues were obtained. As these products have immediate application in various aryl-aryl coupling reactions (Suzuki, Stille, etc.), 3'-bromophenylserine was subjected to various chemical derivatizations to afford compounds primed for Suzuki coupling with phenylboronic acid; protection was required to stave off base-catalyzed retro-aldol reactions. These substrates were chosen to create compounds resembling *meta*-biphenylalanine, a potent micromolar inhibitor of a Large-neutral Amino Acid Transporter (LAT-1) whose expression was shown to directly correlate to the prognosis of various tumor cell lines.

CHARACTERIZATION OF XOXF, A LANTHANIDE-DEPENDENT ALCOHOL DEHYDROGENASE

Carly Suriano

Poster: 95

Mentor(s): N. Cecilia Martinez-Gomez (Microbiology and Molecular Genetics)

Methylotrophic bacteria are widespread in the environment, and are found on leaf surfaces where methanol is released. Research has found that lanthanides are very important to these specialized bacteria that play a vital role in global carbon cycling. These heavy, highly insoluble elements are physiologically relevant to the growth of model methylotroph, *Methylobacterium extorquens* AM1. In gram-negative bacteria, the first step in methylotrophic growth is the oxidation of methanol to formaldehyde in the periplasm of the cell. When certain Rare-Earth Elements are present in growth medium, *M. extorquens* can grow on methanol using a XoxF-type methanol dehydrogenase (MDH). The crystalline structure of this XoxF1 protein has yet to be defined. XoxF1 was over-expressed in and purified from *M. extorquens* to homogeneity using immobilized metal ion affinity chromatography (IMAC). Tobacco etch virus N1a proteinase (TEV protease) was used to cleave the fusion tag. The crystal structure is currently being solved. Understanding the biological role of lanthanides is still in its early stages. The contribution of lanthanide-containing XoxF enzymes to methanol oxidation in the environment has likely been greatly underestimated. Genomic DNA sequences from methylotrophic communities indicate that all methylotrophs utilizing PQQ-dependent MDHs contain a XoxF-type MDH. Obtaining the crystal structure of XoxF1 from *M. extorquens* will provide a greater insight to the mechanism of lanthanide coordination in the enzyme as well as allow for comparison of XoxF-type MDH between methylotrophic and methanotrophic species.

INTRACELLULAR REDOX STATE OF SHEWANELLA ONEIDENSIS GROWN WITH DIFFERENT ELECTRON ACCEPTORS

Heyu Tang

Poster: 96

Mentor(s): Michaela TerAvest (Biochemistry and Molecular Biology)

Biological synthesis of biofuels and certain chemicals often depends on an intracellular electron carrier, NADH. Therefore, controlling the intracellular NAD⁺/NADH ratio could be important for metabolic engineering. Researchers have used a variety of genetic modifications to alter this cofactor ratio. However, previous research has shown that it is also possible to control the NAD⁺/NADH ratio by culture conditions instead of genetic engineering. For example, the NAD⁺/NADH ratio in *Escherichia coli* can be controlled by controlling dissolving oxygen concentration. Most respiring organisms require oxygen as the terminal electron acceptor, but some bacteria can utilize other compounds as terminal electron acceptors under anaerobic conditions. *Shewanella oneidensis* MR-1 is one such organism that was first isolated based on its ability to respire using solid manganese oxides. We hypothesize that, similar to the relationship between oxygen concentration and NAD⁺/NADH, the intracellular redox state of *S. oneidensis* MR-1 will be sensitive to the concentration of other electron acceptors, such as fumarate, DMSO, and nitrate. To test this hypothesis, *S. oneidensis* MR-1 will be grown in anaerobic conditions with different types and concentrations of electron acceptors. We will measure the growth of the culture, track concentration of the substrate and major metabolites, as well as changes in ratio of redox cofactors (NAD⁺/NADH). We expect that the cultures grown with more strongly oxidizing electron acceptors (such as nitrate) will have lower cofactor ratio than those grown with less strongly oxidizing electron acceptors (such as fumarate).

PLANT SCIENCE OF TREE ANCESTRY: PHOTOSYNTHETIC CHARACTERISTICS, PQSPAD, LEF AND ΦI SHOWED DISTINCT DIFFERENCES BETWEEN NATIVE AND NON-NATIVE TREE SPECIES GROWN ON MSU

Zimu Wei

Poster: 97

Mentor(s): Andrew Kenneth Carlson (Fisheries and Wildlife), Sonya Michaud Lawrence (Biological Science)

Improving our understanding of the photosynthesis efficiency and the chlorophyll content of native and exotic plant species was a priority for emerging interdisciplinary research in plant science, agriculture, and biochemistry. Our project identified the effect of tree ancestry on the measurement of efficiency of Photosystem II via chlorophyll fluorescence (Φ I), linear electron flow (LEF), and chlorophyll content (PQ SPAD), which aided in understanding how introduced species adapt to transplanted locations and further applications in planting and gardening industry. Data was collected using the MultispeQ, a beta version of a hand-held spectrophotometer, connected to an open source PhotosynQ website. In Fall, we used the device to measure five, exterior, green leaves located in the outermost canopy of each cardinal direction quadrant of three native Ulmus 'Morton Glossy' and three Ginkgo biloba trees planted on the campus of Michigan State University. Ulmus 'Morton Glossy' had a significantly lower PQ SPAD, 29% increased LEF compared to Ginkgo, and a significantly higher Φ I than Ginkgo. Many non-native trees flourished in new environments despite the advantages native trees have. Despite the lower chlorophyll content, Ulmus trees were more efficient at using the light energy while the non-native Ginkgo trees had more chlorophyll yet had not increased their ability to efficiently capture and utilize the photosynthetic energy during the fall.

BIOCHEMISTRY AND MOLECULAR BIOLOGY POSTER PRESENTATIONS, SECTION 6 BALLROOM, 3:00 PM – 4:30 PM

COMPOSITION OF MINERAL SUPPLEMENTS

Nate Graff

Poster: 100

Mentor(s): Per Askeland (Composite Materials and Structures Center), Carl Boehlert (Materials Science and Engineering)

For my research project, I decided to look at mineral supplements underneath the scanning electron microscope and use spectroscopy to look at the elements within the supplements and how they affect the body. Some of the basic supplements I will examine are calcium, iron, and zinc. It will be very interesting to see what the concentration levels of each of the specific elements are within the supplement as well as what other elements are in the substance and what their contribution is to the overall effectiveness of the mineral supplement. I expect the surfaces of each of the supplements to look very similar, however the compositions are going to be vastly different. After uncovering what elements are in the supplements, I will inspect how they interact in the body and how each element contributes to the overall well-being of the person.

DIFFERENCES IN PYRUVATE DEHYDROGENASE ACTIVITY DURING CONTRACTION OF RED AND WHITE SUPERFICIAL GASTROCNEMIUS IN THE RAT

Gregory Gudziak

Poster: 101

Mentor(s): Robert Wiseman (Physiology)

The increase in glucose oxidation during exercise is dependent upon the mitochondrial enzyme pyruvate dehydrogenase (PDH). However, the relationship between PDH activation and muscle fiber type during exercise has not been well described because fiber specific muscles have not been reported, and, because voluntary exercise involves motor unit recruitment which further complicates interpretation. To determine whether PDH activation differs in red versus superficial white muscle in vivo, gastrocnemius muscle contractile activity was controlled by electrical pacing via surgically implanted electrodes on the sciatic nerve of anesthetized male Wistar rats. Muscle force production of the triceps surae muscle group was recorded from the Achilles tendon and the knee pinned in place with a tungsten rod through the head of the femur. Gastrocnemius muscle samples were collected from the superficial white (predominantly Type IIb fibers) and deep red (predominantly Type I fibers) portions and freeze clamped at rest and during 5 min of twitch stimulation at 0.5Hz and 1.0Hz intensities. PDH activity was assayed in vitro using a radioisotopic tracer assay with [2-¹⁴C]-pyruvate as the substrate. The presentation will detail the differences in PDH activation and regulation in the two muscle fiber types.

MILD INSULIN RESISTANCE AND IMPAIRED LIPID METABOLISM IS ASSOCIATED WITH TYPE 1 DIABETES SUSCEPTIBILITY

Diamond Jones

Poster: 102

Mentor(s): Sharifa Love-Rutledge (Physiology), Karl Olson (Physiology)

Type 1 diabetes (T1D) is an autoimmune disease characterized by immune cell mediated destruction of pancreatic beta cells, the cells responsible for insulin production and regulation of blood glucose levels. T1D risk involves a mix of genetic predisposition, exposure to environmental factors such as viruses, and stochastic events. Our lab utilizes the LEW.1WR1 (LEW) rat to study the link between viral infections and induction of T1D as well as the biological response of T1D resistant Wistar Furth (WF) rats. The goal of this study was to compare LEW and WF rats treated with PIC for 6 days. One difference noted between LEW and WF rats was that fasted LEW rats had a 3-fold increase in circulating insulin levels compared to WF rats, suggesting that LEW rats were relatively insulin resistant. Treatment of LEW and WF rats with PIC increased many interferon-regulated genes in pancreatic islets to a similar extent. In contrast, PIC treatment increased diubiquitin (UBD) mRNA levels ~300-fold in LEW rat islets and only ~30-fold in WF islets. Consistent with the potential of UBD regulating lipid metabolism, PIC treatment suppressed adipose triglyceride lipase (ATGL) and carnitine palmitoyltransferase A (CPT-A) mRNA levels in LEW rat islets, but had no impact on WF islets in vivo. Similar differences in UBD gene expression were observed in lymphocytes isolated from PIC-treated LEW and WF rats. These data suggest that differences in UBD and neutral lipid metabolism along with insulin status in the LEW.1WR1 rat may play an important role in diabetes susceptibility.

LEUKODYSTROPHIES IN HUMAN RNAP III MODEL

Sandra McClure, Anna Baghdadi, Megan Colligan, Alexis Tangelos

Poster: 103

Mentor(s): Zachary Burton (Biochemistry and Molecular Biology), Kaillathe Padmanabhan (Biochemistry and Molecular Biology)

Mutations in human RNA polymerases I, II and III are associated with serious disease. Because appropriate human RNA polymerase III structures were unavailable, homology models of *Schizosaccharomyces pombe* and human RNA polymerase III were generated in order to analyze mutations that cause leukodystrophies, a group of genetic diseases that affect the central nervous system (CNS) by disrupting the growth or maintenance of the myelin sheath that insulates nerve cells. Because *S. pombe* is more similar to human than *S. cerevisiae*, the *S. pombe* model was generated from a *S. cerevisiae* cryo-electron microscopy structure to facilitate construction of the human model, which otherwise was difficult to assemble directly for some subunits starting with the *S. cerevisiae* structure. To construct the model, amino acid sequences were downloaded from the National Center for Biotechnology Information databases and submitted to the online homology modeling server Phyre2. The modeling program COOT was used to place Zn and Mg metals into the structure. Because so many crystal and cryo-electron microscopy structures are available, homology models of very complex molecules, such as human RNA polymerases, can now be constructed. Leukodystrophies appear to be caused by moderate loss of function mutations in RNA polymerase III subunits.

RNA POLYMERASE II MUTATIONS AND UTERINE CANCER

Kelsey McKaig, Allyssa Grayson

Poster: 104

Mentor(s): Zachary Burton (Biochemistry and Molecular Biology), Kaillathe Padmanabhan (Biochemistry and Molecular Biology)

Human cancers accumulate mutations in essential genes, and gene regulation programs are often altered in cancer. RNA polymerase II synthesizes mRNA. As a natural experiment, supported by a vast database, the human RNA polymerase II structure (PDB 5IYD) was therefore analyzed for the distribution of cancer mutations. Cancer mutations were collected from the cBioPortal for Cancer Genomics (Memorial Sloan Kettering; <http://www.cbioportal.org/>) database. Analysis of missense mutations indicates that alterations in RNA polymerase II subunits that contribute to cancer growth are typically moderate loss of function mutations. This conclusion is supported by identification of nonsense mutations and splice junction mutations that contribute to cancer. Most nonsense mutations would be expected, for instance, to inactivate a RNA polymerase II subunit and reduce the capacity for messenger RNA synthesis in the cell. No human genetic diseases have been identified carrying mutations in genes encoding RNA polymerase II, indicating that viability of the organism requires two functional copies of each subunit gene. Cancers, by contrast, can survive with mutations in RNA polymerase II, and some moderate loss of function mutations appear to encourage the growth and/or spread of the tumor.

CREATING A CHIMERIC PROTEIN TO PREVENT CELL DIFFERENTIATION INTO ADIPOCYTES

Melissa Meschkewitz

Poster: 105

Mentor(s): Erik Martinez-Hackert (Biochemistry and Molecular Biology)

Cryptic is a member of the Epidermal Growth Factor-Cripto/FRL-1/Cryptic (EGF-CFC) family and a TGF- β family signaling-regulator. TGF- β signaling pathways are involved in embryonic development as well as in adult cells. They also play important roles in the development of certain diseases like cancer and obesity. In these pathways, a ligand binds to a type II receptor, which recruits and phosphorylates a type I receptor. The type I receptor then phosphorylates receptor-regulated SMADs, which are intracellular proteins that can activate downstream gene transcription. Cryptic, in its membrane bound form, can potentiate TGF- β signaling, but in its soluble form it acts as an inhibitor of Activin B. Therefore, it is crucial for the function of the protein whether it is membrane associated or soluble. Furthermore, Cryptic can inhibit the differentiation from cells to adipocytes which makes it a useful treatment for obesity. Recent studies revealed that in comparison of the human and the mouse homologs of Cryptic, the mouse homolog showed a greater response. Unfortunately, the mouse Cryptic is different enough in its amino acid composition that it could trigger an immune response in the human body and therefore it can't be used as a drug to treat obesity. In my project, I made a chimeric protein of the human and the mouse Cryptic while trying to maintain its availability of binding its ligands, and function in the inhibition of differentiation of cells to adipocytes.

FAD1 MUTATION IS ASSOCIATED WITH REDUCED SPORE FORMATION IN MYXOCOCCUS XANTHUS

Matthew Nelson

Poster: 106

Mentor(s): Lee Kroos (Biochemistry and Molecular Biology), Shreya Saha (Biochemistry and Molecular Biology)

Myxococcus xanthus is a Gram-negative, predatory, rod-shaped bacterium which forms spherical spores when under stress. When deprived of a food source, *M. xanthus* exhibits cooperative behavior: cells aggregate into mounds which develop into spore-containing fruiting bodies. The *fad1* gene is involved in synthesizing triacylglycerol from the disintegrating cytoplasmic membrane during spore development, and the cell uses triacylglycerol as a source of carbon and energy as it forms a spore. Although the precise function of *fad1* is not yet known, expression of *fad1* is upregulated by a factor of 2-3 during development in wild-type *M. xanthus*, whereas its expression is significantly reduced in the non-spore-forming mutants of *M. xanthus*. Based on prior findings, *fad1* is suggested to play an important role in cell shortening during spore formation. My project examined the phenotypic defects of an *M. xanthus* strain containing a mutation in the *fad1* gene (MXAN_5372), in comparison with wild-type *M. xanthus* (DK1622). We report that the germination capability of strains containing *fad1* mutation is significantly less than the wild-type, but was not completely impeded. We determined germination capability after 2 hr long heat treatment, as at 72 hours post-starvation. However, no significant phenotypic defect or defect in spore-forming ability was observed in earlier post-starvation time points. Taken together, our results suggest that *fad1* is important for germination of *Myxococcus xanthus* spores at later times post-starvation.

STRUCTURAL AND FUNCTIONAL ASSESSMENT OF PLIN3 SINGLE NUCLEOTIDE POLYMORPHISMS IN THE LIPID BINDING DOMAIN

Brandon Oswald

Poster: 107

Mentor(s): Barbara Atshaves (Biochemistry and Molecular Biology), Charles Najt (Biochemistry and Molecular Biology)

Dyslipidemia is a major predictor of cardiovascular disease (CVD) while hypertriglyceridemia contributes to the pathogenesis of type 2 diabetes (T2D), diseases affecting millions in the United States. Perilipin 3 (Plin3), a lipid droplet protein involved in lipid storage and secretion is positively correlated with T2D, and when overexpressed leads to lipid accumulation in cells and tissue. Recently, studies have shown knock down of Plin3 decreases triglyceride and cholesterol levels and increases insulin sensitivity yet how Plin3 exerts its function on lipid droplet biology and lipid metabolism is not known. To fill this gap in knowledge, we have performed lipid binding, and structural analysis on wild type Plin3 and single nucleotide polymorphisms (SNPs) to determine Plin3's affinity for lipid ligands. We hypothesize that the punitive binding pocket located in the C-terminal region of Plin3 binds and sequester lipid ligands to the lipid droplet surface, while introduction of the SNPs will disrupt Plin3 binding capacity creating an inactive mutant. Plin3 and several SNPs expressed as recombinant proteins were subjected to fluorescence binding, and circular dichroic, techniques to identify the structural and functional requirements for lipid binding. Major findings of this study indicate that: 1) Plin3 binds cholesterol and fatty acids with nanomolar affinity. 2) A Phe221Leu mutant found in 11 percent of humans negates Plin3 cholesterol binding. 3) SNPs Val272Ala and Gln272Glu increase Plin3 fatty acid and cholesterol binding. Thus, the current work reveals Plin3's lipid binding capacity and assigns mechanistic details to several SNPs found in the human population.

BUSINESS

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

PRESIDENT TRUMP DEFENDS OUR COUNTRY, AND ALSO OUR STOCK PORTFOLIO

Gaoyuan Ji, Tyler Kramer

Time: 8:30 AM

Mentor(s): Kirt Butler (Finance), Antoinette Tessmer (Finance)

We designed an experiment that tests the influences of the US presidential election on the defense industry stocks. Prior to November 8th, 2016, we were confident that the defense industry would yield high returns regardless of the final election results. Still we designed two portfolios: one to prosper if Former Secretary of State H. Clinton was elected and one to prosper if Mr. Trump won the elections. Predictably, President Trump's victory generated a higher return for the Trump-oriented portfolio. While further research would be required to prove our hypothesis, our research seems like a promising step in the direction of selective trading based upon company policies and how company shares may react to a major domestic political event. It signifies that if an investor can predict one of these domestic events, they may be able to profit off of this event. We will demonstrate the basic principle of our theory, the manner in which we chose various companies to form our portfolio, the process of data collection, and finally, our conclusion based on the conformity between our prediction and the actual outcome. If you want to LEARN HOW TO PROFIT FROM THE EFFECT OF POLITICAL EVENTS, come check out our presentation!

EVENT PROFESSIONALS IN COLLEGIATE ATHLETICS

Sarah Michelson

Time: 8:45 AM

Mentor(s): Bonnie Knutson (Hospitality Business)

The social prominence and revenue producing qualities of intercollegiate athletics are undeniable, and as college athletic programs have grown, the need for event professionals in the industry has become apparent. The increased demand for the event professional skill set in college athletics is critical for event professionals to understand so they are able to comprehend the scope of job opportunities available them. The impact that event professionals can have on increasing revenue for athletic departments must also be understood by athletic department and university leaders, to avoid the pitfall of sinking athletic departments. Event professionals are already taking on a more prominent role in athletic departments, but their skills are not being used in the most effective manner. My research has investigated the five major sources of revenue for collegiate athletic departments, according to ESPN's comprehensive analysis of College Athletics Revenue and Expenses in 2008, and how event professionals can use their expertise to expand these current revenue channels. I also explored unexpected ways to integrate event professionals into athletic departments, so they don't feel restrained to one position. By hiring and utilizing event professionals in atypical ways, college athletic departments can set the foundation for increased revenue.

CUSTOMIZED PORTFOLIOS TO PRESERVE LONG-TERM BUYING POWER

Aleksandra Andersen

Time: 9:00 AM

Mentor(s): David Croson (Economics)

Our research improves investors' long-term affordable access to underlying essential forms of consumption such as energy, food, and shelter and reduces the impact of undesirable long-term shifts in the US economy. Although equities and commodities are very different asset classes, most listed stocks' daily returns are correlated with short- and long-term fluctuations of commodity prices, which most firms generally consume but some produce. Our research uses the prices of major commodities consumed as primary production inputs, based both on firms' cost structure and past correlations between commodities and firms' stocks, to predict the impacts of commodity price changes on common stock returns – and thus to explain their returns' covariance. We have developed tools that allow analysis of large datasets of historical stock prices; these tools support investor-friendly portfolio allocations which add an additional objective to the traditional criteria of maximum return or minimum risk – for example, the ability to hedge against a future scenario; lower relative strength of the dollar vs. foreign currencies; and so forth. Our tools can thus build portfolios with any desired combination of these three qualities, mutually trading off return, risk, and protection against higher (or lower) levels of these specific scenarios. The main objective of these tri-purpose funds, rather than superior

financial performance over time in nominal dollars, is to preserve investors' purchasing power over long periods of time for key forms of consumption and thus assuage anxiety against long-term risks that they cannot control.

HOW LARGE SHOULD THE FEDERAL RESERVE BE?

Nick Macina

Time: 9:15 AM

Mentor(s): Hao Jiang (Finance)

The Federal Reserve can alter the size of its balance sheet to implement monetary policy. When the Fed buys assets, it increases the size of the balance sheet which will increase the money supply in the United States. The opposite will occur from the sale of assets. Since the financial crisis of 2008, the Fed's balance sheet has quintupled in size. Now that the financial crisis has passed, there is debate as to whether to shrink the balance sheet or to leave it as is. The research in this presentation will seek to answer that debate. In order to determine the appropriate size of the balance sheet, I looked at various recommendations by economists and industry experts. Then, I synthesized these assessments to formulate my conclusion. This topic is important to address because this element of the Fed's monetary policy will affect the direction of the U.S. economy, and by extension, the global economy. In this presentation, I will explain the importance of the Fed's balance sheet, the reasoning for and against changing the size of the balance sheet, and my conclusions.

LEED CERTIFICATION

Alexander Trompke

Time: 9:30 AM

Mentor(s): Jae Min Cha (Hospitality Business), Mi Ran Kim (Hospitality Business)

In the hotel industry, there has been a large movement toward more sustainable practice and environmentally "green" choices. A key to enhancing brand loyalty is increased customer value. As the environmental benefits of green practices is now entering the mainstream in the hospitality industry, it is critical to evaluate hotels' performance of sustainable business practices by guests. In particular, there is increasing interest in green buildings within the hotel industry. For example, there has been a surge in LEED applications and successful certifications in the last few years, indicating that LEED is becoming a competitive reality for the hospitality industry. Leading hospitality companies such as Marriott, Hilton, Hyatt, InterContinental Hotels Group, and many others have become involved in LEED-certified projects. The purpose of this research is to examine the importance of and satisfaction with indoor environmental quality (IEQ) (i.e., air quality, lighting quality, thermal comfort, and acoustical quality) and compare hotel guests' perceptions and satisfaction on IEQ between LEED-certified and non-LEED certified hotels. To answer the research questions, both interviews and an online survey of hotel guests were conducted on both LEED certified hotels and non-LEED hotels.

BUSINESS ORAL PRESENTATIONS, SECTION 2 ROOM 30, 1:30 PM – 3:30 PM

HOW CAN EMPLOYEES MAINTAIN THEIR CREATIVITY WHEN LEADERS UNDERMINE THEIR SUGGESTIONS? COMMUNICATION IS KEY.

Alleen Acuna

Time: 1:30 PM

Mentor(s): Hun Whee Lee (Management), Linn Van Dyne (Management)

In response to recent calls for research seeking to understand how the negative impacts of leader undermining on positive work outcomes can be mitigated, this study explores how communication can play a key role in minimizing detrimental consequences of leader undermining for individual creativity – necessary for innovation and improvement. When employees feel that their work efforts are being stymied by leader undermining, voice stress increases and anxiety is heightened when attempting to provide constructive criticism for improvement of the workplace or end product. This stress will negatively interfere with the level of creativity the employee displays, but can be lessened if the employee engages in communication behaviors that are appropriate to the situation and will thus be well-understood. Effective communication behaviors result in better receipt of the message and buffer the impact of voice stress, allowing the employee to still be creative in their work, even in the presence of leader undermining. This study presents a model of the relationship between leader undermining and creativity that is mediated by voice stress and moderated by employee communication behaviors. This is an employee-focused approach aimed at understanding how those experiencing leader undermining can lessen negative effects on their creativity. Using multiple-source data from 292

employees working with 43 different senior employees and 43 different supervisors, this study provided strong empirical evidence of the proposed relationships.

REGIONAL VARIATION IN VENTURE CAPITAL

Grace Hough

Time: 1:45 PM

Mentor(s): Elizabeth Mack (Geography)

Since the start of venture capital markets in the late 1950's, the number of venture capital investments, and the engagement of venture capitalists with the companies in which they invest, has evolved. Today the market capitalization of venture capital companies is several trillion dollars. Unfortunately, the availability of venture capital funds is spatially uneven and entrepreneurs often site venture capital as an obstacle to establishing and growing ventures. While it is well-established that venture capital investors are concentrated in large metropolitan areas, some small- to medium-sized metropolitan areas see unusually high levels of venture capital investment. Little is unknown about the characteristics of these smaller, venture-capital rich locales. The evolution of venture capital availability over time, also remains unexplored. Given the importance of venture capital to fledgling ventures, and the lack of spatial and temporal resolution on venture capital availability over time, the goal of this study is to analyze the dynamics of venture capital availability over space and time, and the factors that explain these dynamics for 300 metropolitan areas in the continental U.S.

INVESTING IN HEALTHCARE: POLITICS BECOME PERSONAL

Isabel Marcelletti, Josh Ball, Anne Rhee

Time: 2:00 PM

Mentor(s): Kirk Butler (Finance), Antoinette Tessmer (Finance)

For this analysis, we will look at the healthcare sector's performance in the stock market, particularly the industries related to supplies and services, pharmaceuticals and biotechnology, and insurance providers. We account for Dr. Donald Barr's observation in the Introduction to Health Policy, that the health care industry does not behave according to the traditional economic Law of Supply and Demand. The demand for commodities is not decided by the consumers but rather by the producers. Private corporations are instrumental in the roles of both purchasers and providers. We perform a comparative event analysis on the United States Election Day: November 8th, 2016 and Inauguration Day: January 20th, 2017 to determine the presidential election's impact on the healthcare stock market. This leads us to question under what political climate is investment in healthcare stocks least volatile, under which enacted policies should investors be reassured with stock stability, and when should they be wary of instability. Should investors diversify their healthcare portfolio or invest in a particular area among insurance providers, pharmaceuticals, or health services? Under these inquiries, we propose recommendations for current and future investors in the healthcare sector.

SHAPING CUSTOMER SERVICE AND STORE ATMOSPHERE

Megan McKee

Time: 2:15 PM

Mentor(s): Stephanie Mangus (Marketing)

This research uses an ethnographic approach to study the components of customer service and in-store environment in retail restaurant environments. Over twenty hours of participant observation at two locations uncovers themes of relationships and technology use. The author explores these themes identifying a typology of in-store relationships including employee-to-customer, customer-to-customer, and employee-to-employee interactions. These relationships are further analyzed for nuances identifying different forms and purposes of these relationships. The interactions demonstrate the importance of customer service in building the store atmosphere. The role of technology is also explored from the consumer and employee perspectives. The research identifies a need for consumer education in new technology introductions in retail environments, as well as offers such education as opportunities to build employee-customer relationships and place emphasis on quality customer service interactions. Both the relationship and technology themes emerge as useful tools to be used to enhance the customer experience.

BUSINESS
POSTER PRESENTATIONS, SECTION 1
BALLROOM, 3:00 PM – 4:30 PM

THE IMPORTANCE OF GOING GREEN IN TODAY'S HOSPITALITY MARKET

Kimmy Anderson

Poster: 110

Mentor(s): Mi Ran Kim (Hospitality Business)

Hotel brands across the world are incorporating LEED and other sustainability practices to meet the needs of today without compromising the needs of future generations. In a significant study conducted by Cornell University researchers, they compared the performance of 93 LEED-certified U.S. hotels to 514 comparable (but less efficient) hotels. They concluded that for hotels going green means making green, and for those hotels that renovated their properties to obtain LEED certification they increased occupancy rates not only past previous levels, but even ahead of their competitors. For the hospitality industry, sustainable practices are converting from being a novelty that hoteliers simply talk about, to an expectation of the major clientele at multiple properties. LEED certification is becoming a hot topic nowadays as green hotels can earn more while ultimately using less. Sustainability and green practices are becoming expected and embraced by customers, as they make the connection to good health and environmental awareness. There is plenty of room for progress in both the new construction and renovation categories, building on the operational sustainable development practices that are already pervasive. Therefore, the purpose of this research is to 1) understand the importance of a hotel's sustainable performance related to customer satisfaction and loyalty, and 2) compare sustainable performance, customer satisfaction and loyalty between LEED-certified and non-LEED certified hotels.

DIVERSIFICATION WITHIN THE STOCK MARKET: WEATHERING THE ELECTION STORM THROUGH DIVERSIFICATION

Logan Chamberlain, Ryan Fernandes, Ross Lamerson, Brian Revis, Johnathan Zaremba

Poster: 111

Mentor(s): Antoinette Tessmer (Finance)

Uncertainty is defined as the inability to forecast future events. The stock market is considered to be a vast sea of uncertainty, and to be successful in the stock market you must be able to withstand that uncertainty. Historically, election years tend to increase the level of uncertainty in the stock market as there is excess volatility pumped into the markets. Our research will address this issue and portray how a diversified portfolio can protect from an upcoming election. In order to analyze this issue, we compiled five distinct portfolios within the technology sector starting in October 2016 and compared their returns to the market performance of the S&P 500. We will present the results of our analysis on how portfolio diversification in the Information Technology sector performs within a 5 month time period before and after the election. This research will show how a novice stock trader can not only weather the storm of uncertainty that is the election, but thrive and earn substantial returns.

ROLE OF NON-GOVERNMENTAL ORGANIZATIONS IN ENHANCING THE INTEGRATION OF SMALL-HOLDER FARMERS IN THE SUPPLY CHAIN: A REVIEW AND AN EXAMINATION OF POTENTIAL OPPORTUNITIES FOR SUB-SAHARAN AFRICA

Hepsiba Chepngeno

Poster: 112

Mentor(s): Anand Nair (Supply Chain Management)

Small-holder farmers in sub-Saharan Africa are often unable to play an active role in the supply chain and efficiently reach their customers. Despite the growth of supermarket chains, small holder farmers greatly depend on their local markets, often, open air markets, to sell their products. These farmers experience greater supply and demand uncertainties as well as price fluctuations, which adversely impact their profitability as compared to their counterparts engaged in the supply chain. Some of the constraints these small scale farmers face in their efforts to reach these larger markets include: lower quality products, high transaction costs, low quantity and fragmentation. Using previous research done in the East and South African countries, this poster will look at the role of Non-Governmental Organizations (NGOs) in reducing these constraints and increasing access for these small scale farmers to the supply chain. It will seek to answer the questions: I. What roles do NGOs currently play in promoting small-holder farmers' access to supply and demand opportunities and in strengthening farm operations, and; II. What are the opportunities for better integrating these farmers in the supply chain. NGOs have especially been successful in providing these farmers access to quality inputs from trusted suppliers, and opening up new markets, such as in the horticulture sector. This poster will focus on

how successful methods like contract farming can be further employed by the NGOs in their efforts to reduce constraints and provide access to new supply and demand opportunities.

HOW TO BUILD A STABLE INTERNATIONAL PORTFOLIO IN AN UNSTABLE POLITICAL ENVIRONMENT

Allyson Gillis, Jiayuan Guo, Brennen Mueser, Nikkita Ngalande, Kyle Zaback

Poster: 113

Mentor(s): Kirt Butler (Finance), Antoinette Tessmer (Finance)

Our research is focused on the effects of an American presidential election on international stock markets. We succeeded at building an international stock portfolio that is either positively, negatively, or unaffected by the U.S. presidential election outcome, depending on the winner's political party. We chose to invest in companies that indicate some particular political interests and, as an outcome, would be sensitive to the election results. We will study these companies on both the national and international level. This research is important because it shows that U.S. presidential elections not only affect the domestic stock market, but the global market as well. Our poster will be analyzing international portfolios more closely relating to either the Republican party or the Democratic party, as well as a portfolio whose goal is to minimize the impact of the election. In conclusion, we will be providing recommendations on how to build a portfolio in an unstable U.S. political environment.

EVALUATING EMPLOYEE SICK LEAVE POLICY IN FOOD SERVICE OPERATIONS

Kanmani Govardhanan

Poster: 114

Mentor(s): JaeMin Cha (Hospitality Business)

Many foodborne illness outbreaks are attributed to mishandling errors in foodservice operations such as infected food handlers and workers touching food with their bare hands. This study overviews best practices, current issues and challenges relating to implementing paid sick leave in foodservice operations. The purpose of this study is to examine factors associated with food employees working while they are sick. This study proposes to conduct an online survey, targeting students who have worked in food service operations. The outcomes of this study is expected to provide valuable insight into restaurant policies concerning sick employees.

THE EFFECTS OF HAND WASHING

Mark Rosenberg, Kanmani Govardhanan

Poster: 115

Mentor(s): Carl Borchgrevink (Hospitality Business), JaeMin Cha (Hospitality Business), James Kim (Hospitality Business)

From the research of dedicated professionals, we have learned that correct handwashing means washing our hands from 15 to 20 seconds. It is said that just 1 in 20 people wash their hands correctly, and has become the main reason for the spreading of sickness and germs. Washing hands is known to be the most effective way of ridding bacteria, and incorrectly washing hands may be detrimental for a business and create food-borne illness'. Through our observations, we have non-obtrusively collected research from men and women in a food and beverage, community-style restroom setting. We have surveyed the amount of time spent washing hands as well as the efficiency in the procedure. This has allowed us to notice certain patterns and distinguish any observations in correct handwashing. Through our research we have realized that the quantity, cleanliness, and type of sinks in the restroom directly impact the decision to execute effective handwashing. We will present on the differentiation between good and bad handwashing and what we've noticed men and women do in different types of handwashing situations.

ANALYZING MOTIVATIONAL FACTORS OF COLLABORATIVE CONSUMPTION: AN APPLICATION OF AIRBNB

Zihan Niu

Poster: 116

Mentor(s): SeungHyun Kim (Hospitality Business)

Collaborative consumption, often associated with the sharing economy, is a peer-to-peer-based activity of obtaining, giving, or sharing access to goods and services, coordinated through community-based online services. As a most valuable company in experience with sharing economy, Airbnb is offering temporary space such as apartments, castles, or houseboats in more than 57,000 cities and more than 191 countries. Due to the rapid growth of this business model, it is important to understand the drivers and deterrents of collaborative consumption in hospitality industry. The purpose of this study is 1) to identify the Airbnb market characteristics based on demographics and personal innovativeness and 2) to evaluate the motivational factors that drive and deter airbnb staying. Data was collected from millennial travelers through a web-based online survey. Based on the empirical evidence, this study suggests hospitality businesses on how

to administrate collaborative consumption and offer different propositions for future studies. Moreover, this study contributes to hotel marketers building alternative strategies to compete in the sharing economy.

APPLICATIONS OF THE INTERNET OF THINGS IN SUPPLY CHAIN MANAGEMENT

Ethan Spitzley

Poster: 117

Mentor(s): Judy Whipple (Supply Chain Management)

The Internet of Things (IoT) has the potential to affect many practices in supply chain management. By using smart interconnected devices, firms improve visibility across their supply chains enabling faster and enhanced decision making. Our research is centered around learning more about how organizations are implementing IoT solutions in their supply chains to understand the breadth of applications and the associated costs/benefits. Our research consisted of a thorough literature review and analysis of an online survey.

IN-GAME PURCHASES FACILITATORS

Ian Trost

Poster: 118

Mentor(s): Mei Li (Supply Chain Management)

The gaming industry today is a multi-billion dollar industry. In-game purchases have become one important source of revenue generation for firms in this industry. Therefore, it is vital for firms to understand what promotes consumers to make in-game purchases. Existing research typically focuses on game design features that entice gamers to make in-game purchases, however our research took a different point of view. We argue that two important psychological beliefs are exerting substantial influence over gamers' purchasing decisions. One is the perception that playing video games is addictive. The other is the notion that all video game features should be free after the initial purchase of the game. We set out to validate these two prejudices. We conducted a survey to solicit people's attitudes toward video games and spending on video games. Results show that video games are viewed as a valid form of entertainment similar to going to the movies or playing board games. However, people generally associate playing video games as a negative form of entertainment. Other activities that had a high response rate as a negative activity were drinking alcohol and using drugs. Further, respondents reported a strong bias against in-game purchases. Their belief has its foundation in the perspective that all video game features should be free after the initial purchase of the game. Our study exemplifies the factors preventing consumers' decision to make in-game purchases and therefore is important to game developers who are seeking to generate the maximum level of profit.

CELL BIOLOGY, GENETICS, AND GENOMICS

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

LPS STIMULATED GRK-2 EXPRESSION IN RESPONSE TO NOVEL ANTI-INFLAMMATORY DRUGS IN RAW 264.7 MACROPHAGE CELLS

Courtney Hughes

Poster: 121

Mentor(s): Narayanan Parameswaran (Physiology)

G-protein coupled receptor kinases (GRKs) have been known to play a crucial role in the pathogenesis of inflammatory diseases. GRKs are responsible for regulating desensitization of G-protein coupled receptors (GPCRs), the largest and most diverse class of membrane receptors in eukaryotes. Specifically, GRK2 activity and expression levels have been widely shown to be effected by inflammatory disease conditions. Previous studies have shown that through the stimulation of murine peritoneal macrophages with LPS, GRK2 expression levels will increase. Therefore, an expansion on this data was completed by stimulating Raw 264.7 cells (a murine macrophage cell line) with LPS to observe the cellular GRK2 expression. Furthermore, novel anti-inflammatory drugs, LG100268 and I-BET, were tested with LPS stimulated macrophage cells to evaluate the effect of the drugs on GRK2 expression. Raw 264.7 macrophage cells were grown and stimulated with LPS (1ug/ml) and treated with novel anti-inflammatory drugs to determine their effect on GRK2 expression. GRK2 was measured at both 6 and 24 hours. GRK2 expression levels were determined through SDS-PAGE electrophoresis and quantified through densitometry. It was found that LPS stimulated Raw 264.7 cells show a slight increase in GRK2 expression over a 24-hour period. Subsequently, with the application of I-BET and LG100268, GRK2 expression did show a decrease in respect to the 24-hour period; however, DMSO (control) shows great effects on

decreasing GRK2 expression alone. Future studies will provide greater knowledge on modulating levels of GRK2 expression within inflammatory diseases in the hopes of providing novel therapeutics.

NORMATIVE CANINE PALATOGENESIS

Rachel King

Poster: 122

Mentor(s): John Fyfe (Microbiology and Molecular Genetics), Brian Schutte (Microbiology and Molecular Genetics)

Cleft lip and palate (CLP) is a common birth defect caused by improper fetal development. Palatal formation is a highly regulated and specific process which requires correct gene expression during all stages of development. CLP in humans results in significant medical, psychological, and financial burdens for their family. Mice have served as the prominent animal model for CLP. However, it occurs in other mammals like dogs. In puppies this can cause aspiration pneumonia or malnourishment from ineffective feeding, both of which may cause death. Due to the possible health risk and financial burden of reconstructive surgery, CLP dogs are typically euthanized. We hypothesize that the palatal formation in dogs is homologous to that of humans and mice. To test this hypothesis, we performed immunofluorescent staining on frontal sections from wildtype fetuses of different gestational ages to identify palatal consistencies at each developmental stage. The results of this study will provide evidence for the strong similarities between the palatogenesis of dogs compared to known animal models over their respective gestational timelines. While our data suggests that canine palatogenesis is homologous to the same process in humans and mice, more research still needs to be conducted in order to make this claim.

THE ROLE OF EARLY PHOTORECEPTOR FUNCTION IN EYE GROWTH AND REFRACTIVE ERROR

Taylor Norris

Poster: 123

Mentor(s): Andras Komaromy (Small Animal Clinical Sciences)

Eye growth and refractive status are affected by conditions in the early stages of development. This study examined the effects of early-onset retinal diseases on the development of myopia, a negative refractive error, in adult dogs. We investigated 3 different retinal diseases; achromatopsia (ACHM), which is characterized by early loss of cone photoreceptor function, rod-cone dysplasia (RCD), which is characterized by early loss of rod photoreceptor function, and Leber's congenital amaurosis (LCA), which is characterized by early-onset of retinal pigment epithelium (RPE) dysfunction. A-scan ultrasonography was used to obtain measurements of axial globe length, anterior chamber depth, and lens thickness. Vitreous chamber depth was calculated from those measurements. Refractive error was determined using streak retinoscopy. Multivariate analysis was performed to compare these measurements between dogs with retinal disease and normal controls. The RCD group had significantly longer globes and significantly deeper vitreous chambers compared to normal dogs. These dogs had the highest measurement of myopia, with an average refractive error of -2.47 diopters. The ACHM and LCA groups showed no significant differences in any of the ocular dimension as compared to the normal dogs, and only slightly significant differences in refractive error. Early loss of rod function appears to induce an inappropriate elongation of the vitreous chamber, which leads to the development of myopia. These changes were not seen in dogs with early loss of cone function or early-onset RPE dysfunction. This research introduces new information that will help to formulate a model for the development of myopia.

HUMAN MAST CELL ACTIVATION OF TRPV1 AND STIM1 DURING MRGPRX2 STIMULATION

Christopher Occhluto

Poster: 124

Mentor(s): Hariharan Subramanian (Physiology)

Mast cells are a type of innate immune cell located within many tissues throughout the body. While their most prominent role is in allergic inflammation, they also release cell signaling molecules and inflammatory compounds in the brain, gut, lungs, and other tissues during non-allergic inflammation. One key receptor in mediating their non-allergic response is the MrgprX2 receptor. While it is known that mast cells express this receptor, the means by which calcium—the integral factor for releasing a mast cell's contents—enters the cell from the external environment is not known. This study elaborates on the TRPV1, TRPV4 and STIM1 cell proteins currently known to mediate calcium entry in some cell types. Through the use of calcium channel blockers, it was found that upon activation of MrgprX2, TRPV1 is activated to introduce calcium into the cell. It was also found that STIM1 enhances the release of mast cell contents subsequent to MrgprX2 activation, while TRPV4 played a limited role, if any, in the response.

CHIRALITY VIEW OF CONSECUTIVE 4+2 CYCLOADDITIONS TO HEXAHYDRO-2H-CHROMENES

Christopher Rahn

Poster: 125

Mentor(s): Babak Borhan (Chemistry)

Current synthesis of these hexahydro-2H-Chromenes already exist however our focus was on the mechanist approach using consecutive 4+2 cycloaddition and the potential different R groups that could be added to this structure and the potential astrochemical change and the the resulting effect on the ee. Using the Baylis-Hillman and Diels-Alder reaction we studying the stereo-chemistry of hexahydro-2H-Chromes using 4+2 cycloaddition with varying R groups ranging from simple methyl groups to phenol groups to isopropyl groups among 13 others while alienating between two different catalyst (hydroquinidine -9- phenanthrylether and (DHQ)2AQN) for the final cyclization reaction. Purification of compounds were found using varying solution in a standard bench run coulomb and conformation of product was confirmed by NMR, GC and IR. Further more yield percentage, time differentials and ee with be expanded further with each varying R group and both catalysts which will therefore explaining the chirality the each catalysts imposes on each molecule. The methodology and mechanism in this study will shed light on forth stereochemical reactions of chiral diene reactions in the future.

HISTOLOGICAL ANALYSIS OF A DOG MODEL FOR ISOLATED CLEFT PALATE

Miranda Ratusznik

Poster: 126

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

Isolated 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 (surgical repair). 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 isolated cleft palate that can be used to analyze the outcomes of surgical repairs. Since dogs mature in 18 months, not 18 years, 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 isolated, with no other abnormalities. We performed histological analysis of the upper jaws of three newborn pups with cleft palate and three littermates without a cleft. We made transverse sections of the jaws and stained every tenth slide using hematoxylin and eosin. We manually analyzed each of the stained sections for the presence of distinct landmarks. To date, we sectioned the full palate of one wild type and one affected pup. We have not identified any structural abnormality, other than the cleft. In addition, we surgically repaired the cleft palate of a male and a female. Gross inspection and CT scans of their oral cavities appear normal. Both animals are thriving and reproductively fit. Our data, to date, are consistent with the hypothesis that the affected dogs in this line are a model for isolated cleft palate.

THE EFFECT OF THE SUNSCREEN COMPONENT BENZOPHENONE-3 ON MAMMARY CANCER DEVELOPMENT AND PROGRESSION IN MICE

Bing Qing Wang

Poster: 127

Mentor(s): Anastasia Kariagina (Microbiology and Molecular Genetics), Richard Schwartz (Natural Science)

Multiple environment chemicals may influence breast cancer development. One such chemical, benzophenone-3 (BP-3), is the major active component of sunscreen that acts as a UV-protective agent and antioxidant. There is evidence that BP-3 has estrogen-like activity and it is known that estrogens play a role in breast cancer development. Therefore, we hypothesized BP-3 stimulates mammary cancer development in mouse. To study tumorigenesis in mice, we transplanted Trp53 knockout mammary epithelial tissue into the inguinal mammary glands of wild type BALB/c mice that were surgically cleared of endogenous mammary epithelium (cleared mammary fat pads). Mice were then monitored for mammary tumor development. To study the effect of BP-3, mice were fed with different dietary regimens with or without BP-3. Once tumors developed to a standard 1 cm size, they were surgically excised, fixed in formalin, embedded in paraffin, and stained with hematoxylin and eosin. Two major tumor cell morphologies were observed, epithelial-like cells and spindle-like cells. Some tumors were more aggressive and exhibited invasion of tumor into the stroma or the adjacent muscles of the body wall. Overall, our results suggest that BP-3 may promote development of more invasive tumors. Based on these results, we speculate that BP-3 may contribute to breast cancer development, especially in women with the highest sunscreen exposure.

**CELL BIOLOGY, GENETICS, AND GENOMICS
POSTER PRESENTATIONS, SECTION 2
BALLROOM, 11:00 AM – 12:30 PM**

INVESTIGATION OF TRYPTOPHAN HYDROXYLASE 1 GENE IN SUICIDE ATTEMPTERS AND A HOMOLOG USING PCR

Lauren Eby

Poster: 130

Mentor(s): Douglas Luckie (Lyman Briggs)

The tryptophan hydroxylase 1 gene (TPH1) codes for the release of the tryptophan hydroxylase enzyme, which regulates serotonin levels in the brain; mutations in this gene have been known to lead to suicidal behaviors (Beden et al, 2016). The mutation studied involves a base pair change from A to C in the A218C allele (Liu and Quinn, 2016). It was hypothesized that PCR techniques would reveal the presence of the TPH1 gene in both humans and zebrafish. PCR was used to target and amplify the A218 allele, then the amplified DNA was run through gel electrophoresis to determine if the A218 gene was present in the DNA. It is predicted that the PCR and gel electrophoresis will successfully indicate the presence of the TPH1 gene (Kim et al, 2009). A homologous genetic sequence from the *Danio rerio* - or zebrafish - was analyzed using the same PCR and gel electrophoresis methods. It is predicted that PCR and gel electrophoresis will indicate the presence of the TPH1 gene in the zebrafish homolog (Maximino et al, 2011).

EFFECTS OF LZK ON CELL PROLIFERATION AND MAPK PATHWAY SIGNAL INDUCTION IN LUNG SQUAMOUS CELL CARCINOMA

Brandon Llewellyn, Silvia Aluia, Tasneem Sannah

Poster: 131

Mentor(s): Kathleen Gallo (Physiology), Chotirat Rattanasinchai (Physiology)

Lung cancer is the leading cause of cancer death in men and women in the United States. The vast majority of lung cancers, known as non-small-cell cancers (NSCLC), are comprised of adenocarcinomas and squamous cell carcinomas. Unlike the more common adenocarcinoma, squamous cell carcinoma which represents 30% of NSCLC has no available targeted therapy. Indeed 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 gene encoding Leucine Zipper-bearing Kinase (LZK), an MLK family kinase, is amplified and/or has mRNA up-regulation in a majority of squamous cell carcinoma, but not in lung adenocarcinoma. The purpose of this study is to use gene silencing and an MLK family inhibitor to determine the role of LZK in the growth and proliferation of squamous lung cancer cells. Methods utilized include proliferation assays and assessment of MAPK pathway kinase activation using immunoblotting. In this presentation, we will discuss the potential role of LZK and other MLKs in cell proliferation and in MAPK pathway signal induction in squamous lung cancer.

DETERMINING RELIABLE PHENOTYPIC IDENTIFICATION METHODS IN DREISSENIID MUSSELS

Rebecca Selby

Poster: 132

Mentor(s): Kim Scribner (Fisheries and Wildlife)

Reliably identifying aquatic invasive species (AIS) in the field is essential to implementing effective management actions. Yet, some AIS are difficult to identify based on phenotypes alone. The Zebra mussel (*Dreissena polymorpha*) and Quagga mussel (*Dreissena bugensis*) are two AIS that overlap in shell morphology phenotypes, making identification difficult. Some individuals may exhibit hybridization, which poses additional identification challenges. We measured a variety of phenotypes that characterize aspects of shell morphology to determine if they were predictive of correct species identification. In 2016, we collected putative Zebra mussels (range: 20-30) from 30 locations throughout Michigan. Sampling sites included locations in the Great Lakes and inland lakes. We photographed each mussel on the dorsal, lateral and anterior axes, and measured 27 phenotypes related to shell morphology. We used a polymerase chain reaction-restriction fragment length polymorphism and two microsatellite loci to determine if each sample was a Zebra mussel, Quagga mussel, or hybrid. Our data will be used to determine consistent phenotypic differences that can be used in future Dreissenid field identification, as well as provide information on potential hybridization between the two species.

RILUZOLE EXHIBITS SYNERGISM WITH PACLITAXEL IN TREATING TRIPLE NEGATIVE BREAST CANCER CELLS

Rachel Sexton

Poster: 133

Mentor(s): David Gorski (Oncology)

One in 8 women will develop breast cancer while 15-20% of these women will be diagnosed with Triple Negative Breast Cancer (TNBC), an aggressive form of breast cancer that is ER-/PR- or HER2-. Paclitaxel, an established chemotherapeutic agent works by inhibiting microtubule breakdown and is currently one of the few options available to treat TNBC. Riluzole, an orally administered drug approved to treat ALS inhibits melanoma proliferation through glutamatergic signaling. We previously demonstrated Riluzole inhibits growth of TNBC independent of mGluR1, a hypothesized molecular target. In this study, we explored how riluzole and paclitaxel interact. TNBC cell lines were treated with paclitaxel and riluzole individually and in combination at different cellular concentrations. Any synergistic effects on cell proliferation were observed via MTT assay and CompuSyn analysis. Characteristics of apoptosis were observed by western analysis measuring cleaved PARP and caspase 3 levels. The drugs interactions were also examined in a MDA-MB-231 in-vivo mice xenograft model. Together both drugs significantly induced apoptosis synergistically and halted cell growth in all TNBC cell lines tested. Western analysis showed enhanced PARP cleavage in comparison to controls. In vivo, both drugs individually suppressed tumor growth while showing enhanced growth suppression in combination. Our in vivo data demonstrates that Riluzole and Paclitaxel does work synergistically to inhibit growth of TNBC. These results suggest combination treatment could provide an alternative method to current treatment practices with reduced toxicity and off-target effects. These results are promising for an alternative combination treatment for TNBC.

THE EFFECT OF HIGH FAT DIET ON MAMMARY CANCER DEVELOPMENT AND PROGRESSION IN MICE

Lauren Ulrich

Poster: 134

Mentor(s): Richard Schwartz (Microbiology and Molecular Genetics)

The influence of high-fat diet on breast cancer development is controversial and not yet completely understood. In order to understand how high-fat diet affects breast cancer development, we investigated tumor growth and morphology in BALB/c mice transplanted with Trp53-knockout epithelium. One group of mice were fed a low-fat diet throughout their lives and compared to a second group of mice that were fed a high-fat diet after they reached puberty. To promote tumorigenesis in the wild-type mice, donor mammary epithelium from female BALB/c Trp53-null mice was transplanted into the inguinal mammary glands of 3-week-old wildtype mice that were surgically cleared of endogenous mammary epithelium (cleared fat pads). Once the mice developed tumors of a specific size, the tumors were surgically excised and collected for hematoxylin and eosin staining, and tumor cell morphology was analyzed. We observed two major phenotypes of tumor cells, epithelial and spindle cells. We found increased incidence of spindle cell carcinomas in the animals in the high-fat diet group, as well as a greater number of recurrent tumors. Spindle cell tumors resemble an aggressive type of receptor negative human breast cancer. These results may indicate that staying away from a high fat diet could prevent the development of more aggressive breast cancers.

DETERMINING THE CLASSICAL NEUROTRANSMITTER CONTENT OF LATERAL HYPOTHALAMIC AREA NEUROTENSIN NEURONS

Anna Wright

Poster: 135

Mentor(s): Juliette Brown (Pharmacology and Toxicology), Gina Leininger (Physiology)

Many neurons in the lateral hypothalamic area (LHA) of the brain contain the neuropeptide neurotensin (Nts) and regulate feeding, drinking and physical activity. It remains unclear, however, how LHA Nts neurons synaptically regulate neural targets to mediate these behaviors. Neurons regulate the activity of synaptically connected neurons via releasing either the classical neurotransmitter GABA (inhibitory) or glutamate (excitatory). We therefore sought to determine whether LHA Nts neurons contain GABA or glutamate, and thus whether they inhibit or excite downstream target neurons to control behavior. Previously the lack of reagents to simultaneously identify Nts, GABA and glutamate prevented this analysis. To overcome this obstacle we designed a dual genetic recombinase approach to simultaneously label Nts and GABA or glutamate-containing neurons. First, we generated mice that express FlpO recombinase specifically in Nts neurons (NtsFlpO mice). Injecting NtsFlpO mice in the LHA with a vector for FlpO-inducible green fluorescent protein (GFP) causes GFP expression only within LHA Nts neurons, enabling their detection via fluorescent microscopy. Next, we crossed NtsFlpO mice with mice that express Cre recombinase-induced Tomato (a red fluorescent protein) in GABA or glutamate neurons. Injecting AAV-GFP into the LHA of these mice permits simultaneous detection of Nts (GFP expressing neurons) and GABA and/or glutamate containing neurons (Tomato-expressing neurons) via fluorescent microscopy. Brains from these mice are currently being analyzed.

SERINE PHOSPHORYLATED STAT3 PLAYS A ROLE IN INTERFERON GAMMA-INDUCED METABOLIC GENE EXPRESSION IN PANCREATIC BETA CELLS

Yamini Vepa

Poster: 136

Mentor(s): Karl Olson (Physiology), Nguyen Truong (Physiology)

Interferon gamma (IFN γ) is a critical component of the innate and adaptive immune response and plays a role in autoimmune diseases such as type 1 diabetes mellitus. Recent studies have demonstrated that IFN γ increases FA oxidation in select immune cells and that this impacts antiviral responses. Unpublished studies from our lab have shown that IFN γ increases FA oxidation

lipolysis and mitochondria oxidation including adipose triglyceride lipase (ATGL) and carnitine palmitoyltransferase 1A (CPT1A). In this study, we investigated signaling pathways that regulate IFN γ mediated metabolic gene expression. Sequence analysis of ATGL and CPT1A promoters revealed a gamma-activation site (GAS) consensus, suggesting Signal Transducer and Activator of Transcription (STATs) transcription factor binding is involved. We used nifuroxazide, a pharmacological inhibitor of JAK kinases to examine the role of STAT1/STAT3 phosphorylation on IFN γ induced ATGL and CPT1A expression. In INS-1 cells, IFN γ induced tyrosine phospho phosphorylation of STAT3. Nifuroxazide did not induce tyrosine phosphorylation of either STATs, but strongly induced serine phosphorylation of STAT3. Gene expression data showed that nifuroxazide alone upregulated ATGL/CPT1A to the same extent as IFN γ , and it also had ad

that serine phosphorylation of STAT3 plays a role in IFN γ mediated transcription of genes regulating TAG lipolysis and fatty acid oxidation, supporting the importance IFN γ in regulation of FA metabolism in β cells.

CELL BIOLOGY, GENETICS, AND GENOMICS POSTER PRESENTATIONS, SECTION 3 BALLROOM, 1:00 PM – 2:30 PM

DETERMINING THE ROLE OF SAA1 IN HCC MEDIATED BY NCOA5 DEFICIENCY

Ayda Alavi

Poster: 139

Mentor(s): Hua Xiao (Physiology)

Hepatocellular carcinoma (HCC) is a primary liver cancer that occurs in patients with chronic liver disease and cirrhosis. Research in Dr. Xiao's lab is focused on HCC, specifically through the heterozygous deletion of the nuclear receptor coactivator 5 (NCOA5) gene which causes spontaneous development of HCC in male mice and is therefore a haploinsufficient tumor suppressor. Dr. Xiao's lab has found that NCOA5 haploinsufficiency causes development of hepatic inflammation due in part by enhanced expression of IL-6 and tumor necrosis factor α (TNF α) in Kupffer cells (liver macrophages) (Gao et al., 2013). Further studies showed that the heterozygous deletion of IL-6 partially deters HCC development in NCOA5 \pm male mice (Gao et al., 2013). Serum amyloid A gene in HCC, was discovered to be upregulated in NCOA5 deficient mice. SAA1/2 are inflammation-associated genes and have been found to be increased significantly in NCOA5 \pm male mice. These studies allow us to further investigate SAA1/2 and our hypothesis that NCOA5 deficiency results in increased expression of SAA1/2 thereby promoting tumorigenesis in the liver. this project specifically focuses on testing the hypothesis that 1) SAA protein expression is affected by loss of NCOA5 in vitro, and 2) that it is secreted and can be observed extracellularly. Determining the role of SAA1/2 in HCC mediated by NCOA5 deficiency will provide important information for better understanding the complex mechanism of HCC development and pathogenesis. This is clinically significant because it could possibly lead to identification of a new therapeutic target for patients with HCC, and it will help to elucidate the cascade of regulatory events that NCOA5 moderates.

ASSESSING PATHOGENICITY OF RARE DNA VARIANTS IN IRF6

Kyleigh Buckley

Poster: 140

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

With the ability to sequence genomes, researchers are able to discover more DNA variants. The question then becomes which variants actually cause disease. We are interested in Van der Woude syndrome (VWS), an autosomal dominant form of cleft lip and palate that can be caused by mutations in the IRF6 gene. We hypothesize that rare IRF6 mutations found in patients with VWS are pathogenic for disease and will not be found in control populations. We performed a literature search to compile a list of IRF6 mutations in cases of VWS. We annotated the number, size, geographic origin of each family, and whether the mutation was de novo. We also compiled the number of unrelated families with the

same mutation. Finally, we compared the list of IRF6 mutations from VWS patients with gnomDB, a sequence database representing DNA variants from 122,000 unaffected individuals. To date, 335 rare DNA variants in IRF6 have been reported in the literature in patients with VWS. Of these, 9 were found in the gnomAD database. While 4 of these were only found in 1 individual, 5 variants were found in multiple control samples, including D354N, which was found in 68 controls. Our data are consistent with the hypothesis that most rare IRF6 variants are pathogenic for VWS. However, a small, but significant subset was found in the control database. Further studies are needed to determine which of these variants are sequencing artifacts and which represent possible non-pathogenic or low-penetrant variants.

CIRCADIAN RHYTHMS IN THE HETEROKONT ALGAE NANNOCHLOROPSIS

Cameron Cummings

Poster: 141

Mentor(s): Eva Farre (Plant Biology)

Most organisms have adapted to day and night cycles of the earth by the evolving biological rhythms known as a circadian clock. In order for a biological rhythm to be classified as circadian, it must cycle once per day, persist in absence of external stimuli, can be entrained, and is compensated by changes in temperature. Circadian rhythms are vital in photosynthetic organisms that depend on light from the sun to generate energy; therefore, being able to physiologically adapt to day and night cycles can increase the fitness of these organisms significantly. However, not much is known about the circadian rhythms of algae in the phylum Heterokonta. We can study the biological rhythms of the Heterokont algae, *Nannochloropsis*, by utilizing a Luciferase bioluminescence assay to monitor changes in gene expression. These assays have been shown to be a powerful tool that can allow for the minimally invasive study of circadian-regulated gene expression in both plants and mammals. This study has found that light intensity, light quality, and changes in temperature can influence the rhythmic expression of genes in *Nannochloropsis* under constant light conditions.

IS NTN1 INVOLVED IN PALATAL DEVELOPMENT?

Kathryne Ford

Poster: 142

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

Cleft lip and palate (CLP) is a common birth defect affecting about 1 in 700 live births worldwide. Previous Genome Wide Association Studies (GWAS) showed that DNA variants at chromosomal region 17p13 were associated with (CLP) (Beaty et al., 2010). The nearest gene is *Netrin-1* (*NTN1*), which encodes a protein that is involved in axon guidance and cell migration. *Ntn1* knockout (-/-) mice die shortly after birth. When examined grossly, they lack the white milk spot in their stomach, suggesting that they are unable to suckle (Serafini et al., 1996). This is a common phenotype in mice that have a cleft palate. Our objective is to determine whether *Ntn1* mutant mice have oral abnormalities. We performed standard histological and immuno-staining on frontal sections from wildtype and mutant embryos at E14.5 to screen for palatal abnormalities. We observed areas along the palatal shelves that were in contact with the lower jaw and tongue. In addition, the staining for Keratin 6 (K6), a marker for periderm cells, was absent at these sites. These results are consistent with the presence of abnormal oral epithelial adhesions in *Ntn1* mutant embryos. Since oral adhesions are highly associated with cleft palate in other mutant mouse strains our results are consistent with a role for *Ntn1* in palatal development. Parallel studies at a later embryonic timepoint are needed to determine whether these adhesions are sufficient to abrogate palatal fusion.

POSSIBLE PROTEIN SECRETION VIA NATURAL TRANSFORMATION IN CAMPYLOBACTER JEJUNI

Joseph Hostnik

Poster: 143

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 can 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*.

MITOCHONDRIAL GENOMIC COMPARISONS OF RHAGOLETIS POMONELLA AND RHAGOLETIS ZEPHYRIA

Benjamin Luttninen, Haley Fulco, Karam Hadid, Jordan Stern

Poster: 144

Mentor(s): Patrick Edger (Horticulture), Jim Smith (Entomology)

The genus *Rhagoletis* is a taxonomic group of fruit flies that inhabit temperate climates worldwide. There are 65 species whose phylogenetic relationship is still being resolved, namely between *R. pomonella* and *R. zephyria*. These flies are important from an economic standpoint, as they play a role in the agricultural industry and can be dangerous for some crops. *R. pomonella* and *R. zephyria* share a common ancestor on the phylogenetic tree, however, the degree of genetic speciation has yet to be determined. Through mitochondrial genomic analysis, we looked to uncover the pattern of genetic variation as a function of host use among these *Rhagoletis* species. We approached this by isolating DNA from both species, sequencing it on an Illumina platform, and then comparing the mitochondrial genomes. Our results will allow us to determine if there is a shift towards complete divergence of haplotype groups among *R. pomonella* and *R. zephyria*.

BLUEBERRIES, SNOWBERRIES, AND APPLES: OH FLY!

Yoshua Mathai, Phillip Brzezinski, Michael Kuhn, Graham Wellens

Poster: 145

Mentor(s): Patrick Edger (Horticulture), Jim Smtih (Entomology)

Hungry for apples? The apple maggot fly (*Rhagoletis pomonella*) and closely related flies in the genus *Rhagoletis* are important fruit pests that aren't easily distinguished between each other. In an effort to develop a test to distinguish these species, we will sequence the entire mitochondrial genome of one *Rhagoletis mendax*, one *Rhagoletis pomonella*, and two *Rhagoletis zephyria*. We will then be comparing these mitochondrial genomes of the blueberry (*Rhagoletis mendax*), snowberry (*Rhagoletis zephyria*), and apple maggot flies, in order to discover any phylogenetic differences that may aid in identification between these species. We are testing the following hypotheses: 1) Retention of ancestral states hypothesis: While there are some distinctly *R. pomonella*, *R. mendax*, and *R. zephyria* haplotypes, not enough time has passed for complete fixation of alleles between the species. 2) Divergence of ancestral states hypothesis: There are distinct *R. pomonella*, *R. mendax*, and *R. zephyria* haplotypes, which demonstrates the fixation of alleles between the species. We anticipate a distinct divergence between the *R. mendax* genome and the two others. However, we expect too much retention of the ancestral genome between *R. pomonella* and *R. zephyria* to develop a definitive genetic test.

CELL BIOLOGY, GENETICS, AND GENOMICS POSTER PRESENTATIONS, SECTION 4 BALLROOM, 3:00 PM to 4:30 PM

ELUCIDATING THE LANTHANIDE-DEPENDENT NETWORK AND ITS IMPACT ON THE PYRROLO-QUINOLINE QUINONE ROLE IN METHANOL DEHYDROGENASES

Zachary Jansen

Poster: 148

Mentor(s): N. Cecilia Martinez-Gomez (Microbiology)

Methylobacterium extorquens AM1 is an aerobic methylotrophic bacterium 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 use lanthanides instead of calcium, named XoxF1. XoxF1 is a pyrrolo-quinoline quinone (PQQ) 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 synthesizes PQQ. Our hypothesis is that the mutations in *Meta1_1746* and *Meta1_1747* encodes for an uncharacterized protein that facilitates the incorporation of PQQ into the XoxF protein. Without PQQ, XoxF is unable to catalyze the methanol oxidation reaction, and therefore unable to grow. In order to test our hypothesis, a plasmid overproducing XoxF1 (pLB01) was transformed into *Meta1_1746* and *Meta1_1747* and grown on methanol plus lanthanum. Purification of XoxF from these cultures when compared to the wild type condition showed differences in kinetic properties along with PQQ content.

THE SUNSCREEN COMPONENT OXYBENZONE HAS AN ESTROGEN-LIKE EFFECT IN THE UTERUS OF MICE

Julle Joseph

Poster: 149

Mentor(s): Richard Schwartz (Microbiology and Molecular Genetics)

Environmental endocrine disruptors are compounds that can cause negative health effects due to their interactions with the endocrine system. One environmental endocrine disruptor of concern is oxybenzone (also known as benzophenone-3 or BP-3), a primary UV blocker in sunscreen that is easily absorbed into the body through the skin. In this experiment, the effect of BP-3 on uterine epithelial height (UEH) of pubertal mice was tested to investigate whether BP-3 acts as an estrogen-like compound in stimulating uterine proliferation. Ovariectomized animals were given a 5 day oral gavage treatment of varying doses of BP-3 with or without estrogen. Then, the mice were terminated and the uterus was removed, embedded in paraffin, sectioned, stained with hematoxylin and eosin, and observed under a microscope. Previous studies from the lab showed a uterine effect of dietary BP-3 at a single dosage in combination with estrogen only in pubertal mice fed a high fat diet. Therefore, in this experiment, a dose-response of BP-3 effects on UEH was examined in pubertal mice fed a high fat diet. It was hypothesized that BP-3 in combination with estrogen would augment the effects estrogen, and therefore increase UEH beyond what is observed with estrogen alone. Since estrogen increases the risk of breast cancer, understanding the estrogen-like effects of BP-3 will have implications for breast cancer risk in sunscreen users, especially adolescent females going through puberty.

DIFFERENTIAL EFFECTS OF ESTROGEN DEFICIENCY AND TYPE 1 DIABETES ON THE SMALL INTESTINE

Heather Mallin

Poster: 150

Mentor(s): Laura McCabe (Physiology)

Estrogen deficiency (ED) and Type 1 Diabetes (T1D) are conditions that have both been shown to cause bone loss. With the extended lifespan of T1D patients, the number of post-menopausal T1D women is increasing. Recent studies suggest that gastrointestinal tract inflammation, marked by altered morphology and cytokine expression, may contribute to ED- and T1D-induced bone loss. In the present study we examined the effect of ED, T1D, and ED+T1D on intestinal morphology, goblet cell numbers, and cytokine expression in female mice. Balb/c mice were either sham operated or ovariectomized (OVX) to induce ED. Half in each group were then injected with streptozotocin to induce T1D. Sections of the small intestine were fixed and stained with Periodic acid-Schiff and hematoxylin and eosin to examine intestinal parameters. Both jejunal and ileal villi length and width increased under T1D conditions, whereas OVX had no effect. Crypt depth significantly increased in all sections of T1D mice, but in contrast decreased in OVX mouse jejunum. Interestingly, jejunal and ileal crypt width were not significantly affected by T1D alone, but were increased in OVX+T1D mice. The number of goblet cells in the ileum significantly increased in all T1D but not OVX mice. Expression of anti-inflammatory cytokine IL-10, as measured by qPCR, significantly decreased in the jejunum with ovariectomy but not with T1D. Our results suggest that OVX and T1D elicit varying region-specific changes in small intestine morphology, goblet cell production, and cytokine expression, and that some responses in the combined condition (OVX+T1D) are modified.

COMPETITION BETWEEN CONTINUOUSLY ADAPTING LINEAGES IN ASEQUAL POPULATIONS

Joseph Mulka

Poster: 151

Mentor(s): Jay Bundy (Microbiology and Molecular Genetics), Noah Ribeck (Microbiology and Molecular Genetics)

In an asexual population, the fate of a beneficial mutation depends strongly on how its lineage competes with other mutant lineages within the population. With high beneficial mutation rates or large population sizes, competition between contending mutations is strong, and successful lineages may accumulate multiple mutations before any single one achieves fixation. Most current theory of asexual populations either neglects this multiple mutations regime or introduces large simplifying assumptions. Here, we develop a theoretical framework that describes the dynamics of adaptation and substitution over all regimes of mutation by conceptualizing the population as a collection of continuously adapting lineages. This model of "lineage interference" shows that each new mutant's advantage over the rest of the population must be above a critical threshold in order to be likely to achieve fixation. We use this framework to examine the adaptive role of different mutational effect sizes across the transition to the multiple mutations regime.

CHANGES IN DNA QUANTITY IN THE HUMAN TIBIA AFTER SURFACE OR SUBSURFACE BURIAL

McKenzie Slewert

Poster: 152

Mentor(s): David Foran (Integrative Biology)

Forensic scientists are often tasked with identifying individuals based on DNA analysis of skeletal remains. However, a number of variables can influence the success of such analysis, which have not been thoroughly examined. The purpose of this study was to determine if DNA quantity is relatively uniform within bone, and how it is affected by burial. Tibia pairs from five unpreserved, donated bodies were macerated and cleaned of soft tissue. Preceding burial, two proximal, two distal and one medial location on each tibia were drilled to obtain ~30 mg of bone powder. Next, one bone of each individual was placed on the surface of the ground and the other was buried approximately one foot underground. After one week and one month the tibias were exhumed and the drilling process repeated. DNA from each bone sample was extracted, and the quantity of mitochondrial and nuclear DNA was determined using quantitative PCR. The mid diaphyses of each tibia were found to have the highest quantities of DNA at all time points, while the proximal and distal ends had similar, lower amounts. Interestingly, DNA yields from the midshafts increased after one week of burial, while yields decreased for the other regions. After one month all regions showed sharp declines in both mitochondrial and nuclear DNA, most strongly in subsurface burials. The results indicate that the mid diaphysis yields the highest quantities of DNA, and degradation there occurs less rapidly, therefore this region of tibia is most beneficial for DNA analysis and human identification.

DIFFERENTIAL MAST CELL RESPONSE BETWEEN TH1 (B6) AND TH2 (BALB/C) MICE IS REGULATED BY G-PROTEIN COUPLED RECEPTOR KINASE 2

Canchai Yang

Poster: 153

Mentor(s): Hariharan Subramanian (Physiology)

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

ACTIVATION OF THE SIRT1-LXR SIGNALLING PATHWAY IN RETINAL PIGMENTED EPITHELIAL CELLS PROMOTES CHOLESTEROL METABOLISM

Kiana Wood

Poster: 154

Mentor(s): Julia Busik (Physiology), Sandra Hammer (Physiology)

Diabetic Retinopathy (DR) is a sight threatening disease with few treatment options. Dyslipidemia has shown to play a significant role in DR progression. Liver X Receptors (LXR α/β) are known cholesterol metabolism regulators that play a role in preventing pro-inflammatory gene upregulation. Retinal Pigmented Epithelial Cells (RPEs) are important in retinal cholesterol uptake and elimination and are affected by DR. SIRT1 has recently been shown to activate LXR in non-retinal studies but the role of the SIRT1-LXR signaling axis in DR remains unknown. Bovine RPE were treated with TNF α , and the role of SIRT1-LXR signaling axis was examined using SIRT1 activator SRT1720 and LXR activator DMHCA. LXR α/β , the ATP binding cassette transporters (ABCA1-ABCG1), and cholesterol metabolizing enzymes (CYP27A1, -46A1, -11A1) were analyzed using qRT-PCR. SIRT1-directed siRNA was used to inhibit SIRT1 expression levels. LXR α/β , ABCA1 and ABCG1 mRNA levels decreased when BRPEs were treated with TNF α ($p < 0.01$). All cholesterol metabolizing enzymes were decreased when treated with TNF α ($p < 0.01$). Furthermore, treatment with SIRT1 activator, SRT1720, prevented TNF α -induced ABCA1 and ABCG1 downregulation ($p < 0.001$). LXR activator, DMHCA, prevented TNF α -induced ABCA1 and ABCG1 downregulation ($p < 0.01$). Additionally, SIRT1 inhibition decreased CYP11A1 and ABCA1 levels ($p < 0.05$) while having no statistical effect on LXR α/β expression. Inflammatory cytokine stimulation caused a decrease in retinal CYPs and transporter proteins. Activation of the SIRT1-LXR signaling axis prevented TNF α -induced downregulation of cholesterol

metabolism in retinal cells. Taken together this work suggest that activation of the SIRT1-LXR pathway can help restore normal cholesterol metabolism in diabetic retina and prevent dyslipidemia-induced retinal pathology.

COMMUNICATION ARTS AND SCIENCES

ORAL PRESENTATIONS, SECTION 1 ROOM 41, 1:30 PM to 3:30 PM

IN DEFENSE OF “SLACKTIVISM”: ONLINE ACTIVISM & EMPATHY

Jay Hull

Time: 1:30 PM

Mentor(s): Kate Birdsall (Writing, Rhetoric, and American Cultures)

With the proliferation of the internet, ideas and information can be shared easier and farther than ever. In theory, this would mean grassroots activism and communities like the Riot Grrrl movement of the 1990s could be more active and reach a broader audience. However, the charge of “slacktivism” accuses people who are involved in online activist communities of staying in their own isolated bubbles of beliefs, sharing links that confirm their own views to feel good about themselves, and not following up their words with actions that create any real change. With the internet also comes the ability to communicate and connect with people of diverse geographic and social groups. Online connections are often seen as lesser than face to face relationships because it is much harder to form empathetic connections online. The need for empathy not only in personal relationships, but also in activism, contributes to the notion that online activism is hollow and without real effect. Using the context of queer theory and the riot grrrl movement, this research examines online communities and the forms of activism those communities promote. We seek to understand the various intended purposes and audiences of online activist spaces and how they influence face to face communication and activism. This project also investigates how empathy works in online spaces and how communication in online spaces can increase face-to-face empathetic communication within and across communities by establishing a base knowledge and common language for people to reach others with.

DEVELOPMENTAL CHANGES IN THE BRAIN NETWORK OF L1 AND L2: EVIDENCE FROM CHINESE-ENGLISH BILINGUAL CHILDREN AND ADULTS

Madeleine Dodson-Garrett

Time: 1:45 PM

Mentor(s): Fan Cao (Communicative Sciences and Disorders)

Previous studies on bilingual adults have revealed great overlap between brain activation in first language (L1) and second language (L2) during visual word processing. However, it was unknown whether this was also true for bilingual children. Developmental changes in neurocognitive networks for visual rhyming processing in L1 (Chinese) and L2 (English) were examined in 35 adults and 27 children who were Chinese-English bilingual using fMRI. We found greater similarity of brain activation between L1 and L2 for adults compared to children. This finding suggests increasing convergence between brain networks for L1 and L2 with learning, whereas children as beginning learners tend to have greater differentiation between L1 and L2. Key word: bilingual children; bilingual adults; rhyming processing; neurocognitive networks; fMRI

PRODUCER FOR FOCAL POINT NEWS

Kendall Ashman

Time: 2:00 PM

Mentor(s): Bob Gould (Journalism)

I will be sharing a binder I created for myself and future producers of Focal Point News and I will explain my involvement with Focal Point. I became acquainted with Focal Point last year as a Freshman and immersed myself with the broadcasting program; by following and learning from the reporters and helping out on show days. Bob Gould asked me the following year to produce for Focal Point News with an independent study. This fall I felt very overwhelmed and had very little experience with producing, I felt that there was very little guidance for me but a lot of expectations. I decided I would write down everything to self-teach myself how to be the best senior producer—I created a binder to help myself as well as future producers in the following years with information on how to create a rundown, graphics, and run production meetings. I also felt that it was important to involve lower classmen with Focal Point, and provide them an opportunity because I believe freshmen are very limited with opportunities in the broadcasting department. In the fall a reporter and I met with Freshmen students and taught them the basics of a camera, and how to shoot, edit, and write.

This spring I am reaching out to the freshmen and assigning them to senior reporters, in which they can mentor the freshmen.

MISSION POSSIBLE

Chelsea Dickens, Mia Swanton

Time: 2:15 PM

Mentor(s): Howard Bossen (Journalism)

Fantastical and scientific concept art of man in space has been a vital part of scientific and social history for centuries. The National Aeronautics and Space Administration, NASA, worked relentlessly for decades to get man on the moon and throughout outer space. During the Cold War, in order to rally the nation around their efforts it was essential to show the public just what was happening behind closed doors. The concept pieces in our project are focused on ways for NASA, space contractors (Boeing, Lockheed, etc.) and the press to inform and inspire the public in their conquest of space. Artists from both the United States and Soviet Union created the concept art. Space artists showcased the possibility man could have technologically. Each nation racing to the moon rallied national support via concept art and photographs released to the public and the press. This art was also inspirational for movies and television shows, for example the 1955 movie *Man in Space*. Our findings suggest the significance of each image was to inspire new innovations for which without we would not have the scientific knowledge and technology we know today. The NASA, United Press International and Associated Press Wire concept drawings we have been working with are just a few of the images that will be part of a large photographic exhibition at Michigan State University curated by Professor Howard Bossen and co-curated by Kathy Bossen.

COMMUNICATION ARTS AND SCIENCES POSTER PRESENTATIONS, SECTION 1 BALLROOM, 9:00 AM to 10:30 AM

READ SOMETHING, SAY SOMETHING: DIGITAL BYSTANDER INTERVENTION

Maddie Barnes

Poster: 157

Mentor(s): Saleem Alhabash (Advertising and Public Relations)

In 1964, Kitty Genovese was murdered outside her apartment in New York City. Despite the fact that the crime scene had 38 witnesses, no one assisted Genovese or even called the police. Darley and Latene (1968) concluded that bystanders do not assist victims due to diffusion of responsibility and social influence in physical settings. With new and social media, aggressive behaviors online are widely prevalent with dire short- and long-term health and psychosocial effects on both victims and perpetrators. Research conducted by our team shows that while participants report seeing their peers and others being bullied on social networking sites, much fewer intervene to help the victim or confront and contradict the perpetrator. This study investigated the conditions under which college students will intervene when they witness digital aggression. Using a social media application called "Scuttlebutt" (modeled after Yik Yak in that users are anonymous), the study investigated the effects of the severity of racial attacks (high vs. moderate vs. control) as well as the number of bystanders (zero vs. few vs. a lot) on the likelihood and nature of intervening. Participants (N = 398) were exposed to messages with varying degrees of malicious themes and varying numbers of bystanders. In addition to rating the messages, participants were also able to indicate behaviors upon message exposure (up-vote, down-vote, report, or comment). Our preliminary findings showed that participants were more likely to intervene in passive (i.e., down-voting) than proactive (i.e., commenting or reporting) ways in such cases of digital aggression.

DIFFERENTIATING GENERAL FROM TASK-SPECIFIC SELF-EFFICACY

Robert Aultz, Plet Braun, Rachel Posler

Poster: 158

Mentor(s): Julia DeCook (Media and Information), Christopher Dishop (Media and Information), Rabindra Ratan (Media and Information)

Self-efficacy is one of the most sought after traits organizations seek to embellish in their employees. Historically studied as a task-specific process, recent work suggests that promoting general self-efficacy can provide organizational benefits. Although these are valuable insights, our understanding of self-efficacy has been limited in several ways. First, self-efficacy is usually studied as an antecedent to other outcome variables, despite growing evidence that self-efficacy should be studied in relation to past performance. Second, studies generally focus on either task-specific or general self-efficacy without appreciating how they differ in response to the same antecedent. This study will examine both general and task-specific self-efficacy before and after a team performance episode to add to the field's knowledge on this key

construct. We hypothesize that, consistent with behavioral plasticity theory, low performance will be particularly detrimental to individuals with low initial task-specific self-efficacy. General self-efficacy, on the other hand, will not be deterred. After completing initial surveys measuring both task-specific and general self-efficacy, participants played Portal 2, a video game that demands cooperative interactions, for 30 minutes. They then took a post-survey that measured the same variables. Data are currently being analyzed.

AVATARIFICATION AND GENDER STEREOTYPES ABOUT GAMES AND STEM FIELDS

Piet Braun Rachel Posler, Chanon Sethaburta, Kaleigh Wisely

Poster: 159

Mentor(s): Joseph Fordham (Media and Information), Rabindra Ratan (Media and Information)

Gender stereotypes have been found to negatively impact gaming performance, as well as influencing gendered perceptions of science, technology, engineering, and math (STEM) fields. This research focuses on avatar creation, and its effect on reducing negative effects of stereotype threat in the context of gaming, as well as utilizing the Proteus effect to empower avatar users in specific, non-game contexts. The experiment consisted of participants completing a prompt to create an avatar in the game Destiny. Based on randomly assigned experiential conditions, participants were told to design their avatars to either reflect; their actual self, an alter ego, or to appear game appropriate. Immediately before gameplay, gender-related stereotype threat was induced (or not) by asking participants to rate the offensiveness of sexist or non-sexist threatening gaming messages. Following this, participants play the opening level of Destiny for 20 minutes or until completion. Self measured metrics of gameplay ability, and STEM-gender perception were taken before and after gameplay appropriately. Results suggest that men performed better when using avatars reflecting their actual self. Whereas women's avatar type did not appear to influence their performance. These findings suggest that further analysis with a larger dataset will provide more insight to the effect of avatar creation and gaming efficacy.

MODELS' AGE IN ALCOHOL ADVERTISING: INVESTIGATING PSYCHOPHYSIOLOGICAL RESPONSES, EVALUATIVE AND BEHAVIORAL OUTCOMES

Emily Clark

Poster: 160

Mentor(s): Saleem Alhabash (Advertising And Public Relations)

Exposure to alcohol advertising and marketing via social media have a large impact on the underage youth's alcohol use onset, frequency and intensity of alcohol consumption, as well as excessive use of alcohol, all of which have significant health risks. This study examines the psychophysiological responses, evaluative outcomes, and alcohol use probability among underage youth upon exposure to alcohol and soft drink ads that vary in the perceived age of models. In addition to obtaining self-reported ratings on alcohol ads featuring models of a range of ages, psychophysiological measures were used in order to obtain data on participants' cognitive and affective processing. The sample consisted of 121 Michigan youth aged 18-20. The results showed that participants experienced greater cardiac deceleration (indicative of cognitive resource allocation) and greater electrodermal activity (indicative of arousal) upon exposure to alcohol ads featuring younger-looking models. In terms of self-reported measures, our findings showed that the perceived age of the models in alcohol advertising contributed participants' expression of intentions to consume alcohol.

STUDENT-FACULTY COLLABORATION IN A FEMINIST WORKSPACE

Sabrina Hirsch, Hannah Countryman, Elena Cronick, Jessica Kukla

Poster: 161

Mentor(s): Alexandra Hidalgo (Writing, Rhetoric, and American Cultures)

This presentation follows four undergraduate students as they collaborate with a faculty member to create and produce content in a feminist workspace while running *agnès films*, a digital publication supporting women and feminist filmmakers. Interviews, reviews, essays, articles, featured member narratives, and original videos are among the content *agnès films* publishes. All of *agnès films*'s content is created and published through a feminist creative process. Working with students, faculty, filmmakers, and critics from across the globe the *agnès films* team strives to share many unique experiences and a variety of feminist perspectives. This work is made possible through collaboration both in person and digitally. In curating a digital feminist workspace *agnès films* values feminist ethics in engaging with coworkers, staff writers, and members. The *agnès films* team regularly meets in a location that is oriented towards collaborative work. The roundtable format of our space allows for easy and free-flowing discussion, sharing of ideas, and collaboration. Ideas are regularly workshopped within the space and group input is highly valued. Our team and workspace are run with the tenets of a feminist film crew. That is, everyone has a specific role, but collaboration occurs frequently and decisions are made with input from all group members.

DEVELOPING A PATIENT-CENTERED MHEALTH APP FOR ADOLESCENTS WITH TYPE 1 DIABETES

Molly Kaiser

Poster: 162

Mentor(s): Bree Holtz (Advertising and Public Relations)

This research sought to determine the perceptions of children with type 1 diabetes (T1D) and their parents regarding how our mobile phone app can aid in the transition of diabetes self-management. Parents are typically in charge of managing their child's diabetes. When it is time to transition the care from parent management to child self-management, the process can prove to be difficult, because of the complexity of managing T1D. Focus groups were conducted with children ages 10-13 with T1D (n=5) and their parents (n=7). The data collected in the focus groups were audio recorded, transcribed verbatim, and coded. Using inductive thematic analysis, part of the team iteratively developed a set of themes that captured the focus group dialogue. The codes were presented to the group for clarification and feedback. Two team members coded a random selection of the transcripts to ensure reliability. Once reliability was obtained, each transcript was coded independently. The coders met to compare and evaluate the codes. Disagreements were resolved through discussion. Four key themes were identified: 1) diabetes is unpredictable; 2) negative and frustrated communication; 3) motivations to use an app; and 4) feedback specific to our app. Although independence and full self-management is the ultimate goal, our study showed that the ability to customize the app, along with increasing positive communication between the parent and the child, would create better T1D self-management.

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

A STUDY ON AVATARS AND HIP HOP EDUCATION

Justine Alexander, Aileen Dwyer, Hanna Wong, Whitney Zhou

Poster: 165

Mentor(s): Julia DeCook (Media and Information), Rabindra Ratan (Media and Information)

In recent years, there has been a movement to try and teach STEM and other topics through hip hop education, where topics are taught using rap. Although this education practice has gained attraction and been implemented in more places, the effectiveness of these initiatives is still being called into question. There has also been attention called to the fact that issues that prevail in hip hop regarding race and gender also are prevalent in STEM, particularly against women and minorities. The purpose of this research study was to identify the relationship between hip hop education, race and gender. In order to get at underlying implicit as well as explicit attitudes towards women and minorities, we used an Affect Misattribution Procedure pre and post and had a pre and post survey with explicit measures of sexism, racism, and attitudes towards STEM. For the experiment, we had participants perform an educational STEM-focused rap through an avatar. In another condition, we had them read the same rap to a classical music backdrop (like a spoken word poem), and manipulated the avatar's race and gender for every participant. Afterwards, participants filled out a worksheet with material that was included in the rap. We predict that the race and gender of the avatar as well as which condition (rap or classical) is performed will impact retention of the rap content, and hope to demonstrate that hip hop education may or may not be as effective depending on the message sender.

FOOD AND TRUST: COMMUNITY ATTITUDES AFFECT WILLINGNESS TO ACCEPT APPLICATION

Hauwa Abbas

Poster: 166

Mentor(s): Ashley Sanders-Jackson (Advertising and Public Relations)

Flint residents faced substantial stressors including the lead water crises and depopulation. A healthy diet can mitigate exposure to lead and creating an intervention to help people in Flint eat healthier is therefore essential. One of the many negative consequences of the water crises was a general sense of distrust in the community, which we anticipated would affect acceptance of an app-related intervention to improve eating. We collected data in Flint, recruiting people through a local newspaper, Craigslist, a table at the local farmer's market and library by attending community events. We completed six focus groups in Flint (of roughly 10 participants each) that typically lasted between 60 and 90 minutes (N=64 participants). Here we describe the focus group data. Our participants were 91% Black or African American, 9% White, 54% Female, 45% Male and with an income distribution of 39% made less than \$10,000, 26% made between \$10,000 - \$19,999 and 24% made between \$20,000 - \$29,000. As part of the groups we asked people to map where they found food and where issues arose. We found that all of the grocery stores within the Flint city limits were

small and often has low quality food that was either expired or rotten. We also found that participants were unlikely to trust outsiders (like MSU researchers) unless they were willing to invest in the community.

HISPANICS AND THE 2016 ELECTION

Rachel Beard

Poster: 167

Mentor(s): Manuel Chavez (Journalism)

An analysis of the role of Hispanics in the United States in the 2016 Presidential Election. Research includes content analysis of the news media, such as CNN and The New York Times and how they portrayed the Hispanic vote prior to the election, as well as analysis of who Hispanics cast their vote for in the 2008, 2012 and 2016 US elections. During the 2016 presidential race, Donald Trump made several comments about Hispanics in the US, especially Mexicans, that sparked outrage within the Latino community. This analysis seeks to determine what impact those remarks actually had on Latinos in the US, if any, when it came to their votes for president.

TRANSLATING ENVIRONMENTAL RESEARCH AND ISSUES FOR THE PUBLIC

Natasha Blakely

Poster: 168

Mentor(s): David Poulson (Journalism)

Blakely wrote articles for Great Lakes Echo, the environmental news service funded and founded by the Knight Center. These articles allowed her to gain valuable experience in both professional journalism and knowledge of the environmental concerns of the Great Lakes region. Through interviewing, writing and editing, she gained new experiences to prepare her for a future as a journalist, particularly in environmental journalism. She also accrued a collection of articles to use in her portfolio.

LEARNING FROM MIXED REALITIES WITH A TWIST OF STEREOTYPES

Josephine Boumlis, Matthew Brazler, Conner Lai, Jason Troppens

Poster: 169

Mentor(s): Jessica Francis (Journalism), Kuo-Ting Huang (Media and Information), Rabindra Ratan (Media and Information)

Augmented reality (AR) and virtual reality (VR) have become selling points of modern smartphones and have been applied to different fields. The first purpose of this research was to see if the sense of spatial presence was influenced by these two immersive features, and how players' experiences of AR and VR influenced the outcomes of their science learning. The second purpose of the research was to investigate the impact of stereotype threats: to the extent to which reminders of stereotypes influenced performance in this setting. A mixed reality experiment was conducted to compare the effects of AR and VR and examined the impact of stereotype threats. All Participants were randomly assigned to two different conditions (AR first or VR first). Also, half of the participants were assigned to read an article before the experience which says that women have been found to not do as well as men in the context of gaming (i.e., stereotype threat prime). The other half read an article saying women are just as good at gaming as men. The outcomes for science learning were measured with quiz about the content in the AR and VR (i.e., solar system information). We expected that: 1) participants' feelings of spatial presence and learning outcomes would be affected by the two immersive features differently, and 2) people in the stereotype threat prime condition would perform worse on the task and would support attitudes that men are better-suited for STEM careers than women.

COMMUNICATING FOR PERFORMANCE. DIVERSITY OR SIMILARITY?

Piet Braun, Robert Aultz, Rachel Posler

Poster: 170

Mentor(s): Julia DeCook (Media and Information), Christopher Dishop (Media and Information), Rabindra Ratan (Media and Information)

Communication is a central component to performance among teams, which are the dominant work structures in today's organizations. Two distinct research streams, however, suggest conflicting communication processes that enable team performance. Communication accommodation theory and linguistic style matching research suggests that building similarity between team member's speech patterns leads to increased performance. Conversely, the categorization-elaboration model and research on information sharing advocates diverse idea sharing to enable superior performance. This model would therefore propose that similarity in speech should decrease performance because it limits the possibility of diverse ideas. The present study examines these two competing perspectives to elucidate which is the most relevant for performance. In pairs, participants completed a video game (Portal 2) that demands interaction

between the two players. That is, if the two players do not speak to one another and agree on a course of action then they cannot progress in the game. During gameplay, a microphone was placed between the participants to capture the language used between the two members. The audio were then transcribed and used to determine (1) similarity and (2) the diversity of ideas shared in the speech between the two players. These variables were then related to performance on the game. Data are currently being analyzed.

FACES OF FLINT

Hannah Brenner

Mentor(s): Geri Zeldes (Journalism)

“It’s still there, this water crisis. It hasn’t gone away and it’s not going to go away for a while.,” said Thomas King, Flint Resident and member of the Brennan Senior Center. The city of Flint, in many ways, has become a city of statistics and “he said, she said.” Everyone is talking about Governor Snyder, how many people are without water, and false promises. The media is starting to lose interest in the day to day lives of the people that still do not have accessible water. I have been doing research on the people there and how the Flint Water Crisis is affecting their lives. By focusing on individuals of all kinds, I am creating a new narrative straight from the people affected most, from well known voices like Little Miss Flint to the elderly men and women of the Brennan Senior Center. My medium is photography. Through photojournalism and in depth conversations with these people, I have learned things that aren’t always covered by mainstream media. I have been inside their homes and communities learning about their lives and how they have changed. This presentation is on the amazing people I have met, the things they have told me, and the photos I have taken of them in Flint.

COMMUNICATION ARTS AND SCIENCES POSTER PRESENTATIONS, SECTION 3 BALLROOM, 1:00 PM – 2:30 PM

TYPES OF MODERATION IN ONLINE HEALTH COMMUNITIES:AN OBSERVATIONAL ANALYSIS

Nina Capuzzi

Poster: 174

Mentor(s): Shaheen Kanthawala (Media and Information), Rick Wash (Media and Information)

Online health communities are a major way in which individuals struggling with mental and physical illness connect and share information with each other. Often times these individuals go to these communities not only to share tips and advice regarding their illnesses, but to also give each other support and guidance through them. While information sharing is often unrestricted, moderation within these communities plays an important role in what information is allowed and not allowed to be communicated on these communities. Moderation is important in that often times moderators are vested with the responsibility to ensure that important medical advice is not being shared incorrectly. They also have the job of promoting unity and cohesiveness in these communities. Online health communities are abundant and diversified and so are the moderating techniques and tactics within these communities. This research will focus and observe how these moderating techniques differ between communities and what these different techniques do to affect the quality and quantity of information sharing on these sites. Additionally, there will also be a focus on what sites have the most traffic and use, and how the moderating techniques on these websites may influence this.

SPECTRO-TEMPORAL CUES FOR PERCEPTUAL RECOVERY OF REDUCED SYLLABLES FROM CONTINUOUS, CASUAL SPEECH

Megan Cutting, Molly Griffin, Zachary Ireland

Poster: 175

Mentor(s): Laura Dilley (Communicative Sciences and Disorders), Meisam Khalilarjmandi (Communicative Sciences and Disorders)

Function words may be highly reduced, with little to no discontinuity marking their onsets to cue their segmentation from continuous speech. The present study investigated whether reduced function words lacking onset discontinuities have residual timing cues that could be used for word segmentation. Participants (n = 51) briefly viewed sentences and spoke them from memory to elicit casual speech. They were randomly assigned to either a “function-word present” condition (n = 29) in which experimental items contained a critical function word expected to frequently blend spectrally with context, or a “function-word absent” set (n = 22) with phonetically matched items lacking the critical word. Acoustic analyses confirmed that in “function-word present” sentences, critical words lacked detectable onset discontinuities 60% of the time. Critically, in the “function-word present” condition, portions of speech containing critical function words were longer, both in terms of absolute duration and normalized for context speech rate, compared with

matched portions in the “function-word absent” condition, even when the former were highly reduced and lacked onset discontinuities. These findings suggest that relative duration cues provide substantial information which may be used by listeners for segmentation of highly reduced syllables from continuous speech.

STATISTICAL LEARNING OF TALKER RATE INFLUENCES WORD PERCEPTION

Zachary Ireland, Nikki Losievski

Poster: 176

Mentor(s): Laura Dilley (Communicative Sciences and Disorders), Elizabeth Wieland (Communicative Sciences and Disorders)

Previous studies have shown an effect of speech rate on perception of function words; slower context rate can cause a critical function word to “disappear” (e.g. or in Deena didn’t have any leisure or time). Recently, we demonstrated that listeners track speech rate statistics over an extended timescale (~ 1 hour) where this influences perceptions of words and word boundaries in reduced speech, such as “errr” in leisure or time (Base-Berk, Heffner, et al., 2014). However, it is not clear if listeners track aggregate speech rate statistics experienced across talkers, or whether statistical learning of speech rate is conditioned on experience with individual talkers or talker groups. To test these possibilities, an experiment was conducted in which two talkers (one male, one female) were chosen who frequently coarticulated and reduced words from a corpus of sentences which contained a critical function word. After a training in which listeners heard and transcribed 64 training items from each the female and the male, listeners then transcribed 36 test items which were selected for their ambiguity. During training, listeners heard either the male or female speakers as “slow” through speech rate manipulation. We hypothesized that listeners would learn the statistics of speech rates of talkers during training in a manner that would influence word perception for test items. Crucially, we found a significant Training x Test Talker interaction. Results suggest that listeners encode variation in rate in taking talker-specific statistics.

DRIVING STUDY

Jamie Miller

Poster: 177

Mentor(s): Anastasia Kononova (Advertising and Public Relations)

This experiment investigates how listening to YouTube playlists with advertisements inserted in them affects cognitive performance on a driving game task, as well as the affect that playing the game, listening to music, and hearing advertisements have on people. We are measuring cognitive and emotional processing during game playing while listening to music using physiological measures. Sensors are placed on the participants’ skin that record heart rate, skin conductance, and facial muscle movement as the participant drives and, in some cases, listens to music. The experiment has three conditions: driving only; driving and listening to a playlist; driving, listening to music with ads. We chose three popular songs, “Starboy” (The Weeknd), “Don’t Wanna Know” (Maroon 5), and “Closer” (Chainsmokers), that were carefully selected as some of the most well-known and well liked recent pop music songs. The advertising brands used for the commercials are Sketchers, North Face, and Paper Mate. The main question to answer is whether people will make more mistakes in driving when they listen to the playlists with ads as opposed to playlists without ads or not listening to music at all. We also ask a number of self-reported questions about advertisements such as memory of brand, liking of brand, ad avoidance intentions, and immersion in the task. We measure a number of control variables (e.g., brand involvement) and socio-demographic variables.

CRISIS REPORTING AND COMMUNITY ENGAGEMENT: THE ROLE OF LOCAL REPORTERS DURING THE FLINT WATER CRISIS

Jack Nissen

Poster: 178

Mentor(s): Bruno Takahashi (Journalism)

The social responsibility and role of journalists have shifted. The changing climate of communication and the problem of monetizing new mediums introduces new challenges for journalists every day. For local reporters, an emphasis is placed on the community they cover. From sporting events to public policy debates, audiences look to stay updated on their community’s news. The reporting on the Flint Water Crisis is emblematic of the state of journalism and its role to the community. I will be conducting a qualitative study on the journalists that covered the Flint Water Crisis on a local level. I’ll be showing how journalists adapted to the changing elements of journalism while still practicing their craft during a time of crisis in their community.

USING ROBOTICS TO CONNECT REMOTE TABLETOP GAMERS

Joseph O'Connor

Poster: 179

Mentor(s): Rebecca Tegtmeyer (Art, Art History, and Design)

New software has given tabletop gamers a variety of options for connecting with remote players. Most of these software are used to communicate the real time layout of the game's board or mat through a digital display. Software has eliminated the necessity of a physical board or mat completely, but connecting remote groups who are using physical boards poses problems in changing the game space in real time. I am investigating the possibilities and limitations of using a user-controlled robot to remotely manipulate physical game spaces in real time.

EDUCATORS' DISSEMINATION OF RESEARCH THROUGH SOCIAL MEDIA

Victoria Potapenko

Poster: 180

Mentor(s): Peter De Costa (Linguistics, Germanic, Slavic, Asian, and African Languages)

This research under the direction and mentorship of Dr. Peter De Costa was done to evaluate the ways educators use different forums of social and digital media to propagate their own research and publications. Before we could do any work to propagate Dr. De Costa's work, I first needed to update his Michigan State University Domains website so it not only had his most current published works listed, but also so it was more user friendly, aesthetically pleasing, and easier to navigate. I conducted research through an online newsletter called The Conversation, to see what topics are most relevant to educators. I conducted research on how the top thirty most influential educators, ranked by Education Week, used social media to network themselves as educators, and share their publications with educators, students, and the public alike. It seemed as if these educators' digital forum of choice is twitter, so Dr. De Costa and I decided that the simplest, most effective way to network was through twitter. We then decided to update his twitter page by adding a biography and location, so users would be able to identify his position much more easily. We then used the page to network- deciding on who would be the most appropriate for Dr. De Costa to connect with on twitter. Lastly, we monitored the activity on his twitter page with the activity on his website- seeing if it gathered more online traffic, or not.

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

MEDIA MULTITASKING STUDY

Kara Schafer

Poster: 183

Mentor(s): Anastasia Kononova (Advertising and Public Relations)

We conducted an online survey for Michigan State University students to take part in. The survey asked about the platforms that students used to listen to music, kinds of music they listened to, what tasks they would perform while listening to music, and their reactions to advertisements that are inserted in playlists. Our results concluded that a majority of Michigan State students who participated in the survey listened to pop and rap music the most and usually did it while driving and doing homework. Respondents also frequently used Spotify and YouTube as their main source for music and had negative feelings toward advertisements on these and other music platforms. As for the devices used to stream music, participants mostly used laptop and mobile phones. Detailed information about the results of the survey will be presented in the UURAF poster. Based on these results, we are currently conducting an experiment in Media and Advertising Psychology lab (MAP lab) in the Department of Advertising + Public Relations. We use psychophysiological tools to measure happy or sad emotions and their strength as well as attention paid to a task. The task is playing a simulation video game where participants 1) don't listen to music, 2) listen to music, and 3) listen to music with ads. We will compare these three conditions in terms of emotions our participants experience, focus on the driving task, and the number driving mistakes they make.

NEURORUNNER

Sera Sermet, Madlson Job, Conor Starrs, Scott Tobin

Poster: 184

Mentor(s): Rabindra Ratan (Media and Information)

Avatars, or virtual representations of people, are an important element of mediated experiences, especially because avatar characteristics have been shown to influence subsequent behavior. To further the research in this area, we have asked ourselves a simple question; can the way people interact with their avatars in video games affect the way they exercise afterwards? To put this question to the test, we created an “endless runner” digital game. The participant is able to fully customize the avatar to best represent their identity. The game contains many levels that range from easy to very difficult and will sometimes switch the customized avatar for a randomized one. The participant will play multiple times, each play with randomized conditions. To study how the participant copes with these changes, we have them run on a treadmill and study their athletic performance after each play. We expect that participants’ performances will be affected by these changes. Further, we are interested in the extent to which participants feel connected to their avatars. After running each time, the participant is asked to complete a survey, to indicate the level of embodiment they feel with their character. This is so that we can further assess the correlation between game play and athletic performance.

INTERESTING FINDINGS OF CURIOSITY

Matthew St Germain

Poster: 185

Mentor(s): Ken Levine (Communication Arts and Sciences)

Curiosity is an elusive concept that has been one of the most difficult areas of study for researchers across multiple fields. Loewenstein (1994) defined curiosity as “a form of cognitively induced deprivation that arises from the perception of a gap of knowledge or understanding.” There is currently limited literature focusing on curiosity in organizations as well as the operationalization of the concept. This study administered a modified version of Mussel’s (2012) German Curiosity Scale to 120 undergraduate and graduate students. Our modifications were congruent with the concept behind each item yet were designed to be more similar to the average American dialect. Consistent with earlier studies, analysis of 120 survey responses showed no significant difference between men and women on the curiosity scale. In addition, we examined if there was a specific musical genre associated with curiosity. We found significant correlations between the curiosity scale and the genres of jazz and blues. Using Loewenstein’s (1994) definition of curiosity, this could be insightful about the cognitive processes of those who enjoy more improvisational music. The finding of no significant difference between the curiosity of men and women in the work place could be an impetus for further research regarding factors inhibiting the demonstration of curiosity as well as entrepreneurship. Mussel (2012) identified a correlation between the personality characteristic of openness and curiosity which we hope to examine with a U.S. sample in the future. These are merely two intriguing areas that could act as important catalysts for further research findings.

MODALITY IN VIRTUAL REALITY AND PLAYER REACTIONS

Stefani Taskas

Poster: 186

Mentor(s): Taiwoo Park (Media and Information)

Advances in mobile and virtual reality technologies in recent years have enabled more immersive and interactive gaming experiences. The design, development, and analysis of digital games in virtual reality are in their early stages. As interest in virtual reality grows, aspects central to positive experiences in these virtual worlds need to be explored. In this study, we are surveying commercially available virtual reality games and analyzing play experiences in terms of input and feedback modalities, the size of the virtual world, player motivation and engagement, as well as negative physiological or psychological reactions. Summarizing this analysis, we are proposing a set of design guidelines and unexplored potentials for digital games using virtual reality.

SCHOOL-BASED SLP CULTURAL COMPETENCY

Katie Thompson

Poster: 187

Mentor(s): Matt Phillips (Communicative Sciences and Disorders)

School-Based Speech Language Pathologists work with students who come from a variety of different backgrounds, these backgrounds could effect how students perform during therapy. It is important for School-Based Speech-Language Pathologists to be culturally competent. This means they should be able to understand and interact with

people across different cultures. In order to do this, they must consider their own culture first and then develop appreciation for other cultures and gain knowledge about them. In order to provide services to students they need to be aware of cultural differences so that they can provide the highest level of quality.

EMOTIONAL RESPONSES TO ADVERTISEMENTS: AN EXCITATION TRANSFER THEORY PERSPECTIVE

Alexandra Torres

Poster: 188

Mentor(s): Saleem Alhabash (Advertising and Public Relations), Kristen Lynch (Advertising and Public Relations)

Amidst media clutter, advertisers are keenly interested in understanding what motivates an audience and attracts their attention. On social media, consumers are exposed to advertising messages surrounding their social newsfeeds. Using Zillman's excitation transfer theory (ETT), the current study aims to understand how the emotionality of preceding content influence processing and evaluation of subsequent advertising messages. ETT explores the influence of an episode of arousal on a subsequent emotional response. Zillman stated that depending on levels of excitation (high vs. low, and, positive vs. negative) subjects perceive media that follows the stimuli with more intense feelings. In our study, we used a 2 (valence: positive vs. negative) x 2 (arousal: low vs. high) x 3 (message repetition) within-subject factorial design. In the experiment, participants were exposed to neutral ads for low-involving products (e.g., laundry detergent), where each ad was preceded images that have different levels of valence and arousal. Psychophysiological responses—electrocardiography (ECG), electrodermal activity (EDA), and facial electromyography (EMG) — were measured during ad exposure using BIOPAC MP150. Then, participants were asked to rate their attitudes toward the ads, attitudes toward the brand, viral behavioral intentions, and purchase intentions. We expect that processing the ad will be influenced by the nature of content preceding the ads, where exposure to highly positive images will lead to more pleasant ad processing, whereas highly negative images will lead to unpleasant ad processing.

ANALYZING SAFE BICYCLING PRACTICES ON UNIVERSITY CAMPUSES

Micah Turner

Poster: 189

Mentor(s): Kami Silk (Communication Arts and Sciences)

Bicycling is a common form of transportation on university campuses. Transportation patterns in these areas are complex and potentially dangerous for bicyclists (Grembek et al., 2014). Research on university campus bicycle safety emphasizes improving traffic infrastructure to increase bicyclist safety (Kerr et al., 2013) while research regarding individual bicycling practices is scarce. Formative research is necessary to develop appropriate interventions. Formative data were collected during the fall semesters of two consecutive school years (2015 and 2016) at MSU. A total of 12 observers, stationed at different locations on campus, recorded frequencies of particular behaviors, including bicyclists': 1) utilizing designated bike lanes, 2) riding on sidewalks, 3) riding through crosswalks at intersections, 4) riding, and 5) wearing bicycle helmets. Results revealed the majority (87.7%) of bicyclists rode on sidewalks, while only 12.3% used bike lanes. These findings are problematic given the vast amount of research that confirms using bike lanes reduces risk of bicycle accidents and fatalities (Cohen, 2013). Additionally, riding on sidewalks is prohibited per MSU's campus ordinance. Many students (26%) were distracted while bicycling and many were engaged in more than one unsafe behavior. The use of bike helmets was almost nonexistent. This study is novel because few universities have conducted field observations of bicycling behaviors. The current data provide a baseline of bicycling behaviors that demonstrate potential target behaviors for safe bicycling interventions. This presentation will provide background on bicycle safety, methods used in this study, results, and intervention strategies currently being implemented on MSU's campus.

DIGITAL MEDIA

ORAL PRESENTATIONS, SECTION 1 ROOM 41, 8:30 AM – 10:30 AM

TAKE 3: A LOOK INSIDE BEYOND BOLLYWOOD 2016

Ian Courtney, Stefan Lindahl

Time: 8:30 AM

Mentor(s): Amol Pavangadkar (Media and Information)

I will be presenting on a documentary I made that follows 12 students on a study abroad trip in India. The trip was a month long, and we traveled to 6 different cities while focusing on the media in the international community. We as a team of 12 students also wrote, shot, and premiered a short film in the span of 6 days. All of the production took place at

The Ramoji Film city just outside of Hyderabad, India. Ramoji Film City is the largest film city in the world, and we had access to millions of dollars of equipment and locations.

THE CHICAGO FIELD EXPERIENCE

Chris Cleary

Time: 8:45 AM

Mentor(s): Andy Corner (Advertising And Public Relations)

I will present video displaying students who attended the Chicago field experience trip with Andy Corner. This was an observational documentary of Michigan State students who participated in the study away Chicago program this past November. While in Chicago, I captured students engaging with potential employers and alumni of all major PR industries. The content of documentary will capture students talking, listening, and networking with (Spartan alumni) employers of these companies. The video really emphasized a behind the scenes look into the trip. Beginning with meetings in East Lansing, to the train ride back to Michigan. The video will persuade students what they can benefit by joining the class/program. I interviewed a selected few students to hear their personal thoughts and comments of each company after they met. Also the video focused on the interaction between the students, to display how students are enjoying their time in Chicago. The documentary will then end with emphasizing on how important time is, organization, and professionalism is of every student. The short promo should convince the audience that the experience was an transformational experience showing the difference of moving between being a student at university and being an employee at work.

FLINT MED

Chloe Kiple, Lizzy LaFave

Time: 9:00 AM

Mentor(s): Geri Zeldes (Journalism)

This presentation dissects the layers of environmental education inherent in an innovative collaboration between a nearby university's communication college, the university's medical college and the people of Flint. Through a project tentatively titled "Flint Med," film students plan to spend two years documenting a cohort of medical students as they work and study in Flint, teaching residents to protect their health in the wake of lead-poisoned drinking water. So learners in this project include the film students, the medical students and the Flint residents -- all grappling with and learning from issues familiar to environmental educators. The purpose of "Flint Med" is to capture narratives of physicians-to-be as they grapple with the aftermath in Flint. We're creating a feature-length documentary film about third-year medical students selected to participate in a Leadership in Medicine for the Underserved (LMU) Program in Flint. Only 16 of 80 applicants are chosen for the two-year program based upon their proficiency in Spanish and a demonstration of their desire to serve disadvantaged communities. What is more important is that these students display empathy in their essays in the application and in the activities they've engaged in prior to LMU. The news satellite trucks have left Flint, but this project will continue at least for the next two years during the length of the LMU program. Our film will entertain, maybe anger, and also act as a teaching tool and model for universities responding to environmental crises through a range of inter-connected learning experiences.

REPORTING FROM SHANGHAI: MSU ADVERTISING + PUBLIC RELATIONS

Savannah Swix, Ilene Gould

Time: 9:15 AM

Mentor(s): Henry Brimmer (Advertising and Public Relations)

In November 2016, we traveled with 15 students from the Michigan State University Department of Advertising + Public Relations to Shanghai, China for ten days to document their participation in the One Show Greater China Festival. The annual international advertising competition for students is held by The One Club, a global non-profit that seeks out creative excellence in the industry. As a team of journalists, we created a daily web blog and filmed for a video documentary to share the students' experiences and details about the competition.

INVISIBLE WOUNDS

Ian Courtney

Time: 9:30 AM

Mentor(s): Amol Pavangadkar (Media and Information)

Invisible Wounds is a documentary that explores issues faced by war veterans suffering from post-traumatic stress disorder (PTSD), and ways the community can help. The community can play a vital role in helping veterans deal with the invisible wounds of post-traumatic stress disorder (PTSD). With the uses of interviews, reenactments, and

conversations with former combatants, this documentary explores what PTSD is, what veterans are going through, and how communities can help.

HOW TO VOTE: A GUIDE FOR ASIAN PACIFIC ISLANDER AMERICANS

Julie Dunmire

Time: 9:45 AM

Mentor(s): Joe Grimm (Journalism)

The goal with this project is to explain how to vote, register to vote, and vote absentee to Asian Pacific Islander American Voters. This has been done through a series of how-to videos, translated into multiple languages that break down these three processes for APIA voters who may have English as their second language. The videos' goal is to take the intimidation out of the unknown when it comes to voting. The idea is that before Election Day, this demographic can gain exposure to the voting process. This way, APIA voters will have the opportunity to see exactly what they are getting into in their first language. The videos contain footage of what documents look like, and provide a visual explanation of the voting process. Right now, there are 9 videos total in the project. Three in English, three in Mandarin, and three in Hmong.

EDUCATION

ORAL PRESENTATIONS, SECTION 1

MSU ROOM, 8:30 AM – 10:30 AM

“MAYBE THAT CONCEPT IS STILL WITH US”: ADOLESCENTS’ RACIALIZED AND CLASSED PERCEPTIONS OF TEACHERS’ EXPECTATIONS

Melissa Gutwein

Time: 8:30 AM

Mentor(s): Dorinda Carter Andrews (Teacher Education)

Teacher expectations for student behavior and academic performance have a lasting effect on student academic achievement, not only in the immediate school year but also many years later. Yet, we know very little about how students interpret and understand teachers’ expectations for them. In this presentation, I expand on the literature on teachers’ expectations for students by drawing on student voice to examine how middle and high school students describe and experience the expectations that teachers have for them, and the implications of these expectations for developing positive student-teacher relationships. Findings indicate that traditionally minoritized and traditionally privileged youth harbor racialized and classed perceptions of teachers’ expectations.

COLLABORATIVELY CREATING LEADERSHIP TRAINING CURRICULA

Madeline Aulicino, Cecelia Galvan

Time: 8:45 AM

Mentor(s): Estrella Torrez (Arts and Humanities)

Creating and maintaining leadership are necessary qualities in any good group relationship. However, building these qualities takes time and effort, especially when you are young. As undergraduate research assistants to Professor Torrez, we are working collaboratively with community members from the Lansing School District to build a leadership training curriculum as part of a community engagement project (known as the Latino System of Support) geared towards Latino high school students. This project was created in 2016 and is organized so that both the needs the program strives to address and the ways in which it will meet these needs are decided on by the high school students themselves. In response to requests from the students, this semester we have been working, alongside the Lansing School District, to create a leadership program directly tailored to the population we serve. By teaching these students methods, skills, qualities, and lessons of being a leader, we enable them to, in the future, plan and execute events aimed to support themselves and their fellow students. In the course of researching what makes a good leader, how students of this age can become effective leaders in their community, what they need to do to succeed, and more questions similar to those, we ourselves are learning the leadership and collaborative work skills we hope these students will learn.

SCREENCASTS AND SIMULATIONS IN THE LEARNING OF ATOMIC INTERACTIONS

Alec Shrode

Time: 9:00 AM

Mentor(s): Ryan Sweeder (Lyman Briggs)

Online learning resources, including simulations and illustrations, are becoming more widespread in education. Their use is especially prevalent in chemistry classes, where they can be used to visualize interactions at the molecular level. To understand their use and impact on students, both a guided simulation activity and a screencast were developed to be used with a PhET simulation. These were developed for outside-of-class use, and was the students' first college exposure to the topic. The guided activity led students through a series of questions while interacting with the simulation directly; the screencast was an expert narrated short video demonstrating usage of the simulation which led students to answer the same questions. General chemistry students at two universities were split into two groups and each was given one of the learning treatments. Pre-tests and follow-up questions were analyzed to identify learning gains made by the students. An initial study indicated that neither treatment was particularly effective nor were there notable differences between the two treatments. After revisions, both treatments lead to student learning gains, but few differences exist between them. This result highlights the importance of revising and fine-tuning online learning materials to make them be the most effective. The results of this study will help the efforts of educators in all disciplines be able to use online resources and materials to their full potential.

REFLECTIONS ON MY JOURNEY WITH THE MY BROTHER'S AND SISTER'S KEEPER PROGRAM: DOING AUTHENTIC CIVIC ENGAGEMENT

Ryan Roehler

Time: 9:15 AM

Mentor(s): Kevin Brooks (Arts and Humanities)

In my paper, I argue the critical importance of first gaining an understanding of one's own identity and community affiliations before partaking in meaningful civic engagement work, where one strives to understand the identities of community members and how those identities are positively or, more importantly, negatively influenced by institutional and systemic forces. Through this process, I contend, one grows more cognizant of a community's struggles and needs, and begins to forge genuine, trusting relationships with community members in order to work alongside them to affect lasting growth and change within their community. I construct my theoretical analysis around my two years of mentoring experience with the My Brother's and Sister's Keeper program at Michigan State University, an early intervention program for at risk, African American youth from Detroit, grades six through eight, in which they are exposed to a college atmosphere and encouraged to explore their academic and personal interests through the lens of Afrocentrism.

THE LIFE OF A TEACHER CANDIDATE: TACKLING SENSITIVE ISSUES IN THE CLASSROOM

Cyntara Herndon, Victor Ruiz

Time: 9:30 AM

Mentor(s): Alyssa Dunn (Teacher Education)

It is very common for educators, who are not of color, to avoid vulnerable discussions that may heavily impact their students. Conversations regarding issues of police brutality, racism, sexism and xenophobia are just a few of examples of things that may impact students in a classroom. But how does an educator know what and what not to address in the classroom? Do teacher preparation programs play a role in the absence of sensitive classroom conversations? Does an educator's ethnic background and upbringing play a role in the comfort of teachers leading conversations that involve these issues? This research delves into these issues as it focuses on one of the top teacher preparation programs in the country (Michigan State University). Current teacher education students are presented with questions, in an interview style, that reveal the comfort of prospective teachers leading discussions about systematic issues in their classrooms. Succeeding the recent presidential election, teacher candidates are confronted with the challenge of confidence as it relates to making their students feel accepted.

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

IDENTIFYING RATES OF PARENT-RATED BEHAVIORAL CONCERNS AND PROTECTIVE FACTORS IN A MID-MICHIGAN HEAD START POPULATION: DATA AGGREGATION BY COUNTY

Hadleigh Buchler, Jacqueline Emery

Poster: 193

Mentor(s): John Carlson (Counseling, Educational Psychology, and Special Education)

Through the Social Emotional Screening project, we researched behavioral risk and protective factors in preschoolers enrolled in Head Start programs across four counties in Mid-Michigan. The purpose of this presentation is to present a summary of scores obtained on the parent-rated Devereux Early Childhood Assessment-Preschool (DECA-2) in order to assess the level of risk the target population may have for future behavioral problems. By assessing the scores, we will be able to determine which Head-Start classrooms need the most mental-health supports. Data will be aggregated by county and summarized for the Total Protective Factors and Behavioral Concerns subscales. The level of behavioral risk found in our sample will be compared to the level of social-emotional risk reported for Head Start enrollees within the literature. Implications of these findings will be provided to future Kindergarten programs in order to identify potential mental health supports to meet needs.

CHALLENGES WITH STANDARDIZED TESTING AND COGNITIVE DISABILITIES

Emily Cervone

Poster: 194

Mentor(s): Kate Sonka (Academic Technology)

Over the years, the conversation regarding the growing resistance to high-stakes standardized testing has begun to include the accommodations—or lack thereof—for learning and cognitively disabled students. To make things more complicated, most standardized testing starting in high school, including the ACT and SAT, requires an IEP (Individualized Education Program) form for validation. According to the Michigan Department of Education, this process requires multiple evaluations of the student as well as meetings with school counselors to ensure progress. However, many cognitive disabilities, like mood and anxiety disorders, are not discovered until late teens and early 20's. Dr. Tawa Sina, MSU Psychologist, says that some students may not apply for these accommodations due to the stigma surrounding these disorders as well. This creates a vicious cycle where the student will not receive the appropriate adjustments to their tests and will perform poorly. Sadly, underachievement has wrongly been related to those with these disabilities purely for these reasons. Because of this, there needs to be a more widespread conversation regarding the struggles with navigating testing with disabilities, perhaps using alternate forms (oral tests and short-form exams) that would better suit a wide variety of students and their abilities. I am exploring this topic with a variety of sources, including the Michigan Department of Education, students registered through RCPD, school psychologists and testing agencies to figure out what students with disabilities are currently doing to navigate standardized testing and how they can improve their options as well.

THE RELATIONSHIP BETWEEN STUDENT INTEREST AND ACHIEVEMENT IN ENGINEERING

Alan Chen, Harmony Murray, Joe Onah, Kathryn Schwartz

Poster: 195

Mentor(s): Lisa Linnenbrink-Garcia (Counseling, Educational Psychology, and Special Education), Cary Roseth (Counseling, Education Psychology, and Special Education), Jennifer Schmidt (Counseling, Education Psychology, and Special Education)

Student interest in an academic domain has been shown to be linked to adaptive outcomes such as achievement. Students who are more interested in a particular subject tend to have higher achievement and are more likely to perform better. This study examines the relationship between student interest and achievement of undergraduate students in the college of engineering. Many engineering students end up changing majors; therefore, it is important to understand the relationships that may lead to this decision. To test this, we administered surveys at two time points to all freshman engineering majors during the Fall 2015 and Spring 2016 semesters. Linear regression will be used to test the relationship between student interest in engineering and achievement.

AWARENESS IN SCREENING FOR AUTISM FOR EARLY CHILDCARE AND EDUCATION PROVIDERS

Ellen Hicks

Poster: 196

Mentor(s): Kristin Rispoli (Counseling, Education Psychology, and Special Education)

The following study will examine the awareness of screening for Autism Spectrum Disorder (ASD) in early childcare and education providers (ECEP). There are three research questions that will be addressed: 1) What do ECEPs report regarding knowledge and attitudes towards screening for ASD? 2) Does ECEP's accuracy in understanding of autism relate positively to knowledge in screening practices? 3) Is there a relationship between ECEP's attitudes towards screening for ASD and the number and severity of perceived barriers they report? Daycares, preschools, and universities will be contacted in Michigan to recruit practicing ECEPs. Descriptive and correlation analyses will be used to address the research questions. Results from this study will provide important information regarding the feasibility of having ECEPs screen for Autism Spectrum Disorder.

DEMOGRAPHIC AND CULTURAL RELEVANCE TO TEACHER PINTEREST ACTIVITY

Maggie Keech

Poster: 197

Mentor(s): Kristen Bieda (Education), Nicole Ellefson (Education), Kaitlin Torphy (Education)

This project focuses on the Study of Elementary Mathematics Instruction (SEMI); a research project that is directed at analyzing both how early career elementary teachers plan and enact mathematics lessons and how their colleagues provide mentorship related to mathematics teaching. Data from participating schools in Indiana, Illinois, and Michigan was collected pertaining to the Pinterest activity of each participant. This project focused on the number of math and teaching pins that each one had selected. Participants were categorized into light, medium, and heavy pinning activity depending upon the number of pins they had chosen. Such categorizations were further compared to the socioeconomic status and racial demographics of the participating schools in order to determine whether a correlation existed between school demographics and Pinterest activity. In addition, a smaller sample was studied for the purpose of evaluating whether cultural relevance was significant variable in the pins chosen by the participants. A coding system was generated and conducted to judge the cultural relevance of individual pins to the specific district of the participating schools, focusing on community factors such as whether the pin is indicative of urban or rural settings. Thus, the purpose of this project is to analyze whether Pinterest is being utilized as a social media resource across schools of varying demographics, as well as whether the pins being selected present content that is relevant to the culture of the school's community.

INCORPORATING 3D LEARNING INTO CLASSROOMS AND EXAMS

Samantha Luba

Poster: 198

Mentor(s): Becky Matz (CREATE for STEM Institute)

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

INVESTIGATING STUDENTS' EXPECTATIONS AND VALUES IN A TRANSFORMED GENERAL CHEMISTRY LABORATORY COURSE

Delaney Serlin

Poster: 199

Mentor(s): Justin Carmel (Chemistry), Melanie Cooper (Chemistry)

An ongoing transformation within the general chemistry laboratories at Michigan State University, supported by the Howard Hughes Medical Institute, replaced traditional, individual “cookbook” procedures with project-based activities. The new curriculum enables students to engage in many of the Scientific and Engineering Practices: working in groups to design experiments, collect and analyze data, and use evidence to support conclusions. The purpose of this study is to further our understanding of students’ experiences and learning within the new general chemistry laboratory structure. Through the implementation of this new curriculum, we will discuss the preliminary results on the expectations and values held by students and the resulting implications on their understanding of science.

EDUCATION POSTER PRESENTATIONS, SECTION 2 BALLROOM, 11:00 AM – 12:30 PM

A MODEL FOR SUCCESSFUL SCHOOL-MUSEUM PARTNERSHIPS

Anna Esenther

Poster: 202

Mentor(s): Denice Blair (Teacher Education)

Museums expose K-12 students to new experiences, enhancing the learning, sparking the interest, and developing the motivation of students who interact with them. Museum resources, including knowledgeable staff, present opportunities for producing positive outcomes for students, which can be accomplished through partnerships with schools as well as universities, researchers, and others. This project examines empirical articles detailing such partnerships and their results. Articles were coded (using an inter-organizational relations framework) for evidence of purpose statements, partner descriptions, resources, organization of the work, internal and external context, partnership changes and development, and outcomes. The coding results were used to build a preliminary model of successful collaborations, which we hope will inform future school-museum partnerships and ultimately benefit students.

COMPUTERIZED SCORING OF OPEN RESPONSE QUESTIONS: A CASE STUDY OF ENZYME STRUCTURE AND FUNCTION

Tanner Foster

Poster: 203

Mentor(s): John Merrill (Microbiology and Molecular Genetics), Mark Urban-Lurain (CREATE for STEM Institute), Rachel Yoho (CREATE for STEM Institute)

The Automated Analysis of Constructed Response (AACR) research group develops computer-automated tools that analyze students’ writing. Structure and Function is one of five core concepts for biological literacy identified in Vision and Change for Undergraduate Biological Education. Students must understand the relationship between three-dimensional structures and their functions in order to predict enzyme binding. This research has three strands. First, we investigated how many introductory level Biology and upper level Biochemistry textbooks represented the process of enzyme binding. Second, we collected expert responses from several instructors, and began surveying their methods for teaching enzyme structure and function. Third, we developed three versions of a question to elicit student responses considering not only structure of enzymes, but also function and energetics. From our original sample of student responses (n=147), our exploratory analysis revealed that students were more likely to consider enzyme structure, including lock-and-key and induced fit models, to be the driving force for why enzymes bind to their correct substrates. Using WordStat (Provalis Inc.) to cluster student word choices in terms of commonality and proximity to other words, we observed that student word choices reflected these ideas of enzyme structure. Through the question versions, instructor responses, and textbook statements we will discuss the educational implications for instructor teaching and student learning regarding “structure and function”, using the case study of enzymes. Moving forward, this multifaceted approach can be used to develop questions that instructors can use to explore student thinking about structure and function.

ANALYZING THE TERMINOLOGY OF “SERVICE LEARNING” AND ITS FUTURE IMPACT

Jonathan Miller, Xue Wang

Poster: 204

Mentor(s): Terry Flenbaugh (Teacher Education)

Educators worldwide advocate for service-learning programs to be integrated into their students' learning. An ever growing number of colleges and universities incorporate it into their classroom and curriculum. As service-learning enables education students to gain firsthand classroom experience, there exist risks of unsuccessful experience within the program. With regard to one critical multicultural education course at a midwestern university, a few unanswered questions related to this topic have been: Do students view the service-learning associated with the course relevant and beneficial? What are the current barriers and challenges that service-learning helps to address with students who take it? The focus of our study is to identify how service-learning is impacting future educators' thoughts about entering the education field and to see if students are able to draw connections from their service to the material that is concurrently being covered in class. In order to understand how service-learning impacts students' thinking, especially those who plan to enter the education field, we conducted a survey based on students' preconceived notions surrounding service-learning. Coupled with interview data, this study allowed us to better understand the connection that participants made from their service experiences and material covered in the class.

CHARACTERISTICS OF STUDENT MODELS THAT PERSIST FOLLOWING ELICITATION ON A HIGH-STAKES ASSESSMENT

Hannah Rose

Poster: 205

Mentor(s): Tammy Long (Plant Biology)

Students' understanding of scientific concepts fluctuates over time as they learn. Current assessments, however, typically measure specific content and do not show how students' understanding is changing. Modeling, as a tool for assessment, requires students to represent their mental models of a phenomenon. Mental models are snapshots into a student's understanding and are expected to be flexible. Repeated construction of models can show where there is consistent comprehension as well as concepts that could be challenging. This feedback is important, to both instructor and student, because it shows what concepts are solidified and where there are gaps in understanding. My research question asks, what characteristics of students' models persist following elicitation on a high-stakes assessment? We collected and analyzed models for 29 introductory biology students at two different time points, once at a midterm exam and again within two weeks following the exam. Students were asked to model origin and expression of genetic variation using a cystic fibrosis case study. In their models, genetics concepts were drawn in boxes and connected to other concepts through a relationship or mechanism. Preliminary analyses show the concepts staying the same between the two models, but a different relationship. Knowing which parts of students' models are stable and unstable can help instructors to distinguish where there is fluctuation in understanding, and help to form curriculum based on student needs.

STUDYING HOW STUDENTS CONNECT MACRO-SCALE EXPLANATIONS OF PHOTOSYNTHESIS WITH GLOBAL PROCESSES

Alexandria Walus

Poster: 207

Mentor(s): Andy Anderson (Teacher Education), Emily Scott (Teacher Education)

Carbon TIME (Carbon: Transformations in Matter and Energy) is a curriculum development project designed to teach carbon-transforming processes to middle and high school students. Each unit of this program has a pretest and posttest, as well as a pretest at the beginning of the program and posttest after all of the units have been completed. We are looking at how successfully students reason about plant growth processes (photosynthesis) and seeing how well they transfer this knowledge to a global-scale context with questions based on photosynthesis (explaining seasonal variations and atmospheric CO₂ concentrations). To do this we will analyze the written answers on plant unit posttests and overall posttests. This will give us a good understanding as to how well students connect structure-function explanations of processes at different scales: atomic molecular, macroscopic, and global. These results will also give us indicators as to which parts of the curriculum must be developed further or are successful units.

ENGAGEMENT OF STUDENTS IN SCIENCE CLASSES RELATED TO THE SENSORY STIMULATION OF A CERTAIN ACTIVITY

Jacob Webb, Matthew Pottebaum, Hannah Weatherford

Poster: 208

Mentor(s): Barbara Schneider (Education)

This study investigates the relationship between a student's engagement and various instructional approaches taken by the teacher, with a focus on the relationship between engagement and how each instructional approach stimulates the five senses. The data that is used in this study is compiled from a sampling group of 188 students from high schools across Michigan. The data was collected in four discrete sampling periods in high school chemistry and physics classes. We used a single case design to measure differences between baseline periods during which teachers implemented typical instruction and intervention periods during which teachers implemented common project-based units in their respective subject. Analysis of the data was conducted by comparing a student's engagement during the baseline and intervention periods. Additionally, we coded the common project-based units based on how they stimulated the five senses. Specifically the group analyzed: (i) the various components of "optimal learning"; (ii) the level of engagement a student experienced for a certain activity; (iii) how "optimal learning moments" correlate with variation in which of the student's senses are being used during class activities. Preliminary analysis indicates variation in levels of the components of optimal learning from students in different units, so we investigated the differences and similarities between these units and how they correspond to students' perception of challenge, interest, and skill in an activity to indicate overall engagement.

WHAT IS THE NATURE OF CHANGES STUDENTS MAKE WHEN REVISING A PREVIOUSLY SUBMITTED MODEL?

Katherine Woods

Poster: 209

Mentor(s): Tammy Long (Plant Biology)

Models are regularly used by scientists to help convey scientific concepts. Increasingly, students are asked to represent their understanding of scientific concepts through models. For scientists and students alike, models change as knowledge expands. Revisions are an important component of model-based learning and allow students to adjust and fine-tune their thinking. However, many undergraduate courses do not include revisions as part of assessment. This study asks, what is the nature of changes students make when revising a previously submitted model? As part of an introductory biology midterm, students were asked to create a model representing their understanding of how genetic variation results in the expression of different traits. This model was then handed back; ungraded during the final exam, and students were told they could make up to three revisions. Revisions were categorized as structural, relationship, or connection changes. Preliminary results show that students most frequently revised relationships that explain how model components are connected. Knowledge of the changes that students make when revising their models could help instructors tailor lesson plans to meet students needs; and determine the effectiveness of instruction.

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

UNDERGRADUATE STUDENTS' UNDERSTANDING OF THE ORIGIN OF GENETIC VARIATION: INSIGHTS FROM THE AUTOMATED ANALYSIS OF CONSTRUCTED RESPONSES

Hailey Cockerill

Poster: 212

Mentor(s): Andrea Bierema (Biological Sciences), John Merrill (Biological Sciences), Mark Urban-Lurain (Education)

The Automated Analysis of Constructed Response research group (AACR) develops computer-automated tools to analyze students' writing by creating scoring models that predict human scoring via a combination of computer trained scoring and statistical analyses. AACR questions focus on revealing student thinking about "big ideas" in undergraduate STEM Courses. Genetic variation is an important core concept for undergraduate biology education outlined in Vision and Change. How new genetic variants originate in a population is usually challenging for students to understand because of the common misconception that mutations are harmful. To reveal student thinking on this topic, AACR uses constructed response (CR) assessments, in which students write short answers using their own words. To understand student thinking about the origin of a new variant (trait) in a population, we developed a two-part CR question about how an isolated population of buffaloes began to exhibit a new hair color and how a rapid increase in a new hair color occurred. These questions were administered to introductory undergraduate biology students (n=401) at large universities. An exploratory analysis of those responses revealed several main themes that allowed us to develop two

analytic rubrics, a five-category for part one and a four-category rubric for part two. We scored the responses using these rubrics, and created a computer-scoring model trained with the human scored data set. The resulting AACR questions can be used by instructors to understand their students' thinking and to align their instruction with a core concept of Vision and Change.

UNDERSTANDING THE TRANSITION OF STUDENTS OF COLOR TO A PREDOMINATELY WHITE UNIVERSITY

Tim Herd

Poster: 213

Mentor(s): Terry Flenbaugh (Teacher Education)

This study examines six first-year female students of color and their expectations of what they believed they would experience at a predominately white institution (PWI). Through the use of semi structured interviews in the summer and fall, I was able to gain insight on how these students of color made sense of their experiences transitioning into a large Midwestern university. Prior research suggests that students of color do not experience predominately white institutes the way most of their white peers experience it. Undergraduate students of color have more trouble connecting to their fellow majority peers and persisting at PWIs. There is a significant amount of information that reveals how students of color make sense of their experiences at a PWI. However, less is known about what students of color expect their experience will be prior to enrolling in a PWI. This study seeks to address the following question: What do students of color anticipate they will experience at a predominately white university? Findings suggest that undergraduate students of color participating in this study felt that they would transition into this university with limited problems, although two red flags stood out during the interviews. These six students of color stated that they were prepared to encounter racism during their first few weeks on campus and they also felt that their previous schooling did not prepare them for their college courses.

TEACHERS IN SOCIAL MEDIA: CONTEXTUAL VARIATIONS IN TEACHERS' VIRTUAL ACCESS AND SHARING OF MATHEMATICAL CLASSROOM RESOURCES

Andrew Jurasek

Poster: 214

Mentor(s): Kristen Bieda (Teacher Education), Kaitlin Torphy (Education Policy)

Early career teachers (ECTs) have brought their search for the best mathematical classroom resources to the virtual realm of the Internet. More specifically, they have often searched within a social media site called Pinterest where they can save links to internet resources ("pins") as well as search through other teachers' pins on others' Pinterest "boards." Nearly all pins are from a secondary external online source, and one such commonly pinned site is Teachers Pay Teachers (TPT). This research seeks to describe the mechanisms surrounding teachers' access and sharing of TPT resources. For example, what are the patterns between teachers' district provided curriculum and texts and their seeking and sharing of TPT resources. To achieve this, 2,080 mathematical pins from a sample of 25 ECTs were analyzed. Multiple factors analyzed include the rating and popularity of the resources, the cost, whether the school district supplies teachers with a scripted or unscripted curriculum, the pressure from the district to use the curriculum, whether ECTs' school-based colleagues sell resources on TPT, the number of resources that ECTs' colleagues sell, and the number of resources saved by an ECT. These characteristics represent some of the factors teachers may consider when searching for instructional resources. This work will consider teachers as rational consumers, attempting to increase their students' achievement through supplemental instructional materials while mitigating their inherent cost. When teachers choose resources where the cost to implementation exceeds the benefit to their instruction, we may assume they are not optimizing information seeking behavior within TPT.

SCREENCASTS AND SIMULATIONS IN THE LEARNING OF SOLUBILITY

Brianna Martinez

Poster: 215

Mentor(s): Ryan Sweeder (Lyman Briggs)

As educators increasingly use the growing collection of online resources such as animations and simulations in chemistry courses, it is becoming even more important to understand the strengths and weaknesses of such resources on students' understanding of core chemistry concepts. In this study, a guided simulation activity and screencast were developed, based around the simulation designed by the PhET Interactive Simulations project, to help students from general chemistry classes learn about the dissolution of ionic and covalent compounds in water. Student understanding of the concepts were assessed through pre- and posttests, answers to assignment questions, and near-transfer follow-up questions. The simulation assignment involved students answering guiding questions as they engaged with the simulation; the screencast consisted of analogous instructions and guiding questions that the students answered as they watched an expert manipulate the same simulation. Our initial study indicated that students who engaged with the

screencast gained a better understanding of the dissolving process, more specifically, the particulate level interactions with water. The initial study also suggested, based on eye tracking analysis, that there were significant differences in the way the different treatment groups used the electronic resources. Following the initial study, the pre- and posttests were revised and the study repeated again. After revisions, evidence of learning gains were demonstrated along with significant differences between the two different treatment groups.

DO SELF-REGULATION SKILLS IMPACT A CHILD'S ABILITY TO REASON SCIENTIFICALLY?

Sydney Miller, Tarren Leszczynski, Taylor Petersen

Poster: 216

Mentor(s): Lori Skibbe (Human Development and Family Studies)

Self-regulation is a cognitive skill that involves working memory, inhibitory control, and the ability to resist distraction and stay attentive. Many previous studies have shown that there is a positive correlation between self-regulation skills in children and their literacy levels, math skills, and vocabulary (Morrison, Ponitz, & McClelland, 2010). However, less research has been conducted regarding the significance of self-regulation and scientific reasoning skills in children. In early childhood education, science helps give children the ability to analyze evidence and formulate their own explanations and arguments (Eshach & Fried, 2005). The goal of the present study is to determine if self-regulatory skills are associated with scientific reasoning skills in 3-5 year olds (N=100). The relationship between science and self-regulation will be investigated using two assessments. Children's self regulation skills were measured using HTKS (Cameron et al., 2008). A second assessment was also conducted, Mouse House, a causal reasoning task assessing a child's working memory and inhibition through storytelling and situational reasoning questions. The children were also instructed to give descriptive answers explaining their rationale, which provided further means of analysis regarding the understanding of their reasoning. The results showed that children's ability to self-regulate positively correlated with their science reasoning skills, $r=.26$, $p=.008$. The findings of this study may be useful in understanding the benefits of self-regulation in a child's education.

THE CHANGE IN AN UNDERGRADUATE'S PERCEPTION OF A BIOLOGIST

Jalpa Patel, Madison Kraus, Shals Raza

Poster: 217

Mentor(s): Andrea Bierema (Lyman Briggs)

This study focuses on how undergraduate students ($n = 25$) perceive biologists before and after taking an introductory organismal biology course. During the first and last week of the course, we asked the students to draw what they imagine a biologist does at work. We created a coding scheme based on previous published findings on students' perceptions of scientists and modified it to better suit the standards of our observations. We removed student names and pretest/posttest information from all drawings and randomly ordered the drawings (50 drawings total) before coding. Four coders coded four drawings collaboratively and then coded five drawings independently, reaching intercoder reliability (intraclass correlation coefficient = 0.96). Then three of the four coders evaluated the remaining drawings. Using the refined coding scheme and frequency analysis, we determined changes from pretest to posttest in the prevalence of certain characteristics such as an increase in the presence of animals or female scientists, and a decrease in scientists wearing eyeglasses or lab coats. Overall, this study suggests that the teaching team and the style of the course may influence stereotyping among the scientific community.

ADAPTING A TRANSFORMED UNDERGRADUATE CHEMISTRY CURRICULUM FOR HIGH SCHOOL

Robert McKay

Poster: 218

Mentor(s): Melanie Cooper (Chemistry), Ryan Stowe (Chemistry)

With the adoption of the Next Generation Science Standards (NGSS) in several states, chemistry teachers across the nation are being required to substantially rethink what they teach and well as how they teach chemistry at the high school level. Given the limited time and resources provided for curriculum development, this represents a daunting prospect for most teachers. Unless educators are provided with a framework for this substantial transformation, it is likely that the adoption of NGSS will fail to realize the envisioned revolution of the teaching and learning of science. Adapting the CLUE (Chemistry, Life, the Universe, and Everything) curriculum, which was designed for collegiate chemistry, for use in secondary school provides a solid, research-based framework to assist teachers in aligning their coursework with the Standards. Conception and refinement of CLUE occurred concurrently with and was informed by the development of the Framework. CLUE thus focuses on foundational knowledge in chemistry in lieu of large swathes of often unrelated content and incorporates the science practices put forth in the Framework. Further, CLUE is built upon "big ideas" in chemistry including: structure and properties, bonding and interactions, change and stability, and energy. Accordingly, there exists exceedingly close alignment between CLUE learning objectives and the disciplinary

core ideas (DCIs) and performance expectation of the NGSS. We report this alignment in detail here. We further discuss our plans for developing a working curricular model of CLUE adapted to the high school level.

DECOMPOSERS IN CARBON AND ENERGY MODELS

Ashley Thelsen

Poster: 219

Mentor(s): Tammy Long (Plant Biology), Caleb Trujillo (Plant Biology)

In university biology courses, there are core concepts that students are expected to become fully competent in after completing each course. Pathways and transformations of energy and matter are among the core concepts students are expected to learn. Teachers design instruction to help students understand these concepts in the context of living systems. However, many students face difficulties when learning to trace energy and carbon through non-visible components of a system. Therefore, this project seeks to evaluate students' understanding of decomposers and their hidden role in a system by asking: how do students interrelate decomposers in energy and carbon pathway models? To address this question, we analyzed student-constructed models of energy and carbon movement collected from an introductory biology exam. Relationships that linked decomposers with other organisms were then compared across the models. Our results will provide knowledge of how students interrelate decomposers to carbon and energy movement, as well as help instructors identify potential misconceptions students' have with non-visible systems.

ENGINEERING, COMPUTER SCIENCE, AND MATHEMATICS

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

MULTI-OBJECTIVE OPTIMIZATION AND VISUALIZATION

Rahul Yalamanchili

Time: 11:00 AM

Mentor(s): Kalyanmoy Deb (Electrical And Computer Engineering)

Multi-objective optimization problems give rise to a set of trade-off optimal solutions from which only one solution must be chosen by one or more decision-makers. Due to the trade-off nature of optimal solutions, the selection procedure must analyze the solutions for their trade-offs compared to other solutions. In addition to quantitative analysis, the decision-making procedure can be aided with a qualitative visualization procedure for decision-makers to have visual comparison with respective neighboring solutions. Unfortunately, visualization for four or more dimensional problems becomes a difficult task. In this project, we plan to combine multi-criterion decision analysis methods with visualization tools to identify key and important compromise solutions from the entire set of optimal solutions. Such a method will enable decision-makers to consider only a few filtered solutions, instead of a plethora of optimal solutions. We plan to demonstrate our procedure on three to 10-objective problems having different types of preferred solutions and compare our procedure with other existing methods.

CELLPHONE ELECTROCHEMICAL LAB (CEL)

Luke Wiseman

Time: 11:15 AM

Mentor(s): Andrew Mason (Electrical and Computer Engineering)

This project presents a mobile Android application able to interact with custom electrochemical circuit stimulating sensor response by playing various waveforms and automatically collecting data in real-time, thus allowing the users to mobily conduct electrochemical experiments. The app was created to allow people working in the lab to have an easier way of setting up experiments than monitoring a circuit using an oscilloscope, which does not have the option of writing data to a file in the manner that the app does, and is not nearly as mobile as a cell phone. The end result is a usable android application that works great for the provided waveforms and can simulate them without issues. Using the app, users are prompted to input a set of waveform parameters through a friendly user interface (UI) to customize their stimulus. Once the 'Start' button is pressed, the custom electrochemical circuit streams data through USB in real-time to the mobile app. While the data is being streamed, the app plots the original stimulus waveform along with the collected sensor data on several active graphs on UI for the user to inspect, and logs and saves the sensor data to a local file containing the specific date and time of the measurement. Users are also able to terminate a running experiment using the 'Stop' button on the app.

METHODS FOR DETECTING CYANURIC ACID CONCENTRATIONS IN OUTDOOR SWIMMING POOLS

Sydney Sallt

Time: 11:30 AM

Mentor(s): Susan Masten (Civil and Environmental Engineering)

Cyanuric acid is used as a stabilizer for chlorine in outdoor swimming pools. As cyanuric acid is resistant to breaking down in UV light as well as, it can accumulate in pools. When cyanuric acid concentrations become too high, chlorine is no longer able to oxidize affectively. This causes a decrease in the disinfectant ability of the chlorine and leads to cloudy pools, algal growth, and health risks. Currently, the only realistic method of removing cyanuric acid from outdoor pools is the expensive and time consuming process of partially draining and refilling the pool to dilute the chemical until it is at concentrations low enough. This is not a realistic method for pool owners. Therefore, a cost effective method of reducing the concentration of cyanuric acid in outdoor swimming pools is required. This presentation demonstrates the methods used to detect cyanuric acid concentrations in swimming pools. This information can then be used to develop suitable tests for the sustainable removal of the chemical so that it does not contaminate the water supply once pools are drained.

FIELD USE AND DEPLOYMENT OF AN OPTICAL OXYGEN SENSOR

Charles McIntire

Time: 11:45 AM

Mentor(s): Ruby Ghosh (Physics and Astronomy)

Our field-deployable optical oxygen (O_2) sensor enables in-situ, real-time monitoring of O_2 for a wide range of applications. We have recently used our sensors for measuring microbial consumption of O_2 in crop root systems and for monitoring water quality in Michigan rivers. The autonomous collection of precision data from remote field sites at the temporal resolution of interest (seconds to days) requires careful engineering and setup of the sensor's power supply, data transmission hardware and protocols, and online system diagnostics. I will describe the functionality of our system with respect to clean power and eliminating interference, maintaining and monitoring system health, and internet connectivity and automated data transfer/backup for continuous long-term deployments lasting up to many months. Data from two field deployments (three weeks in a soil lysimeter and three months in an underground site) will be presented.

HILL CLIMBING

Minseo Balk

Time: 12:00 PM

Mentor(s): Arend Hintze (Integrative Biology)

Hill climbing is a well studied optimization methods. The basic idea is to always compare two possible solutions and choose the better one. A new solution is generated from the old one, until the solution can not be improved anymore. In other words, it aims to find the maximum fitness of a given environment. Here we present such environments as a mathematical equation. With genotypes presenting solutions as values on the x-axis, and the corresponding values are on the y-axis represent fitness. We explore how mutational variation, and ruggedness of the landscape effect the chance to find the highest point of the landscape.

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

DESIGN OF BIO BASED FLEXIBLE AND RIGID POLYURETHANE FOAM FORMULATIONS USING BIO, PETROLEUM, AND SILICONE POLYOLS

Nathaniel Arnold

Poster: 650

Mentor(s): Ramani Narayan (Chemical Engineering and Materials Science)

Flexible and rigid polyurethanes (PUs) are used widely in industrial applications. Flexible PUs are used in seatings, head rests, and similar industrial applications. Rigid PUs are used in insulation applications. PUs are made by reacting polyols with isocyanates. In the BMRG lab we are synthesizing biobased polyols as replacement in part or whole for petro-based polyols. Substituting petro based polyols with biobased polyols offers the value proposition of a reduced carbon footprint. Silicone polyols allows us to tailor the properties of the final Pus. We studied polyurethane foam production

using different amount of biobased polyols. The parameters studied were cream time, rise time, and tack free time. These were compared to standard polyurethane production. Using this data, prototype box foams were manufactured to establish viability of the new biobased polyols.

USING MOLECULAR DYNAMICS SIMULATIONS TO CHARACTERIZE THE JUMPING OF SMALL CHEMICAL INTERMEDIATES BETWEEN ALPHA-HELIX PEPTIDE SIDECHAINS

Christopher Baauw

Poster: 651

Mentor(s): Scott Barton (Chemical Engineering and Materials Science)

The electrostatic assisted transport of charged intermediates between enzyme active sites through diffusion along polypeptide bridges is a mechanism utilized in various natural enzyme cascades. During this transport, an anionic intermediate (e.g. oxalate) forms hydrogen bonds with cationic side-chains along the peptide bridge. Bonding with two side-chains simultaneously following with the bonding with an adjacent side-chain results in 'jumping' of the intermediate from residue to residue and thus allowing transport along the peptide bridge. In this work, the energy required for a small intermediate to jump between two side-chains will be determined through extensive MD simulation. Methods for determining successful jumping rates will also be explored. The jumping rate of a molecule on a peptide bridge can be expressed by Arrhenius kinetics, which relates the jumping energy to temperature. With the use of this energy-temperature relationship, the jumping energy can be determined by running simulations on systems with short α -helix peptide bridges containing cationic residues (e.g. lysine, arginine) and small anionic molecules (e.g. oxalate, glucose-6-phosphate) at various temperatures. One method for determining jumping rate of the intermediate is with the use of intermediate-peptide coulombic energy data during a timed simulation. Another and possibly more accurate method involving the tracking of intermediate position relative to the peptide will be investigated and implemented to produce more reliable measurements of jumping rate.

ARE INDICATOR BACTERIA REPRESENTATIVE OF ACTUAL HEALTH RISK: A SEAWATER ASSESSMENT

Kara Dean

Poster: 652

Mentor(s): Jade Mitchell (Biosystems and Agricultural Engineering)

Indicator bacteria are used to assess water quality in sampling and monitoring programs. The concentrations of the indicator bacteria are supposed to be representative of the levels of other, more harmful pathogens. If the main indicator bacteria *E. coli* and Enterococci do not accurately represent the presence of harmful levels of pathogens, use of the water for aquaculture, drinking or recreation may pose a human health risk. One particular representation that may present a challenge is understanding and estimating the persistence of pathogens in water bodies. In the case of seawater samples, this poses a threat to both the food and recreation industry. Shellfish are often consumed raw and swimmers can ingest some of the water they are in, leading to exposure to these bacteria. This study aims to assess the validity of using indicator bacteria to represent the quality of seawater samples. A systematic literature review was performed and figures were digitized to attain the concentrations of different pathogens over time. A set of inactivation models, which characterizes the natural decay of the pathogen over time were fit to the digitized data using the method of maximum likelihood estimation in the "R" statistical programming language. The best model of the set for each pathogen was chosen based on the BIC value and then comparisons were made between each pathogen and the indicator bacteria with the T90 value. Understanding this relationship can help the various seawater industries in risk management.

CONFORMAL DEPOSITION OF NANOCRYSTALS

Tianyuan Gu

Poster: 653

Mentor(s): Rebecca Anthony (Mechanical Engineering)

Nanocrystals can be used for a variety of electronic applications due to their adjustable optical and electrical properties. In order to realize these applications, structures of varying geometry are required. Here a method for conformal deposition of luminescent nanocrystals onto surfaces of arbitrary geometry is investigated. In a single reactor, silicon nanocrystals were synthesized in a nonthermal plasma and deposited directly onto a substrate which was supported on a stand inside the plasma. Validation of a conformal coating of the nanocrystals on the substrate was accomplished through the use of scanning electron microscopy. To achieve the desired optical and electrical properties, the nanocrystals need to be crystalline: control of the crystallinity was accomplished by adjusting gas flow rates and the power to the plasma. Also, the substrate material and geometry affect conformality in deposition. To verify that the nanocrystals were crystalline, ultraviolet light was used to irradiate the sample and the response of the sample was measured with a spectrometer, if the sample exhibited a significant signal, this indicated that the nanocrystals are

crystalline. With continued variation of power, gas flow rates, and substrates, expectations are to achieve conformal deposition of crystalline nanocrystals. Our ongoing work includes studying the degree of conformality, based on the intricacy of the surfaces and their thermal and electrical properties.

LIGAND QUANTIFICATION AND RECOVERY FOR THE COPPER CATALYZED PRETREATMENT OF BIOMASS FOR ETHANOL PRODUCTION

Andrew Koziel

Poster: 654

Mentor(s): Eric Hegg (Biochemistry), Graciellou Klinger (Chemistry)

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 copper, which oxidatively breaks whole biomass down using oxygen radicals. To make this process economically viable, the most expensive input, the ligand, must be recycle. 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. One promising solution is to chelate copper from bipyridine, using a chelating resin column resulting in free bipyridine. 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.

MULTIPLEXED SCREENING OF ANTIMICROBIAL RESISTANCE AND INTEGRATION WITH INTERNET OF THINGS (IOT)

Collin Nicalse

Poster: 655

Mentor(s): Syed Hashsham (Civil and Environmental Engineering)

In the world of modern medicine, antimicrobial resistance (AMR) is a serious problem that continues to worsen. Since AMR has become more prevalent in recent history and new antibiotics are not being developed fast enough, the need to halt the growth of AMR is critical. A key first step to lessening AMR is quantifying its nature and extent globally. While some tools do exist that are helpful in characterizing the nature and extent of AMR, most are too expensive and not integrated with the web. We are developing a new approach to addressing this problem. Using a series of steps, we aim to develop a cheap, integrated platform that will quickly analyze AMR. The first step is a Texas Instruments SensorTag used as a lux sensor to quantify the AMR genes present in a sample. The SensorTag will be calibrated to read 12 wells using a stepper motor and fluorescent signals that will be captured via Bluetooth 4.0 into a cross-platform AMR App. The 12-well chip is being designed and validated in parallel so it could be used as part of the overall platform. The AMR App will then transmit the data to an IoT dashboard. We anticipate that a network of IoT-based AMR devices will be used around the globe, focusing on a set of AMR genes which can be visualized using Google's WebGL Globe. The platform is significant due to its role in quantifying, networking, and visualizing AMR more easily and economically than what is currently possible.

IN-SITU ROOT PHENOTYPING THROUGH ELECTRICAL RESISTIVITY TOMOGRAPHY

Zirui Wang

Poster: 656

Mentor(s): Jungheon Yeom (Mechanical Engineering)

We propose to develop a probe-based, non- or semi-invasive plant root imaging technique based on Electrical Resistance Tomography (ERT) and Electrical Impedance Tomography (EIT). Root system architecture (RSA) including root branching angle, primary root length, and root biomass is the main phenotype targeted by the ERT/EIT system. ERT/EIT is highly advantageous compared to the other non-invasive laboratory-based and field-deployable methods (e.g. X-ray, magnetic resonance imaging, positron emission tomography, ground penetrating radar, or photoacoustic methods) for root imaging because it does not involve ionizing radiations and can be configured as a low-cost and high throughput technique. The objective of the project is to design and fabricate a field-deployable ERT/EIT probe array using the 3D printing technology and develop a compact system for rapid and robust electrical measurements. Electrodes made from aluminum tubes are slide onto a 3d printed plastic probe with a wire soldered on the aluminum ring. Each wire passes through the center hole in the probe and comes out from the top of the probe. All the wires are connected to a multiplexer with the program logic circuit connected to an LCR meter (or other data acquisition system), which measures the impedance (resistance) between two electrodes. The preliminary results show that noticeable

differences in resistance can be detected depending on the presence of soybean roots. Currently, the research efforts are being made to address the key challenges such as contact resistance, high reliance on soil moisture content, environmental noise control, and image reconstruction.

ENGINEERING, COMPUTER SCIENCE, AND MATHEMATICS POSTER PRESENTATIONS, SECTION 2 BALLROOM, 9:00 AM – 10:30 AM

DEPOSITION AND CHARACTERIZATION OF NANOCRYSTAL SEMICONDUCTORS ON PRE-STRAINED ELASTOMERIC SUBSTRATES

Michael Bigelow, Duncan Kroll

Poster: 659

Mentor(s): Rebecca Anthony (Mechanical Engineering)

The production of silicon nanocrystal semiconductors in an all-gas-phase plasma reactor offers many benefits over traditional semiconductor methods. The plasma synthesis method eliminates the need for toxic solvents and allows for easy modification of input production parameters. Most importantly, the silicon nanocrystal semiconductors exit the reactor at near room temperature. This permits deposition on temperature-sensitive elastomers such as polydimethylsiloxane (PDMS) that may otherwise melt during traditional, high-temperature production methods. Investigations focus on how the porous and elastic properties of the PDMS affect the optoelectronic properties of the deposited nanocrystals. As a porous elastomer, PDMS permits air to interact with all sides of the deposited silicon nanocrystals, which results in the oxidation around the entire sample. Such oxidation contrasts with observed results on rigid glass substrates, in which only the top half of the nanocrystals exposed to the air oxidize. The proper oxidation of the sample dramatically affects its optoelectronic properties. Closely related to the porosity of the PDMS, the modification of its strain state during deposition remains a topic of particular interest. Current experimental apparatuses involve a holding mechanism that allows uniaxial straining of the PDMS substrate during deposition. After deposition, the PDMS relaxes back to its original strain state, which has affected oxidation rates of the deposited nanocrystals. Future research will expand the strain experimentation to mapping the strain state of PDMS with digital image correlation software and depositing silicon nanocrystals on PDMS under biaxial strain.

SEM IMAGING OF PRE- AND POST- BREWED TEA LEAVES

Kayla Matheny

Poster: 660

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

Hot brewed tea has been a common morning pick-me-up for decades. The cafeterias here at Michigan State University offer a wide variety of packaged bag tea leaves for college students, including black tea (e.g. chai, earl grey, and English breakfast), green tea, and herbal tea (e.g. passion fruit, chamomile, and mint). For this research project, a scanning electron microscope (SEM) is used to identify and compare surface structures of these different tea leaf varieties before and after brewing in order to investigate the structural differences between the leaf varieties and to determine the effects that brewing has on the tea leaves themselves. Through secondary electron imaging with the SEM at about 10-20 kV, structures such as leaf stomata, crystals, and mold spores could be identified on the surfaces of tea leaves from each tea category. By analyzing the SEM images before and after overnight brewing, a general understanding of the brewing process was formed. The pre- and post-brew SEM images of each tea were then analyzed to decide which teas were the best candidates for morning consumption. It was concluded that the tea that released the most surface structures, flavoring, and other ingredients during the brewing process was the most ideal hot tea beverage.

EVOLUTION OF GAME STRATEGIES

Zachary McCullough

Poster: 661

Mentor(s): Arend Hintze (Integrative Biology)

Humans solving puzzles and playing games, learn through repeated trial and error and some applied abstract thinking the best possible strategy to win. This paper looks at sufficient conditions required to evolve certain strategies in a particular game environment, in this case modeled after the popular 1982 arcade video game "Tron". Using markov brains, various conditions are imposed, tweaking player counts, game rules and certain limiting factors, until a strategy has been evolved. Then, after multiple strategies have arisen through different conditions, the evolved strategies are

pitted against each other in order to attempt to evolve a more optimized strategy. The process can be used to build insight into optimizing strategies and build better AI systems.

DEVELOPMENTS OF AN INSECT TRAPPING FILM WITH REVERSIBLE ADHESION FOR UAV APPLICATIONS

Vasha Sedlacek

Poster: 662

Mentor(s): Junghoon Yeom (Mechanical Engineering)

Entomology based studies, such as the tracking of insect-transmitting diseases, depend on the effective capture and clean removal of the insect species from the capturing apparatus to allow for effective analysis. The main objective of our study is to quantify the tackiness of Polydimethylsiloxane (PDMS) as a reversible adhesive layer, applicable in improving current practices of insect capturing and analysis on a mobile platform (i.e., UAV). Conventional methods of insect capture predominantly rely on acrylic-based polymeric materials, which leave a sticky residue on the collected insects, consequently impeding genomic analysis of the samples. PDMS is common silicone elastomer whose surface exhibits tacky, adhesive properties, but does not generate any glue-like residue. The ratio of the PDMS resin and the curing agent controls the degree of polymerization and thus determines the level of surface adhesion. To allow for future applications of PDMS, the effect of this ratio must be quantified. A weighted pulley setup has been employed to determine the force per unit area required to detach a polyimide film (simulated insect wing) from the PDMS surface, indicating the effects of the prepolymer-to-curing-agent ratio on the resulting adhesion strength. The test results are compared with relevant data describing the critical adhesion needed to successfully trap targeted insects. This adhesive film has also been applied to a UAV to capture flying insects situated over the vegetation field. The film patterning and the relative location of the film to the UAV propellers have been investigated to optimize the performance of insect capture.

ANALYZING STRUCTURAL DIFFERENCES IN CARBON NANOTUBES AND GRAPHENE

Dylan Smith

Poster: 663

Mentor(s): Per Askeland (Composite Materials and Structures Center)

Carbon nanostructures, such as graphene and carbon nanotubes, are considered to be on the cusp of material technology, as they are very durable, flexible, and have very little electrical resistance compared to common copper wiring. As such, employing carbon nanotubes in circuitry would greatly improve processing performance. However, at the moment, carbon nanotechnology is fairly expensive; as such, by studying the microstructure of the current technology and a possible aspect of future technology, it could reveal insight into how to improve current circuitry without fully replacing it with materials that are currently too expensive. The purpose of this research is to analyze the structure of a sample of multi-walled carbon nanotubes, three different samples of graphene known as C750, M25, and M5, and a sample of carbon black known as Ketjenblack EC-600 JD. By observing different areas of each sample under an electron microscope, surface features of each type of material become much more apparent, despite the fact that all of these samples are composed of carbon. As such, any differences in the properties of each material, such as overall resilience, electrical conductivity, and thermodynamic efficiency would, theoretically, arise from any differentiation in nanoscopic structure. This may give insight as to how to build more efficient wires, transistors, and other structures based on the structure of such objects, which would make them more efficient and durable while still maintaining practicality in cost.

DEVELOPING A SMALL-SCALE EXTRACTION EXPERIMENT

Megan Sullivan, Emily Hoban

Poster: 664

Mentor(s): Maddalena Fanelli (Chemical Engineering)

Liquid-liquid extraction is an important separation process in chemical engineering. The current study concentrates on developing a simple method to demonstrate continuous liquid-liquid extraction using relatively safe materials. Color pigment is first extracted from Annatto seeds into soybean oil and then into aqueous ethanol and sodium hydroxide solutions. The products of these extractions are analyzed using a spectrophotometer to determine pigment concentration. Preliminary tests are performed to understand the effectiveness of the process run in batch and simple simulations are completed to guide the design of the continuous extraction process.

COMPARING STRUCTURAL CHARACTERISTICS OF OPEN AND CLOSED CELL POLYURETHANE FOAMS

Jason Zak

Poster: 665

Mentor(s): Per Askeland (Composite Materials and Structures Center)

A Scanning Electron Microscope's ability to display a sample's topography allows one to determine a sample's effectiveness in performing its desired task. Using a Scanning Electron Microscope, the structure of three different types of polyurethane foams were compared and contrasted. The three types of foam analyzed were an open cell foam containing twenty percent bio-based diol and two foams containing only petroleum based diols, one open cell and one closed cell. The SEM images from each sample were compared and the differences in cell size, cell type, wall thickness, and cell shape were recorded. The open and closed cell polyurethane foams have significantly different structural characteristics which cause their differences in physical properties.

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

HIGH VELOCITY IMPACT TESTING OF COMPOSITES

Matthew Auvenshine

Poster: 668

Mentor(s): Xinran Xiao (Mechanical Engineering)

Composite materials offer a variety of benefits over traditional metals due to decreased weight and increased strength. Currently, no standards exist to test or compare the various properties of composites subject to high velocity impact. In this work, a method of determining the ballistic limit of S2-glass/SC15 epoxy composite was explored using an instrumented gas gun test. A gas gun was used to fire a 60g blunt cylindrical projectile at a panel of composite at various velocities. Four load cells were located behind the panel to measure the force of the impact, as well as two high-speed cameras; one located behind the panel to measure out-of-plane displacement and residual velocity of the projectile, and the other parallel to the panel to measure impact velocity of the projectile. Composite panels of 6-ply and 10-ply were tested, having ballistic limits of 329m/s and 381m/s, respectively. Evaluation of the load cell data revealed that failure modes evolved with velocity; as velocity increased, force decreased and damage changed from bending to shearing, as well as becoming more localized. Energy absorbed by the panels was determined as the difference between the initial and residual kinetic energies of the projectile. The composite was able to continue to absorb energy past the ballistic limit, up to a theoretical critical velocity. A way to compare the ballistic protection capabilities of various materials was proposed, derived as the kinetic energy at the ballistic limit normalized by the contact area of the projectile with the target.

BALLISTIC IMPACT OF A CARBON FIBER ARROW

Ryan Brown

Poster: 669

Mentor(s): Carl Boehlert (Chemical Engineering and Materials Science)

I used the a Scanning Electron Microscope to examine a split carbon arrow. The arrow was split when it was struck by another arrow when I was target practicing. I was curious as to how the structure of the carbon fibers changed from the ballistic impact. I also wanted to know if I was getting my money's worth on the carbon arrows by examining the epoxy that holds the carbon fibers together. The arrow had a large amounts of epoxy being used to hold the fibers together and it helped mitigate the damage. I recorded several photos that demonstrate the strength of the arrow and the quality with which it was made. After contacting the company that made the arrow tip that struck the arrow, I learned that it was cast iron. It contained large amounts of iron with small amounts of both carbon and silicon. An additional topic I was interested in was finding out why carbon fibered arrows are the most desired for modern day arrows. What makes them better than aluminum or traditional wood ones? There are several reasons, but the obvious ones are carbon is much lighter which means it can be shot faster, and with the epoxy holding the carbon fibers, the arrows are much more durable and maintain their straightness which is good for accuracy. In conclusion, through the use of the SEM I was able to become educated on what it means to be the best arrow.

FREEZE-THAW CYCLE EFFECTS ON MACROPORE DEFORMATION

Rachelle Crow

Poster: 670

Mentor(s): Steven Safferman (Biosystems and Agricultural Engineering), Jason Smith (Biosystems and Agricultural Engineering)

This research project investigates the effects of freeze-thaw cycles on macropore deformation. Original macropore volume and soil water content are being manipulated to observe their effects on the final volume of the macropores.

Soil columns with macropores have been exposed to six, 24-hour freeze-thaw cycles, and the remaining macropores have been casted. The anticipated findings include a trend indicating that the final volume of macropores after freeze-thaw cycles decrease as the water content of the soil increases. This poster presentation will include the results of these trials and explain the implications of the outcomes. The findings of this research will assist agriculturalists in understanding how freeze-thaw cycles alter the nutrient transport ability of soil.

CONTRIBUTION OF COLLAGEN FIBERS AND MYOCYTES TO RESIDUAL STRESS IN THE LEFT VENTRICULAR WALL

Marissa Grobbel

Poster: 671

Mentor(s): Lik Chuan Lee (Mechanical Engineering), Sara Roccabianca (Mechanical Engineering)

Residual stress is a prominent feature of biological tissues. We hypothesize that the mechanical interaction of two key constituents of cardiac tissue, collagen fibers and myocytes, contributes to the strength of the residual stress field in the left ventricular wall. In order to quantify the contribution of each of these constituents to the residual stress, we have performed opening angle tests on three groups of adult rat hearts (n = 15, each): intact tissue, isolated myocytes (collagenase-treated), and isolated collagen fibers (decellularized). Following constituent isolation treatments, the same opening angle tests were performed on all samples. These tests consist of cutting two lateral slices from the intact heart, creating "ring-like" samples that expose the left and right ventricles. Next, a radial cut was made across the left ventricular wall directly across from the right ventricle. This cut results in the ring-like samples opening up as they approach a stress-free configuration. Pictures of the samples were taken at different time points for 90 minutes following the radial cut. These pictures were analyzed using Imagej to calculate the opening angle. Our results show that the opening angles of the isolated collagen (106.45 deg) were significantly higher when compared to the intact tissue (57.88 deg). Conversely, the opening angles of the isolated myocytes (21.00 deg) were significantly lower. Our results suggest that, although the collagen fiber network accounts for such a small portion of the mass fraction of cardiac tissue, it is the main contributor to residual stress in the left ventricular wall.

SEM TEXTILE STUDIES

Kiera Kimminau

Poster: 672

Location: Ballroom

Time: 11:00 AM - 12:30 PM

Mentor(s): Per Askeland (Composite Materials and Structures Center), Carl Boehlert (Chemical Engineering and Materials Science), Anne Eisenlohr (Chemical Engineering and Materials Science)

Using a Scanning Electron Microscope (SEM) and Energy Dispersive X-ray Spectroscopy (EDS), nine textile fabric samples were analyzed to determine the material composition and its effect on the textile properties. The samples were gathered from a variety of sources and range from natural materials, such as cotton or wool, to synthetic textiles and polymers, such as polyester or acrylic. The samples were imaged in an Environmental (also referred to as Variable Pressure) SEM. Along with the SEM analysis, the textiles also underwent tensile testing to determine the strength. They were measured under tension as well as after failure and compared. It is hypothesized that the synthetic textiles with have a higher strength than the natural textiles.

USING ELECTROCOAGULATION TO TREAT HIGH STRENGTH WASTEWATER AND GENERATE PHOSPHORUS RICH ORGANIC FERTILIZER

Nate Olson

Poster: 673

Mentor(s): Wei Liao (Biosystems and Agricultural Engineering)

Electrocoagulation (EC) is an electrochemical treatment widely used in water reclamation operations in municipal and various industrial areas. Metal ions, instead of conventional chemicals, perform as coagulants in the EC process, leading to high efficiency and cost-effectiveness. Using EC to treat anaerobic digester effluent provides a sustainable alternative for polymer-based coagulants that remove phosphorus and nitrogen to create value-added products. Two iron electrodes on a direct current is the common configuration to performing EC. The present study attempts to optimize the EC process to make it more economically viable by exploring other electrode combinations including magnesium and aluminum and their effectiveness at removing particulates from the wastewater. Parameters such as total phosphorus, total nitrogen, turbidity, and total solids were used to determine the most successful electrode pair. The EC process was then optimized further by testing alternating current and adding settling periods. The economic viability of the optimized conditions was then investigated using economic analysis.

SUBSURFACE GRAIN MORPHOLOGY RECONSTRUCTION BY DIFFERENTIAL APERTURE X-RAY MICROSCOPY

Brendan Vande Kleff

Poster: 674

Mentor(s): Philip Eisenlohr (Chemical Engineering and Materials Science)

A strategy to non-destructively reconstruct a near-surface grain morphology based on differential aperture X-ray microscopy (DAXM) data is suggested and tested on synthetic grain structures. Lattice orientation data extracted along "probes" that are (relatively) sparsely distributed on the surface and penetrate into the volume of interest are used as seeding information in an initial Voronoi tessellation. The reconstruction accuracy and quality of grain morphology can be notably improved by relaxing the sharp grain boundary curvature resulting after Voronoi tessellation through curvature-driven boundary motion, which can be conveniently simulated by means of the Voronoi Implicit Interface Method (VIIM). Since the bulk reconstruction quality is tightly correlated with the surface reconstruction quality, an optimum observed on the readily accessible surface is close to an optimum in the unknown bulk. The overall reconstruction quality increases slightly more than linear with a decreased spacing between probes and is relatively better for the population of larger grains in the characterized structure. Realistic reconstruction, i.e. accuracy on the order of 95%, requires a linear density of about six probes per average grain size.

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

THE ANATOMY OF A TENNIS STRING

Kumaran Arivoli

Poster: 677

Mentor(s): Carl Boehlert (Chemical Engineering and Material Sciences)

For most inexperienced players, choosing the proper tennis string may seem insignificant. But when it is necessary to fine-tune performance and hit tennis balls with more accuracy, power, or spin, choosing the proper tennis string is crucial. While strings are made of numerous materials by dozens of manufacturers, this research will focus on comparing three strings, including a seven-sided co-polyester monofilament string, a softer co-polyether monofilament string, and a polyurethane-infused multifilament string. All three strings are produced by the same manufacturer "Tourna" and may be used for different playing styles. The co-polyester string is geared towards players wanting heavy spin on each shot. On the other hand, both the co-polyether and the multifilament string are geared towards players often suffering from arm problems wanting a softer feel. In order to understand exactly why these strings have different purposes, this research will make use of a scanning electron microscope. Secondary electrons will be used to analyze the topographical differences between the strings and how their surfaces make contact with a tennis ball. In addition, the string cores will be analyzed by studying their diameters and cross sections. Finally, a comparative analysis between new and used strings will be conducted in order to study particular points of wear or damage. This research will study why certain strings are best suited for different players and will also give a scientific explanation to how the strings work at a microscopic level.

ANALYSIS OF HYDRAULIC RETENTION TIME FOR MODELING REMOVAL OF POLLUTANTS IN A BIORETENTION BASIN

Emily Banach

Poster: 678

Mentor(s): Dawn Reinhold (Biosystems and Agricultural Engineering)

Due to their large quantities of impervious surfaces, urbanized areas experience substantial pollutant runoff into lakes and streams. Bioretention ponds are a common tool designed to combat this problem. These man-made sites naturally filter out key pollutants like COD, Nitrogen, and Phosphorous. The amount of time water spends in the system is known as hydraulic retention time (HRT), and is an important factor in proper removal of these pollutants. Using current methods, however, this parameter can only be found experimentally and, as a result, is rarely measured outside of research universities. This project uses continuous storm water data collected from pumping data at the Farm Lane bioretention site. Using this information, changes in HRT can be determined by (1) Quantifying HRT, (2) Determining HRT dependencies, and (3) Modeling a relationship between HRT and its dependencies. A tracer study will also be conducted using sodium chloride in order to verify the model. Hydraulic conductivity will be measured at various points along the retention pond.

NUTRIENT MONITORING VIA NANOCHROMATOGRAPHY

Jeffery Lorencen, Emily Drake, Olivia Slnutko, Rulwel Sul

Poster: 679

Mentor(s): Rebecca Lahr (Lyman Briggs)

Nanochromatography is low cost means of measuring species concentration in solution by analyzing trends in the residue left behind when a sample is dried. A droplet of sample is dried on an aluminum slide and photos are taken using a jeweler's loupe and cell phone camera. Each sample leaves behind patterns in the residue after the water evaporates which is unique to the solution composition. Residue patterns can be used to identify reagent concentrations in unknown solutions. This method is being developed to measure nutrient (nitrogen, phosphorus, magnesium, and total dissolved solids) through a nutrient recovery process to treat source-separated urine. Standard curves of residue images have been collected and correlated to ammonium, magnesium, and phosphate concentrations in pure water, aged source-separated urine, and treated source-separated urine.

IMPEDANCE CHARACTERIZATION OF THE NEURAL ELECTRODE INTERFACE

Joseph Lucas

Poster: 680

Mentor(s): Erin Purcell (Biomedical Engineering)

Microelectrode arrays implanted in the brain can record or stimulate the electrical activity of neurons. These devices are commonly used in research labs to understand normal brain function and are increasingly used in the clinic to treat neural injury or degenerative disease. Impedance spectroscopy is commonly used to characterize the interface between implanted electrode arrays and surrounding brain tissue. Within the Regenerative Electrode Lab, a lab focused on characterizing the integration of microarrays in order to better understand neural function, an ongoing project involves genetically reprogramming glial cells from being a signal "barrier" to a signal "source" for improving device-tissue integration. In support for this project, we set up and validated impedance spectroscopy for the lab. First, an impedance measurement device was selected for testing the impedance of numerous sites on the microelectrode. This impedance measurement device (NanoZ, Neurolynx Inc.) then was validated using factory provided data with microelectrode arrays tested in saline. Finally, we validated the device in vivo using an electrode array implanted into the motor cortex of an anesthetized rat. Our validated device gives the lab a "real time clock" of what is happening in the neural tissue surrounding the probe and can be used in live testing in the glial cell reprogramming project and numerous other projects.

OPTIMUM DIGITAL FILTERING FOR (P,N) TYPE CHARGE EXCHANGE REACTION ANALYSIS.

Panashe Mayangamutse

Poster: 681

Mentor(s): Jorge Pereira (National Superconducting Cyclotron Laboratory), Jaclyn Schmitt (Physics), Remco Zegers (National Superconducting Cyclotron Laboratory)

The Digital Data Acquisition System (DDAS) at the National Superconducting Cyclotron Laboratory (NSCL) employs a symmetric trapezoidal digital filtering system to establish time and energy information from the Low Energy Neutron Detector Array (LENDA)'s scintillator detectors. The digital filtering system allows zero-point time extraction using the Fast Filter (FF) and the Constant Fraction Discriminator (CFD) algorithms. CFD is preferred to FF for it provides a sub-clock-tick precision hence employable in analysis (p,n) type nuclear charge-exchange reactions with radioactive beams where high-resolution timing is important. Linear interpolation and cubic interpolation are used to determine the sub-clock timing using the zero crossing. Detector signals from LENDA reaction are used to illustrate the optimum performance of the CFD algorithm with cubic interpolation compared to the one that employs linear interpolation. The same traces are used to demonstrate the advantage of the CFD algorithm compared to the Fast Filter algorithm in time extraction for (p, n) exchange reactions. The main parameters used in the experiment were the scaling factor, detector traces, rise time and the gap time. A detector-limited timing resolution of 400ps is achieved through the CFD program. The digital filtering techniques are broadly applicable to analysis of other digitized raw detector signals.

SEM RESEARCH FOR THE SURFACE ENGINEERING OF BISMUTH NANOCRYSTALS

Julia Rosander

Poster: 682

Mentor(s): Per Askeland (Composite Materials and Structures Center), Carl Boehlert (Chemical Engineering and Materials Science), Shatadru Chakravarty (Radiology)

I am highly interested in the engineering of biomaterials for medical purposes and so I began to search for research related to this that utilized Scanning Electron Microscopes (SEM). I then came upon Dr. Shatadru Chakravarty's research

of engineering Bismuth nanoparticles for contrast agents in CT scans. The nanoparticles are used to detect cancers in CT imaging and Dr. Chakravarty determines which polymers are biocompatible, or safe for the human body, and don't deteriorate to encase the toxic bismuth. The SEM is used to track the deterioration of the polymer over time by scanning the surface of the nanoparticle. Energy Dispersive X-ray Spectroscopy is also used to identify the elements within the nanoparticle. This research is highly influential in how accurate and effective CT scans are. Through SEM and EDS images, we will determine what amount of polymer and what kind could be used in order to prevent deterioration and the poisoning of patients. I will use my images to then compare the differences in deterioration over time of the surface of the polymer. SEM images will be ideal to scan the surface and receive clear images of the polymer. Dr. Chakravarty and I will be able to use these images to come to a conclusion about the materials and their biocompatibility and create a conclusion that could create clearer CT scan images.

DEVELOPMENTAL AND ORGAN SPECIFIC RECALCITRANCE IN SWITCHGRASS IMPACTING ENZYMATIC HYDROLYSIS

Rachael Zarger

Poster: 683

Mentor(s): Jake Crowe (Chemical Engineering and Materials Science), David Hodge (Chemical Engineering and Materials Science)

As the world becomes more industrialized and fossil fuel dependent, the need for clean energy is becoming increasingly more important. One type of clean energy that is gaining support is biofuels, which could significantly decrease the use of petroleum-based fuels. Currently, one of the main types of biomass being used for second generation biofuel is switchgrass, which is an herbaceous feedstock. However, feedstock recalcitrance is a major obstacle in the commercialization of second generation biofuels, particularly cellulosic bioethanol. This study examined relationships between cell wall composition and response to chemical and enzymatic degradability in maturing internodes of three main switchgrass organs; stem, sheath, and leaf. Prior work with these internodes have shown that although they show similar degrees of lignification, they also showed different key features influencing organ maturity specific recalcitrance. Lignin content was determined as the primary component to recalcitrance in stem internodes, while sheath and leaf internode recalcitrance was shown to be impacted significantly by hemicellulose and structural pectin content. In order to identify differences in organ specific recalcitrance and improve enzymatic digestibility, ranges of severities for alkaline and neutral chemistry pretreatments were selected. The impact of pretreatment severity on the individual organ internodes was examined and the pretreatment response was linearly correlated to compositional changes to determine predictive variables for hydrolysis yields. From these results, multiple linear regression models were developed to include both organ and tissue maturity variability to capture feedstock heterogeneity and effectively predict enzymatic hydrolysis yields.

ENGINEERING, COMPUTER SCIENCE, AND MATHEMATICS POSTER PRESENTATIONS, SECTION 5 BALLROOM, 1:00 PM – 2:30 PM

LOW COST WATER MONITORING WITH A CELL PHONE CAMERA AND A JEWELER'S LOUPE

Selett Allen, Alyssa Sanderson

Poster: 686

Mentor(s): Rebecca Lahr (Lyman Briggs)

The cost for an individual tap water test for one contaminant can range from \$12 to \$125 from the Michigan Department of Environmental Quality (DEQ). This cost is above what many Michigan households can afford, especially lower income households. Consequently, there is a need for user friendly, cost-efficient, low tech, and reliable methods for monitoring contaminants in tap water. Nanochromatography and the "coffee ring" effect have proven useful for separation of aqueous solutions before analysis with Raman spectroscopy (cyanotoxins, human tears, knee fluid), but the residue patterns alone have not yet been harnessed for tap water monitoring. The coffee ring effect separates solutes in water droplets during water evaporation based on size and solubility, causing each water sample to leave a distinguishable residue pattern based on the identities and concentrations solutes present. In this work, droplets of tap water and synthetic hard water solutions were dried on aluminum slides and a cell phone camera was used to capture images. A 30x triplet loupe with an LED light and clear plastic stand produced optimal images of residues. Various pure and mixed synthetic hard water samples each produced distinct patterns.

DRY CROSS-CONTAMINATION MODES AND FACTORS ASSOCIATED WITH SALMONELLA DURING ALMOND PROCESSING

Joanna Carroll

Poster: 687

Mentor(s): Sanghyup Jeong (Biosystems and Agricultural Engineering)

Recently, there have been numerous outbreaks associated with *Salmonella* in low-moisture foods. According to the CDC, there were multistate outbreaks associated with *Salmonella* for pistachios in 2009 and 2016 and almonds in 2000 and 2003, which caused massive nationwide recalls. This study identifies the environmental and physical factors that affect modes of cross-contamination associated with *Salmonella* in order to enhance a discrete element simulation of almond processing. Almond shell pieces and kernels (200 g) were inoculated with *Salmonella* Enteritidis PT30. Subsequently, the inoculated kernels (5 g), shell pieces (5 g) and un-inoculated kernels (200 g) were conditioned at 0.20 and 0.40 a_w , and mixed in a stainless steel drum (140 mm diameter) for a total number of rotations (TNR) of 5, 20, 40, and 80 revolutions. Thereafter, the contaminated samples (5 g) were retrieved, and enumerated for the transferred *Salmonella*. The maximum bacterial load transferred from shells to kernels was significantly different ($P < 0.05$) than that of kernels to kernels for 0.2 and 0.4 a_w . When comparing a_w , there was a significant difference between 0.2 and 0.4 ($P < 0.05$) for both kernel to kernel and shell to kernel. This indicates that environmental and physical factors like a_w and surface structure have a significant effect on the dry transfer of *Salmonella*. Identifying factors affecting bacterial cross-contamination modes is critical information for secondary modeling used in discrete element model simulation, which will reveal the cross-contamination pathways of *Salmonella* for an actual processing system.

RURAL TANZANIANS WILLINGNESS TO INCORPORATE MORE EFFICIENT HOUSEHOLD WATER TREATMENT METHODS

Carly Cohen, David Ravitz

Poster: 688

Mentor(s): Susan Masten (Civil and Environmental Engineering), Tula Ngasala (Civil and Environmental Engineering)

In Tanzania approximately one-third of children under five die due to lack of access to potable water and adequate sanitation. Particularly in rural areas, people rely on contaminated water sources and household water treatment practices are uncommon due to limited access, cost, and time constraint. This study was conducted in an agro-pastoral community in Northern Tanzania during the dry season. The goal was to introduce and assess the acceptability of new water treatment method(s) as an alternative to their current water treatment practice. Additionally, the study identified the availability of existing water sources and the extent of contamination. Three main water sources were identified: surface water, deep wells, and shallow wells. Three different treatment methods were evaluated: chlorine tablets, aluminum-impregnated clay bars, and ultraviolet light (UV) disinfection. Each family surveyed was given one of the three household water treatment methods. These methods were selected due to their availability, ease of use, cost, and effectiveness with high coliform bacteria (E. Coli) levels. Before using the new methods, 40% reported treating their drinking water regularly. However, 80% of the household water samples tested positive for E. Coli. Survey responses showed that after beginning to use the new method, 60% of households increased their water consumption. Most importantly, water quality improved after treatment began and all water samples tested negative for E. Coli during the final week of testing. The work demonstrates the importance of community education regarding household water treatment, especially in rural communities that have poor access to potable water.

RAZOR DURABILITY AND LIFESPAN

Kyle Evans

Poster: 689

Mentor(s): Carl Boehlert (Chemical Engineering and Materials Science)

When shaving, many people say “you get what you pay for when it comes to razor blades”, but is this true? Replacement cartridges range in price between a dollar fifteen to twenty one dollars per five pack. With replacement razor blade cartridge prices on the rise, do more expensive cartridges yield a more comfortable shave and longer lifespan, or is it just a marketing gimmick? Five different razor cartridges from different price points were tested to see if this was true. The razor cartridges were first imaged with a Scanning Electron Microscope (SEM) to observe the original sharpness. Each razor was then used to shave five times. Each shave was performed under the same conditions for a consistent test. After the shaving, the razor cartridges were again imaged with the SEM to observe deformities in the blade. Sharpness was then determined based on the severity of the deformations on the blade. Razors with little to no deformation were deemed sharper and more durable than those with major deformation. Ultimately the razor with the least deformation was selected as the best razor cartridge regardless of price for a close comfortable shave.

STUDY OF ROCK PAPER SCISSORS GAME THEORY WITH EVOLUTION

Zackary Schreur

Poster: 690

Mentor(s): Arend Hintze (Microbiology and Molecular Genetics)

The study of game theory is about the evaluation of choices and to assess possible outcomes. Studying the advantages and disadvantages of different options in a hypothetical situation, is a useful undertaking, since many real world situations can be expressed within game theory. The gained knowledge can often be applied to other situations. Rock paper scissors is classic example within game theory. Here we find two different kinds of strategies: strictly deterministically (only playing rock, paper, or scissors) versus playing randomly. With the rock paper scissors game, the best strategy turns out to be a random strategy, which is unlike strategies to any other games. At the same time, three purely deterministic strategies (playing only rock, paper, or scissors) for another solution to this game. To add another level to this experiment we will allow for actual mutations to strategies, and allow for actual evolution to happen new strategies are inherited from parents. If evolution follows the laws of survival of the fittest, the best strategy should turn out to be a random strategy, as predicted. To visualize the game, we display a pixelated screen where the pixel colors represent the strategy of a player. This will allow users to get an intuitive understanding, as we are visualizing evolution in action.

RAPID, USER-FRIENDLY DIAGNOSTIC TEST USING FUNCTIONALIZED MAGNETIC NANOPARTICLES

Matthew Vasher, Abbey Bugenske

Poster: 691

Mentor(s): Evangelyn Alocilja (Biosystems and Agricultural Engineering)

Diagnosing diseases in developing nations is challenging due to the high costs, resources, and equipment required by many diagnostic methods. Without performing diagnostic tests, diseases such as dengue fever rapidly spread. We have developed a user-friendly method of detecting a range of pathogens that requires no electronic equipment, costs pennies to perform, and takes less than ten minutes to complete. We developed inexpensive functionalized magnetic nanoparticles that will bind to biological materials in a liquid matrix. When introduced to a magnet, the nanoparticles and bound pathogens will form a visible mat on the side of the container. When the liquid is removed, nanoparticles bound to pathogens will remain in the mat formation, but nanoparticles in healthy samples without pathogens will collapse to the bottom of the tube. While this test can be qualitative since there is an obvious visual difference, quantitative results can be obtained by taking a picture of the mat and counting the number of black pixels. This diagnostic test has successfully detected *E. coli*, dengue fever, and common pathogens in individuals who reported themselves as ill. It has been performed in a range of matrices including urine, saliva, and tears. The method has also proven predictive, diagnosing individuals as sick before symptoms have appeared, and has detected pathogens in plants and cows. This diagnostic test has many applications, such as diagnosing humans in all areas of the world, detecting contaminants in water, preventing devastating losses of crops, and diagnosing livestock and pets.

SEEDS OF MORINGA OLEIFERA AS A NATURAL COAGULANT FOR WATER TREATMENT

Brendan Wrobel

Poster: 692

Mentor(s): Volodymyr Tarabara (Civil and Environmental Engineering)

Coagulation is one of the main unit process used in water treatment worldwide. Although relatively inexpensive commercially available coagulants such as $Al_2(SO_4)_3$ and $FeCl_3$ may still be not affordable in many resource-constrained settings. Natural coagulants derived from locally available plant-derived materials can be a cost-effective alternative as coagulants replacing inorganic salts. The extract from the seeds of the drumstick tree, *Moringa oleifera*, has been proven to be an especially effective natural coagulant. This is significant because the tree is broadly cultivated in tropical and subtropical areas spanning large swaths of the developing world. In this study, the coagulation efficiency of *Moringa oleifera* extract was evaluated with respect to model feed waters including kaolin suspensions and solutions of humic acid. Dose-response curves were developed for this coagulant as well as for $Al_2(SO_4)_3$, which served as a comparative basis. The results showed that optimal coagulation performance was achieved at lower dosage (in mg/L) for *Moringa oleifera* seed extract than for alum when applied to kaolin suspension. Contrary to our expectations, the opposite trend was observed for the humic acid solution. Our current work in this ongoing project aims to identify the reasons for this difference and to improve the methodology of quantifying the optimal dosage of *Moringa oleifera* extract when applied to removing organics from water.

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

RURAL ROADWAY SAFETY RESEARCH

Travis Holpuch

Poster: 695

Mentor(s): Timothy Gates (Civil and Environmental Engineering), Anthony Ingle (Civil and Environmental Engineering)

Every year, tens of thousands of people are killed in car accidents, with most of those deaths being in rural areas. The purpose of this research is to gain a better understanding of where vehicle crashes are more likely to occur. This is being done by taking data gathered from rural areas regarding crash incidents, and putting it together with characteristics of the roadways themselves. It is clear that there is some correlation between the surface of the road, intersections, and road width and the total number of crashes per year, and it is the goal of this research to pinpoint exactly where these incidents are more likely to occur. The research project entails data collection of the rural roads in many counties across the state of Michigan paired up with accident reports to eventually be used in an equation to predict the number of accidents any given road will have each year. By using this research to better predict dangerous road segments, more safety precautions can be taken to help reduce the number of road fatalities all over the world.

THE MICROSTRUCTURE OF PTFE FILTERS

Whitley Huelskamp

Poster: 696

Mentor(s): Per Askeland (Composite Materials and Structures Center)

Polytetrafluoroethylene or PTFE is a synthetic fluoropolymer. It is used in a variety of things including Teflon, computer and aerospace wiring, and dental fillings. Another application of PTFE is to make a porous filter. This filter can be waterproof and dustproof while still allowing air to pass through it. The company Nitto Denko Automotive makes a version of PTFE membrane called TEMISH. TEMISH has a porous membrane structure that can be altered to work best under a variety of temperatures and pressures. TEMISH can be used in many things such as the headlamps of cars, digital cameras, and cell phones. This project looks at the microstructure of three different kinds of TEMISH. The material is looked at using a scanning electron microscope (SEM). This will show the structure of TEMISH and give more information on how it works.

CHARACTERIZATION OF BIO-BASED POLYOL AND ITS APPLICATIONS IN FLEXIBLE POLYURETHANE FOAM

Sara Kolar

Poster: 697

Mentor(s): Sayli Bote (Chemical Engineering and Materials Science), Ramani Narayan (Chemical Engineering and Materials Science)

The reaction of a polyol with isocyanates yields polyurethane foam structures that find use in many industrial applications. In order to carry out the reaction, it is necessary to quantify the amount of hydroxyl groups present in the polyol – the hydroxyl value which is defined as milligrams of potassium hydroxide equivalent to the hydroxyl content in one gram of the material tested. The hydroxyl value is an important parameter that needs to be experimentally determined so as to establish the equivalent amount of isocyanate needed for the reaction. The p-toluenesulfonyl isocyanate titration method was chosen to find hydroxyl values, since it does not need the use of pyridine (a carcinogen), quick and accurate. The determination of the acidity or alkalinity of the polyol is required in order to correct its hydroxyl value. Carboxyl groups present in a material contribute to acidity which can be determined by an acid value titration. Amines increase alkalinity, so an amine value titration is required. To find the amine value the material is titrated with hydrochloric acid until alkyl ammonium salts are formed. The acid value is found by titrating with a basic titrant until neutralization. Fourier Infrared Spectrophotometry (FTIR) is used for the determination of functional groups present in polyol. Absorption of light by the polyol at different wavelengths corresponds to the presence of a particular functional group. Thermogravimetric Analysis (TGA) is used to determine degradation behavior of polyol. The biobased polyol synthesized in our laboratory has experimentally determined hydroxyl value less than 200 mg of KOH/gm. The values suggest that the polyols will be used in synthesis of flexible foams. Flexible foams have wide applications in cushioning such as car seats. Flexible foams then will also be characterized for thermal and mechanical properties.

DEVELOPING MULTIPLEX-LAMP FOR INTERNET OF THINGS (IOT)-BASED SCREENING OF ANTIMICROBIAL RESISTANCE

Xiaojing Ma

Poster: 698

Mentor(s): Syed Hashsham (Civil and Environmental Engineering)

By 2050, antimicrobial resistance will cause an estimated 10 million deaths and result in at least \$100 trillion productivity losses. Hence, it is necessary to quantify the burden of AMR and find solutions to protect human health. In this work, we plan to develop multiplex-LAMP for internet of things (IoT) based on screening of antimicrobial resistance with the objective of making it affordable globally. In a previous research, we have designed a rectangular screening AMR chip with 9-25 wells. For a future design, first, a research target will mainly focus on Carbapenem Resistant Enterobacteriaceae (CRE) which is a group of organisms having high-level antibiotics resistance. Second, it is proposed to design a circular chip with 12 wells and can spin on its axis to dispense the sample through the chip. The design will also allow uniform distribution of sample in all wells. Then the final step will be validating the AMR primers using a direct amplification approach. Direct amplification is critically useful because it eliminates the need for DNA/RNA extraction and simplifies the process of AMR screening. The chip will be integrated with an AMR reading platform that is also being developed by our team. The platform will allow capturing of GPS coordinates of the sampling locations, connection to database via an App, visualization, and connectivity to an Internet of Things (IoT) dashboard. Because of the ability to analyze AMR at low cost, the platform is expected to play a significant role in controlling the spread of AMR.

GOLD NANOPARTICLE PROCESSING IN THE GAS PHASE AS A NEW METHOD OF SI NANOROD SYNTHESIS

Abby McQuade Brian Mulvihill

Poster: 699

Mentor(s): Rebecca Anthony (Mechanical Engineering)

Nanotechnology is a growing field for research and development. From biosensors to nanoscale semiconductors for electronics, there are many opportunities for exploration on the nanoscale. This study focuses on the production of silicon and gold nanoparticles in the gas phase, beginning the steps towards synthesizing silicon nanorods. One percent silane gas and 100 percent argon gas is flown through a plasma generated by dielectric barrier discharge between a copper inductor and a gold-plated platinum wire. The nanoparticles produced are then deposited on various substrates, such as steel mesh and silicon wafers. This technique of synthesizing nanorods is still fairly new and is meant to further expedite their production and offer a promising growth environment.

BIODEGRADATION OF BIO-BASED POLYMERS

Ian Scheper

Poster: 700

Mentor(s): Ramani Narayan (Chemical Engineering and Materials Science)

Biodegradation is the breaking down of a material to its base components by bacteria, fungi, or chemical process; this can be performed either aerobically or anaerobically. As some polymers do not biodegrade, this study focusses only on bio-based plastics capable of biodegradation. The ease with which a plastic biodegrades is quite important and is just one of many characterizations that must be run when developing new plastics for industrial use. The goal of this study is to assess the biodegradability of plastics that can be used by industry for a range of applications. The project deals with PLA, PET, and PBSA based polymers which are broken down by the bacteria in the waste water inoculum. The CO₂ and CH₄ produced by biodegradation is calculated to estimate percentage biodegradation. There are various methods used for calculating this estimation that have been performed and covered in this study.

NSC COMPRESSIVE STRENGTH VARIATION DUE TO THERMAL EFFECTS

Lauren Woods

Poster: 701

Mentor(s): Venkatesh Kodur (Civil and Environmental Engineering)

In the field of concrete structures, the effects of fires are not highly considered when designing. When a building is subjected to a fire, the structural integrity of the building is put into question up to a week after the fire was extinguished. The problem is determining if the concrete in the structure has gained back its strength to conclude the safety of the building. Research has begun to focus on the affects the fires have on different materials. How the materials are affected as internal temperatures of the fire changes will be tested in this project. The specimens will be tested with an Ultrasonic Pulse Velocity machine to use as a baseline for the compressive strength. The specimens will be placed in a furnace that will hold a predetermined temperature for an extended period of time so the specimens are evenly heated throughout. After the specimen has cooled it will be tested with the UPV machine again to see the

change in the concrete then placed under a compressive load to find the strength of the specimen. The hope is to find a correlation between the UPV readings and the compressive strength of the specimens for the different temperatures. If a correlation is found, first responders will be able to calculate the strength of the affected beams and columns with the UPV test. This will allow them to determine the safety of the structure.

ENGINEERING, COMPUTER SCIENCE, AND MATHEMATICS POSTER PRESENTATIONS, SECTION 7 BALLROOM, 3:00 PM – 4:30 PM

OPTICAL DNA-NANOSENSOR DETECTION OF BACTERIA

Rebecca Jones, Tess Cannon

Poster: 703

Mentor(s): Evangelyn Alocilja (Biosystems and Agricultural Engineering), Brad Day (Plant, Soil, and Microbial Sciences)

Human pathogenic diseases are often difficult to isolate, diagnose, and treat, especially where the technology for diagnosis, such as microscopy and PCR, is not available. Current methods of disease diagnostics often involve long assay time and low specificity, leading to improper disease management. Previously, DNA-nanosensors have enabled rapid optical detection of human pathogens. We developed an optical method using gold nanoparticles (AuNPs) to sense DNA from *Escherichia coli*. The detection process involves probes specific to a targeted gene of *E. coli* and the unique physical chemical properties of AuNPs with sodium chloride. Diluted denatured DNA was cooled with the probe, upon which AuNPs were added. Sodium chloride differentiated the probe-target interactions colorimetrically (i.e. naked eye) and was quantified by a spectrophotometer over a 400 to 700 nm range. If bacterial DNA was present, the sample remained the red color characteristic of AuNPs, whereas with a lack of target DNA, the reaction turned blue. Optimization of this assay to extracted genomic *E. coli* DNA will be discussed, as well as specificity and sensitivity. The development of this optical diagnostic method has the potential to enable identification of human pathogens in developing countries because it is simple, rapid (i.e. less than two hours) and cost effective.

EMERGENCE OF HIGH STRENGTH STEELS IN THE AUTOMOTIVE INDUSTRY

Alex Maranville

Poster: 704

Mentor(s): Carl Boehlert (Chemical Engineering and Materials Science)

There are increasing demands globally on the automotive industry to reduce the mass of vehicles in order to reduce fuel consumption and meet more stringent emissions requirements. In addition, new global safety regulations are causing automakers to tailor mechanical properties of materials in order to meet these demands. In order to do so, automakers have begun using a combination of steel in the construction of vehicles. High-strength steel, advanced high-strength steel, and ultra-high strength steel are being introduced to solve specific engineering challenges, such as in the design of roof support structures and body stiffening members, while traditional low-carbon steel is currently being used in less safety-critical areas, such as floor pans and body panels. The cost premium and formability limitations of HSS, AHSS, and UHSS currently limits the use of these materials to specialty applications. In this study, the microstructure of several modern steels were investigated to understand their property-structure relationship. A cost-benefit analysis of several different types of automotive steels was also conducted in order better to understand the cost factors relevant in the current increased use of advanced alloys. This analysis hypothesizes that at the minimum efficient scale, companies will find the cost that will help them meet the minimum safety and fuel regulations to maximize their business model profits. To do this, examining the different microstructures of steel to establish a market price for that steel is essential.

SPLAY APPLICATOR: HUMAN LEG RELAXATION IN AUTOMOBILE SEATS

Lindsay Nault

Poster: 705

Mentor(s): Tamara Bush (Mechanical Engineering)

The current comfort of the driver's seat takes into account the H-point of the driver, as well as lumbar support, but does not take into account the splay of the driver's legs. Splay is defined as the angle of rotation of the knees about the axis from the hip joint to the ankle joint. This motion often occurs as a result of relaxation of the legs. The goal of this study was to create and validate a splay applicator to be used with a manikin that assists in determining the comfort of automobile seats. The splay applicator should spread the legs and apply similar loads in multiple seats without adding significant weight to the legs. The splay applicator should cause the manikin to produce splay values similar to human data and be repeatable. Finding the maximum splay, as well as how splay affects the interaction between the leg and seat, will provide data that can be used to improve the comfort of the driver's seat in automobiles.

COMPARISON OF MICRO-STRUCTURES OF FABRICS AND HOW THEY RELATE TO WATER RETENTION

Thomas Pavey

Poster: 706

Mentor(s): Per Askeland (Composite Materials and Structures Center)

This experiment aims to compare the micro-structures of common three types of fabrics (cotton, polyester, and wool) to determine how the structure relates to the material's absorption and retention of water as compared to one another as well as the material after being coated with a 63% heptane waterproofing agent. Each of the materials were observed using a variable pressure Scanning Electron Microscope (SEM) using water vapor as the gas in the chamber. Using this technique, a micro-climate can be created inside the SEM and water may be formed on the sample. By then changing the target humidity inside the chamber, the water was then gradually evaporated and images were taken as this process occurred. The untreated cotton sample retained some water deeper in the fabric even at the very low humidity settings (4.3%). However, the treated sample seemed to have water form at the surface was mostly gone by the time the sample reached 34% humidity. In the polyester sample the water slowly evaporated and was almost completely gone by the time it had reached 13% humidity. The water on the treated polyester sample was for the mostly gone by the time the sample reached 31% humidity. The untreated wool sample was free of most of the water by the time the chamber reached 33% humidity. The treated wool sample behaved similarly to the treated polyester and the majority of the water had disappeared by the time the chamber had reached 32%.

ANALYZING THE DEGRADATION OF CELLULOID, THE FIRST SYNTHETIC POLYMER

Montgomery Smith

Poster: 707

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

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

INTERFACE FOR PARTICULATE ORGANIC MATTER IMAGE PROCESSING AND ANALYSIS

Kenneth Stewart

Poster: 708

Mentor(s): Dirk Colbry (Computational Mathematics, Science and Engineering), Sasha Kravchenko (Plant, Soil, and Microbial Science)

POM is a MATLAB program designed to assist scientists in the analysis of plant organic matter in CT images of soil samples. The software is built off a prototype multistage workflow that uses ImageJ, FORTRAN, and SAS. The POM Graphical User Interface attempts to streamline the workflow to minimize the time a researcher spends analyzing images. MATLAB is used to replace sections of the workflow written in SAS and acts as a glue by communicating directly with FORTRAN and ImageJ. The workflow of POM is divided into steps navigable by an intuitive interface. Algorithm parameters are taken at the initial step to be used throughout, with default parameters designed to provide the user with examples of the input that is expected. POM makes the analysis of plant organic matter using CT scans easy and accessible to scientists enabling new types of research questions such as how the carbon in the plant organic matter of soils may affect climate change or how soil can be maintained to improve crop yield.

TOPOLOGICAL DATA ANALYSIS IN R USING THE MAPPER ALGORITHM

Paul Soma

Poster: 709

Mentor(s): Jose Perea (Computational Mathematics, Science and Engineering)

Since the beginning of the fall 2016 semester, I have been working with Dr. Perea to develop a topological data analysis software called CEDAR. Developed primarily in R, CEDAR analyzes high-dimensional data using the Mapper algorithm described in Topological Methods for the Analysis of High Dimensional Data Sets and 3D Object Recognition by Gurjeet Singh, Facundo Mémoli, and Gunnar Carlsson. CEDAR implements Mapper in R, and uses Shiny, a web application framework from R Studio, to create an interactive user interface. The program allows users to upload data, select parameters for use in the Mapper pipeline, and topologically plots the nodes determined by Mapper. The program allows for hypothesis testing about datasets by manipulating the Mapper parameters, re-running the Mapper algorithm on the data, and viewing the new node structure, all within the user interface.

EVALUATING THE EFFICACY OF INDUSTRIAL VACUUM CLEANING TO REMOVE FOOD ALLERGENS FROM FOOD CONTACT SURFACES

Christopher Wells

Poster: 710

Mentor(s): Sanghyup Jeong (Biosystems and Agricultural Engineering)

Allergenic cross-contamination is a growing concern in low moisture environments where water cannot be used as a cleaning resource. The purpose of this study was to determine the effectiveness of the vacuum dry cleaning method used in the food industry. Stainless steel coupons were electrostatically coated with soy protein isolate as an allergenic material. The coupons were vacuumed at about 3 mm above the surface. After 10 seconds of vacuuming followed by a brushing, the coupons were vacuumed for an additional 10 seconds, and tested for the soy allergen using Neogen 3D Reveal test kits (5 ppm detection limit). For cleaning efficacy, another set of coupons were vacuumed, submerged and agitated in 15 mL of deionized water, to measure total dissolved solids (TDS) and conductivity. The allergen tests showed 50% negative and 50% positive for soy (n=6), indicating the uncertainty of the vacuum cleaning practice for allergen removal. The mean TDS, 4.72 ± 1.57 ppm and the conductivity, $3.7 \pm 0.5 \mu\text{S}/\text{cm}$, supports the allergen test results. These results reinforce the uncertainty of determination of cleanliness based on visual inspection. Although the current industry vacuum cleaning practice is considered as an effective and practical dry cleaning method, it needs to be further validated and improved to ensure allergen free food products.

ENVIRONMENTAL SCIENCE AND NATURAL RESOURCES

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

THE INFLUENCE OF LANDSCAPE COMPOSITION AND CONNECTIVITY ON OCCURRENCE OF CWD IN MICHIGAN WHITE-TAILED DEER

Hunter Stanke

Time: 8:30 AM

Mentor(s): Sonja Christensen (Fisheries and Wildlife), Jonathan Cook (Fisheries and Wildlife), David Williams (Fisheries and Wildlife)

Chronic wasting disease (CWD) is a transmissible spongiform encephalopathy that infects North American cervid species. The spatial distribution of disease at the landscape level is associated with movement and space use patterns of white-tailed deer. We evaluated the composition and connectivity of distinct landscape classes where CWD positive deer have been harvested in Michigan using least cost path analyses and spatial land cover data. We examined percent forest, low-level urban development, and agriculture, as well as road density at each location. We found that the occurrence of CWD is positively correlated with percent low-level urban development and negatively correlated with percent agricultural cover. These findings suggest that deer within the southcentral lower peninsula of Michigan may be more likely to occupy habitats associated with low-level urban development than areas dominated by agriculture. This space use pattern may be explained by relatively high edge density and low hunting pressure present in low-level urban development, and the limited cover availability associated with agricultural fields. Additionally, we present results on the impact that habitat connectivity has on the spread of CWD on the landscape. This study provides the first evidence of the association between CWD and specific habitat types in Michigan, and will aid in the targeting of management efforts to control the disease.

ORIGINS AND STATUS OF MICHIGAN INLAND LAKE CISCO (COREGONUS ARTEDI) POPULATIONS BASED ON ESTIMATES OF GENETIC DIVERSITY WITHIN AND VARIATION AMONG POPULATIONS

Erica Adams

Time: 8:45 AM

Mentor(s): Kim Scribner (Fisheries and Wildlife)

Declining population abundance and distribution of inland lakes Cisco (*Coregonus artedi*) has resulted in the species being listed as threatened by the Michigan Department of Natural Resources. Research is being directed to preserve and restore the populations throughout Michigan; however the origins of the species are unclear. One of the competing hypotheses is Cisco naturally colonized lakes after the glaciers retreated. Alternatively, the species could have been introduced from a hatchery source in the southwest part of the state. Our research focuses on using measures of genetic diversity and inter-lake variance in the frequency of alleles in Cisco populations to determine genetic relatedness. Fin clips or scales were sampled from 336 individuals from 12 Michigan inland lakes. Each sample underwent DNA extraction, polymerase chain reaction, and was genotyped at six microsatellite loci using program GeneMarker. By comparing allele frequencies and measures of diversity between inland lake populations we will be able to ascertain the origins of Ciscos in Michigan. Moving forward, knowledge of the species origin has strong management implications.

EXAMINING THE EXTENT TO WHICH HUMAN-CARNIVORE CONFLICT RESEARCH CURRENTLY INFORMS POLICY FORMATION

Charlie Booher

Time: 9:00 AM

Mentor(s): Robert Montgomery (Fisheries and Wildlife), John Waller (History)

Human-carnivore conflict (HCC) is a leading causes of decline in charismatic carnivore populations worldwide. For instance, conflict with humans is one of the primary drivers of the reduction in African lion populations from around 400,000 in the 1940s to less than 20,000 today. This conflict is derived from carnivores killing livestock. Depredation occurs in every region of the world where carnivores and pastoralists interact. Unfortunately, there is a significant lack of effective interventions that help to protect carnivores, while not negatively effecting local herders. Even when conservation biologists know how these varying interests can be reconciled, their findings are seldom translated into management policy. I therefore conducted an extensive literature review in an effort to explore the current disconnects among researchers, stakeholders, and local politicians, focusing on the issue of HCC in East Africa (which has the most intense rates of HCC on the planet). I utilized a variety of frameworks to measure whether researchers are: (1) interdisciplinary, (2) conducting actionable or basic research, (3) involving stakeholders, (4) co-productive, and (5) evaluating the impact of their research. The metrics I adapted for this study utilize information that is readily available in the published literature, with a focus on the credentials of the authors. These measures were then supplemented by case studies selected from our original literature search. On this basis, we present an accurate representation of the current state of research on HCC in East Africa and offer suggestions as to how collaboration can be enhanced and policy-making improved.

EFFECTS OF TERRESTRIAL VINES ON MACROINVERTEBRATE COMMUNITIES SURROUNDING PARTIALLY SUBMERGED TREES

Katie Kierczynski

Time: 9:15 AM

Mentor(s): M. Eric Benbow (Entomology)

Aquatic macroinvertebrate communities serve as a food source for many fishes and are often used to determine the overall health of a stream. Aquatic macroinvertebrate community structure is determined by a variety of factors including water temperature, habitat type, substrate type, water turbidity, and habitat availability. This study investigated the effect of structural complexity, in the form of fallen trees with vines wrapped around them, on aquatic macroinvertebrate communities in W. K. Kellogg Experimental Forest, Augusta Creek, Michigan. We hypothesized that logs with vines would have increased diversity of aquatic invertebrates than those habitats without vines, due to increased habitat surface area and heterogeneity of the stream. Six sites with logs with vines were identified and sampled two times before and three times after three vines were randomly removed from the trees. Macroinvertebrates were collected and identified to determine functional feeding groups, density estimates, and Simpson's diversity indices. Study sites with vines were compared to study sites without vines. Preliminary results show that two weeks after vine removal, macroinvertebrate diversity was lower in logs that had vines removed, compared to logs with vines still intact, but both had similar values four and seven weeks after removal. These findings will help to fill a gap in the research when it comes to the effect structural complexity in the form of vines can have on aquatic ecosystems.

PHYLOGENETIC RECONSTRUCTION OF NATIVE NORTH AMERICAN XYLEBORINI SPECIES

Lidla Komondy

Time: 9:30 AM

Mentor(s): Anthony Cognato (Entomology)

The Xyleborini are a tribe of 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. Most species carry their symbiotic fungi in specialized pockets of the exoskeleton which are evacuated and begin to grow once the beetle constructs a tunnel. In general, the beetles are not host specific and choice of tree most likely depends on degree of decay and moisture content. This brings us to the phylogenetic analysis of the currently known native species within the United States. While most of North American ambrosia beetles (Xyleborini) are not currently well understood, it is however more clear, that more research is currently being explored on the topics of ambrosia beetles and their phylogenetic history to further understand the tribe.

COLLECTIVE INTELLIGENCE IN NORTHEASTERN FISHERIES

Caitie Reza

Time: 9:45 AM

Mentor(s): Steven Gray (Community Sustainability)

Incorporating the views of key stakeholders in environmental assessments is vital for the health of marine ecosystems. Fisheries-management has long been plagued with conflict, and significant knowledge gaps exist in our understanding of social, economic, and ecological dynamics of coastal fisheries. The first step in addressing this situation is monitoring the socio-ecological relationships of marine systems, such as climate-driven biogeographic shifts. The immediate goal of this project aims to utilize fishers in disturbed marine environments, instead of relying on government data for judgement. The concept of swarm intelligence, the idea that organisms working together as a cohesive unit is exponentially more effective than individual efforts, is crucial in understanding our approach to marine systems. In this context, social-swarmling is a potential management tool; however, it has been repeatedly exemplified in nature, as seen flawlessly in the waggle dance of the honey bee. Currently, our task is distributing the Striped Bass Survey to two groups, Striped Bass fishermen and fisheries. The survey is a functional tool to decipher how the opinions and preferences of both parties compare on separate topics related to ecological factors and management of fisheries. We will be evaluating 'swarm' knowledge using UNU, an online participatory-modeling software, as a space for our experiment. If we can understand the conditions under which these estimates can be thought of as reliable, implications for how to fill in gaps in federal natural resource evaluations used to determine federal fisheries policies.

EVALUATING FACTORS ASSOCIATED AND CONSEQUENCES OF MALE LAKE STURGEON (ACIPENSER FULVESCENS) RIVER OCCUPANCY DURING THE SPAWNING SEASON

Abigail Thiemkey

Time: 10:00 AM

Mentor(s): Kim Scribner (Fisheries and Wildlife)

Lake Sturgeon (*Acipenser fulvescens*) migrate upriver to spawning areas once environmental cues such as temperature and discharge are appropriate. Timing and duration of male movements can dictate operational sex ratios and with whom and how many females they mate. Duration of time spent in spawning areas also can impact male reproductive success (number of offspring sired). Male reproductive success was studied in The Black River in Cheboygan, Michigan to determine aspects of migratory and breeding behaviors males exhibit that are associated with reproductive success. Our goal was to quantify male behavior which included timing and duration of migration and number of migration bouts per season. Our methods included both lab and field analyses. Laboratory analysis involved DNA extractions from fin clips gathered from both adult and juvenile lake sturgeon in The Black River. Individuals were genotyped at thirteen microsatellite loci to conduct parentage analysis implemented in a likelihood-based program (Cervus). Results from previous research have shown that there is a positive correlation between the number of offspring sired and duration of adult male occupancy of spawning areas. Timing and duration of male spawning migration was associated with stream temperature and discharge. Additional variables, such as body size, will also be considered as factors associated with reproductive success. Understanding of the physical river features and biotic factors that are predictive of Lake Sturgeon reproductive success, will further our knowledge of inter-annual variation in population recruitment.

CHANGING PERCEPTIONS AND BARRIERS TO SUSTAINABLE DEVELOPMENT IN THE PLANNING PROFESSION

Kayla Turner

Time: 10:15 AM

Mentor(s): Rex LaMore (Outreach and Engagement)

In 2007, the Michigan Association of Planning (MAP) released an extensive survey to gather input from their members about sustainable development practices in the field of urban planning. Through this, they found that only 51% of respondents considered themselves to be 'Very Familiar' with the concept of sustainable development. More significant, at that time, only 1% of planners considered development trends in their communities to be 'Very Consistent' with sustainable development concepts (LaMore, 2008). Now, nearly 10 years later, we have relaunched this survey in partnership with MAP. Input is being sought both from MAP members and the outside community of professional planners. Results will be compared back to those of the initial survey, in order to gain a greater perspective on how the planning profession's understanding of sustainable development practices and hindrances have changed over time. It is our hope that this research would be used to improve methods used to inform planners and the public on sustainable development and other environmental initiatives. Knowledge of professionals' perceptions of the barriers to sustainable development will also help educators and professional planning organizations to develop stronger solutions for improving the sustainability and resiliency of the built environment in cities across the state. Along with sustainable development, this presentation will consider placemaking, affordable housing, environmental justice, and other related planning concepts.

ENVIRONMENTAL SCIENCES AND NATURAL RESOURCES POSTER PRESENTATIONS, SECTION 1 BALLROOM, 9:00 AM – 10:30 AM

ARE AFRICAN ELEPHANTS THE PRIMARY DRIVER OF TREE MORTALITY ACROSS SAVANNAS?: A META-ANALYSIS.

Logan Brissette

Poster: 715

Mentor(s): Kyla Dahlin (Geography, Environment, and Spatial Sciences), Ryan Nagelkirk (Geography, Environment, and Spatial Sciences)

African savannas endure an incredible amount of disturbance through abiotic and biotic sources. Historically, disturbance ecology in African savannas has focused on fire and precipitation as major controls of savanna tree cover. However, a steadily growing body of literature is focusing on the impacts of megaherbivores. Chief among them is the African elephant (*Loxodonta africana*). The African elephant directly disturbs vegetation by stripping bark, top-killing, and knocking over trees up to 12 meters tall. In some systems, they are the primary cause of tree mortality, but is that the exception or the rule? In order to answer this question, we conducted a literature review and mapped the reported dominant disturbances to woody cover from Kenya to South Africa. Because disturbances often work in concert, we divided the disturbances into groups of relative dominance: primary, secondary, and tertiary disturbances. Preliminary results have attributed the majority (66%) of disturbances to elephants, while 28% were attributed to fire and 6% to drought. Among the primary disturbances, elephants and fire accounted for 82.5% and 17.5%, respectively. Drought was present only as a secondary and tertiary disturbance and fire dominated as the secondary disturbance. These findings suggest that elephants are the dominant determinants of tree cover across their entire range. However future studies will need to examine whether the often-local disturbances of elephants play out across entire landscapes.

EXTRACTION OF BACTERIA FROM UNTREATED WASTEWATER USING MAGNETIC NANOPARTICLES

Anjini Chandra

Poster: 716

Mentor(s): Evangelyn Alocilja (Biosystems and Agricultural Engineering)

Freshwater is essential to sustaining life and regulating ecosystems. Although water comprises 75 percent of the Earth's surface, less than one percent of this water is freshwater that is accessible to humans¹. Many existing freshwater resources harbor microbiological contaminants that can have fatal effects on people. In the future, water recycling will become more important in providing a contaminant-free source of freshwater for activities such as irrigation and industrial processes. In this project, an economical method of removing bacteria from untreated water was developed. Magnetic nanoparticles were used to capture existing bacteria in a sample of untreated wastewater. The nanoparticles were then removed, and serial dilutions of the supernatant were plated on Tryptic Soy Agar (TSA) plates. After 24 hours, the number of bacteria on each plate was converted to colony forming units (CFU) and used to calculate the efficiency of the nanoparticles. The magnetic nanoparticles were able to capture bacteria in the wastewater with an efficiency of

90 percent. The extraction of bacteria from untreated water with magnetic nanoparticles is a simple and inexpensive process that can be carried out close to freshwater sources, thus making it a promising means of providing clean water to people in developing countries.

INFLUENCE OF FRUIT POSITION, HARVEST FREQUENCY AND CANE DENSITY ON DROSOPHILA INFESTATION IN FALL RED RASPBERRY

Emille Cole

Poster: 717

Mentor(s): Eric Hanson (Horticulture), Rufus Isaacs (Entomology), Heather Leach (Entomology), Joshua Moses (Horticulture)

Vinegar flies (Diptera: Drosophilidae) can be a significant pest in fruit crops, particularly soft-skinned fruit like raspberries. Spotted wing Drosophila (SWD) is an invasive vinegar fly which has been especially problematic in this crop because of the female's doubly-serrate ovipositor, which allow her to pierce ripening fruit to lay eggs. The resulting infested fruit becomes degraded and unmarketable. New cultural control techniques for the control of this and other Drosophilids are essential for providing growers with non-chemical options for managing this pest. By understanding Drosophila egg laying preferences and behavior, we may be able to manipulate the crop habitat to minimize Drosophila establishment. Our objectives were to determine how Drosophila infestation is affected by three factors: the height within the canopy, pruning intensity, and harvest frequency. We found that most oviposition and subsequent infestation of fruit occurred closest to the ground. Moreover, increasing harvest frequency to every day or every 2 days significantly lowered the infestation rate compared to harvesting every 3 days. We found no significant differences among infestation rates in the pruning treatments studied. This highlights the importance of thorough and frequent harvest, increased sanitation, and protecting fruit particularly in the lower canopy to reduce Drosophila infestation in this crop.

THAWING CONDITIONS EFFECT ON PHOSPHORUS RELEASE BY ITALIAN RYEGRASS DURING FREEZE-THAW CYCLES

Lauren Costantini

Poster: 718

Mentor(s): Steven Safferman (Biosystems and Agricultural Engineering)

Eutrophication occurs when an overabundance of the nutrients phosphorus and nitrogen enters water sources and stimulates an excessive amount of algae growth, leading to oxygen depletion and decreased water quality. A major source of nonpoint phosphorus pollution is farms, which apply phosphorus-rich fertilizers and manure to the land. The use of cover crops is widely advocated as a way to decrease nutrient runoff and soil erosion, but recent research has suggested that despite its success in decreasing particulate phosphorus loss, cover crops such as Italian ryegrass (*Lolium multiflorum*) increase the concentration of soluble phosphorus being discharged, which can directly enter tile drains. This release of soluble phosphorus is heightened during winter freeze-thaw cycles when the changing temperatures damages cell membranes. This project sought to examine any potential differences in phosphorus release by cover crops during freeze-thaw cycles as a result of various thawing conditions, such as quick thaws versus slow melts. The ryegrass was examined 55 days after seeding to ensure their establishment and maturity and reflect farming practices. After harvesting and freezing the ryegrass, it was either thawed and then subjected to a precipitation event or immediately exposed to precipitation. This procedure was compared to a control where plant samples underwent precipitation events without freezing. The intent of this experiment was to provide information to assist farmers in understanding the environmental impacts of planting cover crops.

THE AMERICAN BLACK BEAR AND BAITED HAIR-SNARES: A QUANTITATIVE ETHOGRAM AND BEHAVIORAL ANALYSIS

Steve Gurney

Poster: 719

Mentor(s): David Williams (Fisheries and Wildlife)

Studying cryptic or elusive wildlife can be difficult, especially when species occur at low densities or inhabit densely vegetated habitats. Non-invasive hair sampling techniques are often used to estimate population size and characteristics of such species. The Michigan Department of Natural Resources uses genetic analysis of collected hair samples to estimate abundance and density of black bears in the northern Lower Peninsula. However, low detection rates of black bears at hair-snares may limit our ability to accurately and precisely estimate density. We explored possible factors driving detection of bears at hair-snares by examining the behavioral ecology of bears from trail camera data. We deployed corral style hair-snares and trail cameras at 40 sites across the northern Lower Peninsula of Michigan. We developed an ethogram based on frequently occurring behaviors and quantified time budgets from our observational data. We reviewed and quantified 1,161 occurrences of behavior and 12,007 seconds of behavioral data. We found a

positive correlation between frequency of wire-crossing behaviors and high amounts of samples (?18). We did not find any difference in how bears cross the wires between occasions that produced low numbers of samples (?11) and high. We found no significant difference among bear behavior frequencies and study area, bait combination, or number of samples. Our results suggest homogeneity in bear behavior at barbed-wire corral hair traps. Our results provide information to improve hair-snare design and reduce the occurrences of “false-negatives.”

ENVIRONMENTAL SCIENCES AND NATURAL RESOURCES POSTER PRESENTATIONS, SECTION 2 BALLROOM, 11:00 AM – 12:30 PM

MONITORING THE IMPACT OF LAND USE ON SOIL TEMPERATURES WITH A SOIL TEMPERATURE NETWORK IN NORTHERN LOWER MICHIGAN

Sabrina Curtis

Poster: 722

Mentor(s): Anthony Kendall (Geological Sciences), Sherry Martin (Geological Sciences)

Land cover directly impacts soil temperatures, yet there are few monitoring networks for soil temperature in natural landscapes across the US. In the summer, forested areas block sunlight from reaching the ground, keeping the soil temperatures relatively cooler than those of open areas. In the winter, trees block winds that carry away snow, while in open areas the snow can be easily swept away. Build up of snow in forested areas helps keep the ground insulated and the temperature range moderated. The MSU Hydrogeology Lab maintains the only active soil temperature network in the Grand Traverse Bay area that has recording stations in both forested and open areas. The network has been active since 2008, measuring soil temperatures every two hours. Here we analyze this 8+ year record and compare temperatures between open and forested land covers. The recorded data shows an average daily range in temperature that varies by several degrees between open and forested land covers. By comparison, climate change has increased air temperatures in the region by approximately 1 degree Celsius over the last century.

PRESCRIBED FIRE EFFECTS ON CARBON POOLS AND FLUX FROM A FOREST MOSAIC LANDSCAPE

Eleanor Domer

Poster: 723

Mentor(s): Jessica Miesel (Forestry), Kathleen Quigley (Forestry)

Prescribed fires are a common land management tool for restoring globally imperiled pine barrens ecosystems, but the ecological impacts of fire are not well-understood. Evaluating fire effects on carbon (C) is of particular importance, because high concentrations of atmospheric carbon dioxide (CO₂) contribute to global climate change. Fire can be a climate forcing mechanism, releasing C as CO₂ during combustion, but can also create a C sink via the formation of a stable C pool known as pyrogenic C (PyC). A study in the Moquah Barrens of northern Wisconsin has allowed a unique opportunity to measure fire effects on ecosystem C in contrasting vegetation types at landscape scale. A total of 56 plots were established within two burn blocks spanning 400-1200 hectares to investigate three burn factors: historic vegetation cover, current vegetation cover, and fuel manipulations. We collected pre- and post-fire measurements of vegetation, fire temperature and fuel consumption, as well as vegetation and soil samples. Preliminary results indicate that prescribed burns resulted in the greatest loss of forest floor C in cut brush vegetation, whereas deciduous woodland lost the least. Mineral soil exhibited C loss in the upper fraction (0-5 cm) but the lower fraction (5-10 cm) remained largely unaffected. By combining these results with data on fuel and vegetation C, I will create a C flux model describing the effects of prescribed burns on C stocks from contrasting vegetation cover. These data are vital to understanding how we can best use prescribed fire to sequester C in soils.

GRAIN-SURFACE TEXTURES ON MARS REGOLITH ANALOG VOLCANIC TEPHRA PH-07_CP AND THEIR ENVIRONMENTAL SIGNIFICANCE

Jordan Marcero, Alexa Muethel, Lakota Shehi

Poster: 724

Mentor(s): Michael Velbel (Earth and Environmental Sciences)

This study acquired and examined SEM images of a Martian analog, PH-07_CP, to characterize the sand grains' formation and alteration. PH-07_CP is a volcanic tephra from Hawai'i, chosen due to its similarity to sand observed around the Mars Phoenix Lander. The PH-07_CP grains were imaged with a scanning electron microscope and visually inspected for several surface features, including vesicles, adhering particles, cracks, and glassy surfaces. Vesicles are rounded cavities exposed at the surface. They are formed by bubbles of gas being “frozen” in place as the rock solidified. Very few grains exhibit vesicles, which are likely obscured by adhering particles on the surface. Grains with

adhering particles appear to have smaller “bits” attached to each grain. This gives a “moss-like” appearance, as reported by previous studies. These particles adhere to the surface during contact with fluids and vapor in the expanding eruptive cloud. Adhering particles observed in our study were more spherical than adhering particles widely reported by other workers, but resembled previously reported surfaces consisting of clustered masses of globules. Grains with cracks have a fissure somewhere on the surface. Cracks were interpreted by previous workers as hydration cracks related to quenching of volcanic melt due to contact between magma and water. Glassy surfaces were characterized by a smooth surface and lack of adhering particles, although there were some glassy surface grains with few adhering particles. The types of surface features observed imply that water was involved to cause several of these alterations.

METABOLOMIC ANALYSIS OF MICROBIAL ISOLATES FROM THE LOST CITY HYDROTHERMAL FIELD

Courtney Stewart

Poster: 725

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

The Lost City Hydrothermal Field (LCHF) harbors a unique deep-sea ecosystem thriving on H₂ and CH₄ compounds generated by the process of serpentinization. Samples from hydrothermal plumes collected above the LCHF were collected in fall 2015 and have been used for the isolation of methanotrophic and hydrogenotrophic organisms. I have been studying the growth of these isolates in artificial seawater medium in the presence of different dissolved gases and salt chemistries. In parallel, we are in the process of comparing soluble and cytoplasmic metabolites from the cultures using Liquid Chromatography Mass Spectrometry approaches. Metabolomics analyses will provide insight into the adaptation of these organisms to the extreme environmental conditions found at LCHF, and a list of potential byproducts that could be used to detect microbial activities in the seafloor. This information can hopefully build a base knowledge template for organisms specifically at this site and also generally in hydrothermal vents. The work could also be used to inform space missions exploring for the potential for life on icy “ocean worlds” of our outer solar system, such as Europa and Enceladus.

THE EFFECTS OF MORPHOLOGY ON THE SURVIVORSHIP OF A KEY PEST IN BERRY CROPS

Jaclyn Stone

Poster: 726

Mentor(s): Rufus Isaacs (Entomology), Heather Leach (Entomology)

Spotted wing drosophila (*Drosophila suzukii*), native to East Asia, was first detected in the United States in 2008. Since then, this frugivorous pest has established in all major fruit producing regions of the United States. Female *D. suzukii* possess a serrated ovipositor, which can pierce the skin of ripening fruits, including raspberry and blueberry, to lay eggs. Larvae of this pest can render infested fruit unmarketable. *Drosophila suzukii* develop into a modified morph when exposed to lower temperatures. This morph has a smaller body, greater melanization, and longer wings than the summer morph, which give it the ability to survive at lower temperatures. Understanding the success of these flies at low temperatures is imperative in controlling their population expansion in the spring. Our objectives were to determine when winter morphs are detected in Michigan and to compare oviposition rate and survivorship between winter and summer morphs. This information will allow us to better understand the abiotic limits of this species, which can be used to develop new tactics to further reduce the population for berry growers struggling to manage this pest.

RISKS FOR HARVESTS & FOOD SOVEREIGNTY: DAM EXACERBATED CONTAMINATION OF FISH

Daniel Xie

Poster: 727

Mentor(s): Jubin Cheruvellil (Extension Health and Nutrition)

Rural and Tribal communities depend heavily on harvests from the Great Lakes water systems –rivers, streams and lakes. The presence of hydrologic dams on these waterways disrupt and exacerbate the toxic contamination of the aquatic organisms and food resources. In fact, mercury contaminated fish continues to be a considerable challenge to communities in the Upper Great Lakes. In response, Tribal and State agencies regularly conduct fish surveys, analyze toxicity, and publish bulletins (Mercury Maps) for Tribal harvesters & communities. However, harvest and consumption of aquatic resources remains an important part of the Anishinaabe lifeways and continues to be practiced. Therefore, we sought to identify locales and communities with increased toxic risks using harvest and mercury maps. The study analyzed the co-occurrence and links between dam locales, fish toxicity and proximity of harvesters to determine locales and structure of increased toxicity risks. Our findings show that fish contamination bulletins do reduce harvests. This reduction in harvest potential, however, could have a negative role in food security, and the ability to practice and reaffirm sovereign Anishinaabe fishing lifeways.

**ENVIRONMENTAL SCIENCES AND NATURAL RESOURCES
POSTER PRESENTATIONS, SECTION 3
BALLROOM, 1:00 PM – 2:30 PM**

PROBING THE COMPOSITION OF THE LITHOSPHERIC MANTLE DURING THE INITIATION OF THE MID-CONTINENT RIFT

Taylor Kelly

Poster: 730

Mentor(s): Tyrone Rooney (Geological Sciences)

During the rifting of a continent, the existing lithosphere exerts a controlling influence on the processes of extension and lithospheric thinning. Lamprophyre dikes are a common feature of large igneous provinces and help probe the composition of the pre-existing lithosphere. Derived from either an upwelling plume or the continental lithospheric mantle, these magmas frequently contain fragments of the continental lithosphere. These dikes commonly intrude basement rock and are notoriously difficult to constrain in terms of their age of eruption. Within the region surrounding the Mid-Continent Rift, located in the Midwestern United States and Canada, are a suite of lamprophyre dikes that may probe the composition of the Laurentian lithosphere. These dikes lack evidence of deformation that is typical for older intrusions (like the Penokian and Grenville) in the Superior Province. We therefore hypothesize that these dikes are related to magmatic activity associated with the younger 1.1 billion year old Keweenaw plume. The dikes contain glomerocrysts and phenocrysts composed of forsterite, an ultramafic magnesium-rich olivine mineral that is mantle-derived and generated during the earliest stages of fractional crystallization or left over as the last remaining phase during partial melting. The forsterite and the dunite occur in two distinct groups containing crystals with Fo₇₄₋₇₈ and Fo₈₈₋₉₂ compositions. We suggest that the crystals with the higher Fo value could be fragments of the mantle that constitute the residue remaining after the extraction of basaltic magmas in the upper mantle. This information provides important insight on mantle conditions during crucial stages of rift generation.

COPPER RESISTANT BACTERIA IN TREE HOLES

Camille Lewis

Poster: 731

Mentor(s): Terence Marsh (Microbiology and Molecular Genetics)

When it comes to tree hole communities, mosquitoes, especially *Aedes triseriatus*, are prevalent. With mosquitoes being excellent vectors of disease transmission, it is not unlikely to think they could easily carry a copper resistant bacterial strain. Naturally occurring microbes pass on copper resistance to opportunistic pathogens in trees. Therefore, it is important to determine the diversity of copper resistance in tree holes in order to help determine characteristics of copper resistant bacteria. As of now, it is unknown how bacteria become resistant. In this experiment, bacteria from tree holes were grown on copper-rich agar plates and the resulting isolated colonies were sent off for metagenomic and phylogenomic analyses. Less than 20% of isolates were able to be identified with confidence at a genus and species level. The majority of isolates (64%) were *Caulobacter vibrioides*. The genus *Bacillus* was the second most popular genus identified. With *Caulobacter* being the predominant genus, Gram-negative bacteria were the ones found to be the most resistant to copper. Therefore, it would appear Gram-negative bacteria are more susceptible to copper resistance. However, *Bacillus* (which is Gram-positive) was also prevalent. If copper-resistant bacteria were to make it to a hospital setting, the bacteria could easily pass along the mutation that makes it copper resistant to other more pathogenic bacteria. For future studies, it would be extremely beneficial to look further into copper resistance in tree hole communities.

QUANTIFYING THE SEVERITY OF AN EMERGING SKIN DISEASE AFFECTING GIRAFFE POPULATION USING PHOTOGRAMMETRY ANALYSIS OF CAMERA TRAP DATA

Waldemar Ortiz

Poster: 732

Mentor(s): Robert Montgomery (Fisheries and Wildlife)

In 1995, a mysterious skin disease, referred to as giraffe skin disease (GSD), was recorded in one giraffe (*Giraffa camelopardalis*) population in Uganda. Since then, GSD has been detected in 13 populations in seven sub-Saharan African countries as well as in 11 captive facilities in six countries around the world. Despite the pervasiveness of GSD, no study has yet quantified the conditions that constitute mild, moderate, or severe forms of the disease. Categorical descriptions are necessary to illustrate the virulence and spatial variation of diseases. Here, we photogrammetrically

analyzed camera-trap images to quantify GSD severity non-invasively. We positioned this study in a system (Ruaha National Park, Tanzania), which has the highest rates of GSD observed (86% of the giraffe population is infected). As GSD afflicts the legs of giraffes in Tanzania, we quantified severity by comparing the total leg length to the vertical length of the GSD patch observed. Then using the Jenks Natural Breaks algorithm, we calculated the categorical divisions and validated our results using known individualized giraffe data. We found no statistical difference in GSD severity classifications between the camera trap and individual giraffe data demonstrating the utility of camera trap data for the study of skin diseases. Our analysis shows that camera traps present an informative platform for examinations of skin disease ecology. Further, this is the first study to statistically quantify the severity of GSD. In this way, our approaches have applicability to a wide range of wildlife species suffering from diseases that manifest externally.

POLITICAL INFLUENCES IN ENVIRONMENTAL SCIENCES

McKenna Rivers

Poster: 733

Mentor(s): David Long (Geology)

It has been hypothesized that the ability to address environmental problems is a function of political affiliations. To test this, a study was conducted and distributed to Michigan State University students. The survey was composed of statements which posed three environmental issues, Global climate change, oil and gas pipelines on water quality, and road salting. Expectations and branching from media reinforcements lead to a prediction that participants views on these topics will correspond to political identification. It is expected that democrats or liberals would agree that global climate change is a problem, it is not natural, and it is affected by human activity, be neutral concerning road salt, and agree that a pipeline would harm drinking water. The republicans and conservatives would be expected to agree global climate change is a problem, is natural, is not affected by human activity, be neutral on road salt, and disagree that pipelines will harm drinking water. The data collected was not fully consistent with the predictions made. Two political identifications agreed on global climate change, but democrats and liberals were split on the natural component. Information gathered should be used to further discussion on how science should be communicated and used to aid policy decision making. Further questions rise from this study: How might generational differences or educational differences change the extent to which political affiliations influence these view, and what does it mean for our society's future? How does the connection of politics and science change geographically?

ECOSYSTEM KNOWLEDGE AND STEWARDSHIP AMONG ADULT CONSERVATION VOLUNTEERS WITH VARIED OUTDOOR RECREATION BACKGROUNDS

Darren Sacks

Poster: 734

Mentor(s): Shari Dann (Community Sustainability)

In past decades, conservation and natural resource stewardship work has been done by "traditional" outdoor groups composed of hunters and anglers. Yet, there have emerged new, enthusiastic ecosystem-minded volunteers to contribute toward this necessary and vital aspect of ecological restoration. Volunteers taking part in the Michigan Conservation Stewards Program (CSP) of MSU Extension come to the program with varied backgrounds in outdoor recreation. Many of the adult learners who attend this program want to get more involved in ecosystem restoration, but how do their learning outcomes vary by their previous outdoor background? Pre- and post-program, online surveys of participants provide data regarding stewardship changes as a result of the CSP. I analyzed data for 200 participants in the CSP from 2006 to 2016. This analysis specifically investigates whether outdoor recreation participation prior to the course affects participants' learning about ecosystems and stewardship. SPSS analysis of the pre- and post-program data show some, although limited, relationships between recreation background of learners and their knowledge change as a result of the program. Yet, understanding the recreation interests of conservation learners can help CSP organizers relate to these participants both during and after the program, and help to keep them connected to volunteer and citizen science efforts. Based on this research, I provide recommendations for CSP and MSU Extension, as well as other natural resource agencies and non-profit organizations for engaging learners with their communities.

MONITORING AEROBIC RESPIRATION IN SOIL WITH AN OPTICAL DISSOLVED OXYGEN PROBE

Donna Ye

Poster: 735

Mentor(s): Ruby Nandini Ghosh (Biomedical and Physical Sciences), Terence L. Marsh (Biomedical and Physical Sciences)

Oxygen is a master variable in nearly all microbial communities of earth. As an electron acceptor in microbial metabolism, oxygen provides the greatest energy return per electron transferred and hence is preferred as an acceptor. A shift from oxic to anoxic requires major changes in microbial metabolism and alters growth rates and excreted

metabolites. Knowing when oxygen becomes limiting and how microbes respond has implications for carbon management and reduction of CO₂ emissions. Our lab has developed a technique to continuously monitor dissolved oxygen (DO) concentrations as a function of time under biologically relevant conditions by immersing our oxygen-sensing probe directly within the soil, sediment or aqueous environment of interest. Real-time measurements of DO concentration and soil moisture from a soil lysimeter system over a period of weeks were performed. During the course of the experiment the lysimeter was (i) flooded with water and then (ii) saturated with three different concentrations of nutrients. The probe tracked the drop in DO as a result of microbial metabolism. We report on the rates of DO decrease and recovery. A parallel experiment with the DO probe in a sterile soil column served as a negative control (no microbes). The in-situ DO measurements obtained from the soil lysimeter will enable us to understand how nutrients, water levels and other environmental factors affect microbial metabolism under real-world conditions.

ENVIRONMENTAL SCIENCES AND NATURAL RESOURCES POSTER PRESENTATIONS, SECTION 4 BALLROOM, 3:00 PM – 4:30 PM

EXPLORING HOW STUDENTS' REASONING ABOUT A SNEEZING PHENOMENON RELATES TO CONCEPTS IN INTRODUCTORY SCIENCE TEXTBOOKS

Justin Gambrell

Poster: 738

Mentor(s): Vashti Sawtelle (Physics)

On the road to knowing whether college students understand how the sciences are related, we must first understand how to characterize their knowledge based on the discipline. In this study, we interviewed students with a background of at least one introductory chemistry, biology, and physics class and asked them to reason about the phenomenon of sneezing and the transfer of disease from person to person. Using these interviews, we explored whether the concepts and ideas students were invoking to describe the phenomenon were concepts found in the introductory textbooks of these classes. In this presentation we discuss our methodology and findings linking students' scientific vocabulary with introductory textbooks (both physical and electronic), and which ideas students commonly invoke from biology, chemistry, and physics. We use this data to make a claim about whether or not the knowledge students draw upon is related to the information available in these introductory science textbooks. Our work shows that the concepts that students used in explaining sneezing were rarely found in the introductory chemistry or introductory physics textbooks and primarily from biology textbooks. In future work we will explore whether the phenomenon of sneezing is more likely to push students to use concepts from the biology textbook than other phenomena.

GRAIN-SURFACE TEXTURES ON MARS REGOLITH ANALOG VOLCANIC TEPHRA JSC MARS-1 AND THEIR ENVIRONMENTAL SIGNIFICANCE

Melanie Harju, Patrick Kurtz, Joey Mukhtar

Poster: 739

Mentor(s): Michael Velbel (Earth and Environmental Sciences)

The purpose of this study was to analyze the surface features of grains taken from the JSC Mars-1 analog, an analog chosen due to its similarity to sand around the Mars Phoenix Lander. In this study, our team analyzed the sample JSC Mars-1 and its physical characteristics. JSC Mars-1 originates from Hawaii and consists of volcanic tephra. Pictures of grains in the sample were taken using a scanning electron microscope. The grains were classified based on their surface features and then compared to published papers that interpreted similar features. Four features were observed and recorded for each grain - vesicles, adhering particles, glassy surface, and cracks. Vesicles are circular cavities that appear on grains and form from gas bubbles trapped within magma before hardening into volcanic glass. Previous work reported vesicles much narrower compared to those in our sample. Adhering particles are small grains that cover the host grain and form from volcanic ash attaching to the grains. Our adhering particles were similar to those imaged in previously published studies. Glassy surfaces are smooth and glossy and caused by intense mixing with water after fracture. Compared to previous papers, our glassy surfaces were not as uniform. Cracks on particles could either be large or small and were caused by water getting into the particles, freezing, and then expanding. Previously published work contained volcanic ash grains with similar cracks. Based on the surface features observed it is apparent that water must have been involved in making these surface features.

EXAMINING THE EFFECT OF CAMERA-TRAP TIME INTERVAL SETTINGS ON DATA STORAGE, WILDLIFE DETECTION, AND ECOLOGICAL MODELS

Clara Lepard

Poster: 740

Mentor(s): Remington Moll (Fisheries and Wildlife), Robert Montgomery (Fisheries and Wildlife)

In the last decade, camera-trapping has become a widespread practice in wildlife studies and large-scale ecological assessments. At present, camera-trap studies use a wide range of settings, including the time interval setting which controls the length of time a camera-trap will be inactive after being triggered. Here we examine the impact of different time interval settings on 1) the number of times the camera-traps were triggered, 2) the detection probability (the chance of detecting a species that is truly in the area) and occupancy probability (the chance an animal is found in an area) of ten mammalian species, and 3) the parameter estimates for habitat-based covariates in occupancy models. Between December 7th, 2015 and January 1st, 2016, we deployed 104 camera-traps in the Cleveland Metroparks. Simulating an increase in time interval from 10 seconds to 60 minutes resulted in an 89.56% decrease in the number of triggers, a 10.1% average decrease in detection probability across species, and a 6.7% decrease in average occupancy probability across species. Time interval had no effect on the qualitative interpretations of two habitat-based covariate models of American mink and humans. These results suggest that relatively long intervals (e.g., 5 to 10 minutes) can be used to save image storage space and reduce analysis time without compromising inference regarding wildlife detection or habitat effects on species' occupancy probabilities. Researchers should continue to make decisions on what time interval is most appropriate based on the trade-off between high detection probability and the feasibility of data management.

AN ANALYSIS OF FACTORS AFFECTING ENDANGERED SPECIES RECOVERY IN TERRESTRIAL PROTECTED AREAS

Katherine Magoullick

Poster: 741

Mentor(s): Vanessa Hull (Wildlife Ecology and Conservation), Jianguo Jack Liu (Systems Integration and Sustainability)

As humans expand across the globe there are an increasing number of negative impacts on animal populations. In many cases this leads to the destruction of ecosystems and the extinction of animal populations. It has become increasingly important to not only identify species that are in greatest need for conservation, but also to design conservation strategies that are successful at reversing their decline. Many previous studies address conservation of individual animal species by analyzing their long-term population changes, or outlining conservation plans for their recovery in certain geographical areas. The disadvantage of this piecemeal approach is that it prevents broader trends in animal population recovery successes and failures from being identified, thus thwarting efforts to focus on effective conservation techniques in the future. I have conducted a meta-analysis by synthesizing numerous individual research studies on animal recovery within terrestrial protected areas around the globe to obtain a more comprehensive picture of factors influencing the success of recovery projects. The goal of this project is to develop guidelines for the recovery of dwindling animal populations and habitats within protected areas that can be used across a broad array of threatened and endangered species. In doing so, I have examined both successes and failures and analyzed the reasons why each occurred, drawing comparisons between studies based on a set of key anthropogenic factors of interest. This project not only provides ideas on how to assist in species recovery, but also important reasons and incentives to do so.

FROM "WET" TO "DRY": HOW DOES INTERMITTENT STREAM FLOW AFFECT CARBON PROCESSING IN MOUNTAIN STREAMS?

Stephen Plont

Poster: 742

Mentor(s): Jay Zarnetske (Earth and Environmental Science)

Small, headwater streams serve as a primary link between terrestrial and aquatic ecosystems and have been shown to serve a significant role in the global carbon cycle. Headwater streams act to transport and process nutrients and carbon as water carries organic matter from the landscape downstream to larger rivers. However, streams are not static systems, and are subject to significant change as a result of changes in the surrounding environment. One such environmental change is seasonal stream intermittency, which leads to an overall decrease in the amount of water flowing in the stream, and to areas of the stream going completely dry during parts of the year. The effect that intermittency has on carbon processing and the overall linkage between landscapes and streams is still poorly understood. The purpose of this study was to answer the following question: how does the onset of seasonal stream intermittency affect the link between streams and the surrounding landscape as well as the dominant spatial scale that controls how carbon is being processed in a watershed? We hypothesized that as flows decrease and intermittency increases, the dominant scale controlling the quantity and quality of DOC in the stream will shift from large, watershed-

scale processes to local scale processes as the stream becomes disconnected from the landscape. Using water chemistry data, geospatial analysis tools, and hydrologic models, results for the study suggest that as flow decreases and intermittency increases, stream carbon controls shift from watershed scale controls to local, valley bottom controls.

FOOD WASTE AT THE CONSUMER LEVEL

Sebastian Stankiewicz

Poster: 743

Mentor(s): Rafael Auras (Packaging)

The United States wastes 40% of all food that it produces. This amount of food equates to approximately \$1200 on average of food thrown away per family per year. Food waste negatively impacts the environment through depletion and misuse of natural resources, as well as warming of the atmosphere. So, it is important to understand why such large amounts of food are squandered at the consumer level. Food categories to be studied are: grains, fruits, vegetables, meat, seafood, eggs, and fats. One of the aims of this study is to understand the reasons for food is wasted at the consumer level, based on case studies that have been performed on consumer behavior. After mapping data from case studies, a survey will determine whether the behavioral studies performed in foreign countries apply to U.S. consumers. Once the reasoning has been determined, a LCA or Life Cycle Analysis will show which food causes the largest environmental impact from a consumer standpoint. The LCA will provide quantifiable data on which food category should be targeted. Subsequently, finding what the reasons for consumer waste are and which foods cause the greatest environmental impact will provide information on how packaging can minimize the amount of waste created at the consumer level.

LAND COVER CONTROLS ON CARBON QUANTITY AND QUALITY IN STREAMS ACROSS THE STREAM-GROUNDWATER INTERFACE

Evan Wlewiora

Poster: 744

Mentor(s): Jay Zarnetske (Earth and Environmental Sciences)

Streams are an important component of the global carbon cycle. In spite of this, organic carbon cycling in streams remains poorly understood. Dissolved organic carbon (DOC) is the largest portion of total organic carbon in streams. DOC abundance in stream surface water is related to land cover. The subsurface water in the hyporheic zone (HZ), the ecotone at the stream-groundwater interface, is a known hotspot for DOC transformations and microbial processes regulating DOC transport downstream. It is unknown if landcover relates to DOC in the HZ. We hypothesize that the high reactivity of the HZ rapidly erases the landcover DOC signature. To test this hypothesis, water samples from various depths across the Augusta Creek Watershed, Michigan were analyzed for DOC concentration and SUVA₂₅₄, a proxy for DOC reactivity. Geographical Information Systems was used to quantify landscape predictor variables. Proportions of agricultural, upland forest, grass/shrubbery, and open water land cover displayed the strongest correlations to stream DOC concentration and SUVA₂₅₄. Correlation between land use and DOC concentration were high in the surface water (.505-.557), but exhibited an immediate decrease in the HZ (.285-.330 at 2.5cm depth). This demonstrates that the land use signature in DOC concentration is disrupted when entering the HZ, indicating substantial biogeochemical cycling in this zone. The land use correlation to SUVA₂₅₄ displays a similar trend of increasing disruption in the HZ, although not as extreme. Overall, disruption of the land use signature in DOC properties is further evidence of the dynamic nature of the hyporheic zone.

EPIDEMIOLOGY AND PUBLIC HEALTH

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

A STUDY COMPARING BACTERIAL CONTENTS VERSUS PROBIOTIC LABELS

Bramyn Payne

Time: 8:30 AM

Mentor(s): Sarah Comstock (Food Science and Human Nutrition)

In 2012, National Health Interview Survey (NHIS) reported that 4,000,000 adults in the United States have taken probiotics within 30 days of the survey. Additionally, the National Institutes of Health (NIH) reported cases of dangerous infections in people taking probiotics with weakened immune systems. We sought to determine the accuracy of several probiotic labels with regard to the abundance of specific bacterial strains. Eight probiotic samples

were purchased at a local grocery. DNA was extracted from these products and PCR was used to amplify the V4 region of the 16s rRNA gene. DNA sequencing was used to determine relative abundance of different strains of bacteria in each sample. In addition to DNA sequencing, qPCR was used to confirm certain strains. Two products listed several bacterial strains; however, it was determined that one strain made up over 80% of the bacteria in the product. Many probiotic labels are inaccurate or incomplete due to the presence of bacteria that are not identified on the product (n=4) or bacteria was present on the label but not present in the sample (n=2). This can potentially mislead consumers. The FDA should develop regulation to require probiotic companies to properly label products with bacterial strains that meet a certain abundance level in the product.

SOCIALLY RESPONSIBLE INNOVATION IN UNITED STATES HEALTH CARE

Georgia Artzberger

Time: 8:45 AM

Mentor(s): Logan Williams (Lyman Briggs)

Socially responsible innovation is a system of thinking and policy making that has the potential to make health care more patient-centered. This presentation seeks to illuminate its importance within the U.S. health care system in providing high-quality patient care and how it differs from previous theories of organizational learning theories, like incrementalism and design problem-solving. These past theories helped policy makers decide effectively, but did not promote loyalty to patient-centered innovation. Through content analysis, we examine three exemplary health care cases - the Chronic Care Model, Lean Management TM principles at ThedaCare, and "systems thinking" at Aravind Eye Care System in India - and explain how these cases include aspects of socially responsible innovation. Components from these cases and components of previous mechanisms, including trial and error and positive applied theory, are used to create socially responsible innovation. Socially responsible innovation allows practitioners to be more responsive to patient needs. These achievements in health care innovation have revealed a reflective mechanism, cycles of actualization, that promotes continuous development and implementation of an ideal model. Cycles of actualization is a practical implementation of socially responsible innovation that can help practitioners innovate from within. Redefining the concept of patient-centered care, this presentation suggests that medical waste management could benefit from socially responsible innovation. If socially responsible innovation is adopted by the U.S. health care system, facilities can begin thinking holistically about their duties, enact patient-centered change, and create a culture of medicine that promotes learning, reflection, and action.

DAIRY PRODUCTS AND IODINE-CONTAINING SUPPLEMENTS USE ARE POSITIVELY ASSOCIATED WITH IODINE STATUS IN CHILDBEARING AGE WOMEN IN THE UNITED STATES

Michelle Arsenault

Time: 9:00 AM

Mentor(s): Kyungwon Lee (Food Science and Human Nutrition), Won Song (Food Science and Human Nutrition)

Iodine is a critical nutrient in the synthesis of thyroid hormone in the body. Although recommended dietary intake of iodine has been established, food composition data of iodine are not available and thus iodine status in population is determined by urinary iodine concentration (UIC). By using food group-based approach, we reported that dairy products are positive contributors to adequate iodine intake in general adult population in the US. We aimed to describe iodine status and its determinants in childbearing age women of different race/ethnic groups and their associations with dairy product intake. Data from the National Health and Nutrition Examination Survey 2003-2012 were utilized. A total of 2,722 non-pregnant and non-lactating women of childbearing age (15-44 years) with information on UIC, single 24-hour dietary recall, iodine-containing dietary supplement, salt use, and sociodemographic characteristics were included. Iodine status was assessed by two different WHO criteria (median UIC and the prevalence of UIC <50 µg/L) from single spot urine sample. Iodine status of childbearing age women had borderline iodine adequacy (median UIC: 126.6 [117.6-135.6] µg/L). Childbearing age women in the highest tertile of dairy product consumption had lower odds of UIC <50 µg/L (adjusted odds ratio=0.52; 95% confidence interval: 0.30-0.91), compared with those in the lowest tertile. An increase in dairy product intake by 100 g/day led to an increase in UIC by 5% (P <0.01). Further studies are needed to identifying dietary and behavioral determinants of iodine status among pregnant and lactating women.

SMALL CHILDREN, BIG BATTLES

Elyssa Hurwitz

Time: 9:15 AM

Mentor(s): Ann Mongoven (Religious Studies)

This presentation brings together theories from Victor Turner, William May, as well as my own experiences and insights to argue that there is a connection between social and religious rites of passage; identity crises for the patient and their family; and stigmas in our society surrounding dying children. Through my independent study this semester, I have been

able to research pediatric palliative care through religious and anthropological lenses. I started looking into end of life care for young adults and children more carefully after my best friend passed away from a rare and aggressive form of cancer, and my passion for this field has transformed from a topic I researched outside of school into a career path. My research has culminated in a paper and also a Powerpoint presentation. This research is important because I firmly believe that our society needs to change the way we look at the deaths of young people. I strongly believe that there is a place for religious rituals specifically for the death of a child, and I want to pose this as an opportunity to religious leaders for an addition in their religions. The only consistent in all of our lives is death, and I think we need to spend more time truly understanding that and understanding how to make death as painless, peaceful, and destigmatized as possible for everyone – including children.

A DESCRIPTION OF FOOD ACCESSIBILITY AMONG URBAN HEAD START FAMILIES

Abby Klemetson

Time: 9:30 AM

Mentor(s): Jiyng Ling (Nursing)

This study aimed to determine the food accessibility among urban Head Start families. Approved by IRB, parents from one Head Start center were invited to complete the Neighborhood Food Access Survey via Qualtrics. Sixty parents completed the survey (96.7% female) with an average age of 28.55 years. The sample included 18.3% Hispanic and 53.3% black, with 61.7% being single. With regards to economic background, 78.3% earned less than \$19,999 last year, and 51.7% were unemployed. The most popular grocery stores were Kroger (n=23) and Meijer (n=21), and Walmart (n=10). Nearly half (48.3%) bought their groceries twice a month. Besides grocery stores, farmers' markets (53.3%) were a popular place to purchase food. About 16.7% lived within 5 minutes of a grocery store, and 45% lived 5-10 minutes away. Approximately 85% transported themselves in their own car, 10% walked to get foods, and 15% used public transportation. Although 91.7% reported no difficulty to get the foods they needed, the top two obstacles to getting the foods they needed were cost (55%) and time for shopping (20%). Parents expressed a desire for more farmers' markets (45%) and a grocery store (21.7%) in the neighborhood where they lived. Regarding neighborhood's present food needs, 16.7% needed better produce, and 10% wanted access to cheaper foods or additional places to get their food. As expected, cost is a primary barrier for urban Head Start families to access healthy food. Farmers' markets and affordable healthy recipes may be promising strategies to promote healthy eating among these families.

THE ASSOCIATION BETWEEN DIETARY DIVERSITY AND BMI IN WOMEN OF REPRODUCTIVE AGE

Breanna Kornatowski

Time: 9:45 AM

Mentor(s): Sarah Comstock (Food Science and Human Nutrition)

Poor dietary habits in the United States have led to an increase in the prevalence of obesity. Obesity can be problematic for everyone, however, a healthy diet is especially important in pregnant mothers in order to provide a healthy environment for the baby. Unfortunately, access to a quality diverse diet isn't always feasible. This research investigated the relationship between dietary diversity and body mass index (BMI) among pregnant women. Pregnant women (n = 30) voluntarily enrolled in ARCH or BABY Gut completed a survey in which they were asked to record everything they consumed in the past day. This information was then assorted into ten categories and scored based on the Minimum Dietary Diversity – Women (MDD-W) Scale developed by Mary Arimond and Terri Ballard. Women who consumed at least five of the ten categories were considered to have an estimated "higher micronutrient adequacy" which is an indicator of a nutrient-dense diet. This score was then compared to the participant's BMI to determine if there was an association. BMI was categorized into three groups: BMI less than 25, BMI greater than or equal to 25 but less than 30, and BMI greater than 30. With the BMI and MDD-W Score, a statistical analysis was performed using SAS software. The results showed that women with higher BMI tended to have a lower MDD-W Score than women with lower BMI ($p < 0.1$). Thus, these results reflect the importance of encouraging obese women to consume a diverse, nutrient rich diet specifically in pregnancy.

**EPIDEMIOLOGY AND PUBLIC HEALTH
POSTER PRESENTATIONS, SECTION 1
BALLROOM, 9:00 AM – 10:30 AM**

PILOT STUDY WITH PARENTS/GUARDIANS TO INCREASE HEALTHY EATING AND PHYSICAL ACTIVITY AMONG THEIR ADOLESCENT CHILDREN

Melina Dickmeyer

Location: Ballroom

Mentor(s): Jiyng Ling (Nursing), Lorraine Robbins (Nursing), Grace Williams (Nursing)

The overweight and obesity prevalence among children and adolescents highlights an urgent need for interventions to address the problem. The purpose of this pilot study was to evaluate the feasibility and preliminary efficacy of a 4-week intervention for parents/guardians of 5-6th graders: 1) two face-to-face meetings with parents/guardians to assist them in helping their child eat healthy and attain adequate physical activity (week 1 and 4); and 2) a Facebook-based program for parents to inform them about healthy eating and physical activity and encourage them to help their child engage in both behaviors. Fifteen parents from an urban school in Michigan joined a private Facebook group and were asked to post two statements or pictures to respond to healthy eating and physical activity challenges and one supportive statement to respond to another parent/guardian's posting each week. After the intervention, parents/guardians completed a survey evaluating their satisfaction with the intervention. Parents/guardians also participated in a focus group to share their thoughts about the intervention and ways to improve it. Parents' BMI decreased from 34.77 to 34.65, while children's BMI z-score decreased from 1.27 to 1.21. Parents' healthy knowledge, attitudes, and behaviors improved; and dyads participated in more self-reported MVPA (parent: 18 min/day; child: 136 min/day). All families reported that they would like to recommend the program to others. Parents also reported improved healthy shopping and cooking behaviors. Challenge completion rates were above 80% each week. The study demonstrated that the intervention was feasible and showed promise in promoting healthy behaviors.

GEOCODING MISSING DATA: A HOPEFUL SOLUTION FOR PUBLIC HEALTH RESEARCH

Paige Gebhardt

Poster: 221

Mentor(s): Sue Grady (Geography Environment and Spatial Sciences)

Even the best geocoded datasets will have some missing data. How that missing data impacts the results of spatial epidemiological studies is an important area of public health research. This study reviews the most common types of missing location data in routine public health surveillance databases, including incomplete information and PO Box and Rural Route addresses. A two-step procedure is presented to (a) improve the quality of these records through address standardization and imputation techniques; and (b) improve the locational accuracy of addresses using the Environmental Protection Agency's (EPA) Intelligent Dasyetric Mapping (IDM) Tool in ArcGIS. Dasyetric mapping uses high resolution imagery to accurately distribute the population of an area. Population density in habitable areas and their combined characteristics are used to guide the interactive geocoding process. A case-study showing the implementation of this solution is presented to hopefully end the worry of missing data in spatial epidemiological studies.

UNDERSTANDING THE RELATIONSHIP BETWEEN VISIBILITY OF FRESHWATER BLUE SPACES AND MENTAL HEALTH IN MICHIGAN

Michael Marchiori

Poster: 222

Mentor(s): Amber Pearson (Geography)

The mental health benefits of blue spaces have become increasingly of interest, particularly since mental health contributes significantly to the global disease burden. Consequently, the ways in which neighborhood features, such as exposure to green or blue spaces, may promote mental health are increasingly under investigation. Research on quantifying visual exposures to blue space is currently limited to one study in New Zealand; in this study, visual exposures to oceanic blue spaces was associated with lower psychological distress in adults. This association, however, has yet to be tested with freshwater blue spaces. Our study uses geospatial data on the location of water bodies, building footprints, population composition and density, and terrain elevation, to quantify visibility of blue space using: 1) the proportion of each zip code occupied by blue space (accounting for zip codes adjacent to the Great Lakes) and; 2) the average Vertical Visibility Index (VVI) value for a set of random points in each zip code. We then tested the relationship between our two measures of blue space visibility and the 2014 age-sex-standardized rates of anxiety and

mood disorder hospitalizations derived from the Michigan Department of Health & Human Services. A better understanding of the mental health benefits associated with blue spaces can be used to help promote mental wellbeing.

PERCEPTIONS OF DEPRESSION AND MENTAL HEALTH TREATMENT IN LARTEH, GHANA

Mary Normand

Poster: 223

Mentor(s): Connie Currier (Public Health)

This study examines the relationship between rates of depression, perceptions of depression, and willingness to seek mental health treatment in Larteh, Ghana. Most Ghanaians who are seeking mental health treatment are experiencing schizophrenia or other delusional disorders. Considering that depression is the most commonly diagnosed mental disorder worldwide, relatively few Ghanaians seek treatment with mental health professionals for depression. Local health officials and literature attributed the mental health treatment gap to stigma surrounding mental illness. Through focus groups, interviews, and data analysis, we evaluated the local community's opinions of depression and mental health treatment. The research found low levels of reported stigma surrounding depression and treatment-seeking behaviors. Results suggest lack of access to mental health services, rather than stigma, as being the cause of the mental health treatment gap. Ghana's health care system consists of very few mental health resources. Our research suggests that investing in mental health resources, rather than working to reduce stigma, would be more effective in addressing the mental health treatment gap.

USE OF COMPLEMENTARY THERAPIES AS ADJUNCT TO OPIOIDS IN CANCER PAIN MANAGEMENT: A REVIEW

Adam Barrett

Poster: 224

Mentor(s): Rebecca Lehto (Nursing)

Despite documented benefits, increased use of opioid analgesics to manage cancer-related pain carry undesired side effects such as decrements in cognitive effectiveness, fatigue, and constipation. The purpose of this review was to evaluate whether complementary therapies (e.g., yoga, meditation) can be viable adjuncts to reduce dosage for opioids in pain management. Cancer-related pain remains undermanaged despite increased use of opioids. Studies conducted with chronic pain groups have found benefits from complementary therapies in reducing need for opioids. The addition of complementary therapies as an adjunct to opioids to help manage cancer pain may reduce aversive side effects while reducing pain. PubMed and MSU Libraries were utilized as search engines, using key words: cancer pain, opiate/opioid, complementary therapy, alternative therapy. Inclusion criteria were: written in English; focus on opioids, complementary therapies, cancer related pain, and published within last 10 years. The PRISMA model was used to organize and target eligible research with 20 papers retrieved. After reviewing abstracts, 6 papers were retained, 4 of which were retrospective studies. Both type of opioid used and opioid demand are directly related to severe pain. While only 4 of 20 studies evaluated complementary therapies in conjunction with opioids, their presence has resulted in significant decreases in pain and increased quality of life (QOL), with decreased need for increasing opioid dosage. Although results are promising, studies that apply specifically to cancer patients are needed. Targeted research is needed to compare cancer-related pain levels, and QOL in patients with and without usage of complementary therapies.

MULTIPLE HEALTH BEHAVIORS AMONG DUAL-SMOKER COUPLES

MacKenzie Clark

Poster: 225

Mentor(s): Seung Hee Choi (Nursing)

The 2009 National Institutes of Health meeting on the science of behavior change recognized clusters of risky health behaviors (multiple health behaviors). Majority of smokers simultaneously engaged in at least one additional risky health behavior. Understanding the co-occurrence of the multiple health behaviors can assist in developing interventions that are most helpful to reduce this occurrence. The purpose of this study was to explore in-depth health behaviors, such as problem drinking, physical inactivity, and unhealthy diet to detect clusters among dual-smoker couples. This study was a cross-sectional online survey with a convenience sample of 183 participants in a dual-smoking relationship. The participants mean age was 34.1 years old and the mean years of being married to their spouse was 7.3 years. Of the sample, 56.9 percent were female and 43.1 percent were male. Among the participants, 100 percent participated in smoking and unhealthy diet, 60.8 percent participated in smoking and physical inactivity, and 27.1 percent participated in smoking and problem drinking. Finally, 9.9 percent of the sample participated in smoking, physical inactivity, unhealthy diet, and problem drinking. These clustering of risky health behaviors shows that among dual-smoker couples, typically they do not participate in just the risky behavior of smoking, but in other risky behaviors as well. These findings demonstrate the need for the promotion of health interventions that address multiple health

behaviors such as physical inactivity, unhealthy diet, and problem drinking rather than one single health behavior by itself.

EPIDEMIOLOGY AND PUBLIC HEALTH POSTER PRESENTATIONS, SECTION 2 BALLROOM, 11:00 AM – 12:30 PM

EDUCATING PATIENTS THROUGH THE DIGITAL SPACE: USING FACEBOOK TO TEACH BREAST HEALTH

Megan Krollkowski

Poster: 226

Mentor(s): Mary Smania (Nursing)

Despite 80% of internet users seeking answers to health-related questions online, little evaluation has been done on the use of social media in the healthcare setting. Social media sites offer a quick source of education for patients and offer an effective form of communication, redefining patient access to health information. Health promotion is an essential part of nursing care; therefore, it is necessary to examine different avenues of patient-centered education, such as the use of Facebook. A quality improvement study was conducted through an anonymous online survey sent to 46 individuals. The sample included 17 females, ages 28 to 80, as 20 individuals did not respond and 9 emails bounced back. Those who participated consisted of prior members of Pink Impact's Facebook page, individuals who were not members before the study, but joined afterward, and individuals who did not want become members of the page. All participants listed above attended Pink Impact's Breast Health Symposium, an educational program for high risk women and breast cancer survivors, funded by Susan G. Komen. The purpose of this study was to evaluate the educational and emotional supportive benefits of an informative Facebook page on breast health, the benefits of one's change in mental health, and the potential of supportive interventions through the use of Pink Impact's Facebook page. Developed from this study was the idea that Registered Nurses could incorporate the use of social media into patient interactions to allow for a deeper level of holistic, patient-centered care.

ANTIBIOTIC RESISTANCE AMONG POULTRY FARMING COMMUNITIES IN RURAL ECUADOR

Danielle Nicklas

Poster: 227

Mentor(s): Lixin Zhang (Epidemiology and Biostatistics)

Small-scale farming operations in rural communities often prescribe high amounts of antibiotics to poultry raised for meat consumption known as "production chickens." In contrast, free-ranging local varieties of household chickens receive almost no antibiotics. Recent evidence suggests that free-range chickens in proximity to production chickens have increased levels of antibiotic resistance. This study aimed to examine whether free-range chickens can serve as intermediate hosts for the transmission of antibiotic resistant bacteria from production chickens to humans in rural Ecuador. *E. coli* isolates were identified from production and household chickens and their resistance phenotypes to 12 antibiotics were examined. These isolates were also genotyped using ERIC PCR and potential resistance genes from resistant strains were amplified and sequenced. We found that *E. coli* from production chickens yielded overall significantly greater antibiotic resistance (2- to 10-fold) with higher percent differences of screened antibiotic resistance genes and mobile elements compared to household chickens [intI1 (100%), blaSHV (30%), blaCTX-M (82%), and tetB (30%)]. There was a significant increase in cefotaxime resistance among household chickens at the end of study (66% to 73%). The predominant blaCTX-M gene found in production chicken isolates was also found in at least three household chicken isolates, although none of these isolates shared the identical ERIC patterns found in production isolates. Results indicate that small production chicken farms can introduce antibiotic resistance into other poultry breeds, likely through horizontal gene transfer spillover events into free-range chickens.

RELATIONSHIP BETWEEN DIETARY INTAKE AND BMI AMONG LOW-INCOME URBAN HEAD START CHILDREN

Shuhan He, Jessica Haas

Poster: 228

Mentor(s): Jiying Ling (Nursing)

Low-income families often have less access to healthy options, purchase less nutritious foods, and have poorer health. The purpose of this study was to examine the relationship between dietary intake and body mass index (BMI) among low-income urban head start children in Michigan. The National Head Start Association provides the preschoolers from low-income households with a program to meet their health and nutritional needs. The study was approved by University IRB. Children's height and weight were measured to calculate BMI, BMI percentile, and BMI z-score. Parents completed the Block Kids Food Screener assessing children's dietary intake. SPSS was used to analyze the data. Sixty-

seven children (64.5% female) participated, with a mean age of 53.7 months. Nearly half (46.3%) of the children were overweight or obese. On average, children consumed 1.64 cups of fruits, 0.74 cups of vegetables, and 1.81 cups of dairy per day. Children's BMI z-score was negatively correlated with their daily dairy consumption ($r=-.28$, $p=0.023$): obese children consumed less dairy than their healthy weight peers (1.34 vs 2.06 cups/day, $p=0.015$). Similarly, healthy weight children ate more vegetables than overweight/obese children (0.87 vs 0.60 cups/day, $p=0.038$), but not differed in fruit consumption (1.73 vs 1.54 cups/day, $p=0.40$). The higher overweight/obesity rate is calling for intervention efforts for low-income urban Head Start children. The results from this study imply that future interventions should focus on improving vegetable and dairy consumptions to help prevent and control childhood obesity among Head Start children.

EVALUATING THE HEALTHY IMMIGRANT EFFECT

Shay Robison, Mary West

Poster: 229

Mentor(s): John Waller (History)

This poster will present the latest evidence on one of epidemiology's most enigmatic phenomena: that immigrants to countries such as the United States live longer on average than the native born. Discovered by epidemiologist Dr. Kyriakos Markides in 1986, the 'Hispanic Epidemiological Paradox' is surprising because immigrants tend to be socioeconomically disadvantaged and they have often left dangerous and unhealthy environments. Just as interesting and striking is the observation that although adult immigrants have a longer life expectancy than the adults in their host countries, their children's longevity tends to match that of their host country. Having surveyed the data on what is now known as the 'Healthy Immigrant Effect', 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 tend to relocate; those who migrate tend to live healthier lifestyles by not readily adopting the poor diets of their host country; and the data has been skewed by migrants returning home once their health begins to decline. We show that none of these explanations can adequately explain the cause of the Healthy Immigrant Effect alone, leading to the conclusion that multiple factors are involved or that an as-yet unidentified cause is responsible.

MATERNAL DEPRESSION IN MICHIGAN'S PREGNANCY RISK ASSESSMENT MONITORING SYSTEM (PRAMS), 2012-2014

Hannah Sauter

Poster: 230

Mentor(s): Pete Haak (Michigan Department of Health and Human Services)

Postpartum depression (PPD) challenges mothers at a time of vulnerability, and much about the prevalence is still unknown. PPD can lead to emotional suffering, negative affect, marital and relationship conflicts, diminished attachment to the newborn, and impaired cognitive, emotional, and social function in the child. This descriptive analysis was conducted using data from MI PRAMS for birth years 2012-2014. Demographic differences are also examined. Before becoming pregnant, 12.5% of all Michigan mothers reported being told they had depression. A similar proportion (13.1%) of all mothers reported symptoms of depression during the postpartum months. Of these women reporting postpartum symptoms, most (73.0%) did not report depression before conception. Few Michigan mothers (3.4%) report persistent depression both before and after pregnancy. Non-Hispanic black mothers were almost twice as likely to report new onset depression symptoms after pregnancy as non-Hispanic white mothers (14.5% vs. 7.5%). Michigan PRAMS shows that the prevalence of prepregnancy and post pregnancy depression are similar, but do not necessarily affect the same women. The majority of women with postpartum depression symptoms did not report prepregnancy depression. A small but significant proportion of mothers report depression before and after pregnancy. Finally, significant differences occur regarding the development of postpartum depression in non-Hispanic black and non-Hispanic white women.

INTERPERSONAL AND SEXUAL VIOLENCE AMONG FOSTER YOUTH

Sean Hancock

Poster: 231

Mentor(s): Heather McCauley (Human Development and Family Studies)

Adolescents in the foster care system are more likely than their peers to have a history of childhood adversity and experience sexual violence in adolescence. The purpose of this study was to understand how young women with a history of foster care involvement made meaning of their abusive experiences and how they impacted their relationships in young adulthood. We conducted mixed methods social network interviews ($n=22$) with adolescent and young adult women ages 16-24 recruited from youth-serving agencies in the Allegheny County, Pennsylvania foster care system. Participants completed a computer-based social network survey via EgoNet software, identifying 25 alters (e.g. people) in their social networks. We then conducted audio-recorded, face-to-face, semi-structured qualitative interviews with the network maps as a guide to understand the context and qualities of their social networks. Thematic analysis was

conducted using Nvivo. In face-to-face interviews, women described significant trauma histories, including childhood sexual abuse and adolescent relationship violence. However, women often downplayed their experiences of sexual violence perpetrated by male partners and emphasized their complicated relationships with women. Women described episodes of physical and sexual abuse and reproductive coercion committed by men, yet physical and verbal altercations with women were found more significant. Participants with a history of trauma exhibited a distrust of women. While participants have experienced violence perpetrated by men, this aggression is downplayed due to the normalization of male dominance in heterosexual relationships. Further interviews should be conducted to collect and analyze more specific qualitative data.

EPIDEMIOLOGY AND PUBLIC HEALTH POSTER PRESENTATIONS, SECTION 3 BALLROOM, 1:00 PM – 2:30 PM

WATER ACCESS VS. DEHYDRATION AND URINARY TRACT INFECTION RATES AMONGST THE PERUVIAN POPULATION

Sumalra Hal, Basma Al Masraf, Shannon Hood, Leah Manimalethu, Clare Reidy, Charlle Tobin, Harrison Wermuth
Poster: 233

Mentor(s): Maddi Massa (Osteopathic Medical Specialties)

Even with improvements in Peru's infrastructure, roughly four million Peruvians still lack access to safe water, and over eight million lack access to sanitation resources. Students from the MSU College of Osteopathic Medicine (MSUCOM) collected data from Iquitos, Peru in 2016. The purpose of this study was to further investigate the aforementioned issue and compare it to the rates of dehydration and urinary tract infections (UTIs). Patient symptoms were recorded and then surveyed. They were asked about access to water, if they felt it was clean enough, and how much they drank. We then compared these responses to those among them who met the criteria for dehydration and UTI's by measuring the BUN/Cr on BMP and specific gravity (SG), leukocytes, and nitrites on urine dipstick. Out of n=76 participants, 19 had elevated BUN/Cr levels, while 45 had elevated SG - signifying dehydration. Of these, 68% and 75% felt they had access to clean water, respectively. Of all those tested, 4 had positive nitrites, while 27 tested positive for leukocytes - showing UTI. 100% of those with positive nitrites reported symptoms, while 67% of those with leukocytes reported symptoms. Further analysis revealed, in dehydrated patients with high urine SG, a 2.5-fold increase in positive leukocytes and a 6-fold increase in positive nitrites. Similarly, results showed dehydrated patients with high BUN/Cr, were 2-fold more likely to test leukocyte positive, and 3.2-fold more likely to test nitrite positive. These results reveal real health consequences for those without adequate hydration status and water supply.

MALPRACTICE CASES AND THEIR EFFECT ON OB GYN JOB SATISFACTION

Megan Placko, Rebecca Schmidt

Poster: 234

Mentor(s): Mark Largent (Lyman Briggs)

Recent trends in malpractice cases may lead to an decreased amount of job satisfaction among OB GYNs due to the emotional and financial burden the lawsuits bring about. Therefore, less doctors continue practicing Obstetrics, which leads to an increase in malpractice cases. These increases arise from Obstetricians needing to take on more patients. With the extra workload, many are forced to work more irregular hours causing sleep deprivation, less of an emotional connection to patients, and therefore greater rates of avoidable error. We believe these causal relationships form a feedback loop in which an increase in malpractice cases leads to a decrease in job satisfaction; ultimately causing a shortage of Obstetricians, furthermore increasing the amount of malpractice cases filed. To study these relationships, we analyzed pre-existing data to determine that the feedback loop is plausible. If this cycle is not rectified, there is a possibility that the act of childbirth could become more dangerous.

NEWLY INCIDENT CANNABIS USE IN THE UNITED STATES, 2002-2011: A REGIONAL AND STATE LEVEL BENCHMARK

Jacob Leinweber

Poster: 235

Mentor(s): James Anthony (Epidemiology and Biostatistics)

We are at a time when cannabis use and legislation is at the forefront of national and international news, public and research communities are increasingly interested in cannabis, and drug trafficking is increasingly publicized. In this study we test for higher cannabis incidence rates along the US-Mexico border and create a 2002-2011 benchmark against which future estimates can be compared. The study population is 12-to-24-year-olds in the US, sampled during National

Surveys on Drug Use and Health, 2002-2011, for which public-use datasets were available. We estimated state-specific incidence rates based on independent replication sample surveys across these years, and derived meta-analysis estimates for 10 pre-specified regions. From meta-analysis, the estimated annual incidence rate for cannabis use in the Mexico Border Region is 5% (95% confidence interval, CI = 4%, 7%), which is not an exceptional value relative to the overall US estimate of 6% (95% CI = 5%, 6%). Within the state-specific estimates, Vermont and Utah have the largest and smallest incidence rates, respectively (VT: 9%; 95% CI = 8%, 10%; UT: 3%; 95% CI = 3%, 4%). Relatively minor variation in region-wise and state-level estimates is seen, although Vermont and Utah might be exceptional. As of 2011, proximity to source countries (Mexico, Canada) and western states with liberalized policies apparently has induced little variation in incidence rates. Public health officials and policy analysts can use these benchmark estimates and comparisons with newer estimates to plan for changes in cannabis use and intervention service demands.

WORKPLACE LEAVE AND BREASTFEEDING INITIATION AND DURATION; MICHIGAN PREGNANCY RISK ASSESSMENT MONITORING SYSTEM

Jacob Paclorek

Poster: 236

Mentor(s): Peterson Haak (Michigan Department of Health and Human Services)

Breastfeeding provides benefits for both mothers and babies. Many mothers do not breastfeed for the recommended duration due to barriers. Inadequate paid and unpaid maternity leave may be one barrier to breastfeeding through three months of age. Univariate analyses were performed using data from the MI PRAMS for the combined birth years 2012-2014. Michigan breastfeeding initiation between 2012 and 2014 was 82%; half (49%) of mothers were still breastfeeding at three months. During pregnancy, 64% of mothers reported working at a job for pay. Among these mothers, 25% took paid leave, 13% took both paid and unpaid leave, 54% took unpaid leave, and 8% took no leave. Mothers with paid leave only had an initiation rate of 87%; 55% breastfed through three months. Mothers with paid and unpaid leave had an initiation rate of 94%; 73% breastfed through three months. Mothers who had unpaid leave only had higher initiation (85%) than the average but no difference in three month duration (49%). Mothers who took no leave and mothers who did not work at a job for pay before pregnancy both had lower initiation (78%, 75%) and three month duration (43%, 42%) than the state average. Michigan mothers reported a range of different options for paid and unpaid leave from work following pregnancy. Mothers with a combination of paid leave and unpaid leave had the highest breastfeeding rates.

COMMUNITY PERCEPTIONS OF DIABETES IN LARTEH, GHANA

Lauren Varvatos

Poster: 237

Mentor(s): Connie Currier (Public Health), Linda Gordon (Anthropology)

This study examined perceptions of diabetes and recommendations for diabetes management by the community of Larteh, Ghana. Using community-based research methods, this study specifically focused on beliefs regarding causes, symptoms, diagnosis, treatment, and dietary changes. Worldwide, type II diabetes mellitus is one of the most rapidly increasing non-communicable diseases, and the diabetes rate in Sub-Saharan Africa is expected to double by 2030. In Ghana, 1 million adults are predicted to have the disease by the same year. Research began with community members using the PhotoVoice technique to assess general perceptions of nutrition in Larteh. The researchers conducted focus groups based on the results of Photovoice, which identified diabetes as a concern to the community. The researchers used this topic to create interview schedules, conduct semi-structured interviews, established themes, and quantitatively code and analyze the data to identify trends. Results indicated that most participants understood the symptoms, treatments, and dietary changes associated with diabetes, but were unaware of risk factors, causes, and methods of prevention. Analysis of responses revealed that education on these variables is required in Larteh. In Ghana, changes in health policy to provide better access to care and treatment for diabetes are necessary. To provide an opportunity for this research to influence policy and to aid future local diabetes education strategies, the project was presented to the District Health Management Team and to the town of Larteh.

FOOD SCIENCE AND HUMAN NUTRITION

POSTER PRESENTATIONS, SECTION 1 BALLROOM, 11:00 AM – 12:30 PM

CONTENT ANALYSIS OF CULTURAL ELEMENTS IN DIABETES EDUCATION CURRICULA FOR MEXICAN-AMERICANS WITH TYPE 2 DIABETES

Jessica Ball

Poster: 240

Mentor(s): Lorraine Weatherspoon (Dietetics)

Although Type 2 diabetes is disproportionately high in Latinos in the U.S., many are either undiagnosed (50%) or poorly controlled. This is due in part to lack of knowledge on cultural aspects included in health care interventions. Therefore, content analysis was used to identify cultural elements in published type 2 diabetes intervention curricula evaluated with Mexican-Americans. Two trained research assistants assessed curricula for 40 cultural elements, from six categories, Family, Diet and Physical Activity, Health Beliefs, Emotions, Values and Social Factors. An analysis of Cohen's kappa was completed to assess inter-rater reliability between coders. Majority of codes (n=38) found were related to the diet category. Cultural elements least found were related to Values and under the category of Emotions, Shame was not found. The majority of the intervention studies published on the outcomes of the interventions described very little about what cultural adaptations were made compared to the findings with the curricula content analysis. Half of the curricula were given with English and Spanish sections but there was no direct statement that the facilitator should be bilingual. More studies about cultural knowledge in health care interventions could positively affect the quality of care received by Latinos in the U.S.

QUANTIFICATION OF FATTY ACID AND MINERAL LEVELS OF SELECTED SEEDS, NUTS, AND OILS IN NORTHERN GHANA.

Raghav Jain

Poster: 241

Mentor(s): Jenifer Fenton (Food Science and Human Nutrition)

Fatty acids (FAs) and micronutrients are crucial for the growth and development of children. FA and micronutrient deficiency is common in developing countries. The objective of this study was to determine the mineral and FA composition of foods available in a region of Northern Ghana. Seven seeds and three oils were collected from a local market. Freeze dried seeds and food grade oils were packaged in containers and shipped to the US. Fatty acids were extracted from the samples, methylated, and quantified by gas chromatography mass spectrometry. Analysis of food mineral composition was performed by inductively coupled plasma emission spectroscopy. ANOVAs were conducted on FA concentrations and Tukey's post hoc test was used to compare foods. We observed the total saturated FA (SFA) content of palm oil was significantly higher than all other foods (293.1 mg/g; $p < .001$). Shea butter (292.0 mg/g) and palm oil (246.5 mg/g) were highest in oleic acid ($p < .001$). Soyabean was significantly higher in alpha-linolenic acid (ALA, 2.98 mg/g; $p < .01$). Fermented dawadawa and soybean contained high amounts calcium (4500 mg/kg, 3223 mg/kg respectively). Calcium is important for bone health and essential fatty acids (EFAs), such as ALA, are necessary for proper growth and development. Palm oil and shea butter have high levels of oleic acid. Whereas oleic acid promotes brain neuron myelination, improving cognition in children, SFAs have been linked to poor cognition in children, hence processing techniques to remove SFAs from these oils can be explored in future studies.

NUTRITIONAL STATUS DISTRESS IN HEAD AND NECK CANCER PATIENTS: VALIDATION OF SYMPTOM SURVEYS

Hannah Sung

Poster: 242

Mentor(s): Rebecca Lehto (Nursing)

Head and neck cancer patients are recognized to receive treatments that greatly affect their nutritional status. Therefore, assessment of symptoms related to nutrition status and dietary factors is critical in managing symptoms in future patients. The purpose of this study was to evaluate existing research tools to determine the survey that best identifies and describes symptoms, and advocate for its usage in research. A literature review was conducted and ten articles were reviewed. The surveys evaluated included: The Brief Symptom Inventory (BSI), Head and Neck Patient Symptom Checklist (HNSC), M.D. Anderson Symptom Inventory (MDASI), McCorkle Symptom Distress Scale (SDS), and Vanderbilt Head and Neck Cancer Symptom Survey (VNHS). Most studies included patients under chemotherapy, radiation treatment, surgery, and were elderly. The Vanderbilt Head and Neck Cancer Symptom Survey was best at

evaluating nutrition status because it provided a detailed explanation of the physical symptoms and identified psychological, functional, and social losses associated with eating.

THE EFFECT OF FISH OIL SUPPLEMENTATION ON BRAIN DHA AND EPA CONTENT AND FATTY ACID PROFILE

Kelly Valentini

Poster: 243

Mentor(s): Jenifer Fenton (Food Science and Human Nutrition)

Docosahexaenoic acid (DHA) constitutes a large portion of the brain and nervous tissue and is necessary for cognitive function and development. Evidence suggests that supplementation with n-3 fatty acids may improve cognitive performance and be protective against cognitive decline. However, the changes in brain phospholipid fatty acid composition after supplementation with n-3 fatty acids are poorly described. In this study, mice were fed enriched fish oil with increasing eicosapentaenoic acid (EPA) + DHA concentrations, equivalent to the current recommendations by the American Heart Association, and the changes in phospholipid fatty acid composition of the brain were investigated in relation to red blood cells (RBCs) and plasma. Increasing dietary EPA+DHA did not alter brain DHA. However, brain EPA increased and total n-6 polyunsaturated fatty acids decreased across treatment groups, and these changes in the brain were correlated with changes in the RBC and plasma phospholipid compositions ($r > 0.8$). In addition, brain cis-monounsaturated fatty acids oleic, eicosaenoic, and nervonic acid ($p < 0.0001$) and saturated fatty acids arachidic, behenic, and lignoceric acid ($p < 0.05$) increased with increasing dietary EPA+DHA. Delta-5-desaturase enzyme activity estimates (EAEs) significantly increased and stearoyl-CoA desaturase n-7 EAEs significantly decreased across treatment groups in the brain, suggesting fatty acid metabolism in the brain may be altered with increasing dietary EPA+DHA. In conclusion, increasing dietary EPA+DHA did not alter DHA in the brain, but significant changes in other fatty acids were observed. These changes should be further investigated to determine their effects on cognition and neurodegenerative disease.

WHOLE BLOOD OMEGA-3 FATTY ACIDS ARE ASSOCIATED WITH EXECUTIVE FUNCTION IN 2 TO 6-YEAR-OLD GHANAIAN CHILDREN

William Yakah

Poster: 245

Mentor(s): Jenifer Fenton (Food Science and Human Nutrition)

Several studies demonstrate the importance of essential fatty acids (EFAs), and the long chain polyunsaturated FA docosahexaenoic acid (DHA), on cognitive function and brain development. The objective of this study was to investigate the relationship between whole-blood FAs and executive function in children from Northern Ghana. A total of 313, 2-to-6-year-old children attempted four levels of dimensional change card sort (DCCS) tasks to assess executive function, and dried blood spot samples were collected and analyzed for FA content by OmegaQuant. Children who could not pass the first test (49%) were considered to have failed, while 51% passed one or more levels. 54% of children who passed were males. Significant differences in mean % total whole-blood fatty acids were observed between children who failed the DCCS test and those who passed. In a regression analysis controlling for age, malaria, BMI-for-age and hemoglobin, DHA ($B=0.24$, $p=0.06$), total omega-3 ($B=0.16$, $p=0.07$) and dihomo gamma-linolenic acid ($B=0.60$, $p=0.006$) remained positively associated with DCCS performance. Whole blood levels of omega-6/omega-3 ratio ($B=-0.08$, $p=0.04$) and palmitelaidic ($B=-5.34$, $p=0.09$) were negatively associated with executive function. In this population, children were more likely to pass the DCCS test of executive function if they had higher blood levels of DHA, total n-3 and lower n-6/n-3 ratios. Children with DHA levels above 4% were twice more likely to pass the DCCS test of executive function than children with lower levels. (OR 2.12; 95% CI 1.11-4.07; $p=0.02$). These results suggest that higher omega-3 intake are associated with better performance on DCCS tests.

CHARACTERIZATION OF 25 MICHIGAN-GROWN BEAN VARIETIES FOR TOTAL STARCH, AMYLOSE, AND DIGESTIBLE AND NON-DIGESTIBLE STARCH CONTENTS

Alexandra Palmiter

Poster: 246

Mentor(s): Carola Cappa (Food Science and Human Nutrition), Perry Ng (Food Science and Human Nutrition)

The digestibility of starch may be affected by nutrients including fiber and protein contents in a food source, as well as the physical nature in which the starch exists in that source. Pulses (e.g., edible dry beans) vary in protein and fiber contents compared to common cereal sources, and differ in starch content as well. Understanding the starch content as it relates to digestibility is important for individuals with diabetes as well as other disorders in which it is desirable to hinder carbohydrate metabolism. This research focuses on the determination of starch content of edible dry bean powder samples and the digestibility of the starch present. Twenty-five Michigan-grown bean varieties were ground to obtain fine bean powders (~~The starch content of each~~ each bean powder was analyzed using the

Megazyme Total Starch Assay, following the same methods traditionally applied to wheat flour, and using maize starch as a standard reference. Additionally, the Englyst Method was used to quantify rapidly digestible starch, slowly digestible starch and resistant (non-digestible) starch in each of the bean powders. Contents of total starch, amylose, and digestible and non-digestible starches were found to be different among the twenty-five edible dry bean varieties. Statistical analyses will be performed to evaluate results for significant differences.

MICHIGAN'S SMARTER LUNCHROOM MOVEMENT

Colleen Joseph, Meghan Donovan

Poster: 247

Mentor(s): Katherine Alaimo (Food Science and Human Nutrition), Nicholas Drzal (Food Science and Human Nutrition)

School lunch programs play an important role in the diet and health of children. When at school students have the power to make food choices on their own. The Smarter Lunchrooms Movement is a low cost tool that schools can use to implement evidence based nutrition intervention practices. The mission of the Smarter Lunchrooms movement is to help improve children's selection and consumption of healthy food. The goals of this research is to 1.) Describe activities that are currently being used in Michigan schools to encourage children to eat healthy foods, and 2.) Assess student selection and consumption rates of fruits and vegetables in six elementary schools in Michigan. The Smarter Lunchroom Scorecard assess the practices and actions that schools use in the cafeteria. The "Focusing on Fruit", "Promoting Vegetables and Salad", and "Student Involvement" scorecard sections will be summarized by grade. In addition the percent of schools serving two types of fruit and vegetables, sliced or cut fruit, and salads or salad bars will also be reported. The weight of food served, food leftover, and trash weight of fruits and vegetables were measured during 3 days of lunch at 6 elementary schools. Average selection and consumption of fruits and vegetables will be summarized by school. This research will help inform an intervention study to improve cafeteria practices designed to encourage students to select and consume fruits and vegetables. It will also indicate current nutrition practices in Michigan school cafeterias.

FOOD SCIENCE AND HUMAN NUTRITION POSTER PRESENTATIONS, SECTION 2 BALLROOM, 3:00 PM – 4:30 PM

SURVIVAL AND GROWTH OF FOODBORNE PATHOGENS IN FRUIT JUICE

Lindsey DeFrain

Poster: 249

Mentor(s): Hamoud Alnughaymishi (Food Science and Human Nutrition), Dr. Elliot Ryser (Food Science and Human Nutrition)

Given the trend toward healthier lifestyles, fresh juice consumption is increasing which brings food safety concerns. This study aimed to evaluate growth and survival of *Listeria monocytogenes*, *Salmonella*, and *Escherichia coli* O157:H7 in freshly made orange, apple, and pear juices. Juices were extracted using a Hamilton Beach 67608 Juicer after which sugar content and pH were measured using a refractometer and pH meter, respectively. The juices were inoculated with 3-strain virulent cocktails of *Listeria monocytogenes*, *Salmonella*, and *E. coli* from recent outbreaks to contain ~3 log CFU/ml. Samples of each juice were then stored at 4°C, 10°C, and 22°C with subsamples collected daily over a period of 5 days for microbiological analysis. *Listeria monocytogenes*, *Salmonella*, and *E. coli* O157:H7 were enumerated by surface-plating appropriate dilutions and incubating for 24h. All experiments were conducted in triplicate. None of the pathogens grew in any of the juices with greater declines seen for *Listeria* (0.5 – 1.7 log) compared to *Salmonella* (0.1 – 0.7 log) and *E. coli* O157:H7 (0.1 – 0.4 log). By day 5, both orange and apple juice had visible mold at 22°C. The pH of the apple, orange and pear juice was 3.80±0.1, 3.63±0.2 and 3.95±0.1 respectively, while the sugar content was 12, 12 and 14° Brix, respectively. This study demonstrates the ability of foodborne pathogens to survive in apple, orange, and pear juices during storage at different temperatures. Therefore, measures to prevent food pathogens in fresh juices and their preparation areas are needed to better ensure end-product safety.

MICROBIAL SIGNATURE IDENTIFICATION USING A HANDHELD POTENTIOSTAT

Gurveer Deol

Poster: 250

Mentor(s): Evangelyn Alocilja (Biosystems and Agricultural Engineering)

Electrochemical detection of pathogenic bacteria is economically feasible by using a handheld potentiostat to perform cyclic voltammetry experiments. In a cyclic voltammetry experiment, a linearly ramped voltage is applied across the working and reference electrodes, creating a current response to electron flow due to electrical characteristics of the sample. This analysis results in a characteristic graph shape, consisting of an anodic and cathodic peak (Libretexts,

2016). Analysis of the magnitude of both characteristic peaks has been successfully utilized as an indicator of the presence of microbial cells (Ferrier, 2013). However, the peak analysis merely indicates the presence of some concentration of cells and does not indicate the identity of the cells. The development of a procedure for the rapid detection as well as identification of specific bacterial pathogens utilizing a handheld potentiostat has the capability to save many lives. This method of identification would provide an easy, economical alternative for poverty-stricken countries around the world. In this project, four pathologically different bacteria were analyzed by running cyclic voltammetry tests on a handheld potentiostat. Varying concentrations of *Escherichia coli* O157:H7 (Ec), *Salmonella enteritidis* (Se), *Listeria monocytogenes* (Lm), and *Bacillus cereus* (Bc) from culture were reacted with a ferrous cyanide mediator and tested on a screen-printed carbon electrode (SPCE) chip within a handheld potentiostat. Voltages were applied across the SPCE chip, and the current response was recorded. The resulting graphs of each bacterium were inspected for signatures identifying the specificity of the microbial cells detected by the potentiostat.

EFFECTS OF OMEGA-3 DOCOSAHEXAENOIC ACID ON SILICA-TRIGGERED IL-1 β RELEASE AND CYTOTOXICITY IN RAW 264.7 CELLS

Kristen Gilley

Poster: 251

Mentor(s): James Pestka (Food Science and Human Nutrition)

Crystalline silica (cSiO₂) is suspected to contribute to the exacerbation of autoimmunity and thus inflammation within genetically-predisposed individuals. We have previously observed in lupus-prone NZBW1 mouse that exposure to cSiO₂ induced an inflammatory response in the lungs characterized in part by elevated proinflammatory cytokines. These pro-inflammatory effects were reduced by consumption of the n-3 polyunsaturated fatty acid docosahexaenoic acid (DHA). We hypothesize that DHA attenuates silica-induced inflammation beginning at the level of the macrophage. Herein, we utilized murine-derived, macrophage-like RAW 264.7 cells to test this hypothesis in vitro. RAW 264.7 (3x10⁵ cells/ml) were incubated for 24 hours with 25 μ M DHA in RPMI-1640 prior to beginning the experiment and maintained in fatty-acid amended media throughout the duration of the experiment. IL-1 β formation was primed with 25 ng/ml lipopolysaccharide (LPS) for 3 hours prior to exposure to 50 ug/ml cSiO₂ for 24 hours. The results indicate that extracellular release of both IL-1 β and lactate dehydrogenase (an indicator of cytotoxicity) were decreased by DHA. These results suggest that DHA might be effective in preventing cSiO₂ toxicity in the macrophage, thereby possibly mitigating downstream autoimmunity.

ASSESSING WATER ACTIVITY CHANGES AT HIGH TEMPERATURES IN FOOD PRODUCTS OF VARYING COMPOSITIONS

Carly Gomez

Poster: 252

Mentor(s): Bradley Marks (Biosystems and Agricultural Engineering)

There are increasing foodborne disease outbreaks and/or product recalls associated with *Salmonella* in low-moisture food products. Thermal resistance of *Salmonella* is affected by water activity (a_w), which is shown to change at high temperatures. Because salmonellosis outbreaks occur in a wide variety of food products distinguishable by fat, protein, and carbohydrate content, the objective was to quantify changes in a_w in differing food products. Samples were equilibrated to a certain a_w , then inserted into a high-temperature a_w meter inside of an oven. Readings were taken and recorded at two temperatures (70 to 90 °C). In preliminary work, equilibrated milk powder a_w was at 0.2439 (\pm 0.005) at room temperature. Using a high-temperature a_w meter, pre-treatment readings were 0.2987 (\pm 0.017), and following 35°C treatment, a_w readings were 0.3247 (\pm 0.030). Readings between pre-treatment measurement with the high activity a_w meter and after treatment were determined to be not statistically significant, while differences between initial measurement with the standard a_w meter and post 35°C treatment were determined to be statistically significant. Gaining a better comprehension of how a_w changes at high temperatures will allow for future improvement of thermal inactivation processes for food products potentially contaminated with *Salmonella*.

CROSS-CULTURAL COMPARISON OF NUTRITION, PHYSICAL ACTIVITY AND CARDIOVASCULAR DISEASE RISK FACTORS IN 5TH GRADE SOUTH AFRICAN AND MICHIGAN CHILDREN

Malghlin Kolesar

Poster: 253

Mentor(s): Robyn Bluhm (Philosophy), Joseph Carlson (Radiology)

Cardiovascular Disease (CVD) is the top cause of death worldwide in adults. Developing countries, including South Africa (SA), are showing increased prevalence of CVD mortality in adults and CVD risk factors in children. Key contributing factors include changes in nutrition, physical activity (PA) levels, and environmental factors. Objective 1) assess the prevalence of 5th grade South African children meeting WHO recommendations for nutrition, PA and CVD

risk factor levels. Objective 2) compare SA data on nutrition, PA and CVD risk factors to Michigan children participating in (S)Partners for Heart Health. Children ages 9-12(N=75-100) will be recruited from public schools in low-to middle socioeconomic, ethnically diverse regions of Durban, SA. Data will be collected from May to July, 2017 using the measurement protocol from MSU's (S)Partners for Heart Health. Self-report surveys will assess nutrition behavior, PA levels, screen time, and food insecurity. CVD risk factors include BMI, waist circumference, resting blood pressure, unhealthy diet and physical inactivity. Anticipate the mean levels for SA children to exceed WHO recommendations for BMI, waist circumference, waist-to-height ratio and exceed SANHANES recommendations for total energy, added sugars and total fat intake. Also expect SA children to have a higher prevalence of CVD risk factors compared to Michigan children. This study will give insight for my future dissertation research involving preventable diseases and food insecurity. This data will be used to see what specific behaviors and risk factors need improvement and will be considered when designing an intervention program.

BEAN POWDER SOLVENT RETENTION CAPACITIES IN RELATION TO PROTEIN CONTENT AND PASTING PROPERTIES

Tabitha Rose

Poster: 254

Mentor(s): Carola Cappa (Food Science and Human Nutrition), Perry Ng (Food Science and Human Nutrition)

This research project evaluated 25 Michigan-grown edible dry bean powders (particle size \approx 0.5 mm) for their solvent retention capacities and related the results to the bean powders' protein contents and pasting properties. Solvent retention capacities of the bean powders were tested with two different solvents, water and 5% lactic acid, following the American Association of Cereal Chemists International Approved Methods, with minor modifications. Protein contents were measured using a modified Kjeldahl method and pasting properties were measured by a Rapid Visco Analyzer. The protein content and pasting properties were then compared to the solvent retention capacities to see if any correlations could be found. This research helps to establish new quality tests for edible dry beans, augmenting the existing bean property tests, such as those used by the canning industry. This will help bean breeders to select varieties for usage other than canning. As new applications for edible dry bean powders are proposed, e.g., as thickeners for salad dressing, the findings of this project would be useful to select dry beans with the desired qualities for their proposed applications. The two anticipated outcomes of this research are: 1) quality determination methods designed for edible dry bean analysis, and 2) correlations between edible dry bean protein content and solvent retention capacities as well as correlations between their pasting properties and solvent retention capacities.

THE EFFECTS OF GARDENING ON GARDEN RESOURCE PROGRAM MEMBERS' PHYSICAL ACTIVITY AND HEALTH

Lauren Varvatos

Poster: 255

Mentor(s): Katherine Alaimo (Food Science and 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." The Garden Resource Program is the foundation of their programming, which provides seeds, plants, soil testing, and technical assistance to gardeners. This research project explored how gardening influences Garden Resource Program members' physical activity and health. For this study, semi-structured qualitative interviews were performed with 28 participants of the Garden Resource Program. These participants were selected through purposive sampling by Keep Growing Detroit. Interviews were transcribed, and the text was coded using thematic coding. Themes were identified related to physical activity and health. Many participants reported that gardening was their main source of physical activity and that it was easier to stay in shape while gardening. Gardeners also reported having more energy, better weight regulation, health improvements despite age, and treatment of their chronic diseases. The results of this study will contribute to the understanding of how gardening can influence health and physical activity.

GLOBAL AND AREA STUDIES

ORAL PRESENTATIONS, SECTION 1 TOWER ROOM, 8:30 AM – 10:30 AM

WHY WE NEED AN AFRICAN APPROACH TO UNDERSTAND DEVELOPMENT IN AFRICA

Luntadilla Paulo

Time: 8:30 AM

Mentor(s): Peter Alegi (History), Damaris Choti (African Studies Center)

This research debates the meaning of development in the “developing world” with a focus specifically on Africa. The research pinpoints the major causes of “underdevelopment” on the continent. According to many western and extra-western scholars, underdevelopment has many causes including: the legacy of colonialism; the structure of the international economy that benefits rich countries to the detriment of the Less Developed Countries (LDCs); and mismanagement of resources by the African elite. Although many of these arguments are valid, one overlooked aspect is the absence of an African Development Approach crafted by Africans. Despite the efforts to create a workable framework that can bring progress in Africa, almost every single approach to “development”--such as Modernization Theory, Dependency Theory and Green or sustainable Development Theory--seem to fail to define “development” from (and for) an African perspective. The advent of new paradigms of development is forcing researchers to rethink “development”. For instance, Bhutan has defined development in terms of Gross National Happiness, “a belief that a society should be measured not simply by its material indicators but by the health, education and the contentedness of its people” (Independent 2012) rather than standard economic measurements such as GDP, GNP, and the Human Development Index. Based on interview with Dr. Rui Fernando (a professor of Contemporary Philosophy at Instituto Superior Politecnico Metropolitano de Angola) and the relevant literature on Africa’s development, this paper discusses what development could or should mean in the African context.

RUSSIAN ARCTIC POLICY: THE YAMAL PIPELINE, OIL DEPENDENCY, AND ITS GEOPOLITICAL CONSEQUENCE

Hannah Thomas

Time: 8:45 AM

Mentor(s): Norman Graham (James Madison)

Russia’s economy has depended on their energy sector for much of the 20th and 21st century. Russia, in part due to its extensive landmass, is one of the wealthiest nations in terms of natural gas and oil reserves. The Russian economy has depended on this wealth since the early 20th century, despite the shifting nature of the market for oil, and its prices. In the 21st century the energy market is beginning to encounter shifts away from traditional forms of energy such as coal, and oil. These new developments coupled with a global drop in oil prices have made development of new oil fields unproductive for most oil producing nations. The Ministry of Energy in the Russian Federation published a strategy report outlining a long-term plan to rid Russia of its economic dependence on oil by 2030. Russian President Vladimir Putin has pushed the development of new oil fields in the Russian arctic despite volatile conditions, a stagnant economy, sanctions by the United States, and falling oil prices. A new natural gas pipeline in the Russian arctic is not about the benefit of new oil production, but rather a symbol of Putin’s ambition to cement his leadership and ability to push Russia towards a position of power on a global scale.

“WHO ARE WE HELPING?” - IDENTIFYING THE SELFISHNESS IN SELFLESSNESS

Kristen Gmerek

Time: 9:00 AM

Mentor(s): Russell Lucas (Global Studies), Elena Ruiz (Global Studies)

American humanitarian relief efforts (NGOs/volunteerism), specifically in East Africa, have seemingly attracted a high volume of millennials to partake in programs offered, in an attempt to provide aid that will contribute to the improvement of lives and communities on a grassroots level. Inspired by social values established through the repercussions of millennial culture, such as narcissism, escapism, xenophilia, self-glorification, wanderlust, and passion for civic service, the influx of millennials participating within the world of International NGOs represents the powerfully tangible, and intangible, forces of globalization. Yet, these values contribute to a sociological perspective that is rooted in understanding an entire generation. The observations included in this research come from personal experiences, case studies, an interview, and the contextual evidence that draws upon Marxism, sociological perspectives, psychological inferences, and the world systems theory to understand the repercussions of American millennial involvement within

international NGOs, involving East African nations. These impacts resulting from international NGO programming are not limited to those withdrawn from the millennial generation, but also the community receiving the service provided by such programs.

HISTORY, POLITICAL SCIENCE, AND ECONOMICS

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

SMIRNOFF AND SEXISM

Samantha Gehm

Time: 8:30 AM

Mentor(s): Helen Veit (History)

The focus of my project will be how sexism is depicted in a variety of alcohol ads, with a concentration on the vodka brand, Smirnoff. Throughout the research that has been conducted so far, there is an abundance of ads that feature a sexist message in order to cater to men and sell more of the intended product. This was very prevalent during the time period of the 1960's and 1970's, but this has been the case for a while before and until present day. Ads for alcohol usually depict a woman pleasing a man with a message about the liquor, often including a recipe. This project analyzes the misogyny and sexism that was very prevalent in ads during this time period. There is a very important central theme of portraying women as less than men in regards to their capability of drinking alcohol. This project will have a focus on the brand Smirnoff because they built their empire based on skilled marketing techniques and branding their product in a way that no one else had attempted to do at this time. Overall, this project will evaluate a time that portrayed women as objects used in order to sell alcohol, and the ads utilized to complete this tactic.

THE FUTURE OF ENERGY IN FRANCE AND EUROPE

Grace Johnson

Time: 8:45 AM

Mentor(s): Norman Graham (International Relations)

This project explores the future of energy and sustainability in Europe, specifically France. France's current dependency on external suppliers, especially Russia for oil and gas echoes a struggle faced by many European countries. This reliance led France initially to focus on nuclear energy more heavily than any other European country for many years. More recently, renewable energy development has been an apparent priority. After the 1973 OPEC Oil Embargo and the sudden quadrupling of oil prices, European countries became wary of their over-dependency on Middle Eastern supplies. France's unique response was to build dozens of nuclear power plants. Nuclear energy accounts for 75% of France's total energy (Boselli, 2013). While nuclear energy has helped the country to become more independent, the French have become wary of the possible repercussions of nuclear power. The Fukushima Daiichi nuclear incident brought to light the possibility of nuclear disasters. 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. The French Energy Transition Law, enacted in August 2015, aims to "Diversify electricity production and reduce the share of nuclear power to 50% by 2025" and "increase the share of renewable energy sources to 32% of the final energy consumption in 2030" (<http://www.developpement-durable.gouv.fr/The-draft-bill.html>). This study aims to evaluate the progress that France has achieved to date and the long-term prospects for meeting these goals.

SCHOOL LUNCH IN THE 1940S

Margaret Snyder

Time: 9:00 AM

Mentor(s): Helen Veit (History)

During World War Two, school lunch programs were prevalent, but not properly regulated. Many families had to survive on little food, and thus, school lunches were slight and were prepared with money in mind. When the war ended, the government needed a proper way to make sure children got the nutrition they needed in a midday meal. With the introduction of President Truman's National School Lunch Act of 1946, lunches became more regulated and focused on the health of children. These regulations included the training of workers, how to spend money, and what type of food to serve. Though many typical recipes used in the 1940s would make modern children squirm with disgust, lunchrooms served what was palatable to children at the time, as well as economical. The effects of the National School Lunch Act of 1946 can still be seen today in modern lunchrooms.

INVALID COOKERY

Emily Cacavas

Time: 9:15 AM

Mentor(s): Helen Veit (History)

I am compiling research from the 18th century to present day in regards to invalid cookery, that is, food used as medicine to treat the ill. I plan to present my information on a tri-fold poster embedded with information, summaries, main points, and pictures in a visually pleasing manner.

ALTERNATIVE HISTORICAL FACTS: THE IMPORTANCE OF ACCURATE HISTORY, AS DEMONSTRATED BY A MISSING MEETING

Jaazaniah Catterall

Time: 9:30 AM

Mentor(s): Thomas Summerhill (History)

Abraham Lincoln was elected President in 1860 despite the fact that none of the other living Presidents supported him. After his election, the South began seceding from the United States, and a war seemed inevitable. In the midst of this maelstrom, the five ex-Presidents were called upon to meet and devise a plan to avoid bloodshed. One historian says they held a meeting in Philadelphia that resulted in nothing but failure and public mockery. Others, meanwhile, claim this never occurred; a meeting was proposed but never actualized. My research investigates what, if anything, actually happened between the former Presidents in that spring of 1861: Martin Van Buren, who at 77 was the most elder of the Presidents; John Tyler, the President-turned-Confederate leading Virginia out of the Union; Millard Fillmore, who voted for Douglas but supported the war effort; Franklin Pierce, a Democrat who sought to foil Lincoln at every turn; and James Buchanan, fresh out of the White House and committed to rehabilitating his reputation. This project uses the potential presidential meeting to speak to a wider issue, the importance of accuracy in historical research and reporting. Beyond a simple yes or no answer to the question of whether a meeting took place, I examine why finding the truth in such an obscure sliver of history even matters. Using this meeting as a case study, I make the argument that it is, in fact, critical to report even the most minor events in our history accurately.

AMERICAN PRESS COVERAGE OF THE NUREMBERG TRIALS, 1945-1949

Anna Cumming

Time: 9:45 AM

Mentor(s): Kirsten Fermaglich (History)

In the years following the devastation of World War II, citizens around the world wanted answers. The aftermath of the war saw many communities, countries, and people decimated. One of the biggest horrors in history, the Holocaust, had been discovered by the liberation of the concentration and death camps established by the Nazis. Because of this discovery, nations demanded the Nazis be held accountable for their crimes against humanity. To find answers and bring justice to the perpetrators, the International Military Tribunal (IMT) established a court at Nuremberg, Germany. The Nuremberg Trials represented a crucial point in the international arena. The results of the trial would not only seek to hold the Nazis accountable for their crimes, but would become the basis of international law in the following years. Given the extreme significance of the proceedings and results of the trial, one would expect a substantial amount of press coverage regarding the Nuremberg Trials. Instead, American press outlets delivered relatively little information regarding the proceedings. In some instances, American news outlets criticized the “legality, judicial authority, morality, and procedures of the International Military Tribunal” at Nuremberg. American press coverage of the Nuremberg Trials varied in the thoroughness, content, and quality of coverage between the New York Times, Los Angeles Times, Wall Street Journal, and Chicago Tribune in the years between 1945 and 1949, with the New York Times and Los Angeles Times displaying a greater depth and breadth of coverage compared to the Wall Street Journal and Chicago Tribune.

THE EFFECTS OF COLONIAL LEGACY ON EQUALITY UNDER THE LAW IN AFRICA

Natalee Dally

Time: 10:00 AM

Mentor(s): Michael Bratton (Political Science)

In order to maintain the rule of law, a legal system and its practices must ensure basic human rights, an important one of which is equality for citizens under the law. The motivation of this paper is to assess popular perceptions of the rule of law in African countries with special reference to equality under the law. This paper uses public opinion data from Afrobarometer to address the question of whether ordinary citizens believe political elites receive fairer treatment under the law than they do. The paper also assesses whether this perception is affected by social, institutional, and historical

factors. In the African context, many scholars have argued that civil and common law legal systems have different effects on a country's implementation of the rule of law. However, this paper shows that it is the impact of colonial legacy rather than the type of legal system that has a significant effect on perceived equality. Specifically, citizens of former British colonies have greater levels of perceived equality under the law than those of former French colonies. The type of legal system, on the other hand, does not have a significant effect on these perceptions. This paper also explores social factors that influence equality perceptions, such as education and religion. Finally, the paper closes by exploring how perceptions of equality under the law have an impact on the legitimacy of African courts and judiciaries.

POSITIVE MESSAGING IN HOLOCAUST MEMOIRS BY SECOND GENERATION

Micaela Procopio

Time: 10:15 AM

Mentor(s): Kirsten Fermaglich (History)

In the 1980s, there was a surge in the publications of Holocaust memoirs, written by survivors. Many scholars have attributed this to the rise of the 'Holocaust Consciousness' movement that had prodded American society to listen to the atrocities of the second World War. However, in the beginning of the 21st century, up to present day, children of Holocaust survivors (also known as the second generation) began to publish their parents' Holocaust narratives for their parents. While in memoirs written by survivors there is specific writing style-to share the story and to lift the pain of holding in the stories. Memoirs written by second generation survivors write the story with an intent of propaganda. While this propaganda is positive, the authors of their parents' story share the story to impart messages of tolerance and love and change. The memoirs include subliminal messaging to 'never forget', to honor and respect and learn from the Holocaust. This shift in the purpose of publishing Holocaust narratives changed generationally.

HISTORY, POLITICAL SCIENCE, AND ECONOMICS ORAL PRESENTATIONS, SECTION 2 LAKE MICHIGAN ROOM, 11:00 AM – 1:00 PM

EDUCATION AND PERCEPTIONS OF CORRUPTION WITHIN DEMOCRATIC LATIN AMERICA

Arturo Ford Sosa

Time: 11:00 AM

Mentor(s): Erica Frantz (Political Science)

Corruption and education are two subjects that have more in common than what most people would like to think. Every country experiences corruption to varying degrees, but the repercussions it has on its populace vary depending on the intensity of the acts in question. Active citizenry participation plays a major role in swaying politicians to change their actions, but considering this, it raises the question on how the mentality of said citizenry can impact the role they play in the political process. Seeing how education plays a fundamental role in the attitudes and beliefs of a person, this research aims to provide some evidence in how education can have an impact on an individual's perception of corruption within their own country. Latin America provides a great sample to test this possible correlation, as education varies wildly by social and economic class. Using the Latin American data-gathering survey Latinobarómetro, several data points were used to create a model that sought to find a possible correlation. After studying said data and doing a proper analysis, there does seem to be a correlation between a given level of education and the likelihood that the person considers their government to be either improving or not improving in regards to corruption levels. The discussion and conclusions presented serve as references for future research.

THE IRAQI MEDIA & SOCIAL DIVISIONS

Jacob Leppke

Time: 11:15 AM

Mentor(s): Martha Olcott (International Relations Faculty)

Iraq has a long history of limited press freedoms. After the 2003 invasion of Iraq, however, the Coalition Provisional Authority (CPA) made a concerted effort to ensure a wide latitude of expression in the Iraqi media environment. Immediately, numerous organizations were created reflecting the diversity of political, religious, ethnic, and other social divisions. Yet rather than develop the level of objective reporting by many researcher's standards, coverage in Iraq is frequently disparaged for bias, sectarian coverage, and other limitations. I am studying the presence of media coverage which favors a certain group i.e. sectarian coverage from 1968 to the present. This, I suggest, has contributed to the current widespread acceptance of the political elite utilizing the media as a tool to gain political advantage, even if these social divisions are not as concrete as often suggested. By widely grouping people together in their political coverage, did this biased coverage encourage an apparent hardening and aggravating of social divisions?

HOW STATE COURTS HAVE SHAPED THE RIGHT TO EDUCATION

Alexa McKinley

Time: 11:30 AM

Mentor(s): Matt Grossmann (Political Science)

Education is not mentioned as a right in the U.S. Constitution and has had little success being recognized even as an implicit right by the Supreme Court. In *Brown v. Board of Education*, the court acknowledged that education was one of the most important functions of the state yet has done little to establish, on a federal level, that all children are guaranteed a right to public education. Instead, after *San Antonio Independent School District v. Rodriguez* in 1971, the Supreme Court declared that education was not a fundamental right, thus accelerating the trend of state supreme courts declaring – or not – that education is a fundamental right of all children. I argue that states have had more success in establishing education as a fundamental right by challenging the system of funding public schools under the education articles from state constitutions in state high courts, rather than on equal protection grounds.

ACCESS TO MENTAL HEALTH CARE: HOW MENTAL HEALTH CARE HAS CHANGED AND HOW TO IMPROVE SERVICES TO THE MOST VULNERABLE POPULATIONS

Iris Robare

Time: 11:45 AM

Mentor(s): Matt Grossman (Political Science), John Waller (History)

This presentation will provide a short history of the De-institutionalization of psychiatric facilities that left millions of Americans with a severe mental illness trapped in a revolving cycle between homelessness, emergency rooms, and incarceration. Policies that set the stage for De-institutionalization will be discussed along with policies that attempt to mediate the consequences of those policies. Next, Medicaid will be discussed as Medicaid is the biggest funding source for mental health services and is essential for many people who have been negatively affected by the policies of De-institutionalization. This presentation will outline the importance of Medicaid and highlight how Medicaid is provided in our state. Specifically, community mental health centers and their locations and effectiveness in Michigan will be discussed. Finally, I will present recommendations for the how the country and the state of Michigan can improve mental health care.

COOKIE SOUL

Audrey Shaefer

Time: 12:00 PM

Mentor(s): Helen Veit (History)

“Cookie Soul - The Emergence of the Chocolate Chip Cookie” is an analysis of how the chocolate chip cookie emerged over the 20th Century and became the American classic we praise of it today. This presentation will be displayed on a website, including both textual and visual representations, and will guide readers throughout the particular decades of 1920-1990. Within each decade focus is placed on either the presence or lack of the chocolate chip cookie and other supporting, influential factors such as what was occurring in the home, lifestyle trends, and external world in order to best uncover rich insights and lesser known developments of how this simple treat came to be. Over the course of a multitude of sources that include cookbooks, newspaper articles, advertisements, and scholarly articles as written by historians, the emergence of the chocolate chip cookie will be further analyzed in order to provoke thought via each segment that appears on the website. Such an analysis will provide a deeper understanding of where this cookie came from, what it means, and ultimately why it has stuck as an admired symbol in the American culture of such comfort, family-oriented, and timeless connotations that we associate it with today so effortlessly. By doing such, a full circle into the cookie “soul”—as suggested by the title of my work—will serve as the conclusion to this presentation and bring to life the “intangible ingredients” of the chocolate chip cookie and its greater nature.

REDEVELOPING DETROIT: EXAMINING COMMUNITY-INCLUSIVE ECONOMIC DEVELOPMENT

Kieran Todd

Time: 12:15 PM

Mentor(s): Matthew Grossman (Political Science)

Tax increment financing in Michigan, particularly in Detroit, often comes in the form of Brownfield redevelopment projects made possible by Public Act 381 of 1996. The revitalization of Detroit can be broken down into Midtown and Downtown development projects, with each sector having their own Brownfield Redevelopment Authority. As brownfield redevelopment projects are primarily funded through local and school tax capture, the impact on community residents must be critically examined. While jobs are created through the increased economic development in Detroit,

these jobs often times are not accessible to much of the Detroit population. Particularly, seniors, low-income people, and people of color. Additional benefits from redevelopment projects, or lack there of, can be gauged through the mechanisms provided for community consultation such as public meetings, formal feedback opportunities, elected official appearances, and how many community-inspired changes were made to a project from the time of the initial announcement to the end of the project. Additionally, the input given to individual projects by community members is often limited and does not adequately incorporate them. Analyzing the consultation and benefit to community members in contrast to the amount of local tax and school tax capture approved for these individual projects displays a severe lack of service to the existing community.

POLITICAL FEASIBILITY ANALYSIS OF THE MICHIGAN EMERGENCY MANAGER POLICY

Lucas Werner, Jacob Ferguson, Joseph Micallef

Time: 12:30 PM

Mentor(s): Joshua Sapotichne (Political Science)

In Michigan, state takeover has long been the preferred method of intervention for failing cities. The Flint Water Crisis was a direct result, and is therefore a good case study the failures of emergency management. The efforts by the state to simply cut costs while negligently ignoring Flint's citizens underscored this failure. While the reasons for repealing the current Emergency manager policy are recognized by both political parties, the ideal replacement is still elusive. We posit a variety of policy avenues that are based on models from other states analyzed for political feasibility in Michigan. To do this, we gathered data from other states to analyze not only their emergency management structure, but also alternative structures such as monitoring systems. We believe this is the best route to finding a solution that works in the best interests of the cities and state government of Michigan to serve the people, but is also feasible in Michigan's current political climate. Thus far, we have identified a few possible strategies that will be politically feasible, but they do not deviate too much from the current system. Until something changes in the power structure of the state, a truly fruitful solution will be hard to come by. Our future direction will involve educating of The State of Michigan Congress in regards to what policy will be best for the electorate of Michigan.

TECHNOLOGY INCUBATORS IN MICHIGAN

Fablola Yanez

Time: 12:45 PM

Mentor(s): Matt Grossman (Political Science)

Business incubators, also known as accelerators, began in 1959 in Batavia, New York. The first commonly known U.S. business incubator was the Batavia Industrial Center. Though the concept of business incubators didn't hit until the 1970s, by 1980 12 business incubators began operating in the United States, mostly in the Northeast. Throughout the 1980s, incubation began to mark its importance on our economy and the value it can create throughout communities. Incubators now range from technology, education, energy & sustainability, health, transportation, etc. On October 2012, the National Business Incubation Association estimated over 1,250 incubators in the United States and about 7,000 business incubators worldwide. Though the concept of incubators are well-intended, there are disadvantages and advantages to incubators. Incubators like Y Combinator, who are known for the start-up of Dropbox and Airbnb are prime examples of how powerful and the advantage an accelerator can be, but how effective are incubators overall? What about, for example TechTown Detroit incubator or the SPARK Central Innovation Center in Ann Arbor? How effective are they and what type of impact are they making, not only where they are located, but the overall state of Michigan? For my presentation I would like to present the effectiveness of incubators, specifically tech incubators, and what they can mean for the future of a city like Detroit and Michigan overall.

HISTORY, POLITICAL SCIENCE, AND ECONOMICS ORAL PRESENTATIONS, SECTION 3 LAKE MICHIGAN ROOM, 1:30 PM – 3:30 PM

HOW THE INTRODUCTION OF TRADITIONAL CHINESE MEDICINE SHAPED AMERICAN DIETS DURING THE LATE 20TH CENTURY

Joseph Bourdages

Time: 1:30 PM

Mentor(s): Helen Veit (History)

During the late 20th century, the counter-culture movement led to a spike in the popularity of alternative medicine. One source of alternative medicine was traditional Chinese medicine (TCM). The introduction of TCM led to a shift in people's

ideas about maintaining healthy lifestyles. TCM introduced ideas about how to create healthy diets such as, eating slowly, eating locally and organically, and balancing your diet. These ideas greatly shaped American food culture for many years to come.

CHANGING WOMEN'S PUBLIC LIFE IN MEIJI JAPAN

Alli Kalam

Time: 1:45 PM

Mentor(s): Ethan Segal (History)

While many attribute the change in women's role in society between the Tokugawa and Meiji eras to a combination of an increased prevalence of religion, higher rates of education, and increased women's rights, it is predominantly the higher rates of education that led to this increased role as it caused many women to seek out a more impactful place in society.

THE IMPACT OF TRADE POLICIES ON ECONOMIC GROWTH IN LANDLOCKED AFRICAN COUNTRIES

Sarah Kenney

Time: 2:00 PM

Mentor(s): Erica Frantz (Political Science)

Landlocked African countries face significant geographic hurdles to economic growth and the trade policies implemented by these countries impact their success in international trade. The purpose of this paper is to investigate the relationship between international trade policies and economic growth. The International Logistics Performance Index was used as a measure of how much a given country promotes infrastructure development as part of their strategy for economic growth. I expected to find that countries with trade policies that promote infrastructure development would be more successful at trading and would have greater economic growth outcomes. After analysis of the relationship between ILPI score and annual percent growth in gross domestic product per capita a negative relationship was revealed. These findings indicate that regardless of a country's resource wealth and attempts to implement good trade policies, the disadvantages of being landlocked make it extremely difficult to create positive economic growth.

THE HOT DOG DREAM

Caitlyn Myers

Time: 2:15 PM

Mentor(s): Helen Veit (History)

Hot Dogs are iconic American foods, but since the beginning Hot Dogs have been a food of different cultures. From Nathan's Hot Dogs to National Coney many of the hot dog companies and restaurant chains are owned by immigrants. This presentation will follow the involvement of immigrants in the Hot Dogs industry from the 1920's to the 1960's. Throughout this time frame different companies and restaurants owned by immigrants will be examined, looking at the origin of the company, the success of the company and the story of the person owning the company. The factors that influenced immigrants to become a part of the Hot Dogs industry will be examined as well as the different types of Hot Dogs that are produced or used by these companies. Not only will restaurants be examined but also Hot Dog producers and packagers. The analysis of these companies and the people that own them will provide a deeper understanding of the Hot Dog industry, immigration in America and the iconic parts of American culture. The research will be presented utilizing information displayed on a website will text and visual representation of the companies and restaurants involved. Cookbooks, newspapers, biographies, books about Hot Dogs, ads, and logos will be combined to create a greater understanding of how immigrants in America and Hot Dogs connect. Immigration and Food are intertwined themes that are essential to the American culture.

GENDERING OF BEER ADVERTISEMENTS

Hanna Rinkevicz

Time: 2:30 PM

Mentor(s): Helen Veit (History)

Directly following the repeal of the 18th amendment leading to the end of the prohibition era, there was an interesting trend in advertisements for alcohol. I explore the ways that alcohol advertisements changed from 1933-1950, particularly focusing on the way that beer advertisements were gendered towards men.

OVERT ASSASSINATIONS: WHY DEMOCRACIES RELEASE INFORMATION ON TARGETED KILLINGS

Kalla Walneo

Time: 2:45 PM

Mentor(s): Yael Aronoff (International Relations)

Critics of the American drone strike program allege that its lack of public information and oversight allows the President to carry out a rogue, secret and undemocratic global war on terrorism, with full permission to execute innocent bystanders. These critics do not explain the motivation that a democratic administration has to release information on drone strikes. I seek to understand this relationship between democracy and counter-terrorism transparency, and I ask What conditions motivate a democracy to release information on counter-terrorism? I explain why two democracies that have struggled with terrorism--the United States and Israel--have released information on a prominent counter-terrorism method, targeted killings. I do so through an analysis of each administration's public statements on targeted killings, with reference to think tank and NGO reports, public polling data, and stated policy promises. I argue that while international legal pressure, domestic public opinion, and deterrence capability were influential factors in these administrations' decision whether to release information on targeted killings, concern for public trust was most influential in both cases: the additional information allowed them to appear resolute on keeping tough-on-terror promises, reaping domestic political benefit, and prove internationally that the military operations were effective and moral, showing that they were a reputable ally. This paper goes beyond asking why democracies should be more transparent by understanding the motivations behind a democracy's release of information. It also adds to the existing research on the influence of domestic politics on foreign policy.

COUNTERCULTURE, BREAD, AND THE RISE OF 'DO IT YOURSELF': 1960-1970S

Peyton DeRulter

Time: 3:00 PM

Mentor(s): Helen Veit (History)

"Counterculture, Bread, and the Rise of 'Do It Yourself': 1960-1970s" is an in-depth exploration of how the American counterculture movement of the 1960s and 1970s impacted food culture across the nation. This project specifically focuses on the relationship between the counterculture movement and the resurgence of homemade bread during these years while placing the conversation in the broader context of the general movement and its relationship to food culture. Analyzing this relationship deepens the understanding of the important role food plays in everyday life and in shaping the beliefs and views of an entire group of people. This presentation will consist of a website, designed to guide readers through the broad counterculture movement while highlighting key groups, events, and beliefs that helped shape lifestyle and food choices, especially in regard to homemade bread. With the help of a variety of resources, including cookbooks, counterculture group publications, and scholarly articles written by historians, my research encompassed a large range of perspectives in order to understand the resurgence of homemaking such a basic yet staple food in our homes. Besides bread, this presentation will briefly explore how the counterculture also pushed other aspects of food and culture toward a 'do it yourself' mentality. This will bring the presentation to a conclusion that just as yeast is the active ingredient in rising bread, so the counterculture played an active role in the rise of a 'do it yourself' food culture during the 1960s and 1970s, of which bread was a key example.

THE EFFECT OF IMMIGRATION ON POLISH-AMERICAN COOKING

Lauren LaBlance

Time: 3:15 PM

Mentor(s): Helen Veit (History)

This project discusses Polish-American cooking in the 1960's and 1970's and how it differs from cooking in Poland. The focus is how the immigration from Poland and the American culture has influenced traditional Polish recipes. This has been accomplished by examining both traditional Polish and Polish-American cookbooks from the time period, as well as articles and research about Polish-American communities. After examining these documents, it becomes evident that the commercialized and fast-paced society of America altered the cooking practices of many Poles. Through the simplification of traditional Polish techniques and recipes, this research proves that increasing American consumerism had an effect on Polish-American cooking.

HISTORY, POLITICAL SCIENCE, AND ECONOMICS POSTER PRESENTATIONS, SECTION 1 BALLROOM, 9:00 AM – 10:30 AM

COMPARATIVE STATE REDISTRICTING PLANS

Bob Brown

Poster: 259

Mentor(s): Matt Grossmann (Political Science)

Redistricting, the process by which congressional and legislative borders are drawn, is a contentious issue and varies wildly across the states. With increased recent focus on gerrymandering, the intentional border drawing to favor one particular political party or incumbents, research is being done to determine alternative or idealized methods to redistrict. This project looks at the redistricting plans nationwide and analyzes how the districts have been implemented, legal challenges to particular states, and any plans that have been successful in mitigating perceived gerrymandering. While most states have “legislature drawn maps,” even then they have particular rules that makes it difficult for singular parties to control the entire process. Often, when there are claims of disenfranchisement based on redistricting, litigation follows in federal courts and many maps have been forced to be redrawn, or even legislation was passed to change the process entirely. With the variation across the country among the 50 states, the effectiveness and success of different plans can be measured against each other. This project is part of the larger push for national redistricting reform, and is hopefully impetus to effect change in state legislatures.

A LOOK INTO THE HISTORY OF MANAGEMENT COMPENSATION IN PUBLIC COMPANIES AND THE TRENDS THAT ARISE TODAY

Marl Djelja

Poster: 260

Mentor(s): Charley Ballard (Economics)

There has been an overall increase in income inequality in the United States over the past several decades and a number of drivers are responsible for why the trend is occurring. Debate continues as to what factors are mostly responsible, this research paper dives into the rise in management compensation for public companies in the United States and how that may be related to the inequality the country sees today. Exploring the impact these trends may have on the overall economy will lead to a better understanding of why a fraction of the population holds a large fraction of the total wealth of the country. The research will be done through examining compensation of a sample of public companies, relating it to macroeconomic data over time, and mine out any correlations that may exist. There will be an exploration of policy changes that may have directly caused a trend. Presentation will be on the findings that are significant and explanatory of the income inequality of today.

THE U.S. SUPREME COURT AND THE FUTURE OF ABORTION IN THE UNITED STATES

Harrison Greenleaf

Poster: 261

Mentor(s): Mark Largent (Research and Faculty Development)

During the final Presidential debate of the 2016 election, then-Republican nominee Donald Trump promised assured voters that he would appoint justices to the Supreme Court who would overturn the decision found in *Roe v. Wade*, which affirmed that abortion was a right protected under the Constitution. Furthermore, Mr. Trump announced that he would leave the decision on the lawfulness of abortion to the discretion of state legislatures. Since his victory in the election, as the President and his administration has not released any official statement contradicting his previous assertion on the subject, it is presumable that this policy towards abortion remains unchanged. However, as one examines the President’s pledge and the multiple complexities that surround it more thoroughly, it becomes increasingly improbable that the precedent set by the Supreme Court’s in *Roe* will be altered within his tenure—whether it be comprised of one or two terms. Through researching and reviewing the various constitutional interpretations employed past and current justices, the legal reasoning which predicated the *Roe* and subsequent decisions involving abortion, and the historical trends of judicial nominations, there is evidence that presents the current legality of abortion—that is, that abortion is a right protected under the Constitution—will persist far past the conclusion of this administration.

ICE CREAM IN THE 1930S TO 1950S

Beth Kozlowski

Poster: 262

Mentor(s): Helen Veit (History)

The purpose of this research is to discover the economic effect on ice cream production and sales in the 1930s to 1950s. The goal is to explain why ice cream was still an important factor to have in society during the Great Depression and World War II era when materials were not easily accessible. The project mostly draws upon primary resources including cookbooks, advertisements, and scholarly texts. By identifying key factors that contribute to the production and preservation of ice cream, this website will allow viewers to understand how various aspects preserved ice cream production for the benefits certain ingredients made on the body.

THE EVOLUTION OF EXECUTIVE VETOES, 1792-2016

Elena Lentz

Poster: 263

Mentor(s): Ian Ostrander (Political Science)

The executive veto is perhaps the most important instrument of power and persuasion that a president may use to influence legislative outcomes. While analyses have been conducted on the patterns of veto use over time, questions remain concerning presidential motivations for vetoing as well the nature of the veto as an instance of inter-branch communication. While contextual variables provide some insight into veto politics, more information may be gained from further investigating the veto messages that presidents send to Congress. Using an original data set with content coding of more than one thousand veto messages from 1792 to 2016, we explore several dimensions of executive veto politics. First, we examine the changing content of veto messages in terms of their argumentation and intent. Second, we explore how the nature of the veto message may influence future congressional action. Ultimately, our analysis finds that the patterns within veto messages over time mirror changes within the presidency and presage congressional responses to presidential vetoes.

TRACKING MICHIGAN STUDENT SUCCESS AFTER SCHOOL DISTRICT DISSOLUTION

Katherine Pino

Poster: 264

Mentor(s): Matt Grossman (Political Science)

In 2013, the Michigan Legislature dissolved both the Buena Vista and Inkster public school districts, leaving hundreds of students to split among the surrounding school districts the next year. The dissolution of school districts is a rare solution Michigan has employed to address the increasingly common issue of financial crisis in its public school districts. Though dissolution of failing school districts is a rare occurrence, it has significant effects on the community and its students. This study will show the effects of dissolving school districts on student success by tracking academic performance of the students in the receiving school districts. This study will look at student performance in mathematics, English language arts, science, social studies, and graduation data. Research will be focused on the school districts who received students who previously attended the School District of the City of Inkster, and Buena Vista School District. The aim of this research is to show the influence of Michigan's school dissolution law on school districts after there is a large influx of students from a dissolved school district nearby. Additionally, this study will look at class size as a factor in the students' success.

TESLA AND THE CASE FOR MICHIGAN

Marco Savarin

Poster: 265

Mentor(s): Matt Grossmann (Political Science)

As Tesla Motors has emerged as a leading innovator in the electric vehicle industry it is an interesting case as to why Tesla has been shut out of the automobile capital of the world, Michigan. Refused a license due to its direct-to-consumer sales method that bypasses dealerships, Tesla has faced similar scenarios in multiple states around the country. Tesla has hit back against laws that require independent auto franchises be a part of selling cars to the public. In a lawsuit filed in federal court Tesla claims that these laws are unconstitutional and violate the due process clause. Laws and regulations similar to the ones Tesla is facing have been struck down and upheld in court before. Investigating the initial reasons for auto franchising laws and their effects on the market is critical to understanding this case.

LIVES UNEARTHED: THE WOMEN OF THE DEPARTMENT OF MATHEMATICS

Emily Fitzsimons

Poster: 268

Mentor(s): Danita Brandt (Earth and Environmental Sciences)

The field of Mathematics, like many other STEM fields, has been traditionally dominated by men and the department at MSU has been no different. Since its establishment in 1855 to now there have been 6 female full professors. This project documents three of those pioneering women who managed to break through the stigmas of women in mathematics and become professors of mathematics in MSU's department of Mathematics.

HISTORY, POLITICAL SCIENCE, AND ECONOMICS POSTER PRESENTATIONS, SECTION 2 BALLROOM, 1:00 PM – 2:30 PM

EVOLUTIONARY JUSTIFICATION FOR OVERCONFIDENCE

Kim Gannon

Poster: 269

Mentor(s): Hanzhe Zhang (Economics)

This research provides evolutionary justifications for overconfidence within a game-theoretical framework. In each time period of the game, players are pairwise matched to fight for a resource and there is uncertainty about who wins the resource if they engage in the fight. Players have heterogeneous beliefs (confidence levels) about their chance of winning although in reality, they actually have the same chance of winning. Each player may (1) always know, (2) never know, or (3) sometimes know his opponent's confidence level. We characterize the evolutionary stable equilibrium, represented by players' strategies and distribution of confidence levels. Furthermore, we characterize the evolutionary dynamics and the rate of convergence to the equilibrium. In all three cases, a majority of players are overconfident, i.e. overestimate their chance of winning.

SUSHI IN AMERICA IN THE 1970S AND 80S: HOW ONE FOOD REFLECTED A CHANGING CULTURE

Julia Goins

Poster: 270

Mentor(s): Helen Veit (History)

Sushi in modern-day America is ubiquitous. Wherever you are, you are probably not far from a sushi bar or a market that sells sushi. However, before the late 20th century, this was not the case. My research is about the rise of sushi in America during the 1970s and the 1980s. I intend to explicate the relationship between the forces that drove this emergence and analyze how they worked together to introduce the ever-popular food to America. In doing so, I will shed light on the reason why sushi is such a marketable and trendy commodity. As a result, one will be able to understand more about our culture today and how the growing forces of globalization have influenced it, and that is precisely why this research is important. It can also be interesting to look at the history of a certain product, because the way it is incorporated into society and when is indicative of the values of that time. To conduct my research, I have studied a variety of sources such as book sections, peer-reviewed articles, recipes, menus, and cookbooks. Some of these sources were found by utilizing the library and Special Collections here at Michigan State and at the University of Michigan. Others were found in online databases. In my presentation, I will exhibit those forces that brought about the advent of sushi in America, and explain how they intertwined to weave a larger story about the impact of cultural diffusion in America.

LIVES UNEARTHED: FEMALE FACULTY OF THE DEPARTMENT OF COMPUTER SCIENCE AND ENGINEERING

Allison Mutka

Poster: 271

Mentor(s): Danita Brandt (Earth and Environmental Sciences)

Women of Science, Technology, Engineering and Math (STEM) often have been overshadowed by male colleagues. The purpose of this project was to document the number of female faculty in the Department of Computer Science and Engineering, from its establishment, in 1969, to present day. Data were collected from the University websites, and On the Banks on the Red Cedar, an online resource put on by the MSU library. Over the department's history, it has employed many more male than female professors and instructors. From 1960-1989 there was only one woman teaching, Helen J. Spence, who was an instructor. Her story reveals an unlikely path that led her to become a pioneer in the field of computing.

LIVES UNEARTHED: FEMALE FACULTY IN THE COLLEGE OF NURSING (1950-2011)

Emily Niemi

Poster: 272

Mentor(s): Danita Brandt (Earth and Environmental Sciences)

In the STEM (Science, Technology, Engineering, Math) fields there are often disproportionate numbers of men compared to women. The purpose of this project was to research the number of women faculty in the College of Nursing from 1950, when it was the Department of Nursing Education, to 2011, when it was an established college. The data used were collected from the University Records at the MSU Archives. Between 1950 and 2011 the College of Nursing employed an average .09% men compared to 99.1% women of the same rank. There was not a male involved in the administration of this department until 1967. The College of Nursing is unique among MSU Colleges for having a history dominated by female administrators. One of the administrators was Dr. Marilyn Rothert, who was responsible for many developments at Michigan State University and the College of Nursing.

THE OBSERVABLE EFFECTS OF TERM LIMITS IN STATE LEGISLATURES

Renee O'Connell

Poster: 273

Mentor(s): Matthew Grossmann (Political Science)

Term limits were championed in the 1990's as a means of reforming wasteful government spending, creating a more diverse legislature, and shifting responsiveness from interest groups to the people. Despite these promises, there is little research that suggests enacting term limits has these effects. This study uses interest group contribution to campaigns, state budgets, economic equality, spending from state funds as a percent of state personal income, and government integrity as variables to compare states with term limits and states without term limits. Data for all 50 states was gathered from the Institute for Public Policy and Social Research's The Correlates of State Policy Project. Before enacting term limits in new states or the federal government, Americans should consider their expectations for a legislature and the observable effects of enacting term limits.

LIVES UNEARTHED: EMERITA FACULTY OF THE COLLEGE OF ENGINEERING

Olivia Sinutko

Poster: 274

Mentor(s): Danita Brandt (Earth and Environmental Sciences)

Women typically have been the minority in Science, Technology, Engineering, and Mathematics (STEM) fields. This gender disparity is especially evident in the field of engineering. The purpose of this project was to highlight the achievements of the women who taught engineering at Michigan State University. Looking specifically at the Departments of Chemical Engineering, Civil and Environmental Engineering, Electrical Engineering, and Mechanical Engineering, the number of women that were employed by MSU was significantly lower than the number of men. There were few women that actually reached the title of professor; many retired as instructors, assistant professors, or associate professors. Harriett Rigas was one of the few women who became a full professor and she was also the first woman to become chair of an engineering department. This project highlights Harriett Rigas' accomplishments in engineering and at Michigan State.

LIVES UNEARTHED

Lauren Sosinski

Poster: 275

Mentor(s): Danita Brandt (Earth and Environmental Sciences)

The participation of female faculty in STEM disciplines (Science, Technology, Engineering, and Math) is overshadowed by that of male faculty due to disparity in the number of each. The department of Biochemistry and Molecular Biology here at MSU has employed fewer female full professors since it's beginning in 1961 compared to male full professors. Using University Archives, the MSU Biochemistry and Molecular Biology Department website, and personal interviews, the contributions of of three emerita faculty - Dr. Estelle McGroarty, Dr. Pamela Fraker, and Dr. Veronica Maher - have been "unearthed."

HISTORY, POLITICAL SCIENCE, AND ECONOMICS POSTER PRESENTATIONS, SECTION 3 LAKE HURON ROOM, 1:00 PM – 2:30 PM

THE CUISINE OF THE FINAL FRONTIER: ALASKAN RED KING CRAB (1960S)

Sam Bloch

Poster: 278

Mentor(s): Helen Veit (History)

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

LIVES UNEARTHED: EMERITUS FEMALE FACULTY OF THE DEPARTMENT OF INTEGRATIVE BIOLOGY

Maggie Brown, Sydney Stauffer

Poster: 279

Mentor(s): Danita Brandt (Earth and Environmental Sciences)

The accomplishments of women are very often overlooked in academic communities, especially their contributions to the Scientific, Technological, Engineering, and Math (STEM) Fields. The purpose of this project was to delve into the prevalence of women in the Department of Integrative Biology at MSU. The data gathered showed that the number of female professors in the department is much lower than that of male professors and historically always has been. Emeritus female professors have made substantial contributions in their fields and yet the ratio of male to female professors is still very skewed.

MEDICINAL ALCOHOL DURING PRE-PROHIBITION

Samantha Brown

Poster: 280

Mentor(s): Helen Veit (History)

A vast number of foods and beverages have been used as medicine throughout time, including alcohol. This research examines alcohol used in medicines and medicinal recipes during the period before prohibition (1900-1919). Alcohol was a controversial topic during this era which had an effect on its use in medicines. During this noteworthy time, medicine was evolving from home remedies to the prevailing physician model still in use today. To investigate this topic, primary sources were gathered from Michigan State University's Special Collections and the University of Michigan's Special Collections Libraries in addition to various electronic databases.

LIVES UNEARTHED: WOMEN PROFESSORS OF THE NATIONAL SUPERCONDUCTING CYCLOTRON LABORATORY

Emily Doss

Poster: 281

Mentor(s): Danita Brandt (Paleobiology and Paleoecology Invertebrates)

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. The purpose of this project was to document the female faculty within the National Superconducting Cyclotron Laboratory (NSCL) from its establishment in 1958 to the retirement of its current emerita. Data were collected from University records at MSU Archives. Over the period 1958 - 2010, the Cyclotron employed 1 female who achieved the rank of full professor compared to the over 20 males who reached the same rank, yet many other women have worked there with varying roles. Dr. Thelma Arnette has been cited as an integral part of the creation of the Cyclotron, yet her work is rarely mentioned during discussion of the Cyclotron.

POISONS IN FRANCE AND ANGLO-SAXON ENGLAND IN THE DECADES AROUND THE NORMAN CONQUEST

Emily Muhich

Poster: 282

Mentor(s): Emily Tabuteau (History)

In the generations surrounding the Conquest of England (1066), numerous accounts of poisonings are recorded in Normandy and England. Few of these deaths were recorded with certainty by the chroniclers of the day and many of the historians and contemporaries contradicted each other. The causes, motives and records of the deaths of individuals such as Conan II and Alan III of Brittany, Richard III and Robert I of Normandy and Elfhthria, wife of King Edgar among others have drawn only sparse scholarship in the past. Many of these deaths play into bias and prejudice of the time, such as misogyny and nationalism and carried major negative political connotations. The medical practices of Anglo-Saxon England and Normandy, also, lead to ambiguity with deaths, particularly those that may have been associated with strokes, heart attacks or dysentery. Despite the occasionally contradictory chronicler's remarks, a suspiciously large number of well-placed nobles were linked to poisonings as Norman leaders expanded their holdings into England.

THE 'AMERICANIZATION' OF IMMIGRANT CUISINE

Allie Pail

Poster: 283

Mentor(s): Helen Veit (History)

Researching the histories of past immigrants to the United States has never been more important than in a present in which the topic of immigration is dividing and galvanizing the nation. This research project focuses on a fundamental aspect of how immigration has shaped America and how American culture has affected immigrant populations: what people eat. In particular, I will be looking at the 'Americanization' of foreign food cultures in the late 19th and early 20th centuries. This process led to changes to the dietary traditions brought over by immigrants such that ethnic cuisines could be redefined as American and become integral to American cultural identity and pride. I show how efforts to alter immigrants' eating habits so as to align more closely with those of white, native-born Americans were justified economically with the claim that immigrants spent too much money on food that was not nutritious. Above all, this report explores why Americanization occurred, the impact it had on immigrant diets, and how that impact is seen in modern-day ethnic foods. Recovering the meanings behind Americanization in a period of large-scale migration to the United States also allows for useful parallels to be drawn with the modern day: what does the Americanization of food cultures indicate about attitudes towards immigrants in the past and to what extent can we find parallels to these earlier sentiments in the debates going on today?

ANALYSIS OF VOTER TURNOUT AND OUTCOMES OF MICHIGAN TAX REFERENDA ELECTIONS, FROM 1999 TO 2016

David Wehrly

Poster: 284

Mentor(s): Michael Conlin (Economics)

Tax referenda elections are a large source of funding for the operations of local governments in Michigan. I analyze how the type of jurisdiction, the purpose of the funds, the timing of the election, and the characteristics of the referendum affect voter turnout and the probability of a referendum passing. In Michigan, the four types of jurisdictions include municipalities/townships, school districts, counties, and special (i.e. library, transportation authority, etc.) districts. The purpose of the tax referenda varies across these jurisdiction types and often involves funding for capital investments, library operations, infrastructure, police/fire/emergency services, parks/recreation facilities, and municipal public services. In addition, I also document how these outcomes are affected by whether the election is held during a general, primary, or special election and whether a similar referenda was recently defeated within a particular jurisdiction. Finally, I document how other characteristics of the referendum affect election outcomes - such as the type of tax (property, income, or sales), the specified tax rate and whether it is a tax renewal or a new tax. In order to investigate these issues, I use outcomes from over 2,000 local referenda from 33 Michigan counties between 1999 and 2016.

CHILD FOOD CULTURE OF THE NINETEEN SEVENTIES

Sydnee Wright

Poster: 285

Mentor(s): Helen Veit (History)

Everyone has memories of their staple childhood meals. Whether it's from the gross cafeteria food to their Thanksgiving day dinners. However people, especially children, never consider the how the society around them, from the mainstream culture to the government politics, impacted the plates in front of them. This research explores the nineteen seventies in

America, with its many historical events and its shift from post-war liberalism to a more conservative personal liberation culture. The research reveals the relationship between children's diets during the nineteen seventies and the culture that surrounded them. This research draws on newspaper articles, cookbooks, government documents, published research, advertisements, census statistics and menus to construct an imagine of what children ate following a daily timeline. while taking into account their social, and economic standings. The examination of these documents shows how political agendas of both government parties impacted the school nutrition programs, how the counterculture movement and scientific advancements altered the perceptions of child health, and how advertisements and mainstream culture changed children's food choice. The results of this research shows just how society can even impact the daily lives of its smallest citizens. Uncovering how past cultural environments affected diet and nutrition among children can help increase our understanding on what impacts present day diets, and how we can alter its effect.

HUMANITIES AND PERFORMING ARTS

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

INTROVERTS AND EXTROVERTS IN THEATER CLASSROOMS

Sam Meade

Time: 11:00 AM

Mentor(s): Rob Roznowski (Theater)

How can a theatrical classroom embrace all learners in order to foster parity in creativity? An examination of current neuroscientific research related to consciousness and introverted learners in relation to creativity will serve as the basis for the initial section of the paper. Through an investigation of current theatrical training practices this paper assesses a reformation of theatre education that understands that the introverted learner must be given equal focus in the classroom and in production. Structured pedagogical guidance for theatre-makers will be offered through careful modifications that embrace a multi-tiered approach to include the introverted actor. Through student testimonials, expert interviews and researched classroom models this paper will showcase the steps for restructuring of theatrical training to reach all learners.

MICHIGAN PROFESSIONAL THEATRE- DESIGN INTERNSHIP

Michael Merluzzi

Time: 11:15 AM

Mentor(s): Kirk Domer (Theater)

In effort to expand the reach of the Department of Theatre in the Michigan Professional Theatre scene, I have been contracted for three designs for the 2016-2017 Season: 1984 by George Orwell (adapted by Michael Gene Sullivan) at the Williamston Theatre in Williamston, MI and two production remounts of Mitch Albom's Ernie about Detroit Tiger's sportscaster Ernie Harwell and Hockey, The Musical at various theatre throughout the state of Michigan including the City Theatre (Detroit), Wealthy Theatre (Grand Rapids) and City Opera House (Traverse City). Mr. Merluzzi will serve as a creative liaison to all three projects and coordinate the scenic installations in order to learn the responsibilities associated with designing for regional repertory theatres. He will be a central part to the research and development of 1984 and work as a draftsperson on Ernie and Hockey, the Musical coordinating the engineering for three completely different theatres each with its own challenge with regard to scenic installation. This sort of assistant design opportunity is a practice that generally falls outside of the purview of most SPT Theatres throughout the country due to limited resources.

CREATED RACES AND THEIR PRESENTATIONS: HOW PLAYERS DECONSTRUCT STEREOTYPES IN TABLETOP RPGS

DuRay Petersen

Time: 11:30 AM

Mentor(s): Kate Fedewa (Writing Rhetoric and American Cultures)

Within Role Playing Games (RPGs), worlds are created through the use of language, and within those worlds, players create characters, undertake quests, and develop fantasy lives through language. However, there is some dissonance between what is written and designed for use within those RPGs and what the players actually do and understand. This study explores the dissonance between the representation of created races in text and play and the players' actions regarding those races in play and after play. Because race is a social construct both in the fantasy worlds created and in

reality, this study emphasizes the creation and representation of canonically evil races within RPGs and players' reactions to them to determine the ways in which the societal norms of the fantasy world are reinforced or deconstructed by players. Research was done using texts that form the backbone of Pathfinder and Dungeons and Dragons, recorded actual play sessions, and forum discussions taken from the Pathfinder official player forums. By understanding how players agree and disagree with how races in game are presented and designed in an RPG, inroads could be made into understanding how race is constructed and understood in real life and ways to deconstruct stereotypes could be derived.

TOOLS FOR EMPOWERMENT: ART, EMPATHY, LITERACY, AND CULTURAL IDENTITY

Dana Reynolds

Time: 11:45 AM

Mentor(s): Kevin Brooks (Arts and Humanities)

Tools for Empowerment: Art, Empathy, Literacy, and Cultural Identity is a program developed in collaboration with Grit, Glam, and Guts that empowers girls and women through art and empathy. By recognizing numbness, developing greater self awareness, and having the courage to be vulnerable, art and empathy become the tools needed to develop meaningful relationships with the self and with others. We are empowered when we know who we are and where we've been, creating opportunity to develop authentic connections with those around us. This is what it means to be empowered. Art and empathy as a tool for empowerment grew out of the womanist values of spirituality and purpose, connectedness, and developing a strong sense of self awareness and identity. As Alice Walker states, "Every affront to human dignity necessarily affects me as a human being on the planet, because I know every single thing on earth is connected." (353, Walker). One empowered individual leads to another, and change in the individual will make change in the community world-wide.

THE JEWISH COMMUNITY DURING AND AROUND THE 1967 DETROIT RIOTS

Elizabeth Sauter

Time: 12:00 PM

Mentor(s): Lisa Biggs (Arts and Humanities)

The July 1967 Detroit riot was a turning point in relations between African Americans and whites in the Detroit, Michigan area. Mainstream media, from the days of the civil unrest until now, has often called the events of '67 a "race riot." However, more than just African Americans and whites were involved. The Jewish community in Detroit played an important part in the events, though they have often been glossed over in historical accounts. Jewish lawyers helped those accused of crimes, and synagogues collected food and found homes for displaced people, among other things. Using books about the Jewish community in Detroit and interviews with current Jewish residents, including members of the Temple Beth El, this research will show the impact the Jewish community had just before, during, and after the riots on local race relations, and will also prove that the riots were not just a simple, clear-cut matter of whites and African Americans.

WORLD SHOWCASE: DIALECTS

Carlisle Shelson

Time: 12:15 PM

Mentor(s): Deric McNish (Theatre)

My presentation will be a retrospective of my work this semester, wherein I collected dialect samples from people of varying international and national origins. The samples' primary purpose is to be uploaded to an online archive, where they may be accessed by actors looking study for performances. They also exemplify the diversity of the world and how our environments--both cultural and physical--and to what we are regularly exposed shape our voices.

WINDS OF CHANGE: CHAMBER MUSIC FOR THREE

Olivia Banach, Ilene Gould, Katherine Lundy

Time: 12:30 PM

Mentor(s): Jan Eberle (Music)

Chamber music is composed for a small group of instruments, originally intended for performance in the houses of the elite. Historically, a small audience would enjoy a private performance in a small room, or chamber—hence the name. Composers largely wrote for string ensembles, yet today we are exploring the unique aspects of different instrumentation for two oboes and English horn. In this trio, or ensemble of three, we will discuss topics such as pitch range, part analysis and unique characteristics of the double reed. Additionally, we will explore the specific aspects of chamber music for this particular instrumental setup. This lecture-recital will include selections from the classical

Beethoven work: Trio in C-Major, Opus 87. In conjunction with this performance, we will expand upon a particular approach to chamber music that employs the delegation of voice roles—a concept central to proper ensemble balance. Playing with consistent style and pacing also contribute to piquing audience interest—the ultimate goal of a performer. With these concepts, which can be applied seamlessly to other chamber ensembles, we will demonstrate the importance of analyzing chamber music to deliver effective performance.

HUMANITIES AND PERFORMING ARTS ORAL PRESENTATIONS, SECTION 2 ROOM 41, 11:00 AM – 1:00 PM

EVOLUTION OF FRENCH FEMINISM

Sarah McCabe

Time: 11:00 AM

Mentor(s): Valentina Denzel (Romance and Classical Studies)

I will provide an analysis of the evolution of French feminism and the contrasting approaches to stimulating discussion on today's feminist movements by comparing the works of two different French feminist comic books: one from the 1970s on punk feminism, the other published in 2016 on the history of feminism, particularly in France.

HAMILTON'S LIMITATIONS

Emma Gregory

Time: 11:15 AM

Mentor(s): Marcie Ray (Music)

Since its opening night, "Hamilton", a Broadway musical written by Lin-Manuel Miranda about founding father Alexander Hamilton, has received remarkable praise. Taking home eleven Tony Awards in 2016, this musical has been lauded for the racial diversity of its cast and innovative, hip-hop inspired score. Indeed, this musical has created an important dialogue about many politically charged topics, such as race, discrimination, immigration, and class. However, its audience is resoundingly white and middle class. Meanwhile, rap artists such as M.I.A and Kendrick Lamar, have opened discussions about similar ideas in their music for years but have not received the same kind of critical acclaim or media attention. They have, in contrast to "Hamilton," achieved popularity among a diverse range of demographics. I argue that "Hamilton's" music, story, and venue is aimed towards a white dominated audience and fails to reach marginalized, low-income groups that are most impacted by its political themes. I also argue, however, that the "Hamilton Mixtape," an album that features the songs of Hamilton performed by popular artists, including important rap and R&B icons, spreads the show's accessibility to a more diverse audience.

THE INTERMINGLING OF ARTISTRY AND TECHNOLOGY: STAGES REPERTORY THEATRE (SRT) INTERNSHIP – PHASE V

Joseph Lancour

Time: 11:30 AM

Mentor(s): Kirk Domer (Theatre)

I served as the assistant scene designer on a production of *Five Course Love* (Book, music and lyrics by Gregg Coffin) designed by Professor Kirk Domer for the Stages Repertory Theatre (SRT) in Houston, Texas. Beyond the traditional design process of creating renderings and drafting for the production, I was in residence at SRT in Houston over spring break (3/3-3/11) in order to assist with final touches to the show, attend technical/dress rehearsals and participated in production meetings in order to help ensure a smooth opening for the production. I also had the privilege to work alongside industry professionals and interact with SRT's production interns which ended up expanding my design/technology residency to also work on their upcoming production of *Late Nite Catechism 3: 'Til Death Do Us Part*. This entire trip gave me an insight into a professional theatre with a much more tightly packed schedule than what we have here at MSU, allowing me to experience the professional world of theatre.

MARXISM IN EBONY

Nanfeng Li

Time: 11:45 AM

Mentor(s): John McClendon (Philosophy)

Professor McClendon wrote an article named “Marxism in Ebony Contra Black Marxism: Categorical implications”. This article is the guidance for Professor McClendon’s new book project, which my research for him relies upon as well. Due to activists and scholars in the Black movement who have debated the merits of Marxism and its applicability to the Black movement, they were documented as “Black Marxism”, in terms of an identifiable race engaged in Marxism. Professor McClendon argues that the name “Black Marxism” is only different in name, but not in content. This is a really important discussion in contemporary philosophy, where sometimes people try to add some ethnic/racial characteristics to a certain school of philosophy. For instance, there was a Chinese philosopher who wrote a book which judged the logical fallacies within Chinese people. Logic, having universally applicable philosophical content, is not committed to being limited within a certain contextual/cultural group, or being differentiated based upon such considerations. Thus, in order to argue that ethnic/racial considerations in Marxism are ill-founded, it is important to find and judge different African American philosophers’ works in Marxism and critically analyze their contents. My presentation will mainly focus on arguments made in Professor McClendon’s article, and by connecting them with my own theoretical and practical experience, I will give the audience the basic ideas of this project.

THE EFFECTS OF TICKETING SYSTEMS ON MUSEUM VISITOR EXPERIENCE

Erin Campbell, Erin VanSloten

Time: 12:00 PM

Mentor(s): Ben Lauren (Writing, Rhetoric, and American Cultures)

For museums it is important to understand who your visitors are, because it is crucial to designing relevant and engaging experiences for them. At the Eli and Edythe Broad Art Museum at Michigan State University, collecting information on visitors has proved challenging for quite some time. Because of this challenge, the Broad is interested in implementing a new ticketing system that will, in part, help the museum learn more about visitor experiences. Since the Broad is a free museum and has never required a ticket, the museum would like to carefully evaluate how visitors will respond to the new ticketing system. This research aims to understand how visitors experience the system in order to understand how the process influences their overall museum experience.

ONCE UPON ANOTHER TIME: EXAMINING AND CHALLENGING GENDER NORMS THROUGH RE-VISIONING FAIRYTALES

Alexis Stark

Time: 12:15 PM

Mentor(s): Anita Skeen (Arts and Humanities)

Once upon a time...the magical opening words to the world of fairytales. To a child, these words transport them into stories of make believe and adventure. As a child, fairytales inspired my adventures and taught me valuable lessons of bravery, kindness and acceptance. Because of this, I saw an opportunity to use the outlet of storytelling to create characters with non-mainstream identities and deliver a message of inclusion and acceptance. As a research assistant, I have been examining the history of using fairytales to challenge social norms in society and using children, a more open-minded outlet, as the audience. For this project, I wanted to address and challenge gender roles and norms in society. My story describes the life of a child seeking to find himself, or herself; defies gender norms defining what boys “should” like to play and dress; and incorporates models of accepting and supportive parents. While still in a familiar and whimsical setting, this story addresses transgender issues and normalizes children coming to terms with their gender identity using the familiar rhyming verse of children’s books but with progressive content. My goal in writing this book and telling the story of a transgender character in a fairytale is to expose younger kids to identities existing in their surroundings not previously offered to them through children’s stories. By writing this story, I hope to lead children to alter the norms leading to social injustices established by patriarchy and heteronormativity.

HUMANITIES AND PERFORMING ARTS ORAL PRESENTATIONS, SECTION 3 LAKE ERIE ROOM, 1:30 PM – 3:30 PM

FARM THE MUSICAL: THEATRE AND AUTISM

Ryan Duda, Evan Phillips

Time: 1:30 PM

Mentor(s): Dionne O’Dell (Theatre)

Individuals with Autism Spectrum Disorder benefit greatly from exposure to the arts. Artistic mediums, such as theatre, allow for the development of strong communication skills, creative thinking abilities, and confidence. Organizations

such as 4th Wall Theatre Company present individuals with ASD the challenge of creating a theatrical production to further cultivate these skills, and Wharton Center has begun to offer sensory-friendly productions of popular shows. However, few organizations across the world actually create theatrical productions specifically for audiences with ASD. In this study, with sponsorship from the Michigan State University Department of Theatre, MSU students of all majors collaborate to devise an original musical geared towards children with ASD. This presentation highlights the creative process of the project, an exciting vision for the future, and professional feedback from theatre educators from 4th Wall Theatre Company, and Lincoln Center Education in New York City.

WHEN FABRIC TALKS BACK: AN EXAMINATION OF CODED MESSAGES USED IN TEXTILES

Mitchell Fehrle

Time: 1:45 PM

Mentor(s): Rebecca Schuiling (Art, Art History, and Design)

The research used in this presentation is centered on the application of messages, both secret and known, coded into fabric, clothing, and even domestic items like curtains. Coded textiles have served as a form of revolutionary protest throughout history, they have acted as an integral means of communication like the “core rope memory” used in the Apollo space missions, and have functioned as the basis of modern computer programming technology. The presentation will focus on the connection between coded textiles and the birth of the digital age as well as how coded textiles have provided agency and technological empowerment throughout historical and modern contexts. The research will be drawn from historical accounts of the use of coded textiles, as well an analysis of modern uses of coded textiles, such as those in the Arts and Crafts movement.

FEMALE DEVOTIONAL SAINTS OF MAHARASHTRA, INDIA

Ronny Ford

Time: 2:00 PM

Mentor(s): Jon Keune (Religious Studies)

The presentation will briefly introduce a research database being created for the study of Hindu devotional traditions and then pay special attention to the lives of three notable female saints from western India: Muktabai, Janabai, and Bahinabai. The critical question of gender politics in medieval India will be explored through the surviving literature written by these three saints. The memory of each saint will be discussed especially in terms of the material reality of their devotional poetry: specifically how much of it has survived, how accessible it is, how it reflected the larger devotional movement in the region, and whether their works display a desire to change gender politics. The talk will stress these saints’ portrayals of women’s everyday life in their compositions and in hagiographical stories about them. There will be context given on the overall ideology of the movement in regards to its goals, members, and openness compared to other religious ideologies in India.

DRAMA THERAPY AS MEANS OF PREVENTATIVE THERAPY: IN THE CONTEXT OF COMBAT RELATED PTSD

Elena Lipscomb

Time: 2:15 PM

Mentor(s): Joanna Bosse (Arts and Humanities)

Combat related PTSD has been a subject of study for many years. According to the U.S. Department of Veteran Affairs PTSD has affected at least 57% of veterans from the Vietnam War. Despite the high rate of prevalence there has been a surprisingly little amount research done on preventative measures. The research that has been done suggests that a key element in lessening PTSD symptoms is a strong support system, as well as a debriefing after the traumatic event has occurred and finally promoting successful re-engagement with civilians, mainly family. I propose that drama therapy could be used as an extremely effective form of prevention as it will introduce many of the elements that research has shown to be preventative to PTSD. Though the combination of the performing arts and our military may seem completely disconnected to some the existing research informs that there may be more similarities between the two than are readily apparent. When looking at this case it is important to speak directly with those impacted such as veterans or actively serving members. Through narratives already published and interviews conducted for this research I will examine this alternative prevention method and build a case, using data from both pre-existing research and the data generated through this research, on why drama therapy is a viable option for the military.

PLAYING PRETTY: PERFORMING GENDER AT THE PIANO IN FILM

Bronwen McVeigh

Time: 2:30 PM

Mentor(s): Marcie Ray (Musicology)

In a worn down plantation house, a vision of Bourgeois domesticity is resurrected in an iconic scene from Nick Cassavetes' 2004 Film adaptation of *The Notebook*. The heroine, Ally, begins playing Chopin's E Minor prelude on an out of tune piano while her lover leans longingly against a doorway, eventually interrupting her music with a kiss. What was initially an act of self expression for Ally becomes an opportunity for her lover to take agency of her song. The piece is also featured in Sam Taylor-Johnson's movie adaptation of *Fifty Shades of Grey*. Christian's performance of this iconic piece is interpreted by his innocent young paramour, Anna, as a mirror to the man's internal, tormented self. Recognizable to millions and a favorite in classical concerts, Chopin's E Minor Prelude has also achieved massive popularity in films. From acting as a midnight soliloquy for brooding billionaires to offering a moment of reflection for the flamboyant pianist Liberace in Steven Soderbergh's *Behind the Candelabra*, the E Minor Prelude acts as a vehicle for expression, particular for characters who must maintain an outward appearance that differs from their inner selves. Particularly, this paper explores how the use of Chopin's famous Prelude within the context of film often plays a part in preserving traditional gender roles. The woman at the piano is a charming vision for the male gaze, while male pianists allow the listener to enter his torment: the wild range of emotion that, for men signifies genius, for women, madness.

CULTURE AND TRAINING IN MUSIC-NARRATIVE COGNITION

Emily Vaughan

Time: 2:45 PM

Mentor(s): Natalie Phillips (English)

The belief that individuals hear stories while listening to music has long been held. Researchers at the University of Arkansas have pioneered a study assessing whether or not college students can generate stories for classical instrumental music with only 90 seconds of the piece provided. As expected, the majority of students generated narratives, however, these narratives were unexpectedly highly unified in terms of narrative topic and emotional themes. The present study at the Digital Humanities and Literary Cognition lab assesses whether if these narratives are universal and can be matched back to the music samples they were inspired by. Participants are tasked with listening to the same 8 samples of classical music and then match sets of narratives written by students at UA back to the excerpts. Findings thus far have revealed that participants are highly accurate, up to 77% overall (n=30). These results spark further questions: are there inherently communicative components in music and which of these factors (if any) lead to high levels of task proficiency? In a post-experiment survey, participants were asked to answer several questions concerning their literary and musical backgrounds. Based on preliminary analysis, we hypothesize that participants with greater levels of training in both areas of study will have the highest accuracy. Further research will investigate questions of cultural universality, including applying the same original study from UA to a participant pool based in rural China. Such a global, cross-cultural study has the ability to critically enhance the scientific community's understanding of narrative cognition.

HUMANITIES AND PERFORMING ARTS POSTER PRESENTATIONS, SECTION 1 BALLROOM, 9:00 AM – 10:30 AM

AESTHETIC PLEASURE IN POETRY: A REVISED APPROACH TO AN OLD INQUIRY

Sal Antonucci, Kristen Bilyea

Poster: 288

Mentor(s): Natalie Phillips (English)

Since the advent of poetry, readers have been curious about its mechanics. The earliest readers, beginning with Aristotle, have been focusing on finding what is responsible for the pleasure that is experienced when reading poetry. This project aims to revise the traditional approach taken to this literary inquiry. Instead of offering a theory centered on subjective readings of poems of one's choosing, this project attempts to offer an explanation for the cause of poetic aesthetic pleasure that is based on both traditional literary analysis and a multitude of readers' responses. To do so, 30 English undergraduates from Michigan State University were tasked with reading 16 sonnets two times. During the first reading, participants became acquainted with the language of the sonnets; in the second reading, participants were prompted to highlight in green specific words, phrases, lines, or passages that they found aesthetically pleasing. By compiling all participants' highlights, we surprisingly found that up to 80% of readers agreed upon positive aesthetic

judgments. This set of data, with its varying degrees of agreement, shows what poetic moments are more or less aesthetically pleasing to our sample of readers. These responses are most valuable to our investigation as they allow us to objectively identify aesthetically pleasing elements within our sample of sonnets. Ultimately, in forming an explanation for aesthetic pleasure in poetry with this approach, we show a way to practice literary criticism without relying on our possibly subjective readings as has been the tradition.

AN INTERDISCIPLINARY APPROACH TO THE STORIES WE HEAR IN MUSIC

Alexander Babbitt, Taylor Ryan

Poster: 289

Mentor(s): Natalie Phillips (English)

Cognitive Narratology (CN) is a relatively new field that has arisen over the past decade. It theorizes that narrative processes guide how one thinks and experiences the world. Previous scholarship in this field has examined a variety of human-media interactions looking specifically at print text, cinema, and virtual environments. However, CN's application to music has yet to be analyzed extensively. As such, we intend to address this gap through a multi-study collaborative project at Michigan State University and the University of Arkansas. After listening to eight 90-second clips of orchestral music, undergraduates at U. Arkansas recorded the narratives they created while listening. Our study required participants to reverse the process by matching the narratives back to the original music samples. Participants listened to the eight original music samples, but were only provided with four corresponding narrative sets. While matching, they were allowed to provide a back up choice and indicate their confidence level. Preliminary results reveal that, when given the opportunity to submit two songs - a final answer and a backup- participants consistently selected the same two songs for each narrative set. This suggests there were potentially similar elements within the musical excerpts and/or the narratives that allowed them to be conflated. We will be exploring these elements and patterns, focusing specifically on narrative analysis using digital humanities tools. Such results will provide support for CN's extension on how we experience music, further suggesting that narrative plays a large role in the processing of external stimuli.

RESILIENT COMMUNICATION AND COMMUNITIES: AN INQUIRY INTO THE ROLE OF ZINE DISTRIBUTION AND ACCESSIBILITY IN A DIGITAL ERA

Rachel Davis

Poster: 290

Mentor(s): Dawn Opel (Writing Rhetoric and American Cultures)

A zine may take many forms. But often they are made in small batches by hand, at a low cost, and personally distributed (often by the zine creator). The capitalist market does not dictate zine distribution. Thus, zines often contain content that is not for profit, but for radical information sharing and personal expression. They function in a network of personal connections. Which makes me wonder, who are they accessible to, and why? Is there a way to make them more accessible and potentially play a larger role in society? Could anything be gained by overlapping the underground zine world and the open-access digital world? Digitizing and disseminating them is one option. What are the other options? Does technology have a place in the zine world or are they opposing forces? We will find out. Within the research, I am gathering information from: 1) the voices of those within the zine community—by interviewing zine makers, distributors, librarians, and event organizers; 2) my own interactions with zines and its community, both in print and online; and 3) published zine research. During a time of globalization, colonization, and technological monopolization—zines are a vital outlet for the silenced voices and ideas in mainstream media. Let's ask and then listen.

INDIE PUBLISHING: THE EFFECTS OF THE BIG FIVE PUBLISHING HOUSES' AND MARKETING CHOICES

Veronica Finniss, Em McCullough, Danielle Schwartz, Hannah Shaneberger

Poster: 291

Mentor(s): Kate Birdsall (Writing Rhetoric and American Cultures)

In the American publishing industry, there exist five big publishing houses (Hachette, HarperCollins, Macmillan, Penguin Random House, and Simon and Schuster) that overshadow independent presses with their financial assets, marketing strategies, and brand recognition. This overshadowing leads to less exposure, sales, and readers for authors who choose independent (indie) publishers, and for the publishers themselves. Since the "big five" act as a monolith, readers often lack knowledge about books published by smaller, lower-budget venues. Indie authors often have to provide their own marketing and social media strategies, while the big five provide their authors with a "marketing machine." Our research revolves around this core question: how do the "big five" and their marketing strategies affect indie publishers, and vice versa? We will research this question by comparing the amounts of money the two publishing avenues spend on marketing, analyzing how social media affects the book marketing process, and, with a set of case studies, evaluating how independently-published books have become bestsellers in spite of their handicaps in the marketplace. Finally, we will research the ways in which genre fiction—often published by independent presses—is often marginalized in the

publishing industry, especially when compared to literary fiction, which is often published by the “big five.” By analyzing the “big five” book market, the independent book market, the New York Times Bestseller lists, and primary source data from independent authors, our poster presentation will be able to answer these questions and provide valuable information for authors who publish independently in the future.

DIGITAL HUMANITIES AND LITERARY COGNITION LAB

Nick Huard, Joe Hazelton

Poster: 292

Mentor(s): Natalie Phillips (English)

As students of literature study poetry, they are often concerned with the pleasurable elements of a poem and how they are conveyed to the reader. Most contributions to this conversation have been subjective in nature as many fear a quantitative approach to this inquiry would miss the nuanced components that are responsible for pleasure in poetry. This study is designed to answer these questions surrounding aesthetic pleasure by using quantitative metrics in addition to traditional methods. A group of 30 English majors were asked to read 16 poems and ranked them on metrics concerning imagery, strength of feelings, and aesthetic pleasure. While reading the poems, the participants were also asked to highlight words or phrases that were aesthetically pleasing or displeasing to them in green and red respectively. We also consider the number of highlights, levels of concreteness, and sentiment within the sonnets in addition to other metrics. These additional metrics are what allow us to explore different qualities that may be responsible for aesthetic pleasure. Ultimately, this sets us apart from others concerned with the same inquiry. The quantitative nature of our data strengthens the conclusions we come to as they are not based off of a purely subjective, traditional literary analysis.

POLYELECTROLYTE MULTILAYER FILMS: ADVANCEMENTS IN TEXTILE TECHNOLOGY AND DEVELOPMENT

Para Low

Poster: 293

Mentor(s): Theresa Winge (Art, Art History, and Design)

The primary reason that humans wear clothes, apart from protection and modesty, is decoration. The fashion industry thrives on finding new ways for people to express themselves through dress. But how can one increase the functionality of clothing? How can clothes become tools for the modern world instead of just decoration? Polyelectrolyte multilayer (PEM) films are used as a coating to add different properties to objects, based on the processes and materials used to create a particular film. The purpose of this project is to research studies and new technology developed within the past decades that involve applying PEM films to textiles. Depending on the particles incorporated between layers, a PEM film can allow fabrics to be dyed with a low environmental impact, be able to neutralize chemicals, able to automatically heal rips, and more. This presentation will cover the process of applying PEM films to textiles and of customizing films to achieve various desired effects.

MEDIA GALLERY: INSTALLING THE ART OF THE FUTURE

Josiah Masvero

Poster: 294

Mentor(s): Alison Dobbins (Theatre)

As the visual arts progress into digital media, art galleries and museums need to be able to present these new media. Some galleries have the necessary equipment and training to showcase and commission this art form for public presentation, but most do not. The scope of this research spans from researching projection mapping and installment techniques, drafting custom plans for local galleries, and training personnel in the use of these AV systems. Some spaces have special consideration such as high ceilings, odd angles, or large windows. This program aims to creatively solve, or at least identify these problems on behalf of the institution for future reference. If these necessities are addressed now, future artists can easily install their work. Projection mapping ushers in a change in the way the public consumes and interacts with art for years to come.

**HUMANITIES AND PERFORMING ARTS
POSTER PRESENTATIONS, SECTION 2
LAKE HURON ROOM, 3:00 PM – 4:30 PM**

ART OF INFERTILITY

Margaret Chesbrough

Poster: 297

Mentor(s): Robin Silbergleid (English)

The ART of Infertility is an international project that is currently in the process of becoming a certified 501(c)(3) non-profit organization. We work to educate and advocate against infertility and how it affects the individual experience. The ART of IF showcases illustrative works that depict the human experience of infertility and addresses these narratives through traveling art exhibits, followed by panel discussions. Through the use of narratives that have been achieved through our interviewing process, I seek to analyze the effects of infertility through the male perspective. Historically, infertility has been seen as an issue that targets women; however, infertility does not discriminate nor is it gender biased. In this manner, I will interview males who have struggled with infertility such as obtaining a low sperm count, the struggles of trying to start a family after receiving a vasectomy reversal, and various other causes and obstacles of infertility. By incorporating my knowledge in Gender Studies, I address how gendered concepts like masculinity and femininity coincide with one's view of this disease. Ultimately, by sharing the male experience of infertility, my objective is to break gender barriers and hopefully introduce infertility as a subject in conversation, focusing on how infertility affects specifically males.

CONTRIBUTION OF MELODIC FACTORS TO TEMPO DETERMINATION

Audrey Drotos, Nora Baty, Shelby Glessner, Stacey Rowland, Andrew Younker

Poster: 298

Mentor(s): Lauren Amick (Psychology), Devin McAuley (Psychology), Leigh VanHandel (Music)

There are many cues that may influence tempo determination, which is an individual's perception of what is the best tempo for an unfamiliar melody. These include pitch range (the distance between the highest and lowest notes), the number of non-stepwise intervals (notes not directly next to each other), the average size of the pitch intervals, and the number of contour changes (changes in pitch trajectory). Boltz (1998) found that when subjects were asked to decide whether a melody was too slow or too fast, contour changes and large pitch leaps caused the biggest change in tempo preference. The aim of the present study was to extend the results from Boltz using novel musical stimuli to consider the relative contribution of different melodic factors to tempo determination. Participants listened to thirty-one melodies created from unfamiliar classical pieces and controlled the tempo in real time with a continuous spin wheel. This allowed participants to speed up and slow down the excerpts until they found a tempo they felt was the "correct" speed for each melody. The primary contributor to tempo determination was contour change; melodies with a higher number of contour changes were assigned a slower best tempo ($r = -0.381, p < 0.05$). These results partially support the original study by Boltz and show that contour change is a statistically significant factor in tempo determination for melodic excerpts. Ongoing work will include investigating a model to determine other melodic factors that contribute to tempo determination.

THE VALUE OF UNDERGRADUATE LITERARY JOURNALS

Carrie Dudewicz, Alex Valenti

Poster: 299

Mentor(s): Robin Silbergleid (English)

The Red Cedar Review is Michigan State's own undergraduate-managed literary journal, accepting submissions from undergraduate writers across the country. This semester, an archive project has begun with the hopes of preserving the rich history of the journal. As members of the Red Cedar Review, we received the opportunity to work as interns reading and reviewing all of the past issues of the journal. In doing so, we have learned and read many notable and fascinating stories and pieces, but what struck us most was the thought that not only staff members of the journal but contributors to the journal as well ended up having prominent careers in the field of creative writing, literature, editing, etc. For UURAF, we will further research the careers of some prominent contributors (Carrie) and staff members (Alex) as well as track their successes in their years after working with the Red Cedar Review. In doing so, we hope to find evidence of the usefulness and value of undergrad literary magazines such as ours, as well as demonstrate that undergraduate literary journals have the potential as a springboard for budding writers and those interested in literature.

SOCIAL CHANGE AND THE ART OF ACTIVISM

JeNiece Freeman-Holt

Poster: 300

Mentor(s): Tama Hamilton-Wray (Arts and Humanities)

Activism and art have always been intertwined in various ways in contemporary American society. We have seen a rise in activism for social change across the country most recently with Black Lives Matter Movement and the Women's March on Washington. Additionally, we have seen a rise in artists taking central roles in these activist movements. My research covers the hidden figures Ruby Dee and Ossie Davis who as actors and filmmakers contributed to social change in the African American community during the 1960s up to their deaths in 2005 and 2014, respectively. I make the case that in some ways this couple set the mold for artist-activist. It is important to understand their contribution to the social movement of the 1960s and how it translates into the present day. It is also important to explore how their being a part of such a pivotal moment affected them. To understand the full significance of Ruby and Ossie's art and activism I analyzed interviews, autobiographies, films, and historical newspaper accounts of their work.

ROOTS: AN INTERDISCIPLINARY RESEARCH INVOLVING DANCE, POETRY, AND PERFORMANCE

Rachel Nanzer

Poster: 301

Mentor(s): Rosely Conz (Theatre)

This research uses ethnographic practices to investigate how collaboration affects the creative process between dancers and poets. Participants in the investigation are voluntary ROOTS performers. ROOTS is a collaborative concert collected of students desiring to create interdisciplinary work. Data is collected from two separate groups of dancers, choreographers, and poets through surveys, oral interviews, and rehearsal observations. The research is still evolving and so far this is what we have found. Collaborative art is exploratory in nature. Shared trends can be identified in each group despite the contrast between their creative processes. As a case study, ROOTS reveals collaboration in art encourages adjustments throughout the creative process. To create a cohesive piece, artistic collaboration relies on the flexibility of partners. Feedback and questions flow between artists to encourage improvements and understanding. The collaborative environment forms a refining process, creating a multi-layered and thoughtful performance. As artists express emotion through their group's chosen theme, a connection with one another forms. Poets look to a dancer's movements. Choreographers and dancers work to embody the poet's words. A cycle of interaction forms as each artist looks to the other for inspiration, meaning, and technical timing of their performance. At the same time, artists bring their individual perspectives and personalities to the work. Participants described how multiple forms of communication in collaboration helps clarify and deepen meaning for an audience. An experience is developed that could not be achieved by an individual, which overshadows challenges presented by creative collaboration.

SADE AND RADICALISM

Syd Pollak

Poster: 302

Mentor(s): Valentina Denzel (Romance and Classical Studies)

This poster will represent my research done about French/American punk feminism. Specifically, I am working with no wave musician/writer/artist, Lydia Lunch, and her adaptation of Sadean philosophy and literature. In her work, Lydia Lunch focuses on the cycle of creation and destruction, waste, matter, sexual violence, and any form of physical transgressions. All of these topics are typical of Sade's writings and of his materialist philosophy.

LIVES UNEARTHED: THE WOMEN OF THE DEPARTMENT OF MEDICINE

Liz Ross

Poster: 303

Mentor(s): Danita Brandt (Geological Sciences)

The contributions of women to STEM disciplines (Science, Technology, Engineering, Math) are often overshadowed by those of their male peers, if for no other reason than the fact that men outnumber women in STEM fields. The purpose of the project was to document the female faculty in the Department of Medicine from 1966, 2 years after its founding in 1964, to the retirement of its current emerita (2011). Data was collected from University records at the MSU archives, primarily from Faculty and Staff Directories. Over the period of 1966-2011, the Department employed a total of 47 women as Instructors, Academic Specialists, Associate/Assistant Professors, and Professors. Only 5 of these women reached full professor status, compared to the 56 male professors who worked in the same time frame. This is a staggering 11 to 1 ratio of male to female professors. Two of these professors emerita, Dr. Ruth Hoppe and Dr. Margaret Holmes-Rovner, submitted to be interviewed and their lives chronicled. Both revolutionized their fields, whether it be

Hoppe's development of modern curriculum in medical schools or Holmes-Rovner's innovative work with patient-doctor shared decision-making. Their hard work and many distinguished accomplishments paved the way for modern women pursuing STEM fields.

INTEGRATIVE AND ORGANISMAL BIOLOGY

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

DEMONSTRATION OF PREY-SWITCHING USING LEPOMIS MACROCHIRUS AND VARIOUS FRESHWATER ZOOPLANKTON

Ellary Marano

Time: 11:00 AM

Mentor(s): Scott Peacor (Fisheries and Wildlife)

Predation plays a prominent role in ecosystems, from Michigan fisheries to the Amazon Rain forest. How predators select their prey can be widely dependent on various environmental factors. According to Optimal Foraging theory, predators will maximize energy intake by foraging such that energy cost is minimized. Thus, when desired prey is available but more difficult catch, possibly as a result of a shift in the ecosystem or the environment, a predator will begin consuming another prey in greater proportion. This is called prey switching. In order to demonstrate this trait of prey switching in response to environments, *Lepomis macrochirus* (Bluegill fish) and freshwater zooplankton (aquatic macroinvertebrates) were kept in mesocosms (small, artificial ponds) of varying levels of water clarity. The fish were allowed to freely swim and consume zooplankton without interference. By comparing the stomach contents of the fish to the community composition of zooplankton in the mesocosms over time it is possible to learn what is preferentially consumed in clearer versus more turbid environments. If an organism, does not engage in prey switching, insufficient food may inhibit their ability to properly reproduce. Understanding why predators choose their prey can also help scientists learn the state of an ecosystem. If predators engage in prey switching, scientists can begin to estimate if the ecosystem has changed. Further, because prey switching is not unique to fish it can also be observed in a predators across a variety of ecosystems the study of these mechanics can be applied to all facets of wildlife ecology.

DECREASED MEAN FLIGHT INITIATION DISTANCE WHEN FEEDING RECORDED IN FOX SQUIRRELS AND HUMANS

Cassie Dutcher

Time: 11:15 AM

Mentor(s): Douglas Luckie (Physiology)

The distance at which an individual starts to flee from a potential threat is called the Flight Initiation Distance (FID), and results from the initiation of the "fight or flight" response. In this study, we investigated the differences in the FIDs of foraging (eating) and non-foraging organisms; specifically, those of the *Sciurus niger* (fox squirrel) and *Homo sapiens* (human). Our working hypothesis was that squirrels and humans will exhibit escape behavior when the cost of remaining is higher than the cost of fleeing, and that when foraging the cost of fleeing increases due to its relation to survival. During our observations, we predicted that both organism types, while actively eating, would exhibit a lower FID than in control conditions. During repeated observations, FID was measured for students (FID_{eating} was 0.73m and $FID_{\text{non-eating}}$ was 1.15m, $n=31$, 16 eating, 15 non-eating) and campus fox squirrels (FID_{eating} was 1.51m and $FID_{\text{non-eating}}$ was 3.87m, $n=31$, 17 eating, 14 non-eating) when confronted with a threat or perceived threat. Only the FIDs between the same organisms were compared. Paired t-tests on the collected data supported that there was a significant difference ($p = .0008$) in the mean FIDs between eating and non-eating squirrels. Though students on MSU's campus followed the general trends of expected behavior, data sets were not found to be statistically significant ($p = 0.12$). These results agree with the existing literature, and thus provide some support to a correlation between FID and foraging, though further research is necessary for *Homo sapiens*.

ELOVL4 PRODUCTS IN PRESERVATION OF BLOOD-RETINAL BARRIER

Meesum Syed

Time: 11:30 AM

Mentor(s): Julia Busik (Physiology)

The foremost cause of blindness amongst working adults in the US is diabetic retinopathy—a retinal microvascular disease. This complication of diabetes is a function of leaky microvasculature in the retina and/or abnormal angiogenesis

in retinal tissue. Diabetic retinopathy is prefaced by blood retinal barrier breakdown. The role of dyslipidemia in retinal vascular permeability has not yet been determined. It has been previously shown that very long chain ceramides play a major role in the integrity of the water permeability barrier in the skin. These ceramides' structure requires very long chained (VLC) fatty acids (>26 carbons) that result from the action of Elongation of Very Long fatty acid 4 enzyme (ELOVL4). ELOVL4 has been found to be down-regulated in the diabetic retina. The objective of this research was to identify the role of ELOVL4 in vascular permeability of retinal endothelial cells. Bovine retinal endothelial cells (BRECs) were isolated and grown for permeability assays using RITC-dextran as a paracellular permeability marker. BRECs treated with 50ng/ml of Vascular Endothelial Growth Factor (VEGF) resulted in a 47.7% increase of permeability in BRECs. This increase was mitigated with overexpression of ELOV4 in BRECS. Zonulae occludentes (TJ: tight junctions) seal the gaps between epithelial and endothelial cells to form impermeable barriers. TJ complexes were pulled down from the plasma membranes of human retinal pigment epithelial cells and analyzed by electrospray ionization- tandem mass spectrometry (ESI-MS/MS) for lipid composition. ESI-MS/MS analysis showed presence of VLC ceramides and sphingolipids in the isolated TJ complexes.

AUDIO PLAYBACK DEMONSTRATES RELIANCE ON VISUAL COMMUNICATION IN SOCIAL SETTINGS IN FOX SQUIRRELS AND HUMANS

Lauren Mileto

Time: 11:45 AM

Mentor(s): Douglas Luckie (Biology)

Communication and processing of information on the population level plays an important role in the survival and continuation of life in both humans and animals. The aim of my project was to investigate how a social environment could alter the modes of communication used by both *Sciurus niger* (fox squirrels) and *homo sapiens* (humans). Based off recent studies of fox squirrel desensitization in urban settings, and the evolution of human screams, I hypothesized that social environments would alter the modes of communication used in both squirrels and humans. To investigate how communication could be altered, a playback recording that initiated "fight-or-flight" responses in squirrels and humans was introduced to two different social environments; one solitary and one social environment. The responses of the subjects were recorded and further categorized. Supporting my hypothesis, it was found that both squirrels and humans responded to the frightening stimulus with more auditory signals in solitary settings, and more visual signals in social settings. The social settings for squirrels and humans resulted in altering their mode of communication to best fit their surroundings.

OBSERVATIONAL AND PREDATOR PLAYBACK STUDY FINDS URGENCY BEHAVIOR IN THE BLACK-CAPPED CHICKADEE

Elizabeth Barton

Time: 12:00 PM

Mentor(s): Douglas Luckie (Physiology and Lyman Briggs)

Observing communication behaviors in animals is a method often used to decode the languages of different species. The information obtained from these studies can then be built upon in order to gain a more comprehensive understanding of each species' language, and underlying parallels between them. Through this, possible evolutionary similarities between species can be investigated. In order to explore the language of the Black-capped Chickadee, observational and playback studies were conducted to determine how they respond in the face of danger. Once the different urgency behaviors of the chickadee were identified through the observational study, the sounds of three common predators of the chickadee were played during the playback study to simulate a dangerous situation. It was found that the length of the vocalization made by the chickadee increased as the magnitude of the possible threat present increased. Previous research in this area suggests that the FOXP2 gene could be responsible for urgency behaviors in multiple species. However, further research is necessary to support this hypothesis in regards to this study.

OBSERVATIONAL STUDY FINDS CORRELATION BETWEEN URGENCY AND COMMUNICATION BEHAVIOR IN HOMO SAPIENS

Phoebe Holmes

Time: 12:15 PM

Mentor(s): Douglass Luckie (Physiology and Lyman Briggs)

Communication behaviors of animals are often able to be interpreted through simple observational studies. These studies can then be expanded upon to further understand the components of each species' language, uncover homologous trends between them, and determine if evolutionary similarities exist. In order to decode the communication trends of *Homo sapiens*, an observational study was performed to determine how the rate of speech fluctuated based on the context of a given situation. Using Breedlove and Watson's eight previously identified emotions

of Homo sapiens and their respective intensities, the rate of speech for 30 individuals, between the ages of 18-22, was calculated and their emotion exhibited, noted. It was found that as the intensity of emotion increased, the rate of speech decreased. In response to a change in surrounding, species alter their language in a specific way. However, future research on the FOXP2 gene may prove to be responsible for these communication behaviors in Homo sapiens as well as in other organisms. Experimentation with the use of PCR is currently being completed to gain further knowledge on this homologous behavior.

INTEGRATIVE AND ORGANISMAL BIOLOGY POSTER PRESENTATIONS, SECTION 1 LAKE HURON ROOM, 9:00 AM – 10:30 AM

EVOLVING A FIGHT OR FLIGHT RESPONSE

Marie Camp

Poster: 306

Mentor(s): Arend Hintze (Integrative Biology)

Fight or flight decisions can literally be life or death decisions. At the same time, they happen often under noisy circumstances and thus in the absence of certainty. Consequently, a lot of information has to be integrated to arrive at the best possible decision at that time. Specifically, here the evolution of a fight or flight/friend or foe response takes center stage. We use evolvable Markov Brains to control virtual organisms, and allow the organisms to evolve the ability to make such decisions. In this study, the organisms must learn to tell the difference between a friend (food) or foe (predator), and are rewarded accordingly. If the organisms come into contact with food, it receives points, and lose points if they contact a predator. The organisms with the highest amount of points in each generation are considered to be the most fit, and their genes get passed on to the next generation proportionally. Over the evolutionary time course, the behavior becomes more and more adapt, and allows us to study how and under what circumstances fight or flight behavior evolves, and how this decision process is implemented in artificial computation brains.

THE MORPHOLOGICAL SIMILARITIES BETWEEN GECKOS AND ANOLES TOEPAD SHAPE

Oacla Fair

Poster: 307

Mentor(s): Travis Hagey (Biological and Computational Evolution in Action)

Many studies suggest that geckos and anoles have similar functionalities such as their clinging ability and toe shape, yet quantifying and analyzing their toepad shape has never been done. It is evident that anoles independently evolved from geckos as these lizards are 160 million years apart in their phylogeny. Given their genetic distance, geckos and anoles appear to have similar toepad shape. There are numerous variations of geckos' toepad shape such as having wide adhesive toepads, narrow toes and losing toes altogether. We hypothesize that geckos and anoles toepad shape morphologies are similar because they experienced similar evolutionary occurrences. We used geometric morphometrics to determine if their toepad shape is indeed similar. We used 82 geckos and 16 anoles for our sample size. Using computer program tpsDIG2, we had a total of 11 landmarks for each specimen to outline the toe, adhesive area and the widest lamella. Then, we put all of that data into R Studio to perform three analyses: Procrustes, Principal Component Analysis, and Phylogenetic Generalized Least Squared. After conducting our methods, we found that these geckos and anoles possess different toepad shapes. By quantifying their toe shape, it allowed us to determine how much their shape resembles one another and which species were closest in morphospace. The importance of this study is it allows scientists to recognize how morphology in toe shape play a role in understanding why distantly related organisms can inherit similar traits and live in similar environments which can be applied to any species.

RECEPTOR EVOLUTION: GLUCAGON- AND INSULIN-LIKE PEPTIDE MODULES AS BINDING SITES FOR GLUCAGON AND INSULIN IN THE GLUCAGON RECEPTOR

Jason Greib

Poster: 308

Mentor(s): Robert Root-Bernstein (Physiology)

Based on the studies of Dwyer and Root-Bernstein it has been suggested that peptide receptors not only evolved from self-aggregating peptides but also complementary molecules. Glucagon itself is a self-aggregating peptide that is also complementary to insulin and in turn the two will bind to each other. Using similarity searching it has been found that the glucagon receptor has sequences within its glucagon binding region that mimic glucagon and insulin sequences. Through use of peptides derived from these glucagon and insulin like regions, it has been shown that the peptides will

bind to glucagon and insulin with up to high-nanomolar affinity. This provides experimental evidence that the glucagon receptor evolved from glucagon and insulin like modules.

COMPARING BEHAVIOR BETWEEN FAMILIAR AND UNFAMILIAR KIN IN THE AMERICAN TOAD

Olivia Guswiler

Poster: 309

Mentor(s): Sara Garnett (Integrative Biology), Tom Getty (Integrative Biology)

American toads are one of many taxa that exhibit kin-biased behavior (where individuals behave differently around kin compared to non-kin). Lab experiments have shown that tadpoles of this species exhibit a preference for associating with kin over non-kin, but can no longer distinguish between them when their nostrils are blocked. This suggests that they recognize each other using olfactory or chemical cues. We wanted to know if these cues are recognized inherently, or if they are learned through association with their kin. For an answer, we looked at clutches of tadpoles that had been separated into two groups early on in development. We reintroduced the separated tadpoles to their kin in low and high density groups, with some remaining separated in low densities. Prior to being placed in their experimental tanks we measured the mass, developmental stage, and snout to vent length of each tadpole. Once set up, we monitored the tanks, removing and measuring tadpoles when they reached metamorphosis (at least one front leg visible). After compiling and analyzing our data we compared the differences between the familiar and unfamiliar kin treatments. Our results suggest that American toad tadpoles are able to distinguish their kin from non-kin regardless of familiarity.

PAIN MEDIATES PREY CHOICE AND PREDATORY BEHAVIOR IN THE SOUTHERN GRASSHOPPER MOUSE (ONYCHOMYS TORRIDUS).

Amber Suto, Olivia Guswiler

Poster: 310

Mentor(s): Ashlee Rowe (Neuroscience), Matthew Rowe (Integrative Biology)

While unpleasant, pain is a necessary indicator for potential threats to the well-being of an organism. Numerous species have taken advantage of the specialized sensory structures evolved for detecting and responding to pain. Despite how obvious the benefits of possessing a painful sting may seem, few studies have demonstrated such benefits. Southern grasshopper mice (*Onychomys torridus*) are avid predators of arthropods; their diets encompass a wide range of scorpions with stings of varying degrees of pain, including extremely painful, neurotoxic Arizona bark scorpions (*Centruroides sculpturatus*) and relatively painless, non-neurotoxic, but less nutritious, stripe-tailed scorpions (*Hoffmannius spinigerus*). These mice have evolved resistance to both the toxic and pain-inducing components of bark scorpion venom; when stung, pain pathways in the mice targeted by the scorpion venom are effectively shut down, thus blocking pain signals. Grasshopper mice, nonetheless, are still exposed to a brief period of pain when initially stung, leading us to ask if this short window of discomfort influences prey preference. Results from three experiments using wild-caught and captive-born mice suggest that even brief exposure to pain may be a significant deterrent to predation. When given the choice between *Centruroides* and *Hoffmannius*, grasshopper mice prefer to prey upon the less painful, but also less nutritious, *Hoffmannius*. However, when both species' stingers are blocked, preventing envenomation, more nutritious *Centruroides* are favored.

HYPERTHERMIA INDUCING CONDITIONS IMPAIR COGNITIVE PERFORMANCE

Ella Potter, Rachel Kuehn

Poster: 311

Mentor(s): Erica Wehrwein (Physiology)

Mild cold stress induces sympathetic activity, which results in vasoconstriction, thus reduced blood flow. We tested the hypothesis that cognitive function would be enhanced with reduced skin temperature, due to thermoregulation mechanisms increasing blood flow to the core of the body. Young, healthy subjects (n=8, 5M/4F, ages 18-25) were studied in a cool setting, using a water perfusing suit, and a control setting. In the cool setting, after a skin temperature decrease of 1 degree was recorded, subjects completed 4 computerized cognitive tests, assessing memory, attention, decision making, and mental math. All data was analyzed using a t-test of baseline versus cool condition and reported as mean \pm SEM. Average skin temperature was 31.9 ± 1.03 °C during baseline and 30.0 ± 1.33 °C during cool condition. Clinical observations indicate the degree we cooled the water, may have been low enough to induce mild hypothermia. Mental math remained unchanged with cooling. Attention and memory were significantly impaired with cooling ($p < 0.05$ and $P < 0.001$ respectively). The Iowa Gambling Task score, used to assess decision making, only improved significantly in subjects who had the cool session before the control ($P < 0.05$), suggesting the cooling impaired performance in the task. Therefore, cognitive function is impaired when skin temperature is reduced. This may be a result of thermoregulation mechanisms reducing brain function to minimize the depletion of resources.

VARIATION IN OFFSPRING FITNESS DUE TO INTENSITY IN MATERNAL CARE IN SPOTTED HYENAS (CROCUTA CROCUTA)

Jessica Sattler, Caroline Titel

Poster: 312

Mentor(s): Kay Holekamp (Integrative Biology)

Maternal care is critical for offspring development and survival, especially among social mammals that give birth to altricial, or undeveloped, young. Spotted hyena (*Crocuta crocuta*) mothers give birth to 1-2 altricial cubs, which experience an extended period of maternal care for up to 2 years. Little is known about how quality of maternal care and social factors, like the mother's rank within the female-dominated hierarchy, predict offspring fitness in hyenas. We hypothesize that greater maternal care is associated with higher offspring fitness, as measured by survivorship to reproductive maturity and that this effect would be modified by a mother's rank and experience. To test our hypothesis, we will use behavioral data collected as part of a long term field study of free-living hyenas within the Masai Mara in Kenya. We will quantify maternal care as the frequency of time spent together between mother and cub assessed as part of regular interval scans at each community den. Additional variables will include a continuous measure of maternal rank and a mother's parity, as proxy for maternal experience. The variables that will be measured to provide a data set will include offspring survival to the reproductive age of 2 and how frequently the mother and cub are seen together. Our research will help us understand the influence of maternal rank on the survival and fitness of hyena offspring, and may lead to increased understanding of maternal behaviors in other predators and the effect of variation in maternal care on offspring survival.

MALE FEMALE COOPERATION IN LION-HYENA INTERACTIONS

Leah McTigue

Poster: 313

Mentor(s): Kay Holekamp (Integrative Biology), Kenna Lehmann (Integrative Biology)

Cooperation is expected to evolve and persist only when the benefits of cooperation outweigh the associated costs. The benefits and costs of cooperation can vary between individuals according to their individual characteristics, including age, reproductive status, and sex. Previous work on spotted hyenas (*Crocuta crocuta*) determined that males and females do not contribute equally to territory defense. Here, I expand on those results and investigate whether males and females contribute equally during cooperative mobbing of lions. During these lion-hyena interactions, hyenas will cooperatively approach to drive a lion away from a kill, den, or territory. I hypothesize that there are sex differences in individual's behavior during lion-hyena interactions and that these differences are related to the benefits that are the most important to each sex. I will extract data from field notes on lion hyena interactions collected from 1988-today by the MSU Hyena Project. I will compare the sex of adult hyenas and their level of participation in lion-hyena interactions. Participation will be defined as the number of mobs participated in per number of mobs performed by the clan. I will also determine which factors affect male or female participation in lion-hyena interactions: the presence/absence of food; the number of female hyenas present; the rank and reproductive status of females present; the number of lions present; and the male's rank.

INTEGRATIVE AND ORGANISMAL BIOLOGY POSTER PRESENTATIONS, SECTION 2 BALLROOM, 1:00 PM – 2:30 PM

DEVELOPMENT OF AN AGROBACTERIUM-MEDIATED TRANSFORMATION SYSTEM OF THE SOIL FUNGUS MORTIERELLA ELONGATA

Ablgail Bryson

Poster: 315

Mentor(s): Gregory Bonito (Plant, Soil, and Microbial Sciences)

Mortierella elongata is a soil fungus that is plant growth promoting, cosmopolitan, and is a root-associate of a broad range of plant hosts. Therefore, *M. elongata* has the potential to be a model system for studying plant-fungal interactions. In order to define *M. elongata* as a viable fungi model, a successful and manipulatable transformation system must be established. *Mortierella elongata* contains multiple nuclei per cell, so we will transform its asexual spores, called sporangiospores - which contain limited nuclei, using *Agrobacterium tumefaciens*. The plasmid backbone of this bacterium is compatible with fungi and contains native fungal promoters for a native fungal gene (*sdhB*) that makes the fungus susceptible to the fungicide carboxin. A point mutation in this gene will confer carboxin resistance. We will therefore use carboxin resistance as our selected marker. In order to screen for natural resistance to carboxin, we will also include GFP in our plasmid as a reporter. Applications for this system include introducing novel genes,

overexpressing existing genes, CRISPR-Cas9 for gene deletion, and siRNA knockdown in order to better understand plant-fungi interactions.

EFFECT OF SENSORY PLASTICITY ON SHOALING BEHAVIOR IN THREESPINE STICKLEBACK (*GASTEROSTEUS ACULEATUS*)

Samuel Decker, Heather Seaman

Poster: 316

Mentor(s): Janette Boughman (Integrative Biology)

Numerous studies have shown that the transfer of information via sensory systems is dependent on environmental conditions. Fewer studies address how sensory plasticity, caused by environmental variation during development, influences choices later in life. A sympatric species pair of threespine stickleback, *Gasterosteus aculeatus*, provide an opportunity to study how sensory plasticity can affect adaptive fitness through changes in olfaction. It is hypothesized that variation in pH and light frequency during development will result in compensatory changes in the acuity and use of olfaction in benthic threespine stickleback. A full-sibling split-clutch design and simultaneous choice experiment was used to identify changes in the use of olfactory cues during shoaling behavior caused by differences in the developmental environment. The proportion of time spent accurately phenotype matching between shoal choices determined any improvement or deterioration in olfaction. This study contributes to understanding how environmental changes affect fitness, which can be used to refine conservation efforts in aquatic systems.

COMPARISON OF OLFACTORY AND VISUAL TISSUE IN THREESPINE STICKLEBACKS (*GASTEROSTEUS ACULEATUS*) FROM DIFFERENT ENVIRONMENTS

Heather Seaman

Poster: 317

Mentor(s): Janette Boughman (Invertebrate Biology), Robert Mobley (Invertebrate Biology)

Comparing different sensory systems can give insight on how selection drives organisms to make use of different senses. Evidence shows species that live in poorly lit habitats have decreased visual senses and often make greater use of their olfactory senses to make up for the reduction in their visual senses. To see how populations may have evolved morphological adaptations to their environments, we measured olfactory and visual tissue from three different populations of threespine sticklebacks (*Gasterosteus aculeatus*). Sticklebacks from marine, as well as freshwater limnetic and benthic environments, were used because each environment may select for the populations to make different use of visual and chemical senses. We predict that benthic sticklebacks will produce larger olfactory organs at the expense of visual organs, since they live in environments that receive little light. In contrast, we predict that limnetic sticklebacks will produce larger visual organs at the expense of olfactory organs, since they live in environments which receive greater quantities of light. Since marine sticklebacks are an ancestral representation of the two freshwater populations, we predict that both sense organs of marine fish will be intermediate in size compared to the different freshwater populations. The information gained from this study will provide more insight into how an organism's senses adapt to their surroundings in order to succeed in their environment.

THE EFFECT OF CHANGING WATER QUALITY AND PREY DENSITIES ON PREY SELECTION IN BLUEGILL FISH, *LEPOMIS MACROCHIRUS*

Hope Healey

Poster: 318

Mentor(s): Scott Peacor (Fisheries and Wildlife)

Predators are a crucial part of ecosystems, maintaining prey levels and influencing plant distribution. According to the optimal foraging theory, predators selectively consume prey in order to maximize the net energy gained; therefore, it is beneficial to minimize the time spent hunting and maximize the energy received. Fish such as bluegill, *Lepomis macrochirus*, have been observed to consume prey in different proportions based on varying water conditions because these parameters change the time spent foraging, thus affecting net energy gained. However, there have not been many studies examining how selectivity for prey is altered when densities of prey change. This is important to understand, because in nature there are different densities of prey. An experiment was completed where bluegills were released into 1100L tanks to consume zooplankton, microinvertebrates; by chance, the tanks with free swimming fish had different turbidity levels and densities of prey species. It is possible to compare zooplankton counts from the tanks with zooplankton counts from the fish stomachs by using the Chesson selectivity index; these equations relate the proportion of specific zooplankton in the environment to the proportion of specific zooplankton in the stomachs to test if preference for a prey species was occurring. Understanding what types of prey bluegills prefer to consume in large proportions despite changing water quality parameters or prey densities in a controlled setting allows scientists to

predict their dietary habits in different aquatic systems; furthermore, this relates to the impact that pollution, climate change, and invasive species have on an ecosystem.

SEEDLING ECOTYPE AND DROUGHT IN NEOTROPICAL TREE SPECIES *Cordia alliodora* IN ECUADOR

Tina Guo

Poster: 319

Mentor(s): David MacFarlane (Forestry)

Laurel (*Cordia alliodora*), is a widespread native Neotropical tree species, growing from Mexico to Argentina. It is adapted to both wet and dry forest regions, and is a valuable species for timber production and in agroforest systems. Laurel's extensive geographic range has resulted in many ecotypes, or distinct genetic populations, occurring due to environmental factors and isolation. Predicted changes in Neotropical climate are increasing temperature and decreasing precipitation, indicating likelihood of future droughts. I hypothesized there would be differences in effects of drought on tree seedling ecotypes from wet and dry regions of Ecuador. I used two provenances, drier Coastal region and wetter Amazonian region, subjecting them to three watering treatments, 0 ml, 50 ml, and 150 ml per day. Responses for tree seedlings were indicated by growth, mortality, damage/form, and disease/pests. Seeds from ecotypes were collected and germinated several months apart. Preliminary analysis of the Amazonian ecotype showed the 0 ml water treatment killed all seedlings within the first month; all other seedlings survived. No significant differences were found between 50 ml and 150 ml in diameter growth, but there was some indication the 150 ml treatment decreased height growth (possibly waterlogging). Data are not yet available for the Coastal ecotype, which was started later. Results suggest a redesign of the experiment is needed, to address methods of seed collection and storage; starting germination for both seed provenances at same time; adjusting daily water amount to reflect rainfall from origin regions (data suggest a maximum of 50 ml/ day).

FUNGAL RESISTANCE IN *Phytolacca americana* SEEDS

Abby Sulesky

Poster: 320

Mentor(s): Marjorie Weber (Plant Biology)

Phytolacca americana, commonly known as Pokeweed, is an herbaceous plant native to the eastern, Midwest, and Gulf Coast regions of the United States. Pokeweed is a very hardy plant, growing in a variety of habitats, and its seeds can persist for decades in the seed bank. The seeds of *P. americana* are known to contain anti-fungal proteins that protect them from pathogens in their dormant state, and are also excreted into the surrounding environment during germination. This project tests the ability of *P. americana* seeds to resist fungal attack by the oomycete *Pythium irregulare*, and compares the defenses of seeds from both northern and southern locations. Comparing seeds from both locations will help researchers understand how fungal defense adaptations evolve differently at northern and southern latitudes. Variation between the seeds may have evolved from increased fungal attack in the soil with warmer temperatures and a longer growing season in the south. *P. irregulare*, collected from field locations around Michigan, were used in petri dish assays with multiple lines of *P. americana* seeds collected from sites in Michigan and Florida. Assays were conducted with both dormant seeds and germinating seeds to assess differences in fungal defense at both life-stages. The results of this project could be helpful in understanding the influence of environmental factors on evolution and adaptation.

VOCAL ANALYSIS OF HOODED PITTA (*Pitta sordida*) TAXA

Paul Sullivan

Poster: 321

Mentor(s): Pamela C. Rasmussen (Integrative Biology)

The Hooded Pitta *Pitta sordida* is a small passerine bird distributed widely in Asia from the Himalayas through New Guinea. It is highly polytypic, with 12 subspecies. Pittas are suboscine birds with apparently innate, simple songs. As part of a collaborative project to evaluate whether there are multiple species of *P. sordida*, I measured 35 song attributes for 43 recordings of 6 taxa of *Pitta sordida*. Recordings were obtained from the online databases AVoCet (avocet.msu.edu), xeno-canto (xeno-canto.org), and the Macaulay Library (macaulaylibrary.org). I used the bioacoustics software Raven Pro to measure frequency maxima and minima, element length, note length, harmonics and other variables. During initial observations of the sonograms I observed clear distinctions in the shape of the notes between some taxa, mirroring the fact that the songs also sound different for these taxa, especially the Biak Island form *P. s. rosenbergii* and New Guinea *P. s. novaeguineae*, which also differ from each other. Principal components analyses (PCAs) showed that *P. s. rosenbergii* in particular forms a distinct cluster on Factor 1 compared to all other taxa. I also did t-tests of the maximum frequency of *rosenbergii* versus all taxa. In all cases a <.05 P value was reported. My poster will show which song characters contribute to the PCAs and will further elucidate among-taxon differences in song of taxa of *Pitta sordida*.

These data will be integrated into a phylogenetic analysis using mtDNA that shows deep divergence between the New Guinea and western groups of *Pitta sordida*.

**INTEGRATIVE AND ORGANISMAL BIOLOGY
POSTER PRESENTATIONS, SECTION 3
LAKE HURON ROOM, 9:00 AM – 10:30 AM**

PREDATOR-PREY POPULATION DYNAMICS IN A WARMING WORLD

Jessie Ventzke

Poster: 331

Mentor(s): Laura Twardochleb (Fisheries and Wildlife)

Every organism will be affected by climate change but not all will be affected in the same way. To explore predator-prey dynamics under warming temperatures, we collected baseline data about the inhabitants of freshwater ponds. Our focus was on predatory *Notonecta* backswimmers and *Enallagma* damselflies and their prey, the planktonic crustacean *Daphnia*. We sampled each of four Lux Arbor ponds every other week for nutrients, chlorophyll a, and several parameters of water quality and took quantitative samples of zooplankton and invertebrates. Although the organisms in question may be small, warming effects on predator-prey dynamics will scale up to ultimately affect whole ecosystems. Information relating to how changing predator-prey dynamics affect survival in rising temperatures could increase understanding of which species will be able to endure climate change and how dynamics will shift as temperatures rise.

DO IMMIGRATED MALE SPOTTED HYENAS SHOW VOCAL FLEXIBILITY IN ACCORDANCE WITH THE AUDIENCE?

Paige Barnes

Poster: 325

Mentor(s): Kay Holekamp (Integrative Biology), Kenna Lehmann (Integrative Biology)

Signalers can flexibly and strategically alter their signaling to maximize benefits obtained from an audience of receivers. It has been hypothesized that male hyenas use a long distance vocalization, the whoop, to advertise to females. Here, we investigate whether male hyenas put more effort into their whoop bout when there is a higher likelihood of mating. First, we determined whether there is a correlation between the effort in a male's whoop and number of females are present. We also tested whether this effort varies according to the rank and reproductive status of the females present. We measured male calling effort in a number of ways: the number of whoops in a bout, duration of the bout, and pitch. We use field notes and recordings of immigrant male hyenas in four clans in the Maasai Mara, Kenya. These results determine whether male hyenas can flexibly alter their vocalizations and calling effort based on the audience present.

AN UNDESCRIBED TAXON WITHIN PHYLLOSCOPUS MAFORENSIS: AN ANALYSIS OF THE ISLAND LEAF WARBLER'S SONG

Tasha Christensen

Poster: 326

Mentor(s): Pamela Rasmussen (Integrative Biology)

Song is well known as an isolating mechanism driving speciation in birds, and thus is important to study. Song recordings were recently obtained of a putatively new taxon, the Island Leaf-warbler *Phylloscopus maforensis*, and recordings are available through public websites for the other taxa of this species. We hypothesized that *P. maforensis* of eastern Indonesia contains an undescribed taxon on Obi Island, partly because its vocalizations seem to differ from those of other subspecies. To test this, we measured 11 variables for song phrases of taxa of *P. maforensis*, such as maximum and minimum frequency (kHz), length of phrase (s), pause between phrases(s) and counts that included the number of elements per note, number of note types per phrase, and the number of notes per phrase. We found that the undescribed putatively new taxon differs from other taxa of *P. maforensis* in the degree of variability, bandwidth, and other song characters. Our poster will discuss further the among-taxon differences between members of this complex, and the implications of this variation on taxonomy of the complex, which may contain multiple species.

EFFICACY OF A CONFERENCE TRAVEL AWARD PROGRAM TO INCREASE DIVERSITY IN EVOLUTIONARY SCIENCE

Hollie Heape

Poster: 327

Mentor(s): Alexa Warwick (Lyman Briggs)

In the field of evolutionary science there are exceptionally low levels of racial/ethnic diversity. 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 various aspects of the program, how it influenced the individual 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. The factors which most influenced student recruitment and retention in careers requiring advanced training in evolutionary science were addressed based on the data obtained from over 140 individuals. The 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.

EVOLUTIONARY ADAPTATION BETWEEN INDIVIDUAL AND GROUP-LEVEL SELECTION

James Jahns

Poster: 328

Mentor(s): Arend Hintze (Integrative Biology)

Collaboration is a major factor in society. It creates an interesting tension between synergistic rewards, communication, and the possibility of defection. The level of reward an organism receives for helping the group versus pursuing individual endeavors can vary drastically, which in turn effects evolutionary dynamics. Here, organisms must complete a collaborative task in order to get a reward, and we juxtapose individual level selection against group-level selection. Organisms controlled via evolvable Markov Brains were placed in groups of four on a grid, with four blocks surrounding a block of food in the center. Blocks could only be moved if two organisms would simultaneously push against it. Once a block was moved, an organism could reach the food to increase their score. The organisms were then scored by some proportion of their own score as well as some proportion of the group's total score. Results of the population as a whole over many generations were then recorded. The results show that evolution occurs most strongly when organisms were scored mostly by the results of their group, and only partly by their individual score. Increasing the proportion of group-level reward also increased the efficiency of organisms, causing less blocks to be pushed uselessly by only a single organism, and more to be moved by two or more organisms. These results indicate that an environment that rewards collaboration is particularly conducive to evolution. They also indicate that some level of rewarding individual performance is necessary for evolution to occur most strongly.

ELICITED MOBBING BEHAVIOR OF MIGRATORY BIRDS TO THE BROADCASTED SONGS OF THE RESIDENT EASTERN SCREECH-OWL (MEGASCOPS ASIO)

Wissam Jawad

Poster: 329

Mentor(s): Pamela Rasmussen (Integrative Biology)

The use of owl call playback to elicit mobbing behavior is an effective way to observe avian species; however, the responsiveness of migratory birds to vocalizations of their non-migratory owl predators away from their normal range is not well-studied. We wanted to determine whether Neotropical migrants respond by mobbing North American owls only on the breeding grounds, and whether they mob their Neotropical owl predator only on their wintering grounds. We tested this by using playback of songs of the Eastern Screech-owl (*Megascops asio*), a local northeastern American owl, in the forest edge habitats of Costa Rica and Michigan, to determine whether migratory eastern North American birds respond to their resident summer predators in the winter months of December and January, even though that owl species is absent there. We used playback of both the Eastern Screech-owl and a local owl species (Vermiculated Screech-owl *M. guatemalae* in lowlands, and Bare-shanked Screech-owl *M. clarkii* in montane forests) to determine whether Neotropical migrants respond to their wintering-ground owl predators both in appropriate and inappropriate locations. We broadcasted the playbacks shortly after sunrise for 10 minutes, noting behavior and species of each bird present. We photographed and sound-recorded nearby bird species, making note of the first responders. We found that North American migrants responded to varying degrees to Eastern Screech-owl and Vermiculated Screech-owl songs in

Costa Rica. This suggests that Neotropical migrants do not discriminate between predators based on their current location.

MODELING THE EVOLUTION OF MIGRATORY BEHAVIOR USING VIRTUAL AGENTS

Brendan Vande Kieft

Poster: 330

Mentor(s): Arend Hintze (Integrative Biology)

One of nature's most prominent examples of animal behavior are migratory patterns. While there are many hypotheses explaining why this behavior evolved, it is hard to test these experimentally, evolution takes too much time, and is hard to control. Instead of natural organisms, we use virtual agents controlled by Markov Brains to study the evolution of migratory behavior in a computational model. Specifically, we explore which environmental factors, such as temporal/spatial variations and sensory range, are necessary for the evolution of migratory behavior. Digital evolution serves as a surrogate for natural organisms, and allow us to make inferences about natural processes and behaviors - even though the actual components of the computational systems are different.

SPATIAL REASONING IN COMPUTATIONAL MODEL

Jiajia Wu

Poster: 332

Mentor(s): Arend Hintze (Integrative Biology)

Without spatial reasoning organisms would literally be lost. Spatial reasoning helps organisms find food, shelter, mates, and helps them avoid predators, and explore and exploit environments optimally. Navigation and directed motion is probably one of the earliest evolved cognitive abilities, and thus we would like to explore their evolutionary origins more carefully. Therefore, we use a computational model, in which we evolved Markov Brain controlled virtual agents to navigate in the Morris Water Maze. The Morris Water Maze is a behavioral assay to study how well rats (*Rattus norvegicus*) remember spatial cues, and use them to find a resting island in a water tank. Here, instead of testing the behavior of rats, we use this environment to evolve digital agents to perform the same task. We ask if the behavior of these artificially intelligent agent resembles the natural behavior, and which evolutionary conditions are necessary to evolve spatial memory and special reasoning skills.

KINESIOLOGY

ORAL PRESENTATIONS, SECTION 1 LAKE SUPERIOR ROOM, 1:30 PM – 3:30 PM

EFFECTS OF A MINDFULNESS INTERVENTION ON MINDFULNESS AND HEALTH-RELATED VARIABLES IN 4TH-5TH GRADERS

Allie Diltz

Time: 1:30 PM

Mentor(s): Karin Pfeiffer (Kinesiology)

Mindfulness is being aware of and accepting one's thoughts and feelings. This study assessed the effect of a mindfulness intervention on children's mindfulness and health behaviors and analyzed children's perception of the mindfulness program. Children (N=178) in 4th and 5th grade in Flint, MI schools were assigned to an intervention (n=113) or control (n=65) group. Both groups completed surveys on physical activity, fruit, vegetable and junk food intake, health-related quality of life (HRQoL), and mindfulness at baseline (TP1) and after an 8-week mindfulness intervention (TP2), when the intervention group completed additional questions about their perception of mindfulness and the lessons. The intervention group completed the surveys again 8-weeks post-intervention (TP3). Individual ANCOVAs were used to assess differences between control and intervention groups at TP2 controlling for TP1 scores. Repeated measures ANOVA was used to assess differences in the intervention group across all time points. Children's mindfulness was higher in the intervention group compared to the control group at TP2 after controlling for TP1 scores ($p < 0.05$). In the intervention group, mindfulness was higher and junk food intake was lower at TP3 compared to TP1 and TP2 ($p < 0.05$). Physical HRQoL was lower at TP3 compared to TP1 and TP2 ($p < 0.05$). Less than half (43.5%) of the intervention group reported their school should receive mindfulness lessons. More research is needed to confirm these findings in other populations, determine if a mindfulness intervention has health benefits not captured by the current study, and on children's perspectives of mindfulness-based interventions.

CHANGES IN DIVISION I COLLEGIATE ICE HOCKEY PLAYER ANTHROPOMETRICS AND FITNESS OVER 36 YEARS

Jane Groetsch

Time: 1:45 PM

Mentor(s): Jim Pivarnik (Kinesiology), Ashley Triplett (Kinesiology)

Over the past several decades, fitness training has become integral to collegiate ice hockey, with the objective of improving game performance. However, changes in anthropometric and fitness profiles of collegiate ice hockey players have not been evaluated. It is unknown whether these characteristics differ in athletes who later play in the National Hockey League (NHL) compared to those who do not. We evaluated anthropometric (height, weight, %fat) and aerobic fitness (VO₂max) of collegiate ice hockey players over 36 years, and compared differences between future and non-NHL players. Physiologic and anthropometric profiles were obtained through preseason fitness testing of all players from an NCAA Division I men's ice hockey team (1980 through 2015). Athletes (n=56) who later played at least one year in the NHL were compared to non-NHL athletes (n=220). Descriptive statistics (means, standard deviations) were calculated for non-NHL team and future NHL players and differences evaluated via ANOVA. Changes over time were evaluated via regression analysis. Non-NHL players had slightly, yet significantly (P<0.01) greater %fat (12.4±3.5 % vs. 11.2±3.3 %) than future NHL players, but there was no difference in height (181.8±6.2 cm vs 182.5±4.8 cm), weight (84.6±7.7 kg vs 85.0±5.7 kg), and VO₂max (58.0±4.6 ml·kg⁻¹·min⁻¹ vs 58.6±5.0 ml·kg⁻¹·min⁻¹). A cubic model best fit change in height (R²=0.65) and weight (R²=0.77) while a quadratic model best fit change in %fat (R²=0.30). While average player heights and weights fluctuated over time, increased emphasis on fitness training did not appear to affect athletes' aerobic fitness.

RETENTION AND ACHIEVEMENT OF SOPHOMORE STATUS FOLLOWING 1 YEAR OF INTRAMURAL SPORTS PARTICIPATION IN UNIVERSITY FRESHMEN

Lauren Kosowski

Time: 2:00 PM

Mentor(s): James Pivarnik (Kinesiology)

Previous research has shown small, positive relationships between academic success and overall recreational sports participation. However, few studies have focused on these relationships within intramural sports participation specifically rather than recreational sports as a whole. The purpose of this study was to investigate differences in retention and achievement of sophomore status between intramural sports participants and non-participants following their first year of college. Participants included first time, on campus, freshmen from the FS13 and FS14 semesters (n=6,134). Intramural sports usage was obtained via an online database system (IM Leagues). All other variables were obtained from a university database. Covariates assessed included age, gender, race, Pell Grant eligibility, first generation student status, and high school GPA. Means±SD and percentages were calculated for all variables of interest. Logistic regression was used to evaluate the role of intramural sports participation on the odds of being retained and achieving sophomore status following the first year of college. After adjusting for significant covariates, participants were more likely to be retained following their first year of college than non-participants (OR=1.96; 95% CI 1.18-3.25). No significant relationships were found for achievement of sophomore status (OR=1.08; 95% CI 0.82-1.43). Results suggest that freshmen students participating in intramural sports during their first year of college are more likely to be retained at the 1-year mark than non-participants. Reasons could include psycho-social variables such as sense of belonging and better organizational skills.

SPORTS-RELATED CONCUSSION OUTCOMES IN HIGH SCHOOL ATHLETES

Allison Bell, Emma McParland

Time: 2:15 PM

Mentor(s): Abigail Bretzin (Kinesiology), Tracey Covassin (Kinesiology), Kyle Petit (Kinesiology)

Sports-related concussions (SRC) have become a growing health concern with over 300,000 occurring annually. Youth athletes may be at a heightened risk for short- and long-term outcomes including increased symptom and neurocognitive impairments. Therefore, the purpose of this study was to evaluate post-concussive symptoms and neurocognitive function between high school athletes with a SRC and a control group. This was a prospective non-randomized study. Concussions were matched based on age, years of education, and sport. Post-concussive symptoms were evaluated using a 22 symptoms checklist on a 7-point Likert scale (range 0-6). Cognitive function was evaluated using the Standardized Assessment of Concussion (SAC) and the computerized Automated Neuropsychological Assessment Metrics (ANAM). Athletes were evaluated within 72 hours, 8 days, return to participation, and 45 days following return to participation. Analyses included descriptive statistics, repeated measures ANOVA and independent t-tests for components of SAC, ANAM, and post-concussive symptoms. Concussed athletes report significantly more symptoms than matched controls at 72 hours, eight days and return to play following SRC (p=0.024). There were no significant differences between concussed athletes and matched controls on SAC at any time points (p=0.793). There

were no significant differences in ANAM test scores except simple reaction time within 72 hours ($p=0.021$) following SRC in the two groups.

SKELETAL MUSCLE FIBER TYPE SHIFT FOLLOWING ACL INJURY AND RECONSTRUCTION

Eric Leszczynski, Michael Zakovich

Time: 2:30 PM

Mentor(s): David Ferguson (Kinesiology), Chris Kuenze (Kinesiology), Ashley Triplett (Kinesiology)

The anterior cruciate ligament is the primary stabilizer of the knee, and connects the femur to the tibia. However, ACL tears affect 250,000 individuals per year. Following reconstruction of the ACL (ACLR), individuals are 4 times more likely to re-tear their ACL. The mechanism for increased risk for re-tearing is not known, but it is hypothesized to be due to impairment in the skeletal muscle of the leg. Therefore, the purpose of this study was to examine skeletal muscle fiber differences (fiber type and cross-sectional area (CSA)) between the ACLR and healthy, contralateral leg of patients. Six participants ($N=6$) were recruited, and muscle biopsies of the vastus lateralis were taken. Muscle biopsies were then cut, stained for myosin ATPase isoforms, and imaged. CSA and fiber type were then determined using ImageJ software. There was a significantly higher proportion of type IIa muscle fibers in the ACLR leg when compared to the healthy contralateral leg. CSA for all 3 fiber types in the ACLR leg were significantly smaller than the healthy contralateral leg. The reduced proportion of type IIa muscle fibers, coupled with the reduced size of all fiber types, demonstrates an “unloading” of the ACLR leg. This results in the contralateral leg doing more work. Results also indicate that the ACLR leg muscle has atrophied and may not be able to support the demands placed upon it, resulting in increased risk of ACL tears.

A COMPARISON OF PHYSICAL ACTIVITY AND SLEEP BEHAVIOR IN 6 MONTH OLD INFANTS

Gabriela Zott

Time: 2:45 PM

Mentor(s): Chelsea Adkins (Kinesiology), Janet Hauck (Kinesiology)

The purpose of this retrospective, observational study was to examine how the quality of physical activity in infants at 6 months of age affected their overall sleep behavior. Physical activity and sleep behavior were measured in twenty-five infants during a 24-hour period in their home environment. Sleep and physical activity data were collected with both parent report and accelerometry (Actigraph GT3X-BT). Sleep behavior was summarized as total number of night time awakenings, minutes of nighttime wakefulness, and total sleep duration. Physical activity was summarized as total counts per minute of wakeful activity and then categorized by an intensity rating. A comparison of physical activity quality to sleep quality will be statistically assessed using correlations and t-tests. While sleep and physical activity behavior are positively linked with other infant developmental factors, such as growth and motor skill development, the way sleep and physical activity quality affect one another has not yet been investigated. This knowledge benefits the scientific community by examining two modifiable factors that influence healthy growth and development throughout the first year of life. Knowledge gained could contribute to the development of meaningful physical activity recommendations for infants to improve overall sleep quality.

THE EFFECT OF EARLY LIFE UNDERNUTRITION ON CARDIAC STRUCTURE AND FUNCTION

Elizabeth Shimoura, Kayla Cascarilla, Emily Guy

Time: 3:00 PM

Mentor(s): David Ferguson (Kinesiology), Ashley Triplett (Kinesiology)

Previous research has shown that individuals exposed to brief periods of undernutrition in early life have altered cardiac structure and function leading to CV disease later in life. A well-known combatant to CV disease is physical activity. The purpose of this study was to determine the relationship between the effects of early life undernutrition and adult physical activity on heart structure and function. FVB breeding mouse dams were fed a control or low-protein diet of similar caloric load. Using a cross fostering model we undernourished pups during gestation (GUN) or lactation (PUN). Additionally a separate cohort of mice only receiving a control diet were analyzed ($n=8$ per group). At 21 days of age all mice pups were weaned and fed a control diet until PN 45, at which point they were given access to running wheels to stimulate physical activity. Thus any physiological effects were isolated to the window of undernutrition. Echocardiograms were used to observe differences in cardiac structure and function. Left ventricular mass (LVM), stroke volume, cardiac output, and ejection fraction were measured. A t-test was performed to compare diet and several cardiac parameters. Stroke volume was highest in CON mice, and lowest in PUN mice. There is a trend for GUN and PUN to have smaller LVM than CON mice, with PUN LVM smaller than GUN. Postnatal undernutrition during the lactation period impairs cardiac function in adulthood. Indicating a potential mechanism by which early life nutrition predisposes individuals to cardiovascular disease.

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

UNDERNUTRITION IN EARLY LIFE PERMANENTLY AFFECTS EXERCISE CAPACITY

Emily Guy, Elizabeth Shlmoura

Poster: 750

Mentor(s): David Ferguson (Kinesiology), Ashley Triplett (Kinesiology)

It has been previously shown that individuals who were undernourished in early life have an increased risk for cardiovascular disease due to impairment in heart function. In addition to impairment in function, it is hypothesized that early life undernutrition will also affect exercise capacity (VO₂max). Thus, the purpose of this study was to determine if early life undernutrition (gestational and postnatal) can alter exercise capacity in mice. FVB mice were fed either a control or a low protein diet at various windows of development. The use of low protein diet restricts growth to pups born to or suckled to the mouse on the low protein diet. We cross fostered mice to dams fed a low protein diet during gestation (GUN), lactation (PUN), and then a nutritionally complete diet control (CON) group was used. At 21 days of age, all mice were weaned and fed a control diet until PN 70. Thus, all physiological effects of undernutrition were isolated to gestation or lactation (the first 21 days of life). PN70 mice completed a maximal treadmill exercise test to evaluate exercise capacity. There was no difference in exercise capacity between the CON and GUN group, but the PUN group had a 15% reduction in maximal exercise capacity. Thus individuals who are born small for gestational age or growth restricted will have an impairment in exercise capacity.

UPDATED REFERENCE VALUES FOR HEMODYNAMIC RESPONSE TO BICYCLE ERGOMETRY IN THE FIRST TWO DECADES OF LIFE: THE APPLICATION IN CHILDREN AFTER CORRECTION OF AORTIC COARCTATION AND FONTAN PROCEDURE

Mirna Kaafarani

Poster: 751

Mentor(s): Tim Takken (Wilhelmina Kinderziekenhuis Utrecht Medical Center)

Myocardial and respiratory responses in children during exercise may help for future diagnosis of a range of diseases; peak systolic blood pressure (SBP) is used to determine the statuses of post-operative cardiac patients. However, the last reliable reference material describing healthy responses to exercise in children is a German paper by Heck et al. published in 1984. This study established current reference values for peak SBP, rate pressure product (RPP), and circulatory power (CircP) and to determine which of the three parameters shows most difference between healthy subjects and patients who ever undergone correction of coarctation of aorta (CoA) and Fontan patients. 240 medical records were used from children who underwent bicycle testing at Wilhelmina Children's Hospital. Using the LMS method, data of all three parameters were compared to that of the diseased to validate the reference values. Regression analyses and independent t-tests were performed to determine the influencers of peak work (W_{peak}). A paired t-test and a Bland-Altman plot was made to compare data from this study and that of 1984. Mean Z-scores showed that the reference values established by this study showed highest difference with SBP values among CoA patients (1.063±1.347) and CircP among Fontan patients (-0.749±1.728). The regression analyses showed height explained the highest variance of W_{peak} (R=0.891), all predictor variables: age, height, weight, and gender all significantly correlate with W_{peak} (p<0.001). The comparison between the 1984 Heck et al. normative data showed almost null similarity to that of this study (p<0.001).

DEVELOPMENT OF INTERFERENCE DURING BIMANUAL MOVEMENTS

Elana Miller, Akshay Seenivasan

Poster: 752

Mentor(s): Florian Kagerer (Kinesiology)

Our daily experiences easily demonstrate that whenever we use both hand simultaneously, there is the potential for interference. For example, by attempting to simultaneously rub your stomach and pat your head, one can see that there is carryover of each movement onto the other. However, the mechanisms underlying this interference are not fully understood, especially in the developing nervous system of children. The present study seeks to further our understanding of interference between the hands during bimanual movements by examining the performance of children in a bimanual reaching task where one hand is visible and the other is not, relying on kinesthetic feedback. Participants used two joysticks to move cursors from each hand's starting position to targets either forward or backward with respect to the starting position. After two baseline conditions, the invisible right hand was exposed to a 60 degree visual feedback rotation, followed by another baseline with normal visual feedback. In an earlier study in adults,

introducing an abrupt visual feedback perturbation to the visible hand forced an update to its visuo-motor map while inducing interference in the nonvisible hand. Previous studies addressing unimanual movements in children have shown that younger children are much more reliant on visual information than their older counterparts. In this context, we determined the 'developmental landscape' of interference in a bimanual task in 7 to 12 year old children; we hypothesized that younger children will show greater degrees of interference as a result of the visual perturbation than the older children.

A NEEDS ASSESSMENT SURVEY OF THE CHALLENGES FACED BY COACHES OF YOUNG CHILDREN

Kim Nguyen

Poster: 753

Mentor(s): Karl Erickson (Kinesiology)

A large proportion of youth sport organizations have difficulty finding and retaining coaches. In particular, coaches of young children (i.e., 8 years old and younger) are typically volunteers and often have little training or experience. In many situations, coaches do not stay active in the organizations, resulting in chronic shortages of youth sport coaches. The purpose of this study is to examine what kinds of challenges coaches of young children face and how their confidence in coaching is influenced by these challenges. This needs assessment will be conducted via an online survey hosted on the Qualtrics software platform. The self-report survey consists of four parts: demographic information, coaches' perception of their confidence in various coaching tasks, challenges coaches' face in their coaching of young children, and their intentions to continue coaching young children in the future. The coaches will be assessed on how their confidence is influenced by the different challenges they face during their experience. Although data collection is on-going, the results will help understand the experience of coaches of young children and how these experiences may influence their intention to continue coaching. Altogether, the outcomes will help guide future efforts to make the coaching experience better, understand their needs, and for them to stay and coach longer. This study will provide insight on youth coaches challenges and confidence, and how to assist coaches with their barriers.

FUNDAMENTAL MOTOR SKILL PROFICIENCY IN TYPICALLY DEVELOPING YOUNG CHILDREN: DEMOGRAPHIC AND GROWTH RELATED FACTORS

Brianne Rajala

Poster: 754

Mentor(s): Janet Hauck (Kinesiology)

Previous literature provides evidence of several disparities related to fundamental motor skill proficiency of young children. Children with poor fundamental motor skills may have limited ability to fully engage in physical activity opportunities. The purpose of this study is to further explore demographic and growth related factors that influence fundamental motor skill proficiency in a sample of typically developing young children. In our study, we assess fundamental motor skills in a sample of children ages 3-10 within the Lansing area with the Test of Gross Motor Development III (TGMD III). We also measure the weight and height of each participant, and caregivers complete a demographic survey. We video record participants' assessments to perform standardized scoring according to TGMD III guidelines. After 90% inter-rater reliability is established, we score TGMD III assessments to obtain locomotor and object control scores. Locomotor and object control scores are presented, and investigated for disparities by gender, socioeconomic status, race/ethnicity, body mass index, typical hours of sleep, and retrospective motor milestone timing. These findings will help identify specific areas for intervention, and the children most likely to benefit from such interventions. This sample will be used as a control group for a future comparative sample of children with Autism Spectrum Disorder (ASD), who commonly display delays in fundamental motor development compared to typically developing children. Our findings may give insight to supplement the creation of programs for children with ASD, in attempt to decrease the time it takes to achieve these fundamental motor skills.

CHANGING MOVEMENT COORDINATION PATTERNS: INCREMENTAL STEPS OR ONE BIG LEAP?

Jordan Sternfeld, Andrew Torigian

Poster: 755

Mentor(s): Rajiv Ranganathan (Kinesiology)

How did Grant Hill reinvent himself in the NBA after multiple ankle surgeries on a Hall of Fame pace? Many professional athletes have to constantly modify and refine their movement coordination pattern during their careers. This is also the same issue encountered by therapists, who have to help their clients learn new movement patterns to accomplish their goals. The aim of our study was to determine the optimal way to facilitate modification of coordination patterns. Specifically, we wanted to examine if it is more efficient to change the coordination pattern in one big step, or through many smaller incremental steps. We had healthy college participants learn a task that involved throwing a virtual ball toward a target on the screen. The technique to do this task required a specific coordination between the trunk and

hand. We then used a feedback scheme that rewarded either a large change or small incremental changes in the coordination pattern. We predict that it is more beneficial for people to change their coordination in smaller incremental steps because they will adapt to the pattern of change faster. The results of this study will help in developing techniques to help those with injuries or other disabilities alter their coordination pattern and perform tasks at their maximum capacity.

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

DOES THE LEFT HAND KNOW WHAT THE RIGHT HAND IS DOING?: THE EFFECT OF EXPERTISE ON BIMANUAL MOTOR LEARNING

Sam Carey, Marco Lin

Poster: 758

Mentor(s): Rajiv Ranganathan (Kinesiology)

Try to rub your stomach with your left hand, while simultaneously patting your head with the right hand. Chances are you are performing the same motion with both hands. This “interference” between the two hands is due to neural crosstalk between the left and right hemispheres when attempting to control both limbs simultaneously. Although this is a limiting factor in learning a new bimanual task, it has been shown that extensive practice with bimanual tasks (e.g. piano playing) can minimize this interference, allowing performance of complex tasks which require independent movement of both hands. The goal of this study is to determine the effect of expertise in such bimanual tasks provides an advantage in the learning of a novel bimanual task. Ten experts (with extensive training in bimanual tasks like piano playing) and ten novices performed a bimanual task that consisted of throwing virtual balls to a target. Critically, the task required asymmetric movements of the hands. We predict the bimanual experts will not only show better initial performance at the task, but also show faster learning. This research can provide insight into improving methodology for more effective rehabilitation protocols that accounts for previous motor experiences.

THE INFLUENCE OF YOUTH SPORT EXPERIENCES ON LATER LIFE TRAJECTORIES: A STUDY OF FORMER PARTICIPANTS OF THE DETROIT POLICE ATHLETIC LEAGUE

Kameron Crawford

Poster: 759

Mentor(s): Karl Erickson (Kinesiology)

The Detroit Police Athletic League (Detroit PAL) is a large urban youth sport organization that provides community sport programming for over 10,000 youth per year. Detroit PAL’s mission emphasizes helping young people to develop high character, be healthy and active, and become civically engaged. The purpose of the study is to examine the connection between the youth sport experiences of adult former Detroit PAL participants (current ages 18-75) and their perceptions of long-term effects on their current lives. This study will use an online self-report survey via the Qualtrics software platform to ascertain whether participants feel that their experience in youth sport and specifically Detroit PAL positively impacted their current lives. The survey will collect demographic information and characteristics of former Detroit PAL participants, including the strength of the relationship that participants had with their past coaches. Additionally, validated measures will be used to collect data indicative of participants’ character, current health and physical activity status, and degree of civic engagement; goals to which Detroit PAL aspires. The research questions will provide an overview of the effects of Detroit PAL participation on athletes’ lives during youth involvement and whether these lessons were learned and applied long-term into adulthood. This study is in process and preliminary results will be presented.

FORCE HAS A HAND IN INTERFERENCE DURING A BIMANUAL TASK

Jessica Cummings, Bradley Miller

Poster: 760

Mentor(s): Florian Kagerer (Kinesiology)

When we move both hands and one hand is perturbed, it can affect the other hand. The goal of this study was to determine the effect of force on rate of learning and magnitude of interference during discrete bimanual movements. Forty-three right handed participants (21 ± 0.81 years, 31 female) performed a bimanual center-out task on a KINARM endpoint robot. Participants interacted with the robot to control two cursors, one for each hand, displayed on a horizontal screen covering their hands. Participants moved the cursors to targets located either forward or backward from the home position. During the experiment, the visual feedback for the left hand was eliminated, and the visual

feedback for the right hand was rotated by 40 degrees for 120 'exposure' trials. Participants were assigned to three groups that experienced different spring forces (0 N/m, 30 N/m, and 60 N/m) anchored at the home position. We used initial directional error (IDE), a measure of angular deviation from the straight movement path, and lateral endpoint error (EPx) as measurements of adaptation (visible right hand) and interference (nonvisible left hand). Preliminary results showed that all participants adapted in a similar way, indicated by IDE in the rotated hand. IDE and EPx in the nonvisible hand increased over the exposure phase, with the 30 N/m and 60 N/m groups showing the greatest interference. These results suggest that greater demand for force production in a bimanual reaching task may lead to increased motor overflow resulting in more interference.

SEX DIFFERENCES IN SINGLE LEG LANDING FORCES AMONG COLLEGE-AGED INDIVIDUALS

Caitlin Davis

Poster: 761

Mentor(s): Chris Kuenze (Kinesiology)

Female athletes are at a higher risk of sustaining non-contact ACL injuries compared to male athletes. Asymmetrical landing patterns in vertical ground reaction force (vGRF) have been shown to increase the risk of knee injury. Therefore, the purpose of this observational laboratory study was to compare normalized unilateral and limb symmetry (LS) in vGRF between healthy males and females during 3 single leg landing tasks. A total of 18 healthy and physically active participants were enrolled in the study (sex=10M/8F, age=21.11±2.63 years, mass=74.61±10.78 kg, height=173.36±10.97 cm). Each participant completed five single leg landing tasks bilaterally from a 30cm box and 48cm box with and without shoes. The mean vGRF(N) normalized to body weight(N/kg) for each limb and landing condition were calculated. LS was calculated by dividing the lower normalized vGRF limb to the higher normalized vGRF limb. Independent t-tests were run to test for significant differences between sex for unilateral normalized vGRF and limb symmetry values for each condition. Effect sizes (ES) and confidences intervals (CI) were calculated for significant results. Males have significantly greater normalized vGRF as compared to females in the 30cm shoe condition (Males=38.86±5.98N/kg, Females=35.56±3.52 N/kg, p=0.47, ES=0.66, CI=[0.02,-1.33]). Females have less symmetrical landing vGRF as compared to males in the 30cm no shoe condition (Males=0.95, Females=0.88, p=0.16, ES=1.32, CI=[0.27,2.37]). Healthy females demonstrate less symmetrical landing patterns compared to males in some conditions, however, further research in injured populations should be completed to better understand the consequences of these findings.

EFFECT OF NUTRITION ON EXERCISE INITIATION AND ADHERENCE

Eric Leszczynskic Macy Dahnke

Poster: 762

Mentor(s): David Ferguson (Kinesiology), Ashley Triplett (Kinesiology)

The beneficial effects of exercise have been extensively reported; physical activity reduces the risk for cardiovascular disease, Type II diabetes, and metabolic syndrome. However, early undernutrition has been shown to reduce cardiovascular function, potentially impairing physical activity engagement. Thus, the purpose of this study was to determine if early life undernutrition influenced frequency and duration of wheel running (measure of physical activity) in mice during adulthood. Using a cross fostering model we undernourished pups during gestation (GUN) or lactation (PUN) by feeding dams a low protein diet to induce early life undernutrition to the pups. Additionally, a separate cohort of mice only receiving a control diet were analyzed (n=8 per group). At 21 days of age all mice pups were weaned and fed a control diet until PN 45. Thus, any physiological effects were isolated to the window of undernutrition. At PN45 mice were placed in cages with free moving running wheels, which recorded number of spins per day. Spins were calculated for 24 hour increments, and averages were compared. The CON and GUN group appeared to run the same amount; The CON group ran 19412 spins/day, and the GUN ran 29383 spins/day on average. However, the PUN group appeared to run a significantly less amount, running on average 17381 spins/day. Based on trends in the data, postnatal undernourishment appears to cause a significant impairment in frequency of exercise initiation and duration.

A CROSS-CULTURAL ANALYSIS ON THE DEVELOPMENT OF PHYSICAL LITERACY IN CHILDREN

Amy Maurer

Poster: 763

Mentor(s): Karl Erickson (Kinesiology)

Research has suggested that there is a link between fundamental motor skill development during childhood and an increased likelihood of healthy lifestyle behaviors, specifically with physical activity, continued later in life. While it has been hypothesized that the type of physical activity – either structured sports or free play – contributes to the development and continued use of fundamental motor skills, it is still unknown how these patterns of physical activity add to movement competence. The purpose of this prospective cross-cultural study is to develop a measurement

protocol that can be used as part of a larger research project to assess the development of physical literacy in children in the United States, Zambia, Australia, and Norway. By reviewing previous research, appropriate methods of assessing children's developmental history of physical activity participation frequency, type (i.e., structured sport vs. free play), and duration will be formulated into a standardized survey that can be translated into different languages for use in multiple countries. In addition, a physical assessment will be given to evaluate fundamental motor skill proficiency in children. The finalized assessment protocol and the process of its development will be presented. It is anticipated that the results of this study will help determine the best patterns of physical activity participation to aid in the development of motor proficiency and physical literacy. In addition, the results of this cross-cultural study will allow for physical activity and fundamental motor skill comparison among children across the world.

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

EXAMINING THE SELF-EFFICACY OF CERTIFIED ATHLETIC TRAINERS IN THE USE OF CONCUSSION ASSESSMENT AND MANAGEMENT

Jensyn Bradley, Emily Cissell, Hannah Walker

Poster: 766

Mentor(s): Tracey Covassin (Kinesiology), Jennifer Savage (Kinesiology)

Diagnostic and return to play assessments of sports-related concussions (SRC) have changed dramatically over the past decade. Due to the rapid changes within sports and in the research literature, one could imagine how a certified athletic trainer's (ATC) self-efficacy could be higher or lower. Thus, the purpose of this study was to examine the self-efficacy of ATCs in the use of SRC assessment and management protocols. Certified members of the NATA were randomly selected and completed a 19 question survey. The survey included: 1) demographics, 2) self-efficacy of evaluation of a SRC, and 3) self-efficacy of managing and return to play guidelines. The one-time survey remained online for four weeks and took approximately 10 minutes to complete. Descriptive statistics (i.e., frequencies, mean, standard deviations) were used to describe demographics and self-efficacy of the assessment and management of ATCs. There were 114 [male (n=62, 54.4%); female (52/114, 45.6%)] ATCs with a mean age of 38.30 ± 11.5 years. Results revealed various proportions of self-efficacy for the assessment of SRCs on clinical evaluation (92.5 ± 11.9), symptoms (95.0 ± 7.4), cranial nerves (69.8 ± 34.79), Sport Concussion Assessment 3 (SCAT3) (69.0 ± 41.6), balance (69.6 ± 39.0), computerized neuropsychological (74.9 ± 38.6), vestibular/ocular (36.9 ± 41.8) and King-Devick (14.5 ± 34.3). In the management of concussions, ATCs have various proportions of self-efficacy in symptoms (94.5 ± 12.2), cranial nerves (69.8 ± 34.79), SCAT3 (65.9 ± 44.2), balance (68.7 ± 40.8), computerized neuropsychological (76.7 ± 37.2), return to play progression (91.1 ± 20.0), vestibular/ocular (36.5 ± 42.6) and King-Devick (12.9 ± 32.8). ATCs seem to have an average self-efficacy on their assessment and management of a SRC and need to continue to gain more knowledge.

ASSESSING FACTORS THAT INFLUENCE MUSCLE ACETYLCARNITINE

Taylor Ann Callahan

Poster: 767

Mentor(s): Jill Slade (Radiology)

Acetylcarnitine is naturally made in muscle tissue and its levels may be associated with a shift between carbohydrate (or sugar) and fat metabolism. That metabolic shift is important for both maintaining physical fitness levels and the development of type 2 diabetes mellitus. In this study, we evaluated the influence of an overnight fast, an oral glucose challenge and brief exercise on muscle acetylcarnitine. Muscle acetylcarnitine levels were measured in the medial gastrocnemius non-invasively using magnetic resonance spectroscopy (MRS) measured at 3T. Eleven participants were tested age= 27.5 ± 11 years old (\pm SD), BMI = 25.34 ± 4.1 . Muscle acetylcarnitine was measured with proton MRS localized to ~31 ml of muscle in the medial gastrocnemius. Acetylcarnitine and blood glucose were measured after fasting and every 15-30 minutes after drinking Gatorade (50g sugar) for 2 hours. On a separate day, fasting acetylcarnitine was measured before and after 5 minutes of plantar flexion repetitive exercise. To further characterize the sample, we also measured physical activity and muscle oxidative capacity of the calf. Physical activity (counts/day) was measured with an ActiGraph GT1M accelerometer worn around the waist. Muscle oxidative capacity was measured with 31P MRS; spectra were acquired at rest, during 30 seconds of plantar flexion and during 5 minutes of recovery. Analyses of data are underway.

LEARNING TO BE A CYBORG: AGE DIFFERENCES IN LEARNING TO CONTROL A ROBOT ARM

Sam Hoesch, Calvin Montgomery, Claire Sickon

Poster: 768

Mentor(s): Mei Hua Lee (Kinesiology)

Recent studies have shown that over 30% of amputees reject prostheses and many more do not find them useful due in part due to the difficulty in learning how to control these devices. This problem is exacerbated in the case of children, where biomechanical and physical changes are taking place in the body. A potential solution for this problem is using a body machine interface (BoMI) that transforms body movements into commands for an external device. The aim of this experiment is to characterize the differences in learning between children and adults. Participants of different age groups, (children 8-12 and adults 18-35) used their shoulder movements to control a robot arm to reach outward at various targets projected onto a screen. Inertial Measurement Units (IMUs) were used to detect the shoulder movements which in turn were processed and sent to a robot arm in the form of a signal. Results showed that approximately 95% of the participants in the age range of 18-35 were able to complete the task in the time allotted, while only 60% of participants in the 8-12 age range were able to complete the task. These results show that children learn differently than adults and potentially need more time. Rehabilitation programs should be adjusted to take into account the learning differences between children and adults.

MEASURING POSTURAL CONTROL IN EXPERTS AND NOVICES USING THE MICROSOFT KINECT

Ten-Nlah Kinney, Jonathan Kushlon, Breanna Williams

Poster: 769

Mentor(s): Rajiv Ranganathan (Kinesiology)

Every year, injury-related falls cost the United States over \$34 billion and affect over a third of the elderly population. Addressing this issue requires the ability to accurately quantify postural control, which can then be used to identify individuals at risk of falling. However, measurement of postural control is hard to acquire outside a lab setting because gold standard technologies like the force plate are not very portable. Our study focuses on examining whether a commercially available device (Microsoft Kinect) can be used as an effective measuring tool to quantify postural control. We compared novices and experts (e.g., dancers or gymnasts) in postural control in a series of balance tasks using both the force plate and the Microsoft Kinect. We hypothesize that (i) experts will show greater postural control than novices, and (ii) that the Microsoft Kinect shows good agreement in postural control measures with force plate data. By finding an inexpensive system to quantitatively assess postural control we can provide accurate evaluations in a wide variety of settings.

EXAMINING THE INFLUENCE OF PERSONALITY TRAITS ON COACH'S SPORT PARTICIPATION CHOICE AND PERCEPTIONS OF SPORT EXPERIENCES

Madison Kohler

Poster: 770

Mentor(s): Karl Erickson (Kinesiology)

Previous research studies the effects of personality traits on the sport athletes pursue into college levels, less research has been done on the personality traits of coaches and if they follow the same pattern. Some coaches pursue to head a sport they once played themselves, however, is it possible the qualities that make someone a good coach in a particular sport are not the same as those they perceive as making a good player in terms of interpreting challenge? One study looked into the Big Five personality traits of coaches and how it affected the relationship of their players, mainly focusing on the idea that opposites attract (Jackson, Dimmock, & Guciardi, 2011). This study aims to look at if these traits helped them to choose this sport and coaching style, such as openness to new strategic ideas from their athletes or being less willing to listen to new takes on a style. Analyzing primarily the Big Five personality traits in depth through qualitative interviews will be used to identify the varying qualities and assess how they may affect the relationship of coach and perception of the challenges their players face. Having also interviewed many of the coach's players will help to assess how the coaching style and personality of the coach interplay in the athlete's assessment of effectiveness when their coach faces adverse situations. It is presumed this study's results may make it easier when analyzing what qualities one can expect to see in effective coaches.

LOWER EXTREMITY FUNCTIONAL ASYMMETRY FOLLOWING ACL RECONSTRUCTION

Megan VerHage

Poster: 771

Mentor(s): Chris Kuenze (Kinesiology)

Functional assessment is a hallmark of clinical evaluation after knee joint injury. Information is limited regarding individuals with a history of meniscus pathology. The purpose of this study was to determine the effect of ACL reconstruction (ACLR) and meniscus pathology on functional performance as compared to healthy controls. 10 healthy participants (sex=7F/3M, age= 22.5±2.9years), 10 participants with unilateral ACLR (sex= 8F/2M, age= 19.5±1.2years), and 5 participants with unilateral, primary meniscus pathology (sex= 3M/2F, age= 19.3±0.5years) were enrolled. Participants completed the Star Excursion Balance Test (SEBT) and a battery of single leg hop tests. SEBT reach distances were normalized to leg length (% leg length) while hop distances were not normalized (cm). Limb symmetry indices (LSI) were calculated by dividing the poorer performing limb by the better performing limb. Between group comparisons of unilateral performance and LSI were made using independent samples t-tests. Between group (healthy vs. ACLR vs. meniscus) comparisons were made using one-way ANOVA. Participants with a knee injury performed significantly worse on the hop for distance (Healthy= 170.3±19.4cm, Injured= 140.4±29.8cm, P= 0.01) when compared to controls. When healthy, ACLR, and meniscus pathology participants were compared, there were significant differences for affected limb SEBT anterior reach (Healthy= 66.2±5.6%, ACLR= 61.1±4.1%, Meniscus= 66.5±3.9%, P= 0.05) and hop for distance (Healthy= 170.3±19.4cm, ACLR= 140.9±29.6cm, Meniscus= 139.4±35.0cm, P= 0.04). Participants with ACLR or meniscus pathology have similar persistent functional limitations within the affected limb when compared to healthy control participants. Among both groups, limb symmetry measures may not adequately identify participants experiencing functional limitations following knee joint injury.

LINGUISTICS, LANGUAGES, AND SPEECH

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

HAS THE BIKE BEEN RODE OR RIDDEN?: CHILDREN'S PRODUCTION OF IRREGULAR PARTICIPLES

Xuejia Lai, Isabella Corsi, Madison Diamond

Poster: 340

Mentor(s): Alan Munn (Linguistics and Germanic, Slavic, Asian, and African Languages), Cristina Schmitt (Linguistics and Germanic, Slavic, Asian, and African Languages)

In English, complex tenses exist, such as the perfect tense. In Standard English, the perfect tenses are formed by the auxiliary "have" + a participial form, as in "I've eaten" or "I should've eaten". The participial form is also used in the passive: "the food was eaten by everybody". Interestingly, speakers in Michigan also produce "I should've ate", but don't tend to produce "the food was ate". This variability poses an interesting problem for children learning the participles. The goal of this experiment is to test adult and preschool children's knowledge of the participial forms in the perfect in order to answer the following questions. What is the effect of the variability on children's acquisition? What kind of participle forms do children use? Do children make a distinction between the modal perfect participle and the passive participle? Using storytelling and interactive stories via a reenactment with a dollhouse, we will create contexts that will elicit sentences using the modal perfect and the passive. This experiment will allow future research to explore more about the acquisition of the passive versus the modal perfect in both children and adults.

A SOCIOLINGUISTIC APPROACH TO PARTICIPLE LEVELING IN AMERICAN ENGLISH

Michael Anderson

Poster: 341

Mentor(s): Alan Munn (Linguistics and Germanic, Slavic, Asian, and African Languages)

In American English, many speakers use the past tense form of irregular verbs in place of the participial form. For example, instead of saying "I shouldn't have eaten so much", many speakers say "I shouldn't have ate so much". This pattern of simplification of irregular forms is called morphological leveling. The purpose of this study is to explore past research on the use of leveled participial forms from a Sociolinguistic perspective. We hope to be able to determine whether the use of the leveled forms is stratified in some way, either: age stratified (indicating a possible change over time), class stratified (indicating an either conscious or unconscious standard/non-standard distinction), or ethnically stratified (usage of the variable indicating an ingroup-outgroup relation and/or dialect influence). Data will be gathered from spoken acceptability judgement tasks, where participants will rate the acceptability of audio recordings on a scale,

and then fill out a short questionnaire to determine sociolinguistic variables (age, education level, etc.). Much of the data will come from parent (or close relative) and child pairs taking the test separately. Our results hope to shed new light on an ongoing linguistic change.

PAST OR PERFECT: PLAYING THE GAME OF VERB CHOICE

Madeline Bross, Melissa Bush, Megan Yatooma

Poster: 342

Mentor(s): Alan Munn (Linguistics and Germanic, Slavic, Asian, and African Languages), Cristina Schmitt (Linguistics and Germanic, Slavic, Asian, and African Languages)

Acquisition of language in young children can be influenced by the input they receive from speakers within their environment. If the input varies, children may develop a style of grammar that differs from their parents' grammar style. In Michigan, it has been observed that some speakers say "John should have eaten more vegetables," while others use the simple past tense verb form, as in "John should have ate more vegetables." This experiment specifically examines how children and adults use the simple past (i.e. ate, saw) and the participial verb forms (i.e. eaten, seen) in modal perfect contexts as demonstrated in the example above. This variability of speech input influences how children learn these tense forms. The participants will play a game where both the past and the modal perfect will be elicited. In order to elicit the modal perfect tense, the participants will verbally answer questions with a "should have" statement; to demonstrate the simple past tense, they will restate as many tasks as they can remember performing throughout the game. By comparing the different forms of the simple past tense and the modal perfect between adults and children, we can more clearly understand how a child's language acquisition is influenced by the input they receive.

PERCEPTUAL RETUNING TARGETS PHONOLOGICAL FEATURES

Scott Nelson

Poster: 343

Mentor(s): Karthik Durvasula (Linguistics and Germanic, Slavic, Asian, and African Languages)

Previous work shows listeners systematically "retune" their phonetic boundaries when presented with lexical tokens containing ambiguous segments. Previous studies on this lexically-guided re-tuning (see Jesse and McQueen 2011) assume that the retuning is at the level of the segment. I show that phonetic retuning occurs at the level of phonological features and therefore the speech perception mechanism also has access to abstract phonological features. I created continua for V-Z and F-S by splicing natural productions of an American English speaker onto an [i] vowel. These were used in all experiments for phonetic categorization. Additionally, the mid-point of the F-S continuum was identified based on pre-test responses and this formed the "ambiguous" token [ʔF S]. This token was used in two experiments, wherein the relevant segment /f/ was replaced by it. In Exp. 1, a replacement of the /f/ segments with [ʔF S] during a lexical decision task resulted in a decrease in the alveolar /s/ responses for the F-S continuum, suggesting that there was a phonetic "re-tuning" involved with the segment /f/, whereby a larger phonetic space was reassigned to the /f/ category. Crucially, in Exp. 2, a replacement of the /f/ segments with [ʔFS] during the LDT resulted in a similar decrease in the alveolar /z/ responses for the V-Z continuum. This suggests that the retuning seen in Exp. 1 was not for the segment /f/ but was for the (phonological) place feature labio-dental. Therefore, phonetic retuning seems to target, not segments, but phonological features.

CASELOAD VERSUS WORKLOAD MANAGEMENT IN SCHOOL-BASED SPEECH-LANGUAGE PATHOLOGY

Megan Nylund

Poster: 344

Mentor(s): Matt Phillips (Communicative Sciences and Disorders)

The purpose of my research will be to identify the workload and caseload tasks of school-based speech-language pathologists in Michigan and determine how they are best managed. This research will include the techniques used to manage these tasks, as well as the time devoted to each activity. Additionally, the research will cover what a speech-language pathologist's workload entails in their school district. Furthermore, the research will address the employers' perspective on the time devoted to workload, in relation to the therapists' perspective. Finally, the research will delve into how therapists' caseloads and workloads have grown over time in their school districts, including how the districts' caseload baseline compares to ASHA's (The American Speech-Language-Hearing Association) baseline for the state of Michigan. The research will also compare how the methods of managing workload have adapted to accommodate for growths in caseload. In the course of my research, I will interview three speech-language pathologists from Midland, MI and Saginaw, MI to discuss their methods of handling caseload and workload and the changes in these divisions of work over the progression of their careers. Using the input from the three speech-language pathologists, these findings will then be presented with my conclusion of the best way to manage growing caseload and workload activities.

WHY HAVE YOU GOT A "GOT" IN "HAVE YOU GOT A GOT": GOT INSERTION IN AMERICAN ENGLISH

Katherine Rock

Poster: 345

Mentor(s): Alan Munn (Linguistics Germanic Slavic Asian and African Languages), Cristina Schmitt (Linguistics Germanic Slavic Asian and African Languages)

The verb 'have' in sentences such as "I have a dog" can also appear with the verb 'got' with no apparent change in meaning, as in "I have got a dog" or "I've got a dog". Why is 'got' possible? The phenomenon of 'got' insertion in English is interesting because you might expect the 'got' to be redundant, and therefore cause the 'got' sentences to be ungrammatical. There are currently two competing hypotheses as to the origin of the "have got" construction. The first argues that 'have' has been weakened to such an extent that it has been moved to auxiliary status, and therefore the structure requires the addition of a semantically similar verb to preserve the original grammatical structure. The second suggests that 'got' insertion was derived from the perfect form of 'get,' 'have gotten,' and has been shifted from a "come to have" interpretation to a simply "have" interpretation. This study will use an acceptability judgment task to test these two hypotheses in college-age American English speakers. We test the auxiliary capabilities of "have" in "have got" constructions and also to what extent "have got" still has a "come to have" interpretation or has only a simple possessive "have" interpretation. We investigate the changing grammaticality of 'got' insertion by investigating how speakers interpret 'have got' paired with alienable, inalienable, and ambiguous objects, in order to examine how historical roots may have impacted modern interpretation.

HAVE YOU EVER EATEN A BAD BANANA? A STUDY ON THE SEMANTICS OF THE PRESENT PERFECT

Caroline Sucher, Charles Crampton, Allison Gyurich

Poster: 346

Mentor(s): Alan Munn (Linguistics and Germanic, Slavic, Asian, and African Languages), Cristina Schmitt (Linguistics and Germanic, Slavic, Asian, and African Languages)

The present perfect tense in English is morphologically and semantically difficult. It is commonly used to describe events that have happened at an unspecified time in the past, but that have some sort of "present relevance". Because the present perfect is used relatively infrequently, relatively little is known about how children acquire its meaning. In our study, we are analyzing two different meanings of the present perfect: the universal and experiential meanings. The universal perfect occurs when an event has begun in the past and is continuously happening when perfect is uttered, as in "John has lived in East Lansing since 2015". The experiential perfect is used to refer to an event that began and finished in the past, as in "John has visited Paris twice". In this study, we will elicit sentences from 4-7 year old children by asking them questions in two different semantic contexts: one designed to elicit the universal perfect, and one designed to elicit the experiential perfect. Our hypothesis is that the mastery of the experiential perfect will occur in children earlier than the universal perfect because a simple past event is easier to understand than an event that continues from the past to the present. The results of our study can help show when each perfect tense becomes established in children as well as comparing which one is easier for them to comprehend.

LINGUISTICS, LANGUAGES, AND SPEECH POSTER PRESENTATIONS, SECTION 2 LAKE HURON ROOM, 11:00 AM – 12:30 PM

THE GERMAN GENITIVE: A VARIATIONAL ANALYSIS

Natalie Chemy

Poster: 349

Mentor(s): Alan Munn (Linguistics and Germanic, Slavic, Asian, and African Languages)

In Standard German, there are many uses for the genitive case. It is used to show possession, after certain prepositions, and after certain verbs and adjectives. In spoken and written German, however, the genitive case has seen variation for many years. This variation is occurring in such a way that the genitive is both being replaced in canonically genitive environments and is replacing other cases where the genitive would not go, according to the standard grammar. The purpose of this research is to answer some questions related to the German genitive case in the context of distributed morphology (DM), a theory of grammatical structure developed by Halle and Marantz (1993) in which the phonetics of morphology is said to be inserted after syntactic operations have been completed. Using feature decompositions following those in Mueller (2005), this research proposes a DM analysis of German case/number morphology which is inserted into determiner and adjective nodes. In addition, this research suggests systematic changes in the rules for lexical insertion to account for the variation of the genitive case. For variation in case morphology related to the stem vowel change of definite determiners, only a single change in the rules is required to account for variation. The case

end markings are a more complex system, however, and explanation of this variation requires a restructuring of lexical insertion rules, depending on the two cases involved and which features are present on the case/number/gender nodes.

DO CHILDREN GET “GET”?

Bethany Dickerson, Julia Andary, Theresa Floyd, Lauren Hoogerland

Poster: 350

Mentor(s): Cristina Schmitt (Linguistics and Germanic, Slavic, Asian, and African Languages)

General All Purpose (GAP) verbs can occur in many different frames because they are semantically weak. For example, ‘get’, unlike ‘eat’ or ‘kill’ (which are semantically specified and only appear with noun phrases), can appear with adjectives (get tired), prepositions (get up), and a variety of other frames (get a cookie, get someone a cookie, get someone to do something, etc). In the literature, researchers disagree on whether GAP verbs help learning of content verbs or not. Previous research argues that children who have difficulties in learning words will overuse GAP verbs. Nobody, however, has tested children’s abilities to produce GAP verbs with various frames. Typically developing children (TDC) and children with autism (CWA) acquire language differently. It is known that children with autism have difficulties learning verbs, and this may lead them to overuse GAP verbs to compensate. To investigate children’s acquisition of “get”, two complementary studies were carried out: a corpus analysis and a repetition task. If input frequency plays a role, then the more frequent frames will be easier to repeat. On the other hand, if GAP verbs are primitives then perhaps frequency is irrelevant. The corpus analysis examines what structures children hear in their input, and if there is a difference in the input to CWA vs TDC. The repetition task will examine which structures are productive. Results are analyzed to determine if there is a difference in children’s input and production, and if there are differences between the two subject groups.

INVESTIGATING THE PERFECT AUTHENTIC CADENCE AS EVIDENCE FOR HEAD MOVEMENT IN TONAL MUSIC

Jacob Duchan

Poster: 351

Mentor(s): Alan Munn (Linguistics and Germanic, Slavic, Asian, and African Languages), Leigh VanHandel (Music)

Since the development of modern linguistics, there has been a great deal of interest in the discipline and its apparent resemblance to properties in music theories. Most attempts to connect the two disciplines have until recently misunderstood what formal linguistics is, or fallen short. One recent effort, still unpublished, has proposed a new theory that is of great interest. Called the Identity Thesis for Language, it argues that music, like language possesses a syntactic component in which musical elements are combined in a binary recursive structure (Katz, Pesetsky 2011). This is in spite of the fact that the indivisible elements of the two cognitive areas are quite different and encode different information. We will attempt to put this proposal into practice by testing for the presence of Head Movement—a phenomenon in the syntactic combinatorial system known as merge, in tonal music. We hope that our findings, however small, can encourage further attempts to connect two manifestations of human intelligence that are otherwise regarded as distinct.

AMBISYLLABIC CONSONANTS IN MICHIGAN ENGLISH

Bobby Felster

Poster: 352

Mentor(s): Karthik Durvasula (Linguistics and Germanic, Slavic, Asian, and African Languages)

Previous research on ambisyllabic consonants (consonants whose affiliation with their surrounding syllables is unclear, like the ‘m’ in ‘homey’) has returned a variety of results. The current hypothesis most commonly accepted is that ambisyllabic consonants are simultaneously linked to both the preceding and following segments, but other research projects have found results that seem to suggest that the ambisyllabic is linked only to either the coda (end) of the onset before it, or the onset (beginning) of the following syllable. Some projects have even found ambiguous data that could be used to support either of these hypotheses. The problem with these previous experiments is that many of them were confounded; the results were potentially compromised because the methods used did not account for problems such as domain-edge lengthening in production experiments, or word-edge boundary judgments in syllable-boundary task experiments. We sought to find a clearer result by controlling against as many potential confounds as possible. We conducted a production experiment on 8 undergraduate participants at Michigan State. We analyzed the recordings gathered from this experiment and extracted the durations of the ambisyllabic consonants produced by the participants, and we compared them to consonants in other positions, with known syllabic affiliations: word-final coda, word-medial coda, and word-medial onset. Our analysis showed that the ambisyllabic consonants produced by our participants patterned most closely with word-medial, foot-initial onset consonants, and they were statistically significantly different from word-medial, foot-medial coda consonants.

AN ANALYSIS OF THE VOWELS IN AFRICAN AMERICAN ENGLISH

Zachary Ireland Talla Magoon

Poster: 353

Mentor(s): Meisam Arjmandi (Communicative Sciences and Disorders), Laura Dilley (Communicative Sciences and Disorders)

Although many of 45 million African Americans speak African American English (AAE), few studies have focused on the acoustic-phonetic characteristics which distinguish this dialect from Standard American English (SAE), particularly for vowels and sonorant consonants. This study investigated whether formant dynamics from short, sonorant portions of speech are sufficient to distinguish AAE and SAE dialects. Seven female speakers, four SAE and three AAE, from the Lansing, Michigan area were selected from a corpus of 30-45 minute sociolinguistic interviews. Target portions of speech consisting of a V or VC sequence (C = /n/, /m/, /l/, /r/) were identified from contexts selected to control for coarticulation. First (F1) and second (F2) formant values were extracted from randomly selected tokens at points 19%, 56%, and 81% of the duration through the demarcated speech portions. Formants are natural resonances of the vocal tract that determine the phonetic quality of a vowel; how they dynamically move through the production of a vowel can provide dialectal information. Pattern recognition techniques were examined to differentiate tokens of the two dialects. The results revealed that formant dynamics of the selected contexts are acoustically informative enough to differentiate groups of SAE from AAE speakers. The implications are widespread; not only will the study provide data to strengthen our understanding of AAE, but it will also elucidate mechanisms listeners use to differentiate dialects. In turn, this will allow future studies that may address how individuals use information from different modalities to identify others as part of a group.

VOICE DEGRADATION OVER A LIFESPAN

Alexis Itskovich, Madeline Crile, Kirsten Rockey, Stephanie Rosin

Poster: 354

Mentor(s): Eric Hunter (Communicative Science and Disorders)

Age-related changes occur in speech that are associated with structural, physiological and immunological processes involving the oral and nasal cavities, the larynx and pharynx, and the respiratory system. In the respiratory system, a decline in lung and diaphragm elasticity and muscle strength can occur, and the thoracic cage can stiffen, leading to reductions in lung pressure and forced expiratory volume. Twenty-six recordings of a man throughout his life were analyzed. These were made over the course of between forty-eight to ninety-seven years of age. Trained raters measured the amount of audible breaks, breathiness, slurs, and errors due to emphasis during speech in each recording. The results indicate increases in all categories measured as his age increased.

THE ROLE OF AUDITORY AND SOMATOSENSORY FEEDBACK ON THE NUMBER OF SPEECH DISFLUENCIES IN CHILDREN WHO STUTTER

Anisah Al-Qadi, Mackenzie Topolski

Poster: 355

Mentor(s): Soo-Eun Chang (Psychiatry), Emily Garnett (Psychiatry)

Developmental stuttering affects approximately 5% of preschool- aged children and 20% of these children will continue to stutter into adulthood. Previous research has suggested that stuttering may be related to disruptions in auditory feedback during speech production. Such disruptions are misinterpreted as errors by the speech production system, in turn leading to speech disfluencies. An alternative theory is that stuttering may be triggered via disruptions in somatosensory feedback related to breathing: if the end of the breathing cycle is not detected, an error signal could be erroneously triggered, leading to disfluencies. One method to test this hypothesis is to examine whether disfluencies occur after a pause in speech. If so, these stuttering events cannot be ascribed to disruptions in auditory feedback of speech sounds alone, but possibly to disruptions in somatosensory feedback. A total of 32 spontaneous speech and 32 narrative samples from 34 children who stutter were collected during conversation between the clinician and the child. Using the Child Language Analysis (CLAN) program, the number of disfluencies occurring after 3-second pauses was compared to that occurring immediately following speech. Data analysis is ongoing. It is expected that if stuttering is not related to auditory feedback alone, there will be a greater percent of disfluencies following a pause compared to those immediately following speech. Results from this study are expected to contribute to our understanding the role of auditory and somatosensory feedback in stuttering.

ETHNIC IDENTITY CONSTRUCTION: THE INTERLOCUTOR EFFECT ON THE GOOSE VOWEL IN CHINESE AMERICAN ENGLISH

Emily Skupin

Poster: 356

Mentor(s): Suzanne Wagner (Linguistics and Germanic, Slavic, Asian, and African Languages), Mingzhe Zheng (Linguistics and Germanic, Slavic, Asian, and African Languages)

The extent to which native-English-speaking Chinese-Americans mark their ethnicity in language has not been well-studied. To better answer this question, this research focuses on the speech of 2nd-generation Chinese Americans (CA) from Troy, MI., to examine the extent to which CAs participate in the Northern Cities Shift (NCS), an ongoing local sound change in the Inland North dialect region of the U.S. affecting the pronunciation of six English vowels, as in KIT, DRESS, STRUT, BOUGHT, LOT and TRAP. My presentation focuses on the interlocutor effect and how it is expressed in the data. The interlocutor effect is the process whereby a person modifies his/her speech to converge or diverge with the speech of the person that s/he is conversing with. Although no interlocutor effects are evident for NCS vowels, I have found an effect on CAs concerning a sound change that is part of a competing vowel system known as the 'Elsewhere Dialect'. The sound change affects pronunciation of the vowel in words like GOOSE, shifting it from 'goose' to something more like 'gee-oose'. My involvement in the research, as an interviewer who is a native speaker of English, reveals that CAs exhibit more GOOSE fronting in interviews with me, compared with interviews conducted by a Chinese non-native speaker of English. This vowel variation between interlocutors is hypothesized to be an identity marker of Chinese-American English in the region of investigation. It may also contribute to our knowledge of how ethnic groups use language to express their ethnic identities.

LINGUISTICS, LANGUAGES, AND SPEECH POSTER PRESENTATIONS, SECTION 3 BALLROOM, 1:00 PM – 2:30 PM

IS SPEECH PLANNING A FACTOR IN CHILDHOOD STUTTERING PERSISTENCE AND RECOVERY?

Jessica Murray, Taylor Sydow

Poster: 359

Mentor(s): Soo-Eun Chang (Psychiatry), Emily Garnett (Psychiatry)

Developmental stuttering affects approximately 5% of preschool-aged children, with up to 80% spontaneous recovery rate during early childhood. Children with persistent stuttering are subject to bullying and significant psychosocial consequences during adolescence and adulthood. At this time, there are few objective markers that can help predict which children would persist versus recover. Such markers could help clinicians prioritize intensive treatment for those children who may be at greatest risk for persistent stuttering. Most disfluencies occur at the beginning of speech utterances, suggesting that speech preparation/planning may be a factor in stuttering. However, few studies have examined whether proportion of utterance initial disfluencies differ between children who stutter (CWS) who persist (CWS-P) and CWS who recover (CWS-R). The purpose of the present study was to compare the number of utterance-initial disfluencies occurring in spontaneous speech samples from both CWS-P and CWS-R, to better understand potential differences in speech planning between the two groups. We hypothesized that if speech planning is an important factor linked to persistent stuttering, CWS-P would exhibit more utterance-initial disfluencies than CWS-R. Speech samples from 96 children were analyzed using Computerized Language Analysis (CLAN). Samples were collected during spontaneous speech yearly for up to 3 years. T- tests were used to compare between CWS-P and CWS-R in the proportion of utterances with initial versus to position disfluencies Data analysis is ongoing. If the results support our hypothesis, we will have a better understanding on the possible role of sentence planning in stuttering persistence during childhood.

LANGUAGE PROFICIENCY AND NEURAL PROCESSES UNDERLYING LANGUAGE IN YOUNG CHILDREN FROM LOWER SOCIOECONOMIC STATUS BACKGROUNDS

Stephanie Nagy

Poster: 360

Mentor(s): Amanda Hampton Wray (Communicative Sciences and Disorders)

Language proficiency in children is associated with working memory and attention. Previous studies have revealed strong and differential relationships between proficiency in different cognitive domains and the neural processes underlying semantics and syntax. Children growing up in lower socioeconomic status (SES) households demonstrate reduced language abilities compared to higher SES peers, continuing into the time of adulthood. However, the relationships between cognitive proficiency and language processing in this population are unclear. The current study

evaluates the relationship between language proficiency and neural processes underlying language in young children from lower SES backgrounds of ages three to six. Event related potentials (ERPs) were used to test semantic regularities and phrase structure violations. We hypothesize that children from lower SES backgrounds will show stronger relationships between language proficiency and semantic, compared to syntactic, processing. These findings have the potential to enhance our understanding of language development in children from lower SES backgrounds.

SOCIAL AND COGNITIVE IMPRESSIONS OF PEOPLE WHO STUTTER FROM READ-SPEECH SAMPLES

Kelly Russell, Olivia Banach

Poster: 361

Mentor(s): Lauren Amick (Psychology), Devin McAuley (Psychology)

Stuttering is a neurodevelopmental disorder characterized by frequent and involuntary disruptions during speech production. People who stutter are often subject to negative perceptions. Recent work in the lab has revealed that negative social and cognitive impressions are formed about people who stutter simply from subtle acoustic differences in read-speech samples even without any knowledge about speaker identity. Naïve listeners judged adults who stutter to be less likeable, more anxious, and to have lower cognitive ability than their typically-speaking peers. Moreover, negative social and cognitive impressions of the speakers were associated with speech characteristics independent of whether or not the speaker stuttered (i.e., they were found within each speaker group) and did not depend on being cued that some of the speakers may have had a speech-and-language disorder. The present study extends this investigation by having participants form social and cognitive impressions of speakers from read-speech samples produced from only one of the two speaker groups. Results revealed that even when listeners heard speech produced by one of the two groups, adults who stutter were perceived to be more anxious and less likeable than typically-speaking adults. Moreover, for adults who stutter, speech rate and percentage of stuttering-like disfluencies (SLDs) were strongly related to perceived cognitive ability, anxiety, and likeability. Adults who stutter with slower speech and more SLDs were perceived to be more anxious, less likeable, and to have lower cognitive ability.

COGNITIVE FUNCTIONS AND NEURAL PROCESSING FOR LANGUAGE IN TYPICALLY-DEVELOPING PRESCHOOL-AGE CHILDREN

Katelan Saunders

Poster: 362

Mentor(s): Amanda Hampton Wray (Communicative Sciences and Disorders)

Cognitive functions, such as working memory, attention, and intelligence quotient, share many neural networks with language processing. Behavioral assessments are ideal for measuring cognitive functions. However, these measures are often unable to provide information regarding the neural processes underlying these behaviors. Event-related brain potentials (ERPs), electroencephalography (EEG) that is time-locked to specific stimuli, provide a non-invasive measure of neural function with exquisite temporal resolution, making them ideal for measuring specific aspects of neural processing for cognitive functions, such as language. Evaluating the relationships between behavioral assessments and ERPs can enhance understanding of the cognitive functions underlying performance on behavioral assessments. In a previous study, typically-developing 7- and 8-year-old children with higher verbal working memory performance exhibited more mature neural processing for semantics and syntax than children with lower verbal working memory performance; children with higher nonverbal IQ performance exhibited faster neural processing for semantics and syntax; and children with stronger grammatical skills exhibited faster neural processing for syntax and more mature neural processing for both semantics and syntax. However, these relationships are currently unclear in typically-developing preschool-age children. Using behavioral assessments and ERPs, the current study evaluates relationships between cognitive functions and language processing in preschool-age children. Preliminary data indicate that children with greater cognitive proficiencies exhibit more mature neural processes for language, with distinct patterns for different cognitive functions, as seen in previous studies with school-age children and adults. Findings will have implications for the understanding of the interactions of cognitive abilities in language development.

TWO GETS, OR NOT TWO GETS?

Catherine Selbert, Julia Andary, Theresa Floyd, Lauren Hoogerland

Poster: 363

Mentor(s): Cristina Schmitt (Linguistics and Germanic, Slavic, Asian, and African Languages)

In this project we examine children and adults' interpretation of the light verb *get*. Light verbs are semantically bleached and syntactically flexible and can occur with many different complements. *Get* can appear with adjectival (*get tired*), prepositional (*get in*) nominal (*get the book*) and also verbal complements (*get Mary to play the flute*, *get eaten by a shark*). The syntactic flexibility is accompanied by semantic flexibility. Previous research shows that light verbs are abundant in the input to children, and that children produce them at similar frequencies. However, no study has tested

children's receptiveness to light verbs in comparison with have and stronger verbs. For this study we are interested in a difference in interpretation in sentences such as "Bear got the ball", where Bear can be either the receiver of a ball or the one who agentively acquires the ball. Previous research indicates that there is a bias towards interpreting the subject as an agent and therefore one hypothesis is that the preferred interpretation would be agentive. However, since the subject is not agentive in a large number of get constructions (Bear got tired, cold, etc.), it is possible that children will not allow an agentive interpretation. We conducted two experiments: the first one analyzes children's interpretation of "get" in these constructions and also in constructions with have and the second experiment examines how children interpret similar sentences with regular strong verbs.

CAN THEY 'OR' CAN'T THEY? DO CHILDREN CALCULATE IMPLICATURES RELATED TO 'OR'

Rachel Stacey, Natalie Chemey, Robert Felster, Adam Smolinski

Poster: 364

Mentor(s): Alan Munn (Linguistics and Germanic, Slavic, Asian, and African Languages), Cristina Schmitt (Linguistics and Germanic, Slavic, Asian, and African, Languages)

'Or' in English allows two interpretations depending on the context. 'Or' can be interpreted exclusively (one or the other but not both), as in "yesterday, Josh played the flute or the clarinet", but it can also be interpreted inclusively (one or the other, or maybe both), as in "Josh can play the flute or the clarinet". In the standard view 'or' has an inclusive meaning, which means it is basically like 'and', and the exclusive interpretation is derived from an inference process, called "implicature": if the speaker intended an inclusive interpretation, they would have chosen the 'and' alternative. Past studies have shown that children have difficulty calculating implicatures (Noveck 2001), and instead use 'or' only with its logical meaning (inclusive). Singh et al. 2016 argues that children can interpret 'or' exclusively, but do so in a way that is systematically different from adults. They argue that children do not generate the same set of alternative interpretations. In Singh's study, however, adults also failed to calculate the implicature to a certain extent, making comparisons with children's behavior difficult to interpret. Our study refines the design and methods of Singh's study in order to better control for the pragmatic set-up. We hypothesize that both the adult and children's behavior can improve with a better experimental design because implicatures are very sensitive to the context. Once the pragmatic set-up is better controlled adults and children will follow show an ability to calculate the same implicatures.

WHEN DO WE ACCEPT THE PERFECT?

Mackenzie Ware, Kelly Esenther, Sarah Popowitz

Poster: 365

Mentor(s): Alan Munn (Linguistics and Germanic, Slavic, Asian, and African Languages), Cristina Schmitt (Linguistics and Germanic, Slavic, Asian, and African, Languages)

The present perfect combines the auxiliary "have" with a participial form of the verb. It is used to describe an event that happened at an unspecified time in the past (I have travelled) and has present relevance or something that starts in the past and continues to now (I have lived in Michigan all my life). Research has shown that the use of the Present Perfect in American English is acquired at a later age than in Scottish English, and that contexts in which the Perfect was preferred now also accept the simple Past in American English. There are, however, no studies systematically investigating the acceptability of the Perfect in contemporary American English. This study presents the results of two experiments testing the acceptability of the Perfect tenses in different contexts among MSU College students. We varied the types of adverbial modifiers, types of predicates (permanent vs. temporary properties), sentential contexts and also formality. We hypothesize that simple past sentences will be rated more acceptable than their present perfect in informal contexts, and that the distinctions described in the literature between the simple tenses and the perfect tenses will be less sharp than predicted, with the simple tenses taking over the perfect tenses in a variety of contexts.

MICROBIOLOGY, IMMUNOLOGY, AND INFECTIOUS DISEASE

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

QUANTIFICATION OF PLACENTAL EXOSOMES DURING PREGNANCY

Jacob Greenberg

Time: 11:00 AM

Mentor(s): Margaret Petroff (Pathobiology and Diagnostic Investigation)

Exosomes are 50-150 nm vesicles that are secreted from all nucleated cells. They are of great interest in biological research because they contain bioactive molecules that can be horizontally transferred between cells, thus representing a newly discovered form of intercellular communication. During pregnancy, the fetal placenta releases large numbers of exosomes directly into the maternal circulation. Placental exosomes may mediate maternal immune tolerance to the semiallogeneic fetus. To begin to understand the role of placental exosomes during pregnancy, we asked whether there is a change in the concentration of exosomes within the maternal blood during pregnancy, using mice as model. Plasma from pregnant mice across gestation, and exosomes were isolated using a commercial kit and characterized by western blot analysis, transmission electron microscopy and Nanosight quantification. Isolated exosomes were found to contain TSG101, and exhibited typical size and morphology. Quantification suggested that plasma exosome concentration was similar in gestation days (GD) 5.5 and 10.5 pregnant mice to virgin animals. In contrast, exosome concentration was elevated at GD14.5 and 17.5. As early as 1 day postpartum, plasma exosomes returned to pre-partum concentrations. These results suggest that the rise in exosomes is correlated with a growth of the placenta and its establishment with maternal blood, and that pregnancy-associated exosomes are rapidly cleared after parturition. Further, the data suggest that the pregnancy-associated increase in maternal plasma exosomes can be attributed to placental exosomes in the maternal blood.

2B4: A NOVEL CHECKPOINT FOR INKT CELL ANTICANCER RESPONSE

Ryan Mack

Time: 11:15 AM

Mentor(s): Rupali Das (Physiology)

In the last few decades, advances in our understanding of the immune system have lead to unprecedented treatments for various types of cancers. Invariant natural killer T cells (iNKTs) comprise a unique lineage of innate-like T lymphocytes with important roles in these developing anticancer immunotherapies. Although iNKTs are capable of rapidly producing cytokines and mounting potent cytotoxic responses following engagement by a tumor cell, the lack of knowledge about how these mechanisms are controlled greatly impedes their full potential in both drug and adoptive therapies. One of the most promising approaches to sustaining antitumor immunity is blocking of the immune checkpoints, which control inhibitory pathways that prevent the immune cells from executing desired antitumor actions. To that end, our recent studies demonstrate that 2B4, a cell surface receptor, negatively regulates iNKT cell antitumor responses both in vitro as well as in vivo. Given that the surface expression of 2B4 is absent on resting iNKT cells but gets upregulated following activation, we postulate that 2B4 may be a novel immune checkpoint for iNKT cells. As CD48, the binding partner of 2B4 is widely expressed on tumors, further elucidation of the mechanisms by which 2B4 regulates iNKT cell antitumor activity is of significant scientific and clinical importance. Studies are also underway to examine whether 2B4 regulates the expression and/or functions of other inhibitory receptors that may regulate iNKT cell antitumor responses. Collectively, these studies will facilitate a better understanding of harnessing the antitumor activates of iNKTs in a clinically relevant manner.

RAPID IDENTIFICATION OF MICROBES IN SEPTIC PATIENTS

Michael Nicholas

Time: 11:30 AM

Mentor(s): Brett Etchebarne (Osteopathic Medical Specialties)

Identifying microbes in a septic patient is essential for giving an appropriate and accurate diagnosis. In certain regions of the world, providing a quick and reliable diagnosis becomes a significant challenge. Our research focuses on new and effective methods to not only speed up, but simplify the process of identifying specific bacteria. Patient samples of urine, stool, blood, or saliva were tested using loop mediated isothermal amplification assays (LAMP). The LAMP technique targets specific genes in a bacterium. With the combination of certain primers and corresponding DNA sequences, amplification is emitted from an individual well of a 64-well reaction plate. In the methods we used in the lab,

fluorescence was deemed the best technique for measuring amplification of the bacteria's genes. In our research, we are focusing on different methods in which to perform LAMP, making the process faster, simpler, and equally effective. Patient samples are tested with these different methods. The results are compared with each other and with the hospital's results. Based on continuous and detailed scientific testing, developments and conclusions are being made on these methods of rapidly identifying the desired microbes. In this presentation, I will review some of these comparisons and give some general conclusions about the testing so far. These conclusions will include explanations of the progressions and resistance points of the research to this date and what this research means for the future of sepsis identification and treatment.

LIPOTEICHOIC ACID SUPPORTS THE METABOLIC FLEXIBILITY OF STAPHYLOCOCCUS AUREUS

Laura Hesse

Time: 11:45 AM

Mentor(s): Neal Hammer (Microbiology and Molecular Genetics)

Antibiotic resistant *Staphylococcus aureus* is the leading cause of skin and soft tissue infections, bacteremia, and endocarditis in the United States. The ability to colonize and cause disease in these distinct niches within the human host is due to a dynamic metabolism that fluctuates between aerobic respiration and fermentation. Fermenting staphylococci produce less ATP, resulting in cells that produce significantly smaller colonies, known as the small colony variant (SCV) phenotype. However, this growth reduction leads to increased resistance to many classes of antibiotics and SCVs are often isolated from patients with chronic infection. Consequently, there is a need to identify pathways that support the transition to respiration-arrested growth in order to reduce the antibiotic recalcitrance of *S. aureus*. Lipoteichoic acid (LTA), a phosphoglycerol polymer anchored to the cell membrane, is an essential component of Gram positive cell walls; however, mutations can be made to the LTA biosynthesis pathway to produce alterations in LTA that allow cells to remain viable. For example, inactivation of the gene *ypfP*, yields cells with altered LTA without reducing viability. We have discovered that when respiration arrest is induced in *ypfP* mutant cells, a significant loss of viability is observed. These respiration-arrested *ypfP* mutant cells also demonstrate a dysregulation of autolytic activity and a further alteration of their LTA profile compared to respiring *ypfP* mutants. These findings suggest that LTA plays a critical role in allowing *S. aureus* to transition to the antibiotic resistant SCV state and identify *YpfP* as a therapeutic target.

MICROBIOLOGY, IMMUNOLOGY, AND INFECTIOUS DISEASE POSTER PRESENTATIONS, SECTION 1 LAKE HURON ROOM, 9:00 AM – 10:30 AM

NOVEL PHOSPHOLIPASE REGULATION IN VIBRIO CHOLERAЕ UTILIZES THE SECOND MESSENGER CYCLIC-GMP-AMP TO REMODEL THE CELL MEMBRANE DURING PATHOGENESIS

Lara Behrmann

Poster: 368

Mentor(s): Geoffrey Severin (Biochemistry and Molecular Biology), Christopher Waters (Microbiology and Molecular Genetics)

Cholera, a disease characterized by severe, watery diarrhea, is caused by the bacterium *Vibrio cholerae*. There have been seven cholera pandemics, the first six of which were caused by the classical biotype of *V. cholerae*. In 1961, the newly evolved El Tor biotype became the primary cause of cholera, initiating the 7th and current pandemic. It is believed that the acquisition of two genomic islands, *Vibrio* 7th pandemic island-1 (VSP1) and VSP2, led to El Tor's epidemiological success. Despite their presumed significance, little is known about the genes present in VSP1/2. In 2012, the VSP1 gene, VC0179, was shown to be a di-nucleotide cyclase (DncV) that synthesizes the second messenger cyclic-GMP-AMP (cGAMP). While this enzymatic activity was proven essential for efficient host colonization, the molecular mechanisms that regulate this critical step in pathogenesis have yet to be elucidated. We have identified a phospholipase, VC0178, that degrades phosphoethanolamine, a major component of bacterial cell membranes, in response to DncV overexpression. It is our hypothesis that VC0178 is activated by cGAMP binding, leading to a change in the lipid composition of the cell membrane that promotes infection. We are performing *in vitro* binding experiments with radiolabeled cGAMP and the phospholipase to determine if cGAMP directly regulates VC0178 and analyzing lipid extracts from wildtype and $\Delta VC0178$ El Tor strains for changes in cell membrane composition. This research will define the interaction between cGAMP and VC0178 and its role in *V. cholerae* pathogenesis, providing clues to better understand the epidemiological success of El Tor.

ANTIMICROBIAL FILMS TO COMBAT LISTERIOSIS

Sadhana Chinnusamy

Poster: 369

Mentor(s): Evangelyn Alocilja (Biosystems and Agricultural Engineering)

Listeria monocytogenes, the bacteria responsible for listeriosis, affects approximately 1600 people in the United States every year (CDC, 2016). *L. monocytogenes* has been traced to fruits, meats, and unpasteurized dairy products such as cheese. *L. monocytogenes* is especially dangerous because it can survive in warm or cold conditions and affects those with weakened immune systems, such as pregnant women and the elderly. Novel methods of bacteria control in food are needed as *L. monocytogenes* outbreaks continue to occur. A naturally occurring, biodegradable, non-toxic antimicrobial polymer extracted from marine origin was used in this experiment (Bhuvaneshwari et al., 2011). This substance could potentially be used as a coating or film in food preparation or packaging. Two types of antimicrobial films are being developed in the Nano-Biosensors Lab. In this experiment, both types of antimicrobials were synthesized and used to wrap soft cheese with a known amount of *L. monocytogenes* inoculated on it. After different time intervals, the colony-forming units of *L. monocytogenes* were qualitatively and quantitatively analyzed and the effects of both antimicrobial substances were analyzed. Based on preliminary data, there has been a significant decrease in the number of surviving bacterial colonies due to the effects of the substances. Further tests on different foods will be performed as well. If fully successful, results of this experiment will lead to an inexpensive method of improving food safety in dairy and other products and reducing foodborne illness.

DELETIONS OF PUTATIVE SUCCINATE TRANSPORTERS IN ACTINOBACILLUS SUCCINOGENES

Garrett Cooper

Poster: 370

Mentor(s): Claire Vieille (Microbiology and Molecular Sciences)

Actinobacillus succinogenes is a bacterium that has the potential to produce a large amount of the chemical succinate. Succinate is produced through the citric acid cycle, a metabolic process that involves energy production using carbon sources. Succinate can be used to replace crude oil in plastic production, thus cutting down on reliance of fossil fuels. Succinate is transported in and out of the cell via specialized protein transporters. The exact transporter or transporters are currently unknown, but there are several putative transporters involved: *Asuc_2058*, *Asuc_0142*, *Asuc_1999*, and *Asuc_1990*. We hypothesized that that *Asuc_2058* is the most involved in succinate export. We constructed plasmids in *Escherichia coli* containing a selection marker and knockouts for the genes encoding the protein transporters: *Asuc_2058*, *Asuc_0142*, *Asuc_1999*, and *Asuc_1990*. Once these plasmids were confirmed to have the insert via PCR, we attempted to transform *A. succinogenes* with the plasmids. All attempts to incorporate the plasmids into *A. succinogenes* have failed thus far. Therefore, we can only predict the expected outcomes based on data obtained from previous research. We expect that once the knockout gene for *Asuc_2058* is present in the *A. succinogenes* genome, we will find that no succinate transport will occur in the cell. As previously stated, we so far do not have any data to support our hypothesis. When the plasmid is incorporated into *A. succinogenes*, we expect to progress with our research towards the goal of overproduction of succinate.

IDENTIFYING GENES REQUIRED FOR SURVIVAL OF DESICCATION IN ENTEROBACTER CLOACAE

Alexandra DeRita

Poster: 371

Mentor(s): Victor DiRita (Microbiology and Molecular Genetics), Natalia Martin (Microbiology and Molecular Genetics)

Enterobacter cloacae is a Gram-negative, facultative anaerobic, rod shaped bacterium, known for its ability to acquire resistance to multiple antibiotics including carbapenems; which are the last resource for treatment of *E. cloacae* caused infections. Therefore, *E. cloacae* is an immediate public health threat that requires urgent action. *E. cloacae* is easily contracted in nosocomial environments through oral-fecal transmission, and contaminated equipment and surfaces and it can lead to sepsis and death for the immunocompromised, young, and elderly. Identifying the mechanisms by which *E. cloacae* is able to survive on hospital equipment and surfaces is key to prevent transmission. The goal of my work is to identify traits of *E. cloacae* that enable such persistence, with an emphasis on understanding desiccation survival of this pathogen. A library of *E. cloacae* transposon insertion mutants is being developed to identify genes required by this bacterium to endure desiccation. We have determined the experimental conditions to assess desiccation of wild-type *E. cloacae* in the laboratory and are currently interrogating the library to identify mutants with increased sensitivity to desiccation.

EFFICACY OF BIOCIDAL TREATMENT ON PLANKTONIC AND BIOFILM BACTERIAL GROWTH IN MSU'S CHILLED WATER PLANT

Charnay Gloss

Poster: 372

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

Chilled Water Plants at MSU utilize water energy to decrease the amount of electricity the campus uses for air conditioning. These water systems promote bacterial growth, which can cause corrosion of the water plant. This growth takes forms biofilm or multicellular communities of bacteria encased in an extracellular matrix typically attached to a surface. To prevent this corrosion, biocides are added to the water to reduce bacterial growth. As biofilms have numerous mechanisms to resist toxic environments, it is not clear if these biocides are effective at killing biofilm communities of these bacteria. The goal is to test the efficacy of biocides on planktonic (free-living) and biofilm bacterial growth to help provide better treatment of these systems. Three populations of bacteria were collected from two water plants on campus. The bacteria were grown planktonically, and killing assays were performed on those populations to test the efficacy of five common biocides. Similarly, the efficacy of the biocides on biofilm growing bacteria was also determined. Variable killing capacity is shown throughout all populations of bacteria in preliminary planktonic killing trials. The results of my research indicates that the biocide "SM116" is the least effective across bacterial populations, and the Chill Dry population is not sensitive to all five biocides. My results suggest that planktonic growth is more sensitive to the biocide treatments than biofilm growth. Future experiments will repeat these experiments to test reliability of biocides on the three populations in planktonic killing and inhibition of biofilm growth.

IDENTIFYING LICHEN COMPOUNDS THAT ENHANCE TOBRAMYCIN KILLING OF PSEUDOMONAS AERUGINOSA BIOFILMS

Mitchell Zachos

Poster: 373

Mentor(s): Michael Maiden (Microbiology and Molecular Genetics), Chris Waters (Microbiology and Molecular Genetics)

Cystic Fibrosis (CF) is a genetically recessive disease that leads to many complications in the human body. CF is caused by a mutation to the Cystic Fibrosis Transmembrane Conductance Regulator gene, leading to improper transport of sodium, chloride, and water molecules in the lungs. This creates an environment prone to bacterial infection. *Pseudomonas aeruginosa* is an opportunistic, multi-drug resistant pathogen that is a predominant cause of lung bacterial infections in CF patients. In the lungs of CF patients, *P. aeruginosa* forms biofilms that are resistant to antimicrobial therapy. Currently, the aminoglycoside tobramycin is the most commonly used therapy to treat these infections. However, tobramycin fails to completely eradicate *P. aeruginosa* biofilms. The goal of my research is to test a collection of lichen extracts for their ability to enhance tobramycin killing of *P. aeruginosa* biofilms. Lichens, which are symbiotic organisms of microbes and fungi, produce extracts that are especially useful because of their antimicrobial and antifungal properties. Using BacTiter-Glo™ microbial cell viability assay and crystal violet staining, we assessed both killing of *P. aeruginosa* cells within the biofilm and biofilm dispersal. My results show that 4/6 extracts enhance tobramycin killing at 6 hours, and 6/6 extracts enhance killing at 24 hours. However, these treatments fail to disperse the biofilm, which is required to eradicate any infection. Further study is needed, using Colony Forming Unit enumeration and repeated experiments. These experiments highlight the positive attributes of Lichen and could develop new therapies for these bacterial infections.

RESISTANT PHENOTYPE AND GENOTYPE OF ESBL PRODUCING E. COLI FROM NOSOCOMIAL INFECTION

Sanchitha Meda

Poster: 374

Mentor(s): Lixin Zhang (Epidemiology and Biostatistics)

Antibiotic resistance is rapidly becoming a significant problem in the scientific and hospital communities. Our lab focused on the ESBL-producing *E. coli* strains; since, they have become a major cause of nosocomial infections. These gram-negative bacilli produce Extended-Spectrum beta-lactamase (ESBL) enzymes as a common mechanism of resistance to various beta-lactam antibiotic drugs. The purpose of this research was to determine the resistant phenotype and genotype of 81 samples of ESBL-producing *E. coli* from nosocomial infections isolated from a Korea Hospital. To test the resistant genotype, Singleplex and Multiplex PCR were performed to detect 8 different *bla* genes (some including: *bla*OXA1, *bla*ACC, *bla*TEM, and *bla*CTX-M) on the 81 ESBL-producing *E. coli* samples. Six of these 8 *bla* genes were detected in our ESBL collection. About 39% of these samples carry two or more of different *bla* genes. For testing the phenotypic antibiotic resistance, antibiotic susceptibilities to 15 different antibiotics were determined using the disk diffusion method. From this, it was found that 100% of the 81 samples were resistant to cephalathin, 95.06% were resistant to ampicillin, and 83.95% were resistant to nalidixic acid. A majority of these 81 samples, 70.29%, were multi-resistant to multiple classes of antibiotics. It was established that not only are the ESBL-producing *E. coli* strains

resistant to beta-lactam antibiotics, they are also multi-drug resistant to other classes of antibiotics. It is important to be able to recognize that the ESBL-producing *E. coli* strains are a major threat to the usage of antibiotics in the future.

**MICROBIOLOGY, IMMUNOLOGY, AND INFECTIOUS DISEASE
POSTER PRESENTATIONS, SECTION 2
LAKE HURON ROOM, 9:00 AM – 10:30 AM**

CONTRIBUTION OF IMMUNE CELLS TO PROGRESSION OF MURINE BREAST CANCER

Margaret Durbin

Poster: 377

Mentor(s): Richard Schwartz (Microbiology and Molecular Genetics)

Lymphoid cells may play an important role in breast cancer development and progression. In order to better understand this interaction, we investigated recruitment of these immune cells to the normal mammary epithelium, hyperplastic lesions, and mammary cancers. BALB/c mice with inguinal mammary glands surgically cleared of endogenous mammary epithelium (cleared fat pad) were transplanted with mammary epithelial tissue from Trp53-ko mice and tumor development was monitored. We analyzed the presence of CD4, CD8, B220, and Foxp3 proteins via immunofluorescence staining. MetaMorph image processing software was used to compare immune cell recruitment in normal tissue, hyperplastic precancerous lesions, tumor boundaries, and tumor interiors. Tumor progression was associated with increased numbers of CD4 (T helper cells) and Foxp3-positive cells (regulatory T cells; Tregs). Tregs inhibit the immune response to antigens and cause suppression of CD8+ cytotoxic T cells. We speculate that Tregs may promote tumor development in mice by decreasing anti-tumor immune responses. Analysis of Tregs in breast cancer biopsies may serve as an important prognostic indicator of aggressive breast cancer.

METHYLOTROPHS, AN EFFICIENT PLATFORM FOR CRITICAL METAL RECOVERY

Adam Kibiloski

Poster: 378

Mentor(s): N. Cecilia Martinez-Gomez (Microbiology and 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 cannot be found in high concentrations in ores. However, lanthanides are as abundant as copper and zinc. Current lanthanide mining techniques are hazardous both to the workers and the ecosystem. This process requires the use of highly concentrated acid. Lanthanides typically coexist with radioactive elements such as uranium and thorium. Therefore, waste produced by these mines are both highly radioactive and acidic. These products can do 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* to effectively recover lanthanides from used batteries and speakers to generate a safer and more economically viable technology for lanthanide supply.

UNRAVELING THE GROWTH PHENOTYPES OF AN MDH-3 TRIPLE MUTANT IN METHYLOBACTERIUM EXTORQUENS AM1

Riley Moore

Poster: 379

Mentor(s): Nathan Good (Microbiology and Molecular Genetics), N. Cecilia Martinez-Gomez (Microbiology and Molecular Genetics)

Previous research in *Escherichia coli* has unveiled the role of PntAB transhydrogenase as a vital membrane-bound enzyme that utilizes the electrochemical proton gradient as a driving force for the reduction of NADP+ to NADPH via the oxidation of NADH to NAD+. These redox cofactors assist in the generation of ATP as well as provide the reducing power necessary to synthesize a variety of biomolecules important for cell growth. Additional research has found that when a *Methylobacterium extorquens* triple mutant strain, deleted of three known methanol dehydrogenases (mxaF xoxF1 xoxF2) but with the active alcohol dehydrogenase ExaF, was grown in methanol supplemented with lanthanum (La3+) there was poor growth. From this, it has been hypothesized that the defect in growth observed in the triple mutant strain is the result of ExaF catalyzing the oxidation of methanol to formate in the periplasm rather than the production of formaldehyde (an intermediate that usually gets oxidized through a pathway that produces reducing power). Because of this, our lab is investigating the effect of overproduction of PntAB, a transhydrogenase that can adjust the concentration of NADPH pools by using excess NADH, a condition present under methanol metabolism. I have

successfully engineered and transformed the pNG276 plasmid encoding for pntAB constitutive transcription in both the triple mutant and wild type strains and I am currently performing growth curve experiments.

MOLECULAR STUDY OF PYTHIUM INSIDIOSUM

Don Nguyen

Poster: 380

Mentor(s): Leonel Mendoza (Biomedical Laboratory Diagnostics)

The objective of this study is to determine the phylogenetic location of *Pythium insidiosum* within the Oomycota, on the strains deposited at Michigan State University. *P. insidiosum* strains were inoculated in media cultures using traditional protocol. Cultures were autoclaved for proper sterilization, and the strains were incubated for 7 days at 37°C under rotating conditions (250 rpm). Cultures were then filtrated, and the cell mass was disrupted using liquid nitrogen with mortar and pestle. The DNA was extracted using phenol/chloroform protocol, and Polymerase Chain Reaction will be conducted using primers specific to the *ITS*, *COX I*, and *COX II* genes. PCR amplicons will be sequenced, and their DNA sequences used in phylogenetic analysis.

A GENETIC APPROACH TO CHARACTERIZE THE NOVEL SECOND MESSENGER CYCLIC-GMP-AMP DEPENDENT REGULATION OF CHEMOTAXIS IN VIBRIO CHOLERAE

Christopher Rhoades

Poster: 381

Mentor(s): Geoffrey Severin (Biochemistry and Molecular Biology), Christopher Waters (Microbiology and Molecular Genetics)

Vibrio cholerae, a pathogenic Gram-negative bacterium responsible for the disease cholera, utilizes a complex regulatory network to modulate virulence factor expression and pathogenicity. The latest *V. cholerae* biotype, El Tor, has supplanted classical *V. cholerae* strains notably due to the acquisition of two novel gene islands, VSP-1 and VSP-2. These novel El Tor genomic islands encode additional genes hypothesized to enhance environmental and host persistence and chemotactic regulation. While the majority of genes in these islands remain to be characterized, the gene VC1079 encodes the dinucleotide cyclase, DncV, whose predominant product is the hybrid cyclic nucleotide, cyclic-GMP-AMP (cGAMP). cGAMP is the newest described bacterial second messenger whose function has just begun to be explored. However, it has been shown that increased intracellular concentration of cGAMP reduces chemotactic gene expression in El Tor. Within a host, reduced chemotaxis is critical to El Tor's pathogenicity, but the molecular mechanisms involved in this cGAMP-mediated phenotype are unknown. We will determine this mechanism by inducing a high intracellular cGAMP concentration using a bi-plasmid system to screen for the evolution of chemotactic mutants that resist cGAMP induced chemotactic inhibition. Currently, 36 potential chemotactic mutants have been identified. After validation of these mutant phenotypes, whole genome sequencing will reveal genes involved in cGAMP mediated chemotactic repression. Chemotactic regulation is vital to *V. cholerae* pathogenicity and knowledge gained from this research will provide clues to understanding the enhanced pathogenic capacity of the El Tor biotype and cGAMP's role in virulence.

PHYLOGENETIC DIVERSITY AND BIOFILM FORMATION CAPACITY OF PSEUDOMONAS AND AEROMONAS BACTERIAL ISOLATES FROM THE RED CEDAR RIVER

Trinha Ton

Poster: 382

Mentor(s): Terence Marsh (Microbiology and Molecular Genetics)

The *Pseudomonas* and *Aeromonas* genera are ubiquitous in soils and freshwater. The *Pseudomonas* genus contains the human pathogen *P. aeruginosa* and *Aeromonas* is a fish pathogen that has been recently recognized as an emerging human pathogen. Circumstances such as contaminated water, contaminated food, and natural disasters such as hurricanes and tsunamis are a few ways that these typically waterborne bacteria come into contact with humans and cause infection. The ability of certain bacteria to form biofilms has been shown to enhance their pathogenicity. For these reasons we isolated and screened *Pseudomonas* and *Aeromonas* species from the Red Cedar using *Pseudomonas* Isolation Agar. Of 846 total isolates, 69.27% were identified as *Pseudomonas* and 4.02% were identified as *Aeromonas* using 16S rRNA comparative sequencing. Furthermore, 42.15% of the *Pseudomonas* showed robust biofilm formation under standard conditions and 57.17% had strong biofilm with nutritionally enhanced media. Under the same two nutritional conditions 20.59% and 70.59% of *Aeromonas* isolates formed robust biofilm. Our data revealed a broad range of phenotypic ability to form biofilm but under enhanced nutritional conditions some *Aeromonas* spp. formed particularly robust biofilm. The relationship between biofilm formation and pathogenicity in *Aeromonas* is under further investigation.

ELUCIDATING THE IMPACT OF ALTERED LIPOTEICHOIC ACID SYNTHESIS ON THE VIABILITY OF RESPIRATION ARRESTED STAPHYLOCOCCUS AUREUS

Erin Uhelski

Poster: 383

Mentor(s): Neal Hammer (Microbiology and Molecular Genetics)

Methicillin-resistant *Staphylococcus aureus* (MRSA) causes significant morbidity and mortality world-wide. Consistent with this, MRSA is the leading cause of skin and soft tissue infections in the United States. Breach of the protective barrier provided by the skin has the potential to promote systemic MRSA infections and colonization in the bone, joints, and bloodstream increasing risk of mortality. The CDC reports that annual MRSA infections exceed 70,000 cases. These facts highlight the need to develop new therapeutic targets to combat MRSA. One resistance mechanism employed by MRSA is to arrest respiration and proliferate as a small colony variant (SCV). SCVs are limited in their metabolic activity resulting in a distinct reduced colony size. The diminished metabolic activity of SCVs supports the hypothesis that these cells rely on dedicated pathways to facilitate slower proliferation. This hypothesis is validated by the finding that altering lipoteichoic acid (LTA), an essential component of the membrane of Gram-positive bacteria, via inactivation of a gene called *ypfP* reduces the viability of SCVs. *YpfP* synthesizes a diglycosyl moiety that functions to anchor LTA to the membrane. Two additional genes, *gtaB* and *pgcA*, function upstream of *ypfP* to synthesize the diglycosyl molecule. We hypothesize that *gtaB* and *pgcA* are also vital to SCV proliferation. To test this hypothesis *gtaB* and *pgcA* mutants will be cultured in several SCV-inducing conditions and viability will be assessed. These studies will provide additional validation for the role of LTA in modulating *S. aureus* metabolism and antibiotic resistance.

MICROBIOLOGY, IMMUNOLOGY, AND INFECTIOUS DISEASE POSTER PRESENTATIONS, SECTION 3 LAKE HURON ROOM, 11:00 AM – 12:30 PM

EFFECTS OF EARLY LIFE ADVERSITY ON LONG TERM INTESTINAL HEALTH

Morgan DeWilde

Poster: 387

Mentor(s): Adam Moeser (Large Animal Clinical Sciences), Calvin Pohl (Large Animal Clinical Sciences)

Early life adversity (ELA) is a risk factor for manifestation of functional gastrointestinal disorders (FGIDs) later in life; however the mechanism linking early life events with FGIDs remains unknown. Utilizing the porcine early weaning stress (EWS) model to mimic ELA, we investigated the interaction of EWS on intestinal mast cell infiltration and association with enteric ganglia. Since ELA is associated with an upregulation of neuroimmune function we hypothesized that EWS in pigs induces increased mast cell numbers throughout all layers of the ileum with an increased association with the enteric nerve plexi. Juvenile and adult early weaned pigs demonstrated an increase number of mast cells in ileum mucosa, submucosa and muscularis compared to late weaned control pigs. EWS pigs also exhibited increased mast cell association with the enteric submucosal and myenteric plexi. These findings suggest that ELA in the form of EWS induces life long increases in intestinal mast cell populations. Furthermore, the close association of these mast cells with enteric ganglia may be contributing to long-term changes in GI function.

THE ROLE OF CYCLIC-AMP DEGRADING PHOSPHODIESTERASE IN NATURAL TRANSFORMATION OF VIBRIO CHOLERAЕ AND THE POTENTIAL FOR MUCIN INDUCED NATURAL COMPETENCY

Shaun Dunyak

Poster: 388

Mentor(s): Victor DiRita (Microbiology and Molecular Genetics), Andrew Vanalst (Microbiology and Molecular Genetics)

Vibrio cholerae, 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 on 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. We hypothesize that mucin is capable of activating TfoX, an activator of the natural competency pathway, based on structural similarity to chitin. From preliminary data, *V. cholerae* was not naturally competent on commercially available mucin. We hypothesize that degraded mucin products may be altering intracellular cAMP levels by entering the phosphotransferase system (PTS) indirectly preventing expression of CRP, a gene needed for natural transformation.

We will address fluctuating levels of cAMP by generating an in-frame deletion of *cpdA* to observe intracellular cAMP levels while growing on mucin. Through further investigation, we may be able to propose that competence in *V.cholerae* may serve to enable acquisition of new genetic material during infection of humans.

THE EFFECT OF A MAJOR SUNSCREEN COMPONENT, OXYBENZONE, ON IMMUNE CELL RECRUITMENT TO THE MAMMARY GLAND

Patricia Glover

Poster: 389

Mentor(s): Richard Schwartz (Microbiology and Molecular Genetics)

A high fat diet may influence the incidence and development of breast cancer. Previous studies from our laboratory indicate that a compound common in sunscreen, oxybenzone (benzophenone-3, BP-3), has estrogen-like activity. To understand the interaction between dietary BP-3 and fat in breast cancer development, we studied immune cell recruitment to mammary glands in a Tip30 knockout transplant mouse model. Mammary gland fragments from Tip30 knockout mice were transplanted into the inguinal mammary glands of 3-week-old wildtype BALB/c mice that had been surgically cleared of endogenous mammary epithelium. The mice were then put on specific dietary regimens either containing or not containing BP-3: a continuous low fat diet, a low fat to high fat switch diet, or a high fat to low fat switch diet. Mice on switch diets were kept on the first diet until the end of puberty and then switched to the second diet at 10 weeks of age. Once mice reached 13 weeks of age, their mammary glands were collected. A single cell suspension of mammary gland was prepared by collagenase digestion and analyzed by flow cytometry. We tested the recruitment of CD4+ T-helper, CD8+ cytotoxic T, CD25+ Treg cells, and macrophages to the mammary glands of mice from each treatment group. We found that BP-3 increased macrophage recruitment to mammary glands of mice fed a low fat diet. Since macrophages are known to play roles in breast cancer development, their increased recruitment indicates that BP-3 may play a role in promoting breast cancer development or progression.

THE ABILITY OF CMEIAS SIZE AND ABUNDANCE METRICS TO DISCRIMINATE BIOFILM ARCHITECTURE ON VARIOUS SUBSTRATA

Donald Gusfa

Poster: 390

Mentor(s): Frank Dazzo (Microbiology and Molecular Genetics)

The influence of substratum physicochemistry on biofilm growth and development is one of great importance when elucidating the characteristics of bacterial growth *in situ*. The effects of a hydrophobic substratum like polystyrene plastic on biofilm growth is important due to its common use in studies to examine gene requirements for biofilm development. The Center for Microbial Ecology Image Analysis System (CMEIAS) software is being developed to analyze the phenotypic characteristics of microcolony biofilms on varying substrata. I hypothesize that the added CMEIAS size and abundance measurement features are useful in quantifying components of biofilm architecture and growth on varying substrata. Microscope slides of plain glass (control) and coated with polystyrene polymer were submerged into the Red Cedar River. The biofilms developed on the slides were examined using brightfield microscopy with optimized settings for high signal: noise ratio. 25 digital images were acquired for each treatment. These images were segmented, then analyzed using fourteen object size metrics in the Object Analysis plugin. Statistical analyses show that Area, Perimeter, Equivalent Circular Diameter, Mean-Radius, and Maximum-Radius were very effective in discriminating microcolony biofilm size distributions, with a combined MANOVA-F of 33.49 and a rejected H_0 (of no size difference) with a probability of 3.24×10^{-34} . These CMEIAS metrics can effectively discriminate different biofilms architectures, and indicate that polystyrene allows more productive growth of microcolonies in the river ecosystem. This interpretation is probably due to the very hydrophobic nature of polystyrene affecting nutrient adsorption and apportionment during microbial colonization of this environment.

THE ROLE OF CYCLIC DI-GMP IN REGULATING UV SURVIVAL IN VIBRIO CHOLERAЕ

Connor Riegal

Poster: 391

Mentor(s): Nico Fernandez (Microbiology and Molecular Genetics), Chris Waters (Microbiology and Molecular Genetics)

Vibrio cholerae is a pathogenic microorganism that infects human hosts causing diarrhea, leading to dehydration, and even death. Outside the human host, *V. cholerae* frequently resides in aquatic environments, where it forms biofilms and interacts with environmental stressors such as ultraviolet (UV) light. The second messenger cyclic dimeric guanosine monophosphate (c-di-GMP) primarily regulates biofilm formation in *V. cholerae*. However, recent evidence suggests c-di-GMP controls other aspects of cell physiology. Therefore, we hypothesized *V. cholerae* strains with higher levels of c-di-GMP would have higher UV survival rates. We tested this by measuring the survivability after UV stress in strains with high c-di-GMP compared to strains with normal c-di-GMP. Further, we measured the effect of c-di-GMP on expression

of a gene involved in UV damage repair. Our data demonstrates that high levels of intracellular c-di-GMP aid in survival after UV treatment. In addition, we found the DNA repair gene photolyase (phrB) displayed increased expression in high intracellular c-di-GMP conditions. Future experiments will look at the induction of phrB in strains with low c-di-GMP levels, where we hypothesize 1) phrB induction will be decreased and 2) cells exposed to UV light will have lower survival rates than the parent strain. We will also elucidate the mechanism by which cyclic di-GMP is regulating UV survival and gene expression at the phrB promoter. Our data thus far highlights a novel connection between cyclic di-GMP signaling, regulation of DNA damage repair, and survival against UV damage.

CHARACTERIZING MOTILITY PERFORMANCE AND BEHAVIOR ACROSS PATHOGENIC STRAINS

Lucas Werner

Poster: 392

Mentor(s): Yann Dufour (Microbiology and 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. This will be elucidated via agarose swim plates, which create a maze-like environment for cells to swim through. Cells will then be picked from multiple locations on the plate to assess performance on a single cell level with a constant selective pressure. We will continue to plate the cells to select specific performance types and compare them to the wild type. Thus far, we have seen an increase in performance from each tested strain from each location. This unexpected result begs the further question, why are cells that appear to have different performance levels performing exactly the same when isolated, a question which our future research will revolve around.

MICROBIOLOGY, IMMUNOLOGY, AND INFECTIOUS DISEASE POSTER PRESENTATIONS, SECTION 4 LAKE HURON ROOM, 1:00 PM – 2:30 PM

CD2 CRITICAL REGULATOR OF ALLERGIC RESPONSE WITH ASTHMA

Sami Abdelaziz

Poster: 395

Mentor(s): Rupali Das (Physiology)

Asthma is a major public health problem and its prevalence has increased considerably in recent decades. It is characterized by symptoms of recurrent wheezing, coughing and shortness of breath. The inflammatory immune response that is characteristic of allergic asthma is triggered by exposure to allergens such as house dust mite extract (HDME) and is driven by CD4⁺Th2 lymphocytes that secrete large quantities of Th2 cytokines including interleukin (IL)-4, IL-13, IL-5 and IL-9. Invariant natural killer T (iNKT) cells are innate lipid-reactive CD4⁺ lymphocytes that play an essential role in the pathogenesis of asthma. However the precise mechanisms that drive iNKT cell-mediated cytokine production and lung inflammation during asthma are not fully understood. Our studies demonstrate that CD2 is required for iNKT cell activation and cytokine production. Furthermore, surface expression of CD2 and its ligand; CD58 is increased on the monocytes and eosinophils of asthma patients, which correlate with elevated serum IgE levels, suggesting that CD2 may contribute to allergic airway inflammation. Employing HDME-induced murine model of human asthma, we demonstrate that CD2 is required for the development of Th2-associated airway inflammation, suggesting that CD2 is a critical regulator of Th2 allergic response. Studies are currently underway to define the role of CD2 in murine iNKT cell-mediated allergic responses. The results obtained from these studies will have an impact by facilitating a better understanding of how iNKT cells can be harnessed in a therapeutically relevant manner for the treatment of asthma patients that are resistant to current therapies.

CHARACTERIZING THE MECHANISMS OF ACTION OF NOVEL CHEMICAL INHIBITORS OF MYCOBACTERIUM SMEGMATIS GROWTH

A'Jah Chandler

Poster: 396

Mentor(s): Robert Abramovitch (Microbiology)

Mycobacterium tuberculosis is the bacterium that causes the infectious disease, tuberculosis. One-third of the world's population is infected with this bacterium. The key feature of tuberculosis disease is the granuloma, which is caused when alveolar macrophages, infected with bacteria, are surrounded by other cells to form a protective barrier in the lung. The granuloma provides a hypoxic and acidic environment that restricts bacterial growth and spread. These two factors cause the bacterium to go into a dormant phase, in which antibiotics do not inhibit them as well. In attempt to further understand the mechanism of action of drugs, our lab is trying to characterize chemical compounds that may inhibit the growth of dormant bacterium. We hypothesize that in a hypoxic environment, the chemical compounds PH003, PH017, and tyrphostin will inhibit the growth of this bacterium. The effects of chemical compounds were tested on a nonpathogenic strain, dormant M. smegmatis. The dormant M. smegmatis was generated by adding a small concentration of the bacteria to a flask, with growth medium, and sealing the flask so there is no access to oxygen. Bacterial growth consumes the oxygen and causes a gradual onset of hypoxia and bacterial dormancy. Hypoxia did in fact slow the growth of M. smegmatis. However, the chemical compounds, PH003, PH017, and tyrphostin did not inhibit growth of the bacterium under these conditions. Characterizing these chemical compounds may lead to new drugs that can possibly shorten the time it takes to treat tuberculosis.

METHODOLOGICAL OBSERVATIONS WHILE INVESTIGATING GENOMIC ABILITIES OF SPHINGOMONAS WITTICHII RW1 AND THE DEGRADATION OF DIOXINS.

Jillian Howland

Poster: 397

Mentor(s): Lisa Boughner (Microbial Ecology)

Sphingomonas wittichii RW1 (RW1) is one of the few organisms able to utilize dibenzo-p-dioxin (DD; an environmentally toxic compound) as its sole carbon and energy source. RW1 possesses a unique angular dioxygenase able to degrade many polycyclic aromatic hydrocarbons, including DD and dibenzofuran (DBF; a similar compound). This work is part of a genome-wide transposon scanning method (Tn-seq) which will be used to evaluate RW1's essential genes for DD and DBF metabolism. Phenylalanine (Phe) will be the carbon source used to establish baseline genes of essentiality for aromatic degradation. A conjugating strain of Escherichia coli (BW20767/pRL27) containing a kanamycin resistant transposable element on a plasmid is used to generate transposon libraries of RW1 (Tn-library: a collection of individual deletion mutants). In this experiment, the Tn-libraries are created on Brunner's (457) mineral media containing Phe (457-Phe); then aliquots are grown on 457 with either Phe, DD, or DBF (457-DD, 457-DBF). Kanamycin is included to maintain selection for transconjugants. During experimental development, antibiotic screening determined that nalidixic acid is the best method for selecting against the donor E. coli strain. RW1 mutants in the Tn-library will only grow if the transposable element does not insert into a gene necessary for metabolizing the individual carbon sources. The genomic DNA will be extracted from each experimental treatment and analyzed using high thorough-put sequencing. The sequence results will then be used to identify and compare the genes essential for degrading dioxins.

ISOLATING MYCOBACTERIUM SMEGMATIS MUTANTS RESISTANT TO A NOVEL TUBERCULOSIS ANTIMICROBIAL

Emily Juzwiak

Poster: 398

Mentor(s): Robert Abramovitch (Microbiology and Molecular Genetics)

Tuberculosis is caused by the bacterium Mycobacterium tuberculosis (Mtb). Upon entering the host, it slowly colonizes the acidic environments of macrophages or granulomas. This process is vital to the establishment of the pathogen as a chronic infection and its development of drug resistance (1). 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 used a drug plate to grow AC2P017 resistant M. smegmatis mutants. I picked twenty-one resistant colonies, then I plated dilution series of each mutant to ensure that they were truly isolated mutants. 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 was associated with resistance to AC2P017 (2). 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 and if the addition of the mutant allele into wild type bacteria will

produce resistance to AC2P017. I will also test if there is a phenotypic difference observed when the gene construct is overexpressed versus when it is present in natural quantities.

ISOLATION OF CANDIDATE PROBIOTIC BACTERIA FROM THE GASTROINTESTINAL TRACT OF C57BL/6 IL-10/- MICE PROTECTED FROM CAMPYLOBACTER JEJUNI-INDUCED COLITIS

Keenan O'Dea

Poster: 399

Mentor(s): Jean Brudvig (Veterinary Medicine), Linda Mansfield (Veterinary Medicine)

C57BL/6 mice lacking anti-inflammatory interleukin (IL)-10 are a laboratory model for investigating inflammatory bowel disease (IBD). Deficiency of IL-10 blocks inflammation-suppressive mechanisms in the gut and IBD results following exposure to the foodborne pathogen *Campylobacter jejuni*. However, in a recent experiment where mice were inoculated with *C. jejuni* strain 11168, mortality rates in C57BL/6 IL-10^{-/-} mice were low and histopathologic lesions were mild suggesting that the mice had been protected from colonic inflammation. Coincident with this finding, two unidentified bacteria appeared on TSA-CVA (tryptic soy agar, defibrinated sheep's blood, cefoperazone, vancomycin, and amphotericin) isolation plates cultured from feces and tissues of both infected and sham-inoculated mice. We hypothesized that one or both of these bacteria had probiotic effects, protecting the mice from *C. jejuni* induced colitis. Frozen cultures isolated from samples taken at necropsy were thawed and streaked onto 4 plates for isolation of these organisms. A single colony from each plate was re-streaked 3 times successively in an attempt to obtain a pure culture. A Gram stain was performed and 2 bacterial types were observed, a large gram-positive rod, and a small, gram-positive filamentous rod. A dilution series was performed, as subsequent attempts at isolation of these organisms were unsuccessful. Three tenfold dilutions vortexed and spread on a plate yielded colonies of each bacterium which were pure based on Gram stain observation. Further establishment of purity and characterization are in progress. Funded by NIH Grant U19AI090872.

EXPLOITING THE DIVERSE MORPHOLOGIES WITHIN THE PHYLUM FIRMICUTES TO VISUALIZE METABOLITE EXCHANGE

Audrey Pena

Poster: 400

Mentor(s): Neal Hammer (Microbiology and Molecular Genetics)

Treatment of infections caused by *Staphylococcus aureus* is challenging due to antibiotic resistance. One strategy employed by *S. aureus* to resist antibiotics is to arrest respiration, resulting in small colony variants (SCV). The enhanced antibiotic resistance profile of SCVs leads to a persistent colonization. SCVs are also associated with decreased virulence potential, however, genetically distinct SCVs restore growth and virulence factor production through a process called metabolite exchange. Metabolite exchange occurs between two commonly isolated SCVs, heme and menaquinone (MK) biosynthesis mutants, restoring respiration, toxin production, and virulence. *S. aureus* SCVs exchange metabolites with other Firmicutes, demonstrating that the transfer of metabolites occurs between species within this phylum. However, the mechanism that supports metabolite exchange remains elusive. We hypothesized that metabolite exchange requires close contact between two actively dividing cells. To begin testing this hypothesis, we exploited the diverse cell morphologies within the phylum Firmicutes. We found that cocultures of *S. aureus* heme mutant SCVs (cocci) mixed with *Listeria monocytogenes* MK mutant SCVs (bacillus) were enhanced for growth after 48 hours compared to cells grown in monoculture, indicating that these cells exchange metabolites. Additionally, visualization of the cells within the coculture using crystal violet staining revealed that *S. aureus* cells clustered around *L. monocytogenes* cells in close contact. Flocculation was also detected when *S. aureus* SCVs and *L. monocytogenes* SCVs were cocultured. These findings suggest that close contact between actively dividing respiration-arrested SCVs supports the process of metabolite exchange.

FRESHWATER AEROMONAS VIRULENCE FACTORS AND BIOFILM

Zachary Yarost

Poster: 401

Mentor(s): Terence Marsh (Microbiology and Molecular Genetics)

Aeromonas is a gram negative proteobacteria commonly found in freshwater systems. Species of *Aeromonas* are known to cause disease in fish and immunocompromised humans. *Aeromonas* has additionally been linked as a major cause of human infection in natural disaster stricken areas. The exact qualities that make some species of *Aeromonas* pathogenic are not all known. A diverse collection of virulence factors impact the pathogenicity of *Aeromonas*. In some cases the presence of a virulence factor coincided with a trend in biofilm formation. Biofilms are a microbiotic lifestyle that contributes to the fitness of an organism by creating a colony with an external protective matrix that resists desiccation and increases colony resistance to antibiotics and metals, as well as acting as a trap for nutrient acquisition. Forty two

isolates of *Aeromonas* were screened from the Red Cedar River and Black River for their ability to form biofilm using a spectrophotometric assay. Ninety six total isolates of *Aeromonas* were positively identified at the genus level and individually tested for select virulence factors. Different levels of biofilm formation were observed depending on nutrient availability (trypticase soy broth) and exogenous protein presence. The presence of certain virulence factors coincided with greater biofilm formation.

**MICROBIOLOGY, IMMUNOLOGY, AND INFECTIOUS DISEASE
POSTER PRESENTATIONS, SECTION 5
LAKE HURON ROOM, 1:00 PM – 2:30 PM**

THE ROLE OF SEDIMENT MICROBES IN THE PRODUCTION OF THE EASTERN TREEHOLE MOSQUITO, *Aedes triseriatus*.

Richard Lee

Poster: 404

Mentor(s): Beth Norman (Microbiology and Molecular Genetics)

Mosquitoes are vectors for many human and animal pathogens. Therefore, understanding how mosquitoes interact with their habitat is important for vector control and public health initiatives. Aquatic larvae of many medically-relevant mosquito species develop in natural or artificial containers, including water-filled tree holes. Decomposition of detritus by bacteria and fungi provide energy to these habitats with nutrient supplements from stem flow. Larvae consume bacteria from the water column and leaf surfaces. Studies of mosquito production have traditionally focused on water column dynamics. However, tree holes contain sediments derived from the products of decomposition and inorganic material blown in from the forest floor. Mosquito production may be affected by microbial activity in the sediment, particularly if that activity alters nutrient availability in the water column. Our objective was to investigate the link between sediment microbes and mosquito success. We hypothesized that activity in the sediment would negatively affect mosquito production because sediment microbes compete with water column microbes for nutrients and possibly produce toxic intermediates. We manipulated the amount of biologically-active sediment in laboratory mesocosms simulating natural tree holes and measured the development time, emergence, and adult biomass of the Eastern tree hole mosquito, *Aedes triseriatus*. Mesocosms containing sterile sediment, a mix of sterile and active sediment, active sediment, or no sediment were seeded with 30 *A. triseriatus* larvae. We also measured nutrient concentrations in the mesocosms. We predict to see higher rates of success in the treatment without sediment and the lowest rates in the treatment with active sediment only.

DIFFERENTIAL EFFECTS OF GLUCOCORTICOIDS AND PROBIOTIC TREATMENT ON THE SMALL AND LARGE INTESTINE.

Tristan Lemon

Poster: 405

Mentor(s): Laura McCabe (Physiology)

Glucocorticoids are potent anti-inflammatory drugs that are given for a wide range of effect on inflammatory and immunologically-mediated diseases. Despite their clinical importance, studies have shown use of oral glucocorticoids have a wide array of side effects. Recent studies have also found that glucocorticoids modulate the gut microbiome and have been shown to alter intestinal pro/anti-inflammatory cytokine expression. Previous data from our lab has shown treatment with probiotic *Lactobacillus reuteri* ATCC-6475 can have beneficial effects on inflammatory cytokines in the gut. However, it is not known how treatments with probiotics effect gut cytokine expression during glucocorticoid treatment. In the present study we examined changes to the small and large intestine cytokine gene expression under glucocorticoid treatment with or without the presence of probiotic *L. reuteri*. 16-week old C57/b6 mice were treated for 8 weeks with prednisolone (5mg 60-day slow release pellet) implanted subcutaneously behind shoulder. Another group received *L. reuteri* during the duration of glucocorticoid treatment. Interestingly the large intestine expression of pro-inflammatory cytokine TNF- α trended to increase in glucocorticoid treated only cohort, while treatment with *L. reuteri* brought it back down to control levels. However the opposite was seen in the small intestine, in which glucocorticoid and *L. reuteri* treatment decreased levels of TNF- α . These results suggest that glucocorticoids have differential effects on the small and large intestine cytokine expression, which can be modulated by probiotic *L. reuteri*.

BIOFILM FORMATION BY FRESHWATER ISOLATES OF PSEUDOMONAS

Terra Lomber

Poster: 406

Mentor(s): Terence Marsh (Microbiology and Molecular Genetics)

The purpose of this study was to observe the biofilm growth of *Pseudomonas* isolates obtained from the Red Cedar River. Biofilm growth was observed between tryptone soya broth (TSB), and TSB plus protein. The data presented showed that 55% of *Pseudomonas* strains have more biofilm growth in TSB compared to TSB plus protein. The species that showed the most prevalence within the *Pseudomonas* isolates was *Pseudomonas taiwanensis* where results showed that 58% of this species had more biofilm growth in TSB compared to TSB plus protein. Another common species was *Pseudomonas plecoglossicida*, it was observed that 73% of *Pseudomonas plecoglossicida* had more biofilm growth in TSB compared to TSB plus protein. The overall trend of the isolates obtained showed that there was an increase in biofilm growth in TSB compared to TSB plus protein, within the *Pseudomonas* genus.

TRICLOSAN RESISTANCE IN TREE HOLES

Brianna Nelson

Poster: 407

Mentor(s): Terence Marsh (Microbiology and Molecular Genetics)

The bacteria found in tree holes is extremely diverse, and some of them are resistant to the antimicrobial agent called Triclosan. The significance of this study is to figure out how much of an impact we have on our environment to understand how best to combat the threats we cannot see. The goal of the experiment is to discover Triclosan resistant microbes in the environment. My hypothesis is that a bacterium will be found resistant to Triclosan that was not previously known to be. A soil sample was collected from a tree hole on the campus of Michigan State University. We grew it on agar plates made with Triclosan. Once isolated, we performed PCR and 16s analysis for phylogenetic identity. We observed multiple species of *pseudomonas* which are commonly known to be Triclosan resistant. Only two out of the seven different species that were discovered have been previously noted in research as being Triclosan resistant. *Pseudomonas fluorescens* and *Pseudomonas veronii* are the two, in recent studies, have been classified as triclosan resistant. Antarctic species also have not been previously found to be triclosan resistant. This could mean that there is more resistance to triclosan spreading throughout the environment because of exposure to the antimicrobial through human products. This study is important because by gaining a better understanding of which bacteria are resistant to triclosan and why they are resistant, we can then find better ways to combat and stop growing existence of triclosan resistant bacteria.

GENERATION OF WOLBACHIA INFECTED REL2 TRANSGENIC MOSQUITO LINES

Harrison Quaal

Poster: 408

Mentor(s): Xiaoling Pan (Microbiology and Molecular Genetics), Zhiyong Xi (Microbiology and Molecular Genetics)

Malaria is a prominent problem around the world, especially in tropical climates. Even in recent time, malaria has claimed the lives of hundreds of thousands each year. New methods are being developed to prevent the spread the Plasmodium, the parasite that causes the ailment. For example, infecting the mosquito, *Anopheles stephensi*, with the bacteria *Wolbachia* inhibits Plasmodium infection. Additionally, it has been found that overexpression of the mosquito Rel2 gene inhibits infection. We hypothesize that generating a *Wolbachia* infected, Rel2 overexpressed mosquito line could exhibit stronger inhibition to Plasmodium infection. To generate the new mosquito line, we outcrossed female *Wolbachia* infected mosquitoes (LB1 line) with male Rel2 mosquitoes, and tested the offspring for the presence of *Wolbachia*. We produced 12 generations from this cross. Infection rates at the first outcrossing were 70% and then proceeded downward. At generations 4 and 7 infected females were isolated to recover the infection. We will continue the outcrossing. When we produce a line that carries the Rel2 mutation and has a well-established *Wolbachia* infection, we will test for resistance to Plasmodium infection. Integration of mosquitoes that cannot transmit Plasmodium into the nature could greatly reduce the presence of malaria.

DEFINING LANTHANIDE-DEPENDENT PLANT-MICROBE INTERACTIONS

Isabel Velosa

Poster: 409

Mentor(s): Norma Cecilia Martinez-Gomez (Microbiology and Molecular Genetics)

Lanthanide metals have previously shown to have little biological significance. However, it has recently been shown that lanthanides support life in bacteria like methylotrophs, which are organisms that require one-carbon compounds for growth. Further, addition of lanthanides to fertilizers has shown increased plant growth but the mechanism of this effect

is unknown. *Methylobacterium extorquens* AM1 is a methylotroph that lives on the phyllosphere of plants and has been previously shown to moderately promote plant growth. It is known that some bacteria and plants have symbiotic relationships, whether they are mutualistic or parasitic. One of the most prominent bacteria-plant interactions is nodulation for nitrogen fixation. Besides *M. extorquens* AM1, there are a multitude of other bacteria that are beneficial to plants. Specifically, rhizobia bacteria are bacteria that fix nitrogen after acquiring a plant host. Nitrogen is essential for plant growth, but is often limited. *Bradyrhizobium* USDA 3458 is one of these rhizobia, acting as an endosymbiont for leguminous plants, forming a mutualistic relationship between the plant and itself. By taking these aspects into consideration, my project focuses on the application of these bacteria and metals to bush beans. Bacteria and lanthanides will be applied with different conditions, with careful observation during growth to see how these factors affect plant biomass. The future directions hope to develop and optimize mixtures of bacteria and lanthanides to maximize plant biomass, and perform metabolomics studies to identify the bacterial lanthanide-dependent metabolism enhancing plant growth. Together, these studies can translate into technology for sustainable agricultural systems.

PARALLEL EVOLUTION OF BURKHOLDERIA CENOCEPACIA WITHIN THE LUNGS OF CYSTIC FIBROSIS PATIENTS

Rachel Greenberg

Poster: 410

Mentor(s): Martha Mulks (Microbiology and Molecular Genetics)

Burkholderia cenocepacia (Bcc), an environmental organism first identified as an onion pathogen, is an opportunist pathogen that can infect the lungs of cystic fibrosis (CF) patients. In the 1980s, Bcc strains, including the Midwest clone found in Michigan, arose that were able to transmit from patient to patient, leading to epidemics. Bcc causes severe lung infection, in part because innate resistance to many antibiotics makes it difficult to treat, and few infected patients survived long term. The goal of this research is to examine Midwest clone Bcc strains both phenotypically and genetically to determine whether parallel evolution within multiple CF patients occurred and what key pathways were affected. Midwest clone strains isolated from multiple patients early in the epidemic as well as from patients who have survived over 25 years with this pathogen have been collected and analyzed. Phenotypic analyses have shown loss of key virulence factors such as a functional Type II secretion system and secreted enzyme including degradative protease and lipases, as well as gain of function mutations such as development of resistance to new antibiotics. Genomic DNA has been extracted from isolate and whole genome sequencing preformed. Comparative analysis of assembled genome sequences to identify mutations that occurred is in progress. Mutations found in isolates from multiple patients, demonstrating parallel evolution of Bcc within the CF lung, may identify both key pathways required for initial adaptation of Bcc to the lung environment as well as pathways that contribute to long term Bcc survival during chronic infection.

MICROBIOLOGY, IMMUNOLOGY, AND INFECTIOUS DISEASE POSTER PRESENTATIONS, SECTION 6 LAKE HURON ROOM, 3:00 PM – 4:30 PM

INVESTIGATING THE MICROBIOTA OF THE MSU EYE-WASHERS IN DIFFERENT DEPARTMENTS

Jacob Amallo Omar Abbas, Jia-Yi Chan, Nicole Hermes

Poster: 413

Mentor(s): Leonel Mendoza (Microbiology and Molecular Genetics)

Dr. Leonel Mendoza, Associate Professor at Biomedical Laboratory Diagnostics, has assembled a research team of nine undergraduate BLD students to study the normal microbiota of eyewash stations located in teaching and research laboratories at Michigan State University. Our research central questions are: What is the eye-washer stations normal microbiota? How many different type of microbes (bacteria, fungi, others) inhabit the surfaces of these devices? Is the surface of the eye-washers an ideal microenvironment facilitating the growth of microbes? To answer these questions our research team, following the collection of environmental samples guidelines, will collect samples on the different eyewash stations located in at least four buildings across MSU campus. During the fall semester we collected ten samples from ten different teaching facilities as well as research laboratories located in North Kedzie Hall. Our preliminary results showed that the eye-washing stations have developed a thin biofilm of microbes, probably due to the constant flushing, which may provide the microbes with the essential elements to develop. The first ten specimens collected in North Kedzie Hall showed heavily contaminated stations with numerous bacteria and fungi (too many to count on some plates), some of them being potential pathogenic species.

PREVALENCE OF ANTIBIOTIC RESISTANCE IN NON-TYPHOIDAL STRAINS OF SALMONELLA IN MICHIGAN

Chase Anderson

Poster: 414

Mentor(s): Shannon Manning (Microbiology and Molecular Genetics)

Non-typhoidal serotypes of Salmonella are significant disease causing foodborne pathogens with severe global impact, contributing to roughly 94 million cases and 115,000 deaths annually. The widespread emergence of antibiotic resistance in Salmonella has made it an important area of research in public health and food safety. Non-typhoidal Salmonella isolates from 2011-2014 (n = 148) received from MDHHS, were tested for antibiotic resistance using Minimum Inhibitory Concentration (MIC) plates containing predetermined antibiotic concentrations. E. coli ATCC 25922 was used as quality control and Clinical Laboratory Standards Institute (CLSI) standards were used to determine the breakpoint values. In Michigan, non-typhoidal Salmonella strains were resistant to antibiotics such as ampicillin (12.20%), tetracycline (10.90%), ceftriaxone (1.40%), and trimethoprim-sulfamethoxazole (2.70%). These antibiotics belong to classes of penicillins, tetracyclines, cephalosporins, and sulfonamides which are used clinically to treat bacterial infections. Higher rates of resistance results in less efficient treatment of food-borne pathogens. Based on serotypes of Salmonella, high levels of antibiotic resistance were also observed in the serotypes Enteritidis (4.76%), Typhimurium (20.00%), Newport (17.64%), and others (20.27%). Future work will include genome sequencing of non-typhoidal Salmonella to determine the genes or mutations responsible for increased resistance.

ANTIMICROBIAL FILM'S EFFECT ON THE SHELF LIFE OF GROUND BEEF

Claire Bassett

Poster: 415

Mentor(s): Evangelyn Alocilja (Biosystems and Agricultural Engineering), Shan Shan (Biosystems and Agricultural Engineering)

It is estimated that 30% of food is thrown away each year, and a large portion of this is due to perishable foods going bad before they can be consumed. For meats, most can only be safely stored in a refrigerator for 1 to 5 days [1]. Foods like fresh meat cannot be stored for extended periods of time because of the rapid growth of potentially harmful bacteria such as E. coli, Salmonella, or Listeria that may occur [2]. This experiment determined how two different antimicrobial films developed in the Nano-Biosensors Lab affect the shelf life of meat. One gram of ground beef was wrapped with the antimicrobial film and then left in the refrigerator for different increments of time. For control, one gram of beef was wrapped using a regular food wrapping film. After each period of time, samples from the ground beef were tested for bacterial load. Preliminary results show that the two antimicrobial films had significant bacterial load reduction compared to the control. If successful, the two antimicrobial films hold great potential for significantly extending the shelf life of a variety of perishable foods.

GENETIC ANALYSIS OF THE MECHANISMS THAT SUPPORT STAPHYLOCOCCUS AUREUS GROWTH ON TELLURITE

Alexa Calas

Poster: 416

Mentor(s): Neal Hammer (Microbiology and Molecular Genetics)

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

A ROLE FOR PSOR IN PHOTOPROTECTION IN CYANOBACTERIA

Kendall Veasley

Poster: 417

Mentor(s): Beronda Montgomery (Plant Research Laboratory), Melissa Whitake (Plant Research Laboratory)

Cyanobacteria are photosynthetic bacteria that have many possible uses in biotechnology, including biofuel production. Although sunlight is critical for photosynthesis, excess light energy can be dangerous to cyanobacteria. Long-term photoprotection is achieved by regulation of phycobilisomes (PBS) and short-term photoprotection is achieved by orange carotenoid proteins (OCP) in these organisms. To better understand photoprotection in cyanobacteria, we analyzed a transposon insertion in the phycobilisome abundance regulator (*psor*) gene. We hypothesize that the *psor* gene functions to regulate the number of phycobilisomes and amount of light absorbed, thereby contributing to photoprotection and organismal fitness. PCR and Sanger sequencing were used to determine the location of the IS701 transposon insertion in the *Fremyella diplosiphon* MRGL2-G1 (MRGL2 green #1) mutant. The location of the IS701 transposon in the *psor* gene of MRGL2-G1 was not determined. There is evidence of insertion in the *psor* gene and potential disruption of function. The MRGL2-G1 mutant has a dark green color in contrast to the reddish-brown color of the MRGL2 parent strain. This phenotype leads us to believe that the insertion is a disruptive mutation affecting the composition of PBS. No evidence of the presence of IS701 transposon in the *psor* gene of MRGL2-G1 was found. In future experiments, phycobiliprotein and chlorophyll levels will be assessed to compare levels in the parent strain MRGL2 to the MRGL2-G1 mutant. Our hope is that our findings related to regulation of PBS levels can better help future research into cyanobacteria and their potential use in biotechnological applications.

INVESTIGATING MECHANISMS OF ACTION AGAINST 2-COMPONENT REGULATORY SYSTEM DOS RST OF MYCOBACTERIUM TUBERCULOSIS

Marilyn Werner

Poster: 418

Mentor(s): Robert Abramovitch (Microbiology and Molecular Genetics)

The pathogen *Mycobacterium tuberculosis* (Mtb) senses and responds to environmental cues using two-component regulatory systems. The DosRST regulatory system includes the DosS and DosT sensor kinases and the DosR response regulator, and allows Mtb to sense and adapt to changing oxygen levels. Inhibition of this pathway may break Mtb's drug tolerance, thus shortening TB treatment. Our goal was to define the functions of three compounds, HC104A, HC105A, and HC106A, which all inhibit the DosRST system. We hypothesized that these compounds may act via modulation of the heme group carried by DosS or DosT proteins. DosS protein was expressed and purified from *E. coli*. Under anaerobic conditions, DosS heme was reduced by treatment with dithionite, and the impact of the compounds on DosS heme redox was monitored by UV-visible spectroscopy. The heme must be in reduced form for DosS to be active, therefore, inhibitors that shift the heme from the reduced to oxidized state may be inhibiting DosS function. One of the three compounds, HC106A, modulated heme redox in the UV-visible spectroscopy assay. However, HC106A did not fully oxidize the heme. HC104A and HC105A had no impact on heme redox status. This study suggests that HC106A inhibits the DosRST regulatory pathway via an interaction with DosS heme. Given that full oxidation of the heme is not observed, the compound may directly binds to the heme group rather than changing its redox status. Indeed, the observed UV-visible spectrum is similar to that observed when carbon monoxide interacts with heme.

MICROBIOLOGY, IMMUNOLOGY, AND INFECTIOUS DISEASE POSTER PRESENTATIONS, SECTION 7 LAKE HURON ROOM, 3:00 PM – 4:30 PM

DEVELOPING METHODS TO STUDY ENTEROBACTER CLOACAE COLONIZATION MECHANISMS

Benjamin Sims

Poster: 420

Mentor(s): Victor DiRita (Microbiology and Molecular Genetics), Natalia Martin (Microbiology and Molecular Genetics)

Enterobacter cloacae is a rod shaped facultatively anaerobic Gram-negative bacterium belonging to the Enterobacteriaceae family. Some *E. cloacae* strains have acquired resistance to a majority of the available antibiotics including carbapenems, making *E. cloacae* one of the most dangerous human pathogens currently causing nosocomial infections. *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. The goal of my project is to develop genetic tools for the study of the molecular mechanisms required for *E. cloacae* pathogenesis and colonization. I am working to apply a method of genome engineering called recombineering to *E. cloacae*. Recombineering utilizes a recombination system

called RED from phage lambda and enables very precise, efficient, and rapid insertion or deletion of genomic DNA. By expressing the RED system from a plasmid in *E. cloacae* along with small fragments of DNA to be introduced into the genome, I will construct mutations in specific *E. cloacae* genes to assess their role in colonization outside of the GI tract.

ELUCIDATING THE ACTIVATION OF BIOFILM FORMATION IN VIBRIO CHOLERAEE

Hannah Smith

Poster: 421

Mentor(s): Christopher Waters (Microbiology and Molecular Genetics)

Biofilms are complex communities of bacteria that aggregate together through production of an extracellular polymeric substance (EPS) and typically adhere to a surface. Bacterial biofilm formation is tightly regulated by chemical signaling molecules. *Vibrio cholerae*, the bacterium responsible for the devastating disease cholera, is a model organism for studying chemical signaling. In *V. cholerae*, regulation of biofilm production is controlled by several different chemical signaling systems. One of these is via the second messenger molecule cyclic di-GMP (c-di-GMP). Cyclic di-GMP allows bacteria to sense, respond, and adapt to changing environmental conditions, and it is known to activate biofilm formation in *V. cholerae*. Increased levels of c-di-GMP directly bind to and activate the transcription factor VpsR in *V. cholerae*. VpsR bound to c-di-GMP induces transcription of the polysaccharide biosynthesis operon that is responsible for synthesizing the *V. cholerae* biofilm EPS. However, the molecular mechanism by which c-di-GMP activates VpsR is not understood. Using error-prone PCR, the *vpsR* gene containing random mutations was cloned into *E. coli* and subsequently conjugated into *V. cholerae* to be used in a high-throughput screen to identify VpsR proteins that no longer responded to c-di-GMP. Sequencing of these mutations will allow identification of the amino acids in VpsR necessary for binding to c-di-GMP. 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 binding impacts VpsR activity and how c-di-GMP regulates biofilm formation in *V. cholerae*.

ROLE OF THE GROUP B STREPTOCOCCAL NADH PEROXIDASE IN REACTIVE OXYGEN STRESS TOLERANCE WITHIN THE MACROPHAGE

Brian Snyder

Poster: 422

Mentor(s): Shannon Manning (Microbiology and Molecular Genetics)

Group B *Streptococcus* (GBS), a leading cause of neonatal meningitis and sepsis, asymptotically colonizes up to 25% of woman and can persistently colonize after antibiotic administration. Sequence type (ST) 17 has been associated with invasive disease and is referred to as a hypervirulent lineage. The ability of GBS to evade the immune system and cause severe disease could be attributed to its ability to persist within macrophages as we previously demonstrated that a ST-17 strain could survive intracellularly for up to 72 hours. Because RNA sequencing identified *npx*, which encodes a NADH peroxidase, to have a 25-fold and 10-fold increase in expression after 1 and 24 hours survival inside THP-1 macrophages respectively, we deleted *npx* to examine its role in intracellular survival. Compared to wild type (WT), Δnpx showed decreased survival 24 hours after macrophage uptake. This reduced survival was complemented through reintroducing *npx* on a complement vector. Moreover, Δnpx had significantly reduced survival after H₂O₂ exposure, but *npx* expression was not upregulated in the WT. The Δnpx mutant also showed no difference in H₂O₂ detoxification compared to the WT, which could be due to the presence of two other putative H₂O₂ detoxifiers in the GBS genome. Expression of these genes was reduced intracellularly at 1 and 24 hours, however, expression was upregulated in both genes after H₂O₂ exposure. Downstream studies are warranted to define the regulation of each gene and to better understand how they contribute to survival within macrophages.

EFFECT OF UNBALANCED MEALS ON PERIPHERAL LEUKOCYTE GLOBAL AND DIFFERENTIAL COUNTS IN HUMANS

Christopher Truszkowski

Poster: 423

Mentor(s): Etel Rocha-Vieira (Faculdade de Medicina)

Leukocytes play defensive roles against pathogens, but the immune system is also able to respond to non-infectious changes in the homeostasis of the body. Low-grade chronic inflammation present in obese individuals appear to be the result of an unbalanced diet; however, the acute effect of diet is not well established. This study aims to investigate whether unbalanced high carbohydrate or high lipid meals can change the distribution of leukocyte populations in blood. We hypothesize that distribution of leukocyte populations will vary by meal composition. 6 healthy volunteers had their blood collected after fasting overnight; then given a balanced meal on Day 1, a high carbohydrate meal on Day 2, and a high lipid meal on Day 3. Blood was collected 1 and 2 hours postprandial. Blood samples were used to assess leukocyte global and differential counts by microscopy. Data presented as mean \pm SD; found using ANOVA One-

Way, $p=0.05$. Significant differences were only found in balanced meals. In global leukocyte counts, we only exhibited an increase between fasting (5800 ± 647) and 2hrs postprandial (8135 ± 1395) blood. For the differential count, we observed an increase in monocytes between fasting (232.0 ± 25.9) and 2hrs postprandial (357.9 ± 61.4); and also an increase in neutrophils between fasting (3358.2 ± 374.7) and 2hrs postprandial (5361.0 ± 919.6). Significant increases on differential and global counts were observed in balanced meals only. Therefore, our hypothesis of expecting variation of leukocyte populations in unbalanced meals was not supported by our data; however, due to issues in the design, it should be completed again for better results.

BACTERIA STRAINS OF THE RED CEDAR AND ANTIBIOTIC RESISTANCE

Alexis Waslowski

Poster: 424

Mentor(s): Terence Marsh (Microbiology and Molecular Genetics)

Hospitals releasing antibiotics into the environment has been known to change the genetic makeup of bacteria and their resistance over time. Antibiotic resistance of 858 various strains was tested by stamping on a variety of antibiotic plates. Overall most of the strains analyzed and observed were found to be resistant to the antibiotic/s. The results were also compared to previous recorded antibiotic resistance patterns found in literature, most of which were clinical strains. One may be able to predict antibiotic resistance patterns of not discussed strains by comparing both sets of data.

BACTERIAL INFLUENCES ON LAKE STURGEON EGG MORTALITY

Donna Ye

Poster: 425

Mentor(s): Terence Marsh (Microbiology and Molecular Genetics)

Lake Sturgeon (*Acipenser fulvescens*) is one of the longest-lived and oldest species of fish found in the Great Lakes. Before the 1800s, this fish was abundant but the population has been in continuous decline due to overfishing and habitat loss. Conservation efforts include rearing eggs and larvae in hatcheries and releasing fry to help maintain populations. However, the egg mortality rate of these species remains high, putting the species at continued risk. To determine the role of bacteria in egg mortality we have isolated ~300 bacterial strains from eggs collected from Black River MI, 2-3 days after spawning. All the bacterial isolates were identified phylogenetically and screened for hemolytic and protease activities (virulence factors) and their ability to form biofilm. Approximately 62% of the samples were positive for extracellular protease and 48% were positive for β -hemolysin. Biofilm formation varied among species as follows; *Aeromonas* (196 strains; 51.9% positive for biofilm), *Pseudomonas* (54 strains; 14.3%), *Albidiferax* (17 strains; 4.5%), *Flavobacterium* (13 strains; 3.4%), *Serratia* (13 strains; 3.4%). The majority of the abundant genera isolated from eggs are linked to fish pathogenicity suggesting that high egg mortality in spawning areas is in part due to bacteria. Illumina sequencing of bacterial communities from river water and eggs revealed complex but very different communities. The *Aeromonas* population was only 1.3% of the water community but represented 26.5% of the egg community. These data also suggest that egg mortality due to bacteria is a concern in the maintenance of sturgeon populations.

NEUROSCIENCE

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

STRUCTURAL VARIATION OF KV1.1 CHANNELS IN ONYCHOMYS' PAIN-SENSING NEURONS

Zachary Bordeaux

Poster: 428

Mentor(s): Ashlee Rowe (Neuroscience), Kaitlyn Sherer (Neuroscience)

Onychomys mice are carnivorous and prey on venomous scorpions (*Centruroides*) that produce lethal and painful venom. Intra-plantar hind-paw injections of *Centruroides* venom show decreased pain-related behavior (paw licking) in *O. arenicola* (OA) and *O. torridus* (OT) compared to sensitive animals (*Mus musculus*, house mouse). We aim to understand the mechanisms underlying *Onychomys*' decreased sensitivity to painful venom. Our lab has shown that voltage-gated sodium (Na^+) channel Nav1.8 is involved in reduced pain sensitivity of OT, but closer examination of OA Nav1.8 reveals it is not sufficient to reduce pain signals in this species. Voltage-gated potassium (K^+) channels, specifically the Kv1 family, are known targets of *Centruroides* venom and are critical in regulating neuronal excitability. One member, Kv1.1 is directly involved in cessation of peripheral pain signals. To reduce excitability of pain-sensing

neurons, I hypothesize that *Onychomys*' Kv1.1 contain structural variants that will modify its' function. To test this, RT-PCR was performed with dorsal root ganglion (DRG) tissue from OA and OT. DRG tissue was used because it contains the cell bodies of neurons in the peripheral pain pathway. Sequencing revealed differences in both OT and OA Kv1.1 compared to *M. musculus*. OA has two changes in the amino-terminus: A14T and H30R; OT also exhibits A14T and H30R but additionally possesses a variant in the S4 region: H308N. Due to the critical location of these amino acid variants, the structural changes in Kv1.1 likely produce functional changes and provide a mechanism for decreased sensitivity to pain-inducing venom in *Onychomys*.

SYSTEMIC TRKB ACTIVATION WITH 7, 8-DIHYDROXYFLAVONE DOES NOT AMELIORATE DISEASE PROGRESSION IN A MOUSE MODEL OF NEUROMUSCULAR DISEASE

Rachel Connelly

Poster: 429

Mentor(s): Marc Breedlove (Neuroscience), Katherine Halievski (Neuroscience), Cynthia Jordan (Neuroscience)

Spinal bulbar muscular atrophy (SBMA) is a neuromuscular disease that only occurs in males, is androgen-dependent and linked to a polyglutamine expansion mutation in the androgen receptor. Symptoms of SBMA include muscular atrophy and weakness and there is currently no treatment. Previous findings suggest one potential underlying cause for disease symptoms could be a loss of the neurotrophic factor BDNF (brain-derived neurotrophic factor) in skeletal muscle. Thus, the purpose of this research was to determine if 7, 8-Dihydroxyflavone (7, 8-DHF) could ameliorate disease symptoms in a mouse model of SBMA. 7, 8-DHF is a selective agonist for the BDNF TrkB receptor. 7, 8-DHF has been shown to improve motor function in mice modeling another neuromuscular disorder, amyotrophic lateral sclerosis. In this experiment, we intraperitoneally injected 7, 8-DHF (n=11) or vehicle (n=9) into SBMA mice globally overexpressing the disease allele. Mice (28-32 days old) received injections (5mg/kg 7, 8-DHF) or control injections three times weekly. An experimenter blind to treatment monitored the progression of the disease based on hang time, body weight, and grip strength until mice reached end stage disease, defined by hang times < 30 seconds. The results of this study showed no differences in the average age of disease onset or age they reached end stage. A higher dose and/or more frequent injections may be required to see an effect. Alternatively, we may need to specifically target the synaptic region of skeletal muscles rather than treat systemically.

FORAGING BEHAVIOR IN A VARYING ENVIRONMENT

Carl Gelger

Poster: 430

Mentor(s): Arend Hintze (Integrative Biology)

Most organisms have to forage for their food in changing environments. With the amount of alterations a location can experience, organisms are forced to adapt in order to survive. Here we want to explore under which circumstances adaptive behavior evolves, and how behavior evolves in these circumstances. Experimental evolution of natural organisms is inconvenient to study given the lengthy amount of time needed to gather data; therefore we use a computational model instead. In this model mobile agents are controlled by evolvable Markov Brains, who have to forage for different kinds of foods. Where food can be found differs from generation to generation, and thus requires the agents to evolve a foraging strategy that is adaptive to the present situation. We hypothesize, that the degree of adaptability depends on the variability of the environment. In constant environments we assume a stereotypic behavioral response to evolve, while changing environments will require agents to evolve an adaptive response. Beyond these extreme points, we test to what degree temporal spatial variation is required for an adaptive response.

SEXUALLY DIMORPHIC INDUCED BIOCHEMICAL RESPONSES TO MORPHINE EXPOSURE

Michael Kain

Poster: 431

Mentor(s): Michelle Mazei-Robison (Physiology)

Opiate addiction has increased 300% over the last decade in the US, leading to a sharp increase in overdose deaths as well as producing significant economic and social welfare costs. Despite the harmful consequences of long-term opiate use, little is known about the effects of chronic opiate exposure on neuronal structure and function. Our lab has shown that chronic morphine exposure decreases the size of dopamine (DA) neurons in the ventral tegmental area (VTA) of mice and that the decrease in size predicts changes in DA neuronal activity and the rewarding properties of opiates. However, a big limitation of the current studies is that almost all of the work has been exclusively conducted using males despite the fact that there is increasing evidence for sex differences in natural and drug reward processing and addiction. While prior studies illuminate that opiates modify VTA DA neuron morphology through changes in neurotrophic signaling patterns in male rodents, whether similar adaptations and mechanisms occur in females is unknown. In my project, I examined the levels of total and phosphorylated forms of neurotrophic signaling proteins via

western blot analysis in male and female mice that underwent either sham or chronic morphine exposure. I found phospho-AKT and phospho-NDRG levels were decreased in morphine-treated mice and that this effect appeared to be more pronounced in females compared to males. Future studies should address whether females are more sensitive to morphine effects by determining the dose-response relationship of morphine-induced biochemical changes in the VTA.

ROLE OF HISTONE DEACETYLASE-9 ON VASCULAR REMODELING OF THE BASILAR ARTERY IN HYPERTENSION

Melody Marzjarani

Poster: 432

Mentor(s): Stacie Demel (Pharmacology and Toxicology)

Subarachnoid hemorrhage from ruptured cerebral aneurysms has 50% mortality. Cerebral arteries undergo remodeling in the presence of hypertension, which in turn is a risk factor for cerebral aneurysm formation. Human genome wide association studies implicate histone deacetylases (HDACs), specifically HDAC-9, in this process. Previous studies have illustrated the role of HDAC-9 in endothelial cell injury, suggesting a potential mechanism for remodeling. In our study we will use histopathological techniques to compare the structure of the basilar artery between hypertensive and normotensive rats. We used a genetic model of hypertensive rats, Spontaneously Hypertensive Stroke Prone (SHRSP) rats and Wistar Kyoto (WKY) rats as normotensive controls. Basilar arteries were extracted and fixed in 4% formaldehyde prior to sectioning (20 μ m). Sections were stained with hematoxylin and eosin to assess basilar artery structure. Other sections were co-stained with fluorescently tagged β -actin, a marker for smooth muscle cells, and HDAC-9 antibodies to determine the presence and localization of HDAC-9. We hypothesized that (1) there will be remodeling in the basilar arteries of hypertensive rats, and (2) that HDAC-9 is located in basilar arteries, and is increased in arteries from hypertensive rats compared to normotensive controls. These results are important to identify potential therapeutic targets to prevent cerebral aneurysm formation and rupture. Future studies will entail co-localizing HDAC-9 with markers of endothelial cells and macrophages in normotensive and hypertensive rats to further characterize this protein's role in the pathogenesis of aneurysms.

MEHG-INDUCED CYTOTOXICITY THROUGH VESICULAR RELEASE OF GLUTAMATE IN MOUSE PRIMARY CEREBELLAR AND CORTICAL ASTROCYTES

Paige McKeon

Poster: 433

Mentor(s): William Atchison (Pharmacology and Toxicology)

Methylmercury (MeHg) produces excitotoxicity in neurons by enhancing their release of glutamate. Astrocytes protect the neurons by removing glutamate from the extracellular space. Studies have shown that MeHg also affects astrocytes by causing them to release glutamate, which exacerbates neuron excitotoxicity. The objective of this study was to determine if MeHg could produce cytotoxicity through the vesicular release of glutamate in cerebellar and cortical astrocytes. Primary astrocyte cultures of 7-8 days old mice were exposed for 3h to 0, 1, 2, or 5 μ M MeHg. Cytotoxicity was measured 24h after exposure using EthD-1 and calcein-AM. To determine if astrocyte death was due to a vesicular release of glutamate, Rose Bengal (RB) was added to inhibit glutamate uptake into vesicular lumen. The mean percentage of cell death in the MeHg+RB group of cerebellar astrocytes was: 0.6%, 2%, 9%, and 30% at 0, 1, 2, or 5 μ M MeHg, respectively. In the MeHg+RB group of cortical astrocytes, it was: 2%, 5%, 14%, and 29%, respectively. Compared to the MeHg exposure group, there was a significant reduction in cell death of 61% and 67% at 2 and 5 μ M MeHg in cerebellar astrocytes treated with MeHg+RB. In the MeHg+RB group of cortical astrocytes, there was a significant decrease in cell death of 37% at 5 μ M MeHg in comparison to the MeHg group. This suggests that vesicular release of glutamate from astrocytes due to MeHg toxicity contributes to cerebellar and cortical astrocyte death. Supported by NSF grant DBI1359302 and NIH grants R01ES024064 and T32GM092715.

IS THERE A CHEMICAL BASIS FOR NEURONAL CO-TRANSMISSION?

Katarzyna Purzycka

Poster: 434

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: ascorbate, dopamine, epinephrine, norepinephrine, GABA, glutamate, glycine, histamine, serotonin, Met-enkephalin and thyrotropin releasing hormone. Data from our experiments will be provided and our hypothesis tested against the results.

THE SCIENCE OF SONNETS: AN FMRI INVESTIGATION INTO THE NEUROSCIENCE OF READING

Addy Wood, Derrick Dwamena, Ben Horne

Poster: 435

Mentor(s): Natalie Phillips (English)

The field of literary neuroscience is a rapidly expanding field providing valuable insights into the cognitive processes involved in reading. The cognitive processes involved in reading sonnets has historically been an understudied aspect of literary neuroscience. Our study aims to investigate the neural structures involved in reading poetry, specifically sonnets. Sonnets have been a part of western culture since the 13th century, but the research into the cognitive processes involved has been largely untapped. In our study, English undergraduates read 16 sonnets inside a functional Magnetic Resonance Imaging scanner. Participants read both Elizabethan and Petrarchan sonnets, 8 of each. Participants were asked to highlight during moments that were aesthetically pleasing in green and moments that were aesthetically displeasing in red. Eye tracking was used throughout to more effectively track the participant's reading. We hypothesized that during moments of aesthetic pleasure, the intraparietal sulcus (IPS) will have heightened activation, while moments of aesthetic displeasure will show decrease activation in the IPS. This research will hopefully help develop a more complete understanding of the cognitive processes involved in various forms of reading that are embedded in western culture.

NEUROSCIENCE POSTER PRESENTATIONS, SECTION 2 BALLROOM, 11:00 AM – 12:30 PM

SEXUAL EXPERIENCE RESCUES MALE-MALE AGGRESSION IN PREVIOUSLY NON-AGGRESSIVE TRPC2 KNOCK-OUT

Sarah Baribeau, Zach Smith

Poster: 438

Mentor(s): Marc Breedlove (Neuroscience), Cynthia Jordan (Neuroscience), Daniel Pfau (Neuroscience)

Male-typical pheromones detected by the vomeronasal organ facilitate male-male aggression in mice. Knocking out the TRPC2 gene, an essential component of vomeronasal neuron signaling, eliminates male-male aggression in mice. A single 10-day pairing with a female is reported to be insufficient to rescue aggression in TRPC2 knockout (KO) males (Leypold et al., 2002. Proc Natl Acad Sci. v99i9. P6376-81). However, we find that multiple pairings with a female does in fact restore male-male aggression. KO male breeders (?2 successful pairings with a female) were compared to age-matched (200 days +) sexually naïve KO males. After one week of single housing, such males in their home cage were transported to a behavioral testing room. After a 10 minute acclimation period, a randomly selected male stimulus mouse was then introduced into the resident's cage. Behavior was videotaped for 10 minutes and analyzed for aggression and sexual behavior. Preliminary data indicate that sexual experience, but not old age, can restore aggression in KO males. Since aggression is normally triggered by pheromones, and the loss of TRPC2 impairs the detection and/or processing of pheromonal information, these novel findings raise fundamental questions about the factors necessary and sufficient to trigger aggression. Moreover, the fact that sexual experience is sufficient to rescue aggression in KO mice prompts questions about the nature of the change. Has the brain been rewired by sexual experience?

EVOLVING BRAINS IN DIGITAL ORGANISMS

Jordan Salvi

Poster: 439

Mentor(s): Mark Reimers (Neuroscience Program)

We are investigating the evolution and development of brains and biological neural networks using simulated organisms in a simplified digital environment. We hope that these artificial creatures, known as 'animats', can give neuroscientists a direct view into the black box of neural circuitry in a comprehensive way that isn't possible or practical with current recording technologies in real organisms. The simulated brain framework is implemented according to our best understanding and theories about how evolution and genetics shape real brain structures and processes. We present the

results one of the most basic forms of our animat: a sphere that learns to move and find food in a 3D space, controlled by a genetically configured spiking neural network model that evolves over many generations. We analyze the behaviors of this animat in terms of how well it learns to capture food, and how closely it emulates simple organisms, and then investigate how evolution has shaped its neural circuitry to create these behaviors. This simulation runs on the MSU HPCC and is written in the Julia programming language.

HEK CELL VIABILITY IN RESPONSE TO BLUE LIGHT

Kylie Smith

Poster: 440

Mentor(s): Erin Purcell (Biomedical Engineering)

Optogenetics is a technique that uses a combination of optics and genetics to control specific cellular events. Recently, techniques have been developed to use light to induce gene expression, where stimulation by a specific wavelength of light stimulates transcriptional activators to drive gene expression in transfected cells. A key advantage of this approach is the ability to control gene expression in a highly defined spatial pattern. We have adopted a blue-light activated gene expression system, EL222, to drive proneural gene expression for applications in neural regeneration. Currently, we are optimizing our optical stimulus to deliver induced gene expression while maintaining robust cellular viability. Using HEK 293 cells, we will characterize the most efficient method of blue light delivery in regards to intensity and duration in vitro through live/death assays.

COCAINE DEPENDENT ALTERNATIONS IN SYNAPTIC MORPHOLOGY OF HIPPOCAMPAL PYRAMIDAL NEURONS

Audrey St Germain

Poster: 441

Mentor(s): AJ Robison (Physiology)

Drug addiction is characterized by the continued seeking and taking of drugs despite adverse consequences. The hippocampus, a brain region essential for learning and memory, has been implicated in this process, as the user typically makes associations between the drug and the environment that can prompt craving and relapse. Thus, in order to better treat addiction, we require a better understanding of the synaptic underpinnings of these hippocampus-driven associations. It has been shown that cocaine exposure causes an upregulation of a transcription factor γ FosB, which is activated and builds up over chronic exposure, and can influence gene expression for extended periods of time. γ FosB has been found to be upregulated by drugs in other regions of the brain, including the nucleus accumbens (NAc), also known as the reward center, and its expression there is critical for cocaine-mediated behaviors in mouse models. The ventral hippocampus (vHipp) exerts top-down control over the NAc, and thus cocaine-dependent induction of γ FosB in vHipp may also be critical for drug responses. Excitatory signaling in the hippocampus occurs at dendritic spines, small postsynaptic specializations whose number, size, and shape correspond to synaptic number, strength, and maturity. I treated mice chronically with cocaine in a novel environment and used confocal imaging to quantify the morphologic changes in both the ventral and dorsal hippocampus neuron dendritic spines. Discovering the hippocampal synaptic changes due to cocaine, and the role of γ FosB in these changes, will be an essential step for understanding how drug-environment memories are formed.

REPRODUCTIVE STATE CHANGES IN 5HT-1A AND 5HT-2A RECEPTOR MRNA IN THE PREFRONTAL CORTEX AND DORSAL RAPHE NUCLEUS

Catherine Washington

Poster: 442

Mentor(s): Joseph Lonstein (Neuroscience)

Serotonin release within the brain influences many aspects of maternal behavior. Cells of the midbrain dorsal raphe nucleus (DR) are a major source of serotonin, and modulate maternal behaviors by sending projections to forebrain regions like the prefrontal cortex (PFC). Though it is known that the concentrations of serotonin change throughout maternal states, no studies have shown how the expression of serotonin receptors differ across these states. In this experiment, we used PCR to quantify levels of 5HT-1A and 5HT-2A receptor mRNA in the PFC, and 5HT-1A in the DR of diestrus virgins (DV), pregnancy day 10 (P10), parturient (Part), and postpartum day 7 (PP7) female rats. We found no change across reproduction in 5HT-1A or 5HT-2A mRNA in the PFC. In the DR, we found an increase in 5HT-1A mRNA from DV to Part and then decrease through PP7. Because 5HT-1A receptors in the DR are autoreceptors (reduce serotonin release when activated), these findings suggest that at parturition, there is less need for serotonin. At PP7, the decrease in 5HT-1A mRNA suggests less inhibition of serotonin. We propose that the maternal behaviors exhibited at parturition may require reduced serotonin while the behaviors at PP7 are influenced by the increased presence of serotonin. Additionally, these behavioral changes across maternal states may not be regulated by 5-HT1A or 2A

receptors in the PFC. Follow up studies will analyze the binding of serotonin to these receptors to provide further insight into the influence of brain 5-HT receptor expression on postpartum behaviors.

OPIATE INDUCED DOPAMINE NEURON MORPHOLOGICAL CHANGES

Katie Wheeler

Poster: 443

Mentor(s): Michelle Mazei-Robison (Neuroscience)

In 2014, the CDC reported that there are 46 deaths per day from prescription opioid overdose in the USA. Opiate dependence develops from chronic administration, and leads to morphological changes in neurons within the mesocorticolimbic system, particularly in the ventral tegmental area (VTA) dopamine (DA) neurons. Previous work from our lab has shown that opiates reduce VTA DA neuron soma size, which is correlated with increased DA activity and decreased opiate reward. Prevention of this morphological change is sufficient to rescue the morphine-induced changes, suggesting that decreased soma size is important in addiction-related processes. To better understand the circuit-based consequences of morphine-induced neuroadaptations, we are comparing the morphology of VTA DA neurons that project to the nucleus accumbens (NAc) versus those that project to the prefrontal cortex (PFC). Our experimental design is to label NAc- or PFC- projecting DA neurons via infusion of retrograde Cre-dependent viral constructs into tyrosine hydroxylase (TH)-Cre and dopamine transporter (DAT)-Cre mice, followed by comparison of VTA DA soma size under basal and chronic morphine conditions. I am currently identifying TH-Cre and DAT-Cre mice through genotyping, sectioning and mounting samples from virally-infused mice, and quantifying the viral targeting via immunohistochemical analysis. The overall objective of our studies is to delineate the pathways in the brain that undergo neuroadaptation in response to chronic opiate abuse in order to better understand the mechanisms underlying addiction, which is a necessary step to improve treatments.

CIRCUIT-SPECIFIC EXPRESSION OF Δ FOSB IN CHRONIC SOCIAL STRESS

Basma Al Masraf

Poster: 444

Mentor(s): AJ Robison (Physiology)

The ventral hippocampus (vHPC) controls emotional memory through projections to the nucleus accumbens (NAc) and the basal lateral amygdale (BLA), associated with reward and anxiety, respectively. Our lab has shown that the transcription factor Δ FosB regulates hippocampal morphology and hippocampal plasticity. I will investigate whether

will investigate whether

this out via viral injections of retrograde herpes simplex virus (HSV) expressing mCherry in the BLA or NAc and measure the expression of mCherry in vHPC cells. I will determine whether there are differences in basal Δ FosB expression

between male and female mice in the vHPC cells that project to either the BLA or the NAc using immunohistochemistry and whether there are differences in number or location of those projection cells in vHPC between female and male mice. I aim to uncover the effects of stress on Δ FosB expression in these projection cells

into the NAc or the BLA and apply chronic social defeat stress, then measure depressive- and anxiety-like behaviors. To determine whether stress mediates Δ FosB expression in

mCherry and immunohistochemistry in stressed and control mice. I hypothesize that stress will lead to increased Δ FosB expression in vHPC projection neurons of both females and male mice. These results will critically inform ongoing studies in the lab that implicate Δ FosB expression in HPC on resilience to social defeat stress.

expression in vHPC projection neurons of both females and male mice. These results will critically inform ongoing studies in the lab that implicate

studies in the lab that implicate Δ FosB expression in HPC on resilience to social defeat stress.

NEUROSCIENCE

POSTER PRESENTATIONS, SECTION 3

LAKE HURON ROOM, 3:00 PM – 4:30 PM

MOVEMENT RELATED CORTICAL POTENTIALS DURING A BIMANUAL COORDINATION TASK

Jennifer Brand

Poster: 447

Mentor(s): Alexander Brunfeldt (Kinesiology), Phillip Desrochers (Kinesiology), Florian Kagerer (Kinesiology)

Executing movements requires the formation of motor plans in the brain. Electroencephalography (EEG) measures changes in electrical activity coming from neural populations. Movement related cortical potentials (MRCP), derived from EEG, reflect movement planning in the brain. This study examined MRCPs during a complex bimanual motor task. Twenty-four (13 experimental, 11 control) right-handed participants performed a bimanual visuomotor perturbation task. Participants performed the task in three phases. In the baseline phase, participants reached to targets with normal visual

feedback. In the exposure phase, the visual feedback for the right hand was rotated by 40 degrees in the experimental group, to which participants adapted during the task. In the post-exposure phase, participants again reached to the targets under normal visuomotor conditions. Concurrently recorded EEG was epoched around movement onset of each reach (-1100ms to -100ms before movement onset). Epochs were averaged and compared between early and late exposure. We evaluated MRCPs at frontal, central, and parietal sites. At the frontal site, we found a trend for group differences, but no differences between early and late stages of adaptation. At the central site, we found a significant timing x group interaction ($p=0.045$), but no main effects. At the parietal site, we found a trend for group differences, but no main effect of timing and no interaction. These data demonstrate region-specific differences in MRCPs in this task. Larger magnitude MRCPs in the group exposed to a perturbation may be related to increased movement planning demands during the complex motor task.

NEURAL MECHANISMS BY WHICH NEUROTENSIN NEURONS SENSE THIRST AND REGULATE WATER INTAKE

Sabrina Fowler

Poster: 448

Mentor(s): Gina Leininger (Physiology)

Water intake is crucial for maintaining cellular osmolality and survival, thus thirst is an essential drive to maintain health. Despite its exigency, little is known about the physiological mechanisms by which the brain coordinates the need for water with the behavior to drink. Current research suggests that the Lateral Hypothalamic Area (LHA) is crucial for both eating and drinking. Additionally, subtypes of neurons within the LHA have been found to modify eating behavior. Previous work in the Leininger lab has found that activation of LHA Neurotensin (Nts) neurons results in vigorous drinking but not eating. This experiment sought to identify the impact dehydration has on that activation of LHA Nts neurons as well as identify which areas of the brain are in communication with these neurons. Monosynaptic tracing confirmed that circumventricular organs, Subfornical Organ (SFO) and Vascular Organ of Lamina Terminalis (OVLT), synapse to the LHA. We observed a trend for dehydration to increase the activation of LHA Nts neurons, however it was observed that dehydration may also increase the number of Nts expressing neurons. This experiment suggests that dehydration can regulate both the activity of LHA neurons and expression of Nts. Suggesting there are two mechanisms by which the LHA can respond to dehydration signal. This data supports the hypothesis that LHA Nts neurons are possible downstream targets of osmolality-sensing neurons. This work contributes to a larger goal of understanding drinking behavior to better address problems of over-consumption of water (e.g. polydipsia) and in under-consumption of water (e.g. dehydration).

SYNAPTIC PLASTICITY WITHIN THE PERFORANT PATHWAY OF FMR1 KNOCKOUT MICE

Samuel Gregerson

Poster: 449

Mentor(s): Charles Cox (Physiology)

Fragile X Syndrome (FXS) is the most common form of inherited intellectual disability. Those afflicted with FXS exhibit cognitive and behavioral impairment with a significant proportion diagnosed with Autism Spectrum Disorder. FXS is caused by an absence of the Fragile X Mental Retardation Protein, and lack of this protein has been associated with alterations in neuronal function. The hippocampus is a brain region associated with learning and memory. Early studies within the hippocampus using *Fmr1* knockout mice have demonstrated alterations in long-term depression, a specific form of synaptic plasticity. My research focuses on the primary input into the hippocampus, namely the perforant pathway that connects the entorhinal cortex to the dentate gyrus. This pathway has two anatomically and physiologically distinct projections into hippocampus: lateral and medial pathways. Activity within the lateral pathway has been associated with novel object recognition, a behavioral representation of memory that is compromised in *Fmr1* knockout mice. My working hypothesis is that long-term potentiation (LTP), another form of long-lasting synaptic plasticity, is dampened within the lateral perforant pathway innervating the dentate gyrus of *Fmr1* knockout mice. To test this, I will make extracellular electrophysiological recordings from the dentate gyrus of brain slices. LTP will be elicited by high frequency tetanic electrical stimulation of either the lateral or medial perforant pathway within the dentate. I will isolate these distinct pathways and evoke LTP, comparing the magnitude of potentiation elicited in wild type animals and *Fmr1* knockout animals.

IS TRANSCRIPT FOR THE NEONATAL ISOFORM OF A CALCIUM REGULATING PROTEIN EXPRESSED IN ADULT MUSCLE AFFECTED BY THE NEUROMUSCULAR DISEASE SBMA?

Yazeed Haddad

Poster: 450

Mentor(s): Kathy Halievski (Neuroscience)

Spinal and bulbar muscular atrophy (SBMA) is an androgen dependent disorder linked to a polyglutamine expansion in the androgen receptor. Mouse models of SBMA exhibit skeletal muscle dysfunction including weakened contractile ability and generation of force, which is independent of muscle mass. Disruption in calcium homeostasis could explain this muscle dysfunction since calcium ions are key to generating muscle contraction. Here, we focus on SERCA1, which is an ATPase that brings calcium ions from the cytosol to the sarcoplasmic reticulum for storage. SERCA1 is one of three homologous genes that encode for this protein and exists in two isoforms that differ at exon 22: the adult (SERCA1a) and neonatal (SERCA1b) isoforms. Using quantitative PCR (qPCR) we previously found a down regulation in Adult-specific and Total mRNA transcript levels in the skeletal muscle of two SBMA mouse models. In the current study, we further explored the levels of the Neonatal isoforms in SBMA muscle using semi-quantitative PCR (sqPCR) since it was not possible to do so with qPCR. sqPCR allows quantification and comparison of adult and neonatal isoforms based on the presence or absence of exon 22, which results in two product sizes that can be separated on an agarose gel. If we find an increased level of the neonatal isoform, it may provide an explanation of muscle dysfunction in SBMA since the neonatal SERCA1 isoform has a reduced efficiency. Understanding which aspects of skeletal muscle calcium homeostasis are dysregulated in SBMA will provide better targets for therapeutics.

EFFECTS OF LIGHT DEFICIENCY ON MALE SEXUAL BEHAVIOR IN A DIURNAL GRASS RAT

Julian Johnson

Poster: 451

Mentor(s): Lily Yan (Psychology)

The prominent effects of light can be observed in Seasonal Affective Disorder (SAD), a major depressive disorder. Dim lighting conditions in a diurnal rodent model can cause depression-like symptoms, anxiety-like symptoms, and impairments in cognition but the effects of dim light on sexual behavior are not well documented. The Nile grass rat, *Arvicanthis niloticus*, was used as a diurnal animal model of SAD to investigate the effects lighting conditions and male sexual behavior. After males were housed in bright light conditions (1000 lux, BLD) or dim light conditions (50 lux, DLD) for periods of 5 weeks, they were paired with primed females to observe their sexual behaviors. Behaviors were videotaped and analyzed. Data showed that grass rats in the DLD group showed lower levels of sexual activity compared to grass rats in the BLD group. This is a possible implication that androgen levels could be altered by lighting conditions.

ROLE OF SGK1 IN HIPPOCAMPAL DENDRITIC SPINE ALTERATIONS AFTER CHRONIC COCAINE

Emily Steffke

Poster: 452

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 environments 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 the alterations in synaptic connections that underlie drug-environment associations. Excitatory hippocampal neurotransmission occurs at dendritic spines, small postsynaptic specializations whose number, size, and shape correspond to synaptic number, strength, and maturity. In order to determine the effects of SGK1 on spine morphology, I administered bilateral injections of GFP or GFP+SGK1 virus to the hippocampus in two groups of mice. Their brains were sectioned and mounted for confocal imaging and the number of stubby, thin, mushroom, and total spines in hippocampus were quantified relative to the length of the dendrite using NeuronStudio software. Follow-up studies will investigate the role of SGK1 in the effects of cocaine administration on the spine morphology, as well as the effects of SGK1 mutants that alter the phospho-state of the protein. These studies will determine whether SGK1 plays an active role in cocaine-mediated changes in hippocampal synaptic function. Better understanding of the molecular pathways underlying context-driven relapse to drug seeking will be crucial in developing more effective treatments for drug addiction.

THE EFFECTS OF SOCIAL SHUFFLING DURING PUBERTY ON PUBERTAL CYTOGENESIS AND BEHAVIORS IN ADULTHOOD

Kristian Wilks

Poster: 453

Mentor(s): Cheryl Sisk (Neuroscience)

Mice are known social creatures who thrive from social connection and experience a significant negative impact when that connection is removed. Social isolation during adolescence has been greatly studied and has been shown to negatively affect neurogenesis and promote increased anxiety and depression in mice. Social instability regarding changing social partners, however, has not been given much attention despite social interaction being a key component in development of mice. As a social environment does not naturally consist of only familiar individuals, it is important to look at how a shift in social partners affects the developing brain. This study aimed to examine how an unstable social environment during puberty regarding a constantly changing social partner may have effected pubertal cytogenesis as well as behaviors similar to anxiety and depression in adulthood. For this experiment, mice of the same age were pair-housed during puberty, with one group having a constant cage-mate while one group of mice rotated cage-mates twice per week, every three and four days, until the end of puberty. Both groups received water containing bromodeoxyuridine (BrdU) during early puberty to tag proliferating cells at the time. In adulthood, the mice were tested for anxiety-like behaviors with the light/dark box and the open field test, and potential depression-like behavior was evaluated with the sucrose preference test. The brains were then collected and the density of surviving pubertally born cells was measured in the dentate gyrus of the hippocampus and the posterodorsal medial amygdala.

PHYSICAL SCIENCES

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

ELECTROCHEMICAL ANALYSIS OF ANTICORROSIVE COATINGS ON ALUMINUM

Jack Walton

Time: 1:30 PM

Mentor(s): Greg Swain (Chemistry)

The scope of this research is to qualitatively analyze the performance of a new anti-corrosion coating. This will be done using microscopy paired with electrochemical and enhanced aging tests. The presentation will include an overview of how each method works before showing the results of the experiments. Electron Microscopy can be used to see how well the coating binds to the surface of the sample and what elements are present in the coating itself. The most important data for analyzing the coating are the anodic and cathodic polarization curves. These can be directly compared to uncoated samples under the same conditions. This comparison will show how strong the coating is at protecting the surface from rusting. The aging test will also test the integrity of the coating. Furthermore, the benefits and drawbacks of using the new coating will be addressed. This will be done by looking at the broader impact that this may make commercially and environmentally.

CREATING AN ULTRALOW MAGNETIC FIELD ENVIRONMENT FOR PRECISION NMR MEASUREMENTS

Liam Clink

Time: 1:45 PM

Mentor(s): Jaideep Singh (National Superconducting Cyclotron Laboratory)

Measurement of electric dipole moments (EDM) can be used to demonstrate time reversal symmetry violation. If a non-zero EDM is measured, this suggests physics beyond the Standard Model. To measure the EDM of a species, nuclear magnetic resonance (NMR) is used. This technique measures the difference in energies of the nuclei. Since an EDM perturbs the energies accessible to the nucleus in the presence of a high electric field, this causes a small shift in the NMR frequency. This requires a very stable magnetic field because the energies are proportional to the magnitude of the magnetic field. Variation of external magnetic fields make it more difficult to measure the NMR frequency precisely so to acquire usable data it is critical to shield such experiments. μ metal is a good candidate for this application, as it has a high magnetic permeability which makes it good at "absorbing" and redirecting magnetic field lines. μ metal is also ferromagnetic; this is problematic because it means that over time the shield will become magnetized and as a result it is necessary to degauss or remove the residual magnetization of the shield regularly to prevent measurement bias. Since ferromagnetic materials exhibit hysteresis, they don't demagnetize when an opposing magnetic field is applied. I will describe the development of the degaussing apparatus.

CHARACTERIZATION OF THE MAGNETIC FIELD IN THE SPINLAB (ROOM 1350) AT NSCL

Daniel Coulter

Time: 2:00 PM

Mentor(s): Jaideep Singh (National Superconducting Cyclotron Laboratory)

One research focus of the Spinlab, a research lab at the National Superconducting Cyclotron Laboratory (NSCL), is the search for the permanent electric dipole moment of atoms originating within nuclei. Such searches require low, stable, and uniform magnetic fields, which are created inside of a magnetically shielded environment. In order to create such an environment and make best use of it, it is crucial to identify and monitor sources of external magnetic fields in the vicinity of such an environment. In April of 2016, I performed the first complete mapping of the magnetic field of the Spinlab, analyzed the data, and created a map of the magnetic field in the lab. This was done using four fluxgate magnetometers, which I used to measure the magnetic field at four different heights where the sensitive experiments will be taking place. In May of 2016, I mapped the magnetic field around the newly installed laser tables to determine their contribution to the magnetic field. In this talk, I will briefly describe the motivation for mapping the magnetic field of the Spinlab, the methods used to map the magnetic field, and present the results of both the room mapping and laser table mappings.

INCREASING THE ELECTRIC FIELD FOR AN IMPROVED SEARCH FOR TIME-REVERSAL VIOLATION USING RADIUM-225

Adam Powers

Time: 2:15 PM

Mentor(s): Jaideep Singh (National Superconducting Cyclotron Laboratory)

Radium-225 atoms, because of their unusual pear-shaped nuclei, have an enhanced sensitivity to the violation of time-reversal symmetry. A breakdown of this fundamental symmetry could help explain the apparent scarcity of antimatter in the Universe. We are attempting to observe this violation by precisely measuring the small shift in the Ra-225 nuclear magnetic resonance (NMR) frequency due to a coupling between a large electric field and the electric dipole moment (EDM) of Ra atoms. We are using a varying high voltage system to smooth the surface of metal electrodes in order to allow for higher voltage potentials between the electrodes. Increasing the high voltage that can be reliably applied between the electrodes and by narrowing the gap between the electrodes will improve the statistical sensitivity of our experiment. These parameters can be improved by creating a surface as smooth as possible on the electrodes. We are able to create micro-discharges that smooth impurities off of the surface of the electrodes by gradually increasing the voltage potential between the two electrodes in discrete steps. We carefully monitor the current passing through the electrodes in order to control the size of the discharges. Doing this multiple times allows us to continue increasing that voltage potential until we get a difference that is stable enough to create as large an electric field as possible.

A CATALOG OF VELOCITY SYSTEMS OF [SII] IN THE CRAB NEBULA

Huel Sears

Time: 2:30 PM

Mentor(s): Edwin Loh (Physics and Astronomy)

The Crab Nebula is a supernova remnant. This nebula is of great interest for studying elements produced in supernova explosions. My research focuses on velocity systems of [SII] in the Crab Nebula. Using images taken by Dr. Jack Baldwin, I extracted [SII] emissions from 472 unique knots. As there were so many knots, I could not efficiently examine each knot by hand. Accordingly, I wrote software to then find the three brightest [SII] velocity systems within each knot. In this talk, I will present a catalog of 1,416 [SII] velocity systems and statistics about the knots in the catalog. A catalog of these bright velocity systems will assist in studying this nebula.

3 GAMMA RECONSTRUCTION

Nicolas Dronchi

Time: 2:45 PM

Mentor(s): Gregory Severin (Chemistry)

Normally, positronium annihilation is a 2-gamma decay, but in some instances 3-gamma decays can occur. These 3-gamma events are of interest because they can be compared to the 2-gamma reconstructions used in imaging technologies like PET scans. The purpose of this research is to take these 3-gamma events and see if they can be used to reconstruct positional data of the initial decay and to what resolution they can be reconstructed. To reconstruct the decay, conservation of momentum and energy is being used to solve the problem geometrically. The data will be taken by the GRETINA gamma-ray detector using a sodium-22 source. The source was moved to 5 different positions over the period of the experiment and the detector read out the position of each gamma-ray as well as the energy.

Reconstructing the 3-gamma events to find the initial points of positronium before annihilation is useful because it has real applications. This could be useful in studying chemical environmental conditions, where 3-gamma events have different properties depending on its environment, as well as being useful in medical imaging, expanding the information PET scans receive.

STUDYING SHAPE COEXISTENCE OF ^{32}Mg THROUGH β -DELAYED NEUTRON DECAY

Jacob Duckworth

Time: 3:00 PM

Mentor(s): Sean Liddick (National Superconducting Cyclotron Laboratory)

Shape coexistence in nuclei far from stability is a phenomenon in which nuclei exhibit varying shapes at relatively low excitation energies. A particularly interesting region is the $N=20$ "island of inversion" in which nuclei do not follow the standard sequence of filling shell model orbitals, leading to a coexistence of deformed and spherical configurations. The experimental signature of this phenomenon is the appearance of low-lying 0^+ states in even-even nuclei. To study these low-lying 0^+ states, an experiment has been planned at the National Superconducting Cyclotron Laboratory to create the neutron-rich isotope ^{32}Mg which lies within the $N=20$ region. Specifically, the experiment will measure the half-life of a previously identified, excited 0^+ state in ^{32}Mg . This ^{32}Mg 0^+ state will be created by means of the fragmentation of primary ^{48}Ca beam to create ^{35}Na , and subsequent beta-delayed neutron decay to excited states in ^{32}Mg . From the measured time differences between primary beta-decay electron and secondary gamma rays, time difference spectra can be generated, and the desired lifetime extracted. In my presentation, I will discuss the preparation for this experiment including energy and time resolution optimization, as well as scintillation detection details, and future directions.

ANALYSIS OF NMR DATA FROM THE SEARCH FOR TIME-REVERSAL VIOLATION USING XENON-129 AND HELIUM-3 ATOMS

Jake Huneau

Time: 3:15 PM

Mentor(s): Jaideep Singh (National Superconducting Cyclotron Laboratory)

Time-reversal violation refers to the concept that the basic laws of physics are modified when the arrow of time is reversed. The existence of a permanent electric dipole moment (EDM) in atoms would be a clear signature of time-reversal violation and, at present and planned levels of experimental sensitivity, evidence of physics beyond the Standard Model. A search for the permanent EDM of Xe-129 is being conducted at the Technical University of Munich, which uses He-3 as a co-magnetometer to improve on the current limits of EDM searches. The experiment is conducted in a magnetically shielded room, which utilizes a small and stable magnetic field. The gas mixture of Xe-129 and He-3 are polarized outside of the room in a cell using spin-exchange optical pumping. The noble gas mixture is then transferred into the room where they are exposed to magnetic and electric fields. These fields cause the spins of atoms to precess at their unique nuclear magnetic resonance (NMR) frequencies, which is measured using an ultrasensitive magnetometer. Shifts in the NMR frequency correlated with the electric field can then be used to detect an EDM. Spin precession lifetimes exceeding 2700 seconds has been achieved for both of noble gas species. Analysis of spin precession data taken during test runs will be discussed.

PULSE SHAPE DISCRIMINATION IN NEUTRON DETECTORS

Evan Litch

Time: 3:30 PM

Mentor(s): Remco Zegers (Physics and Astronomy)

Pulse Shape Discrimination (PSD) is a method used to distinguish signals neutrons and gamma rays produce in neutron detectors/scintillators. The focus of the project was the analysis of different graphic methods to maximize the separation between gamma rays and neutrons, optimizing PSD analysis. Liquid neutron detector data was gathered, manipulated, and compared to display PSD in the different graphical methods utilized. An additional part to the project included verifying the signals produced by gamma rays and neutrons in plastic scintillators are indistinguishable. Results showed no change in difference between neutron and gamma ray components.

**PHYSICAL SCIENCES
POSTER PRESENTATIONS, SECTION 1
LAKE HURON ROOM, 9:00 AM – 10:30 AM**

HIRA 10 AND COSMIC RAYS

Jacob Crosby

Poster: 456

Mentor(s): Betty Tsang (High Resolution Array)

Do you love science? Have you ever wondered how we test what goes on inside a neutron star? Do you want to know more about the constant bombardment of radiation you receive from the universe? Then look no further! Come learn about a project that has been ongoing at the NSCL for 10 years called HiRA and how we use it to test for cosmic rays! Learn new enticing information on how the scientists in your backyard analyze high energy particles that simulate the never ending waltz of the cosmos.

SELECTIVE CROSS-COUPPLING TO (Z)-PRODUCT

Sandipta Haldar

Poster: 457

Mentor(s): Robert Maleczka (Chemistry), Susanne Miller (Chemistry)

Cross-couplings are an important class of carbon-carbon forming chemical reactions. Indeed, chemists working in fields ranging from drug discovery to organic electronic materials use cross-couplings widely. Such reactions typically involve the transition-metal catalyzed reaction of an organic halide with an organometallic species. Among the useful organometallics are organosilanes and organostannane. Interestingly, despite their common periodicity, organogermanes are relatively uncommon reactants in cross-couplings. Reasons for this include lower reactivity and stereospecificity. This lack of stereospecificity into an advantage by developing conditions that would favor the minor geometric isomer. To be precise, we sought to develop germanium cross-couplings (E)-vinylgermanes would (Z)-cross-coupled products. Because (Z)-products are not sterically favored, such a reaction would be a valuable complement to traditional cross-couplings. During studies designed to achieve this aim, we discovered that nanoparticle formation likely plays a beneficial role in the reaction. This presentation will emphasize what led to than discovery, efforts to optimize our first generation conditions and expand substrate scope as well as future implications on our research.

ANALYSIS OF GUNSHOT RESIDUE UTILIZING SEM/EDS TECHNOLOGY

Alexis Langtry

Poster: 458

Mentor(s): Per Askeland (Engineering and Chemistry), Carl Boehlert (Engineering)

For my Honors Research Seminar project, I will utilize a scanning electron microscope (SEM) to examine gunshot residue (GSR). Gunshot residue is the chemical compounds and particulate materials that result when a firearm is discharged. The gunshot residue samples will be collected from the exterior of the fired cartridge casings. These known cartridge casings will be classified by make and manufacturer. The particles from these samples will be compared and contrasted based upon their images provided by the SEM. Additionally, energy dispersive x-ray spectroscopy (EDS) will aid in the determination of trace elements found within the residue. Based upon the analysis of the samples, the individual particles will be classified under standard reporting criteria as either characteristic of, consistent with or commonly associated with GSR.

COATING POST-RINSE PH EFFECTS ON THE CORROSIVE RESISTANCE OF TCC COATED ALUMINUM

Christopher McAllister

Poster: 459

Mentor(s): Greg Swain (Chemistry)

Research regarding the formation of trivalent conversion coatings (TCC) on aluminum has become relevant due to concern over Cr(VI)-containing coatings. Development of TCC aluminum coating protocol yielding coating with strong comparable corrosive resistance could lead to the purging of toxic Cr(VI) from industry practice. Increasing alkalinity of the TCC coating post-rinse is a proposed method of improving the coating's galvanic and pitting corrosion resistances. Minimizing the current densities at specific potentials and the pitting potentials of the coated aluminum is integral to the understanding of TCC coating corrosive resistance. Linear polarization of Alodine T5900 (TCC) coated AA2024-aluminum alloy gives current at ranging potentials, from which current density and pitting potential can be determined.

REDUCTION OF AMIDES TO AMINES USING NA-SG AND NA-AG

Hayley Siegel, Kevin Bracco

Poster: 460

Mentor(s): Fatmata Jalloh (Chemistry)

Amine constitute an important intermediate in pharmaceutical industries, and is a key linking moiety in protein and peptide drug productions. Different reagents have been used in the reduction of amides to amines, such as lithium aluminum hydride (LiAlH₄), Ir, Pt, Ru, Fe, Zn, etc. Although these reagents are effective, they have some downsides: they can be expensive, difficult to make or handle, air and moisture sensitive, complex work up and purification process, may also reduce other groups in the compound of interest, or limited by other functional groups present. By applying the Bouveault-Blanc reduction method, under similar reaction conditions, amides have been successfully reduced to amine using both sodium encapsulated in silica and alumina gel (Na-SG and Na-AG). These reagents are commercially available free-flowing powders that are non-pyrophoric in dry air, and cheap. We have seen significant progress in the reduction of tertiary amides to amine, especially with Na-AG, giving a higher yield. We are currently exploring a wide range of amides to show the versatility of our reagents.

ELECTROACTIVATED REDUCTIVE ALKYLATION OF AMINES WITH ALCOHOLS

Driscilla Tetley

Poster: 461

Mentor(s): Benjamin Appiagyei (Chemistry)

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. In the method, in a one cell compartment, alcohol is oxidized on activated carbon cloth to a ketone or an aldehyde which is reacted with the amine and reduced on a Ruthenium on activated carbon cloth to form the desired alkylamine.

PHYSICAL SCIENCES POSTER PRESENTATIONS, SECTION 2 BALLROOM, 9:00 AM – 10:30 AM

STUDY OF THE AMPEROMETRIC DETECTION OF ESTROGENIC COMPOUNDS USING A TETRAHEDRAL AMORPHOUS CARBON THIN-FILM ELECTRODE

Elizabeth Katherine, Algaje Espinosa

Poster: 464

Mentor(s): Greg Swain (Chemistry)

The endocrine disrupting chemicals (EDCs) are organic pollutants that are able to mimic the effects of endogenous compounds. At extremely low doses, these pollutants cause reproductive and neurological disorders in both humans and wildlife. Estrogenic compounds represent a class of EDCs that are introduced to the environment through human and animal excretion. Whereby, it is important to develop an inexpensive technique that allows the detection of these metabolites in such a lower concentrations and complex matrices. Electrochemical methods offer reliable and inexpensive detection of estrogenic compounds. Nitrogen-incorporated tetrahedral amorphous carbon (ta-C:N) is a new carbon electrode material that has shown promise for the detection of several classes of analytes. This investigation studied the detection of estrone, estriol and estradiol using FIA and HPLC, both coupled with amperometric detection. The ta-C:N electrode performance was assessed. The electrode exhibited good electrochemical response and reproducibility in the current responses for all the three estrogenic compounds. The presentation will review the physical and chemical properties of ta-C:N electrodes and the detection figures of merit for estriol, estradiol and estrone.

TESTING AND CHARACTERIZATION OF LARGE PLASTIC SCINTILLATOR BARS FOR CHARGE-EXCHANGE REACTIONS STUDIES WITH NEUTRONS

Devon Thompson

Poster: 465

Mentor(s): Jorge Pereira (Physics), Remco Zegers (Physics and Astronomy)

The Low Energy Neutron Detector Array (LEND) is a neutron time-of-flight spectrometer developed at the National Superconducting Cyclotron Laboratory to measure neutrons produced in (p,n) reactions. The detector is designed to detect neutrons between 50 keV and 10 MeV with good timing resolution (better than 1 ns). It is not so suitable for detecting neutrons that are more energetic. To help cope with this issue, a new set of larger and thicker scintillator bars is currently being integrated into the setup. The goal of the present project is to characterize the new group of plastic scintillators, including measurement of the energy thresholds, energy/time resolution, and detection efficiency. Details on the methods employed in the detectors characterization will be discussed.

DETECTION OF HEAVY METAL IONS BY ANODIC STRIPPING VOLTAMMETRY USING A BORON-DOPED DIAMOND ELECTRODE

Vanessa Maldonado

Poster: 466

Mentor(s): Greg Swain (Chemistry)

Monitoring heavy metal ion levels in water is essential for human health and safety. Human activity has released these toxic metals into the environment and now the impact on the health of humans is high. Electroanalytical methods, in particular anodic stripping voltammetry with a Hg film electrode, have been used historically to identify and quantify certain heavy metal ions in a variety of sample types. Electrochemical methods are attractive for this analytical application due to their high sensitivity and reproducibility, ease of use and portability. In recent years, there has been a shift away from the toxic Hg to alternate electrodes that offer the same superlative performance. Boron-doped diamond is one of these alternate electrodes. In this presentation, we will present on the material properties of electrically-conducting diamond electrodes and on their performance for the anodic stripping voltammetric analysis of Zn²⁺, Cd²⁺, Cu²⁺ and Ag⁺ in standard solutions, drinking water and urine simulant. The diamond electrode offers chemical inertness, low detection limits, high sensibility and selectivity, which are all ideal for this analytical application.

LOOKING AT A TINY EFFECT IN NUCLEAR RADIATION DETECTORS

Gabriel Moreau, Steven Haywood

Poster: 467

Mentor(s): Oscar Naviliat-Cuncic (Physics and Astronomy)

Precision measurements in nuclear radiation spectroscopy require dedicated characterizations of radiation detectors used for experiments. Instrumental effects from such detectors and from the associated electronics can adversely impact measurements by either blurring a signal or by producing spurious structures which will appear in the recorded histograms. A well-known effect in the detection of nuclear radiation is the superposition of signals from independent events which are detected within a given time window, called pile-up. There are several methods available to correct measured spectra for pile-up effects when the two signals occur within a time window comparable to the duration of the signal. However, for some detectors, signals can have a long-lasting and weak component called "afterglow", which is due to phosphorescence within the detector and which occurs after the radiation is first detected. Because this component lasts longer than the prompt part of the signal, the probability for a second signal to superimpose itself on this component is large and can therefore affect measurements. There are no known methods available to correct for this effect. This presentation summarizes a study of pile-up effects of signals in CsI(Na) scintillation detectors. It involves measurements of the energy of gamma radiation from radioactive sources as a function of counting rates. We propose that the effects on the detector's response due to afterglow pile-up are similar to a change in the detector's gain.

UNDERSTANDING MARTIAN REGOLITH THROUGH GRAIN SURFACE TEXTURES ON TERRESTRIAL ANALOGS

Lillian Slajus

Poster: 468

Mentor(s): Michael Velbel (Earth and Environmental Sciences)

Arriving on Mars in May of 2008, the Phoenix Lander began imaging the Martian regolith. Without physical samples or chemical data from the grains, much of the geologic knowledge gained from the mission has to be determined from images. Fortunately for scientists, terrestrial analogs such as tephra from Hawaii's Mauna Kea and Pu'u Nene volcanoes are close simulants to Martian regolith and can be readily studied. During this study 294 SEM grain images from two analog tephra sites on Mauna Kea were inventoried for adhering particles, cracks, vesicles, planar fracturing, and glassy

surfaces. Because scientists know the eruption styles and chemical compositions of the Hawaiian grains, these features can be linked to volcanic mechanisms. The grain surface-feature inventories compiled during this study can be used to interpret the eruption mechanisms and relative water content of the volcanism that formed the terrestrial samples and, more importantly, the Phoenix grain images. Statistics on grain feature abundances also allowed investigation of accuracy and precision in studies of this kind. Vesicles, adhering particles, and cracks in volcanoclastic grains indicate the presence of water at the time of eruption. Further research can use these results and the percent abundances of grain-surface features from this study as a baseline for future comparisons of feature inventories on grains of different origin. Volcanoclastic feature inventories additionally provide a new basis for studying interactions of water with grains on Mars and other planets for which sample return missions are not in the immediate future.

PHYSICAL SCIENCES
POSTER PRESENTATIONS, SECTION 3
LAKE HURON ROOM, 11:00 AM – 12:30 PM

SYNTHESIS AND STRUCTURAL ANALYSIS OF METAL FURANDICARBOXYLATE OR THIOPHENEDICARBOXYLATE COORDINATION POLYMERS

Torel Beard

Poster: 472

Mentor(s): Robert LaDuca (Chemistry)

Research regarding the synthesis and analysis of metal-organic coordination polymers has been continuously conducted for over 20 years. These compounds are produced by combining a metal ion, an acidic dicarboxylate ligand, and a dipyriddy ligand in a hydrothermal reaction. The virtually endless possible combinations of reagents allow coordination polymers to form diverse crystalline structures that gives these compounds an array of applications, including ion exchange, hydrogen storage, heterogeneous catalysis, and explosives residue detection. The aesthetics of these unique structures always continues to spur the curiosity of researchers. This project explores the synthesis of new coordination polymers using a metal nitrate, bis(4-pyridylformyl)piperazine (bfp), and either 2,5-furandicarboxylic acid (fdc) or 2,5-thiophenedicarboxylic acid (tdc). Fdc and bfp produced three coordination polymers with cadmium nitrate, copper nitrate, and nickel nitrate; tdc and bfp produced three coordination polymers with zinc nitrate, cadmium nitrate, and nickel nitrate. The structures of all compounds were characterized using single-crystal X-ray diffraction, and the compounds were further analyzed using infrared spectroscopy and thermogravimetric analysis.

HYDROGEN BONDING EFFECT ON ELECTROCATALYTIC UPGRADING OF LIGNIN MONOMERS TO BIOFUELS

Gabriela Keeney

Poster: 473

Mentor(s): James Jackson (Chemistry)

Electrocatalytic hydrogenation (ECH) provides a new approach for the upgrading of bio-oil to biofuel. Bio-oil, the liquid product from biomass pyrolysis, can be reductively stabilized with ECH using Raney™ Nickel as the cathode under very mild conditions (75 °C, 1 atm, H₂O as electrolyte). This approach comes with a general concern, 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.

MEASURING NEUTRONS AND CHARGED PARTICLES FROM NUCLEAR REACTIONS

Suhas Kodall

Poster: 474

Mentor(s): Man-Yee Tsang (National Superconducting Cyclotron Laboratory)

To understand properties of neutron stars, it is important to study the symmetry energy, which is the penalty energy for having unequal number of neutrons and protons in a system. One way to study the symmetry energy is by colliding heavy nuclei at the National Superconducting Cyclotron Laboratory. The identities, emission angles and energies of particles, including neutrons emitted during a nuclear reaction, are important information that allows scientists to extract information about nuclear properties including the symmetry energy. Unlike protons, which interact with detector material easily, neutrons are much more difficult to detect. Consequently, most neutron detectors are also sensitive to charged particles. To ensure that we can differentiate between the particles and identify neutrons with near certainty, we are building a Charged Particle Veto wall, placed in front of the existing (2x2 m²) Neutron Wall at NSCL. In this poster, I will describe a nuclear physics experiment designed to study the symmetry energy and my contributions to the design and build of the plastic veto wall. This material is based on work supported by the NSF under Grant No. PHY-1565546 and DOE under Grant No. DE-NA0002923.

PHOENIX RISES AGAIN: COMPARISON OF NASA MPL GRAIN IMAGERY TO A TERRESTRIAL COUNTERPART

Jeremy Rapp

Poster: 475

Mentor(s): Michael Velbel (Earth and Environmental Science)

The planet Mars is the poster example of the NASA "Follow the Water" enterprise. The agency continues to develop and deploy multiple platforms, rovers, and orbiters to hunt for liquid water and for evidence of history of that liquid water. Many of these scientific research vehicles have done precisely that, demonstrating that at one time there must have been liquid water present on the planet Mars or currently may still be. However, little attention was given to idea of Martian glaciation and consequently no work was done searching for evidence of it at the scale of individual regolith grains. The Mars Phoenix Lander (MPL) was deployed in the Martian Arctic to investigate the soil-ice boundary and what that meant for planetary climate change. Using a terrestrial analog like the polygonal ground surveyed by the Phoenix Lander differences in grain attributes between localities were quantified and studied. Using ImageJ, a software for image analysis, scanning electron microscope images of the terrestrial analog at two magnifications and optical microscope images from the Phoenix lander were processed and shape descriptors of grains were calculated. Both datasets generated in this process were then statistically validated both within themselves as well as against each other. Statistical indifference of the terrestrial analog grains and the Martian grains allows for the possibility that both may have been shaped by comparable processes, which for the terrestrial grains is known to be glacier related (periglacial).

CHARACTERIZATION OF POTENTIAL SOURCES OF OPTICAL BACKGROUNDS FOR THE DEVELOPMENT OF A SINGLE ATOM MICROSCOPE

Evan Ryan

Poster: 476

Mentor(s): Jaideep Singh (National Superconducting Cyclotron Laboratory), Jennifer Wenzl (National Superconducting Cyclotron Laboratory)

We are developing a single atom microscope to measure the reaction rates of rare nuclear reactions in the low energy regime. The product atom will be collected in a thin film of frozen Neon which is grown on a solid transparent substrate. The film is illuminated with laser light at the excitation wavelength of the captured atom. The captured atoms will then emit fluorescent light at a different wavelength than the excitation wavelength, which can then be detected. This excitation light may also inadvertently excite impurities embedded in the substrate which would result in fluorescence within the wavelength region of the captured atoms. In order to develop a technique to suppress the optical background produced by these impurities, we first need to characterize the absorption and emission spectra from all the possible impurities from a variety of substrates. For these studies, a spectrometer was used to detect the emitted light from the substrates. To illuminate the substrate a white light source and a laser with the excitation wavelength of the atom of interest was used. I will present the benefits and drawbacks to each substrate tested, and how we decide which is the most suitable for use in the single atom microscope.

LINEAR ACTIVE TARGET TIME CHAMBER (LATTICE): NUCLEAR DETECTOR DEVELOPMENT

Abe Yeck, Jason Sammut

Poster: 477

Mentor(s): Saul Beceiro Novo (Physics and Astronomy), Wolfgang Mittag (Physics and Astronomy)

Recent developments of a new generation of detectors called Active Target Time Projection Chambers (AT-TPC) have provided greater resolution and sensitivity capabilities in the study of unstable isotopes. This research discusses the modification of the existing AT-TPC design to create a condensed, linear prototype for the study of low energy fusion reactions with small scattering angles. Initial experiments will measure the kinematics of $^{12}\text{N}(d,n)^{13}\text{O}$, the Nitrogen-12 and deuterium fusion reaction forming Oxygen-13 with the release of a neutron. The design in this study offers greater data efficiency than previous active target detectors due to the decreased dead-time of the collection pads. The electron amplification system, called the micromegas, is moved beneath the beam in this prototype to minimize drift length. This compact design will allow coincidence with ancillary detection devices such as gamma and neutron detectors. Some design characteristics could be collected from existing active target detectors, however unique designs of major components were necessary for this prototype's modified function. Detailed electric field simulations were conducted using electrostatic finite element software to optimize field homogeneity and resistance to sparks. Window pressure models were created to estimate safe minimum window thickness. The micromegas was designed with a symmetric backgammon-like structure and a resistive layer beneath the mesh for precise spatial resolution. Pressure valves were designed to exchange and maintain purity of the reaction gas. Future research will involve the creation and assembly of the prototype design, calibration of the chamber's components, and finally experiments to confirm performance.

PHYSICAL SCIENCES POSTER PRESENTATIONS, SECTION 4 LAKE HURON ROOM, 1:00 PM – 2:30 PM

COMMERCIAL VS TRADITIONAL

Mohammad Hafizuddin Bin Halwi

Poster: 480

Mentor(s): Per Askeland (Chemical Engineering)

This study aimed to compare the quality of different method of shampooing towards hair of a man. The traditional method of shampooing, including henna and traditional shampoo recipe, and use of commercial shampoo would be differentiated by their results on the same type of hair. Other methods include hair dye and pomade to further see their effects on hair microscopically after being shampooed. So, to what extent do each method of using different hair products affect the hair microscopically in terms of their surface. Common perception would say that the commercial shampoo would be preferable in terms of hair health compared to traditional method due to modern technology and advanced knowledge over the years but people in the past centuries have managed to keep their hair in good health. This is a difficult challenge that I am ready to embark and if I was successful, a handful of people who will have a different opinion about shampoo. The difference between both types of meat could be extrapolated by the use of Scanning Electron Microscope (SEM) via several methodologies. Secondary electrons were used to assess the quality characteristics and any change on the hair surface such as texture while energy dispersive (EDS) x-ray spectroscopy was used to analyse their chemical composition. The predicted results indicate that commercial shampoo provides better health of hair than traditional shampoo in the longer term. Hair with pomade or hair dye after being shampooed look worse microscopically than normal hair.

GRAIN-SURFACE TEXTURES ON MARS REGOLITH ANALOGUE GLACIAL SOIL SALTEN SKOV AND THEIR ENVIRONMENTAL SIGNIFICANCE

Kayla Hunnewell, Phillip Conrad, Michael O'Connor

Poster: 481

Mentor(s): Michael Velbel (Earth and Environmental Sciences)

This study examines high definition scanning electron microscope (SEM) images of sediment in support of interpreting images of Mars sediment imaged by the Phoenix mission. The goal is to glean information about the current environment and its history from surface grain features. Our approach is to use grain surface features from an analogue from Earth for comparison to Mars features. The analogue, from Salten Skov, Denmark, is used by Mars scientists as a magnetic analogue and is primarily composed of quartz and iron oxides. Elemental composition and previous research on the Salton Skov analog assisted interpretation. The key surface features observed in our sample include adhering particles and cracks on the surface. Adhering particles are smaller sediments attached to grains and are usually

characteristic of a few environments including glacial ones. The cracks found on the sediments are most likely due to chemical processes. The high iron oxide content of the grains is likely the result of iron hydroxide being dehydrated, most likely from heat. The smaller cracks would likely have been eroded away if made mechanically. From these images and elemental compositions of the grains, a few conclusions may be inferred of the environment on Mars. Because of the Mars site's proximity to the North Pole, it is highly likely for glacial or periglacial processes, past and present, to cause adhering particles and other mechanically produced surface features. Such adhering particles can also be inferred to be the work of the magnetic minerals present in the analog sample.

PIEZO-ACTUATOR INSTALLATION ON BECOLA LASER LINE

Colton Kalman

Poster: 482

Mentor(s): Kei Minamisono (National Superconducting Cyclotron Laboratory)

The BEam COoling and LAsER spectroscopy (BECOLA) facility at the NSCL at MSU is a facility where collinear laser spectroscopy is performed to determine properties of radioactive nuclei. Laser light is superimposed on a radioactive isotope beam to excite atomic transitions, and resulting resonant fluorescence is detected, which allows us to 'see' the shape and size of the nucleus through the hyper fine interaction. To have the necessary sensitivity to make such measurements, it is critical to reduce light background, which is primarily caused by scattered laser light due to its misalignment. The laser light alignment system at BECOLA consists of a telescope and mirrors that require manual adjustment, and thus tedious but very sensitive work. In order to make the alignment process efficient and to further reduce background, piezo-actuated mirror mounts were installed. These actuators allow for the system to be controlled remotely with a much finer, more precise control over the movement of the mirrors than was previously available by human hand. The installation leads to better alignment and lower background. The remote control of the alignment system also allows for safer laboratory conditions during alignment, as the system can be covered, preventing exposure to laser light. The installation of the piezo-actuator mounts, the actuator software, and results of the first alignment tests will be discussed.

GRAIN-SURFACE TEXTURES ON MARS REGOLITH ANALOG VOLCANIC TEPHRA HWMK600 AND THEIR ENVIRONMENTAL SIGNIFICANCE

Liam Peterson, Lynnea Jackson, Allison Mason

Poster: 483

Mentor(s): Michael Velbel (Geological Sciences)

The processes that formed the martian landscape are only partially known. Samples from NASA's Phoenix Lander are lithologically similar to terrestrial, phreatomagmatic simulants. We examined grains from HWMK600, volcanic tephra from Mauna Kea, Hawaii, to determine the presence of surface features that indicate formational and alteration processes. Our sample was imaged using scanning electron microscopy (SEM) at 13x magnification. One-hundred fifty grains were then imaged at higher magnifications to allow for surface features to be inventoried. Cracks are identifiable by linear and branching divisions in the grains. They indicate changes in volume due to hydration or chemical alteration. In our sample, cracks are likely a result of hydration due to the phreatomagmatic nature of eruptions on Mauna Kea. Glassy surfaces are indicated by a smooth, polished surface appearance. This feature generally signifies quenching of volcanic glass at the time of fragmentation or alteration phases due to interaction with the geothermal system. Vesicles are identified by concave sections on the grain surface that range in shape and may contain adhering particles. They form during quenching of the magma at fragmentation; their size and shape varies with volatile content and depth of magma. Adhering particles are clusters of small particles spread across the surface or confined to specific portions of the grain. Presence of adhering particles correlates positively with proximity to the magmatic source. The relative abundance of cracks, vesicles, and adhering particles indicates our sample has primarily undergone alteration by the phreatomagmatic system.

PACKET VS PILL: AN EXAMINATION OF STRUCTURAL DIFFERENCES

Logan Soule

Poster: 484

Mentor(s): Per Askeland (Chemical Engineering and Materials Science), Carl Boehlert (Materials Science)

Too often in life, our bodies endure full on war with various pathogens at the microscopic level and many times these pathogens defeat us and cause us to feel congested, exhausted, and make us cough hysterically leading to the decision to swallow a pill, drink a tablespoon of some liquid medicine or drink a dissolved mixture of powdered medicine. This study investigates the structural differences between the pill forms of cough medicine and the dissolvable packet forms of cough medicine and attempts to provide reasons for these differences. A few of the specific compounds in question are Tylenol Cold and Flu – Severe, Meijer Severe Cold and Cough, Meijer Severe Cold and Cough Nighttime, and Meijer

Cold Max. Using scanning electron microscopy and energy dispersive spectroscopy, these compounds were analyzed and compared through structural differences. Because many of the compounds studied contain many of the same active ingredients, it is interesting why they would be advertised using two different delivery methods. The dissolvable packet cough relievers showed much more organization in regards to the separation and identification of each active ingredient whereas the pills were often difficult in identifying separate ingredients. The dissolvable packet also revealed a much more crystalline structure whereas the pills did not. These differences then beg the question of why? It may be a matter of preference or there may truly be a difference in function between these two variations.

PLANNING A NUCLEAR PHYSICS EXPERIMENT TO CONSTRAIN CALCIUM PRODUCTION IN NOVAE

Pranjal Tiwari

Poster: 485

Mentor(s): Chris Wrede (Physics and Astronomy)

Calcium is an element that can be produced in astrophysical explosions called novae. There are discrepancies between the abundance of Calcium observed astronomically in novae and what we expect to see through astrophysical models. The present work describes preparations for a nuclear physics experiment designed to measure the energies of the excited states of ^{39}Ca . States in a certain energy range affect the production of Calcium in nova models. In the experiment, we will take a thin sheet of ^{40}Ca and bombard it with a beam of deuterons. This bombardment will result in a tritium and ^{39}Ca , which is what we are interested in. We will be using a Q3D magnetic spectrograph in Munich, which will allow us to accurately record the momenta of tritons and therefore the excitation energy of the resulting ^{39}Ca . I ran simulations to determine the optimal spectrograph settings (observation angle, magnetic field) using the information we currently know, and investigated different target options. Using a target of pure calcium is problematic, since pure calcium reacts with air, so we decided to use a chemically stable compound CaF_2 . But doing so resulted in an extra contaminant, Fluorine, which I found could be dealt with by measuring the background using a LiF target. Ultimately, my simulations have led to settings and targets that will result in the observation of the ^{39}Ca states of interest with minimal interference from contaminants.

PHYSICAL SCIENCES POSTER PRESENTATIONS, SECTION 5 LAKE HURON ROOM, 3:00 PM – 4:30 PM

GRAIN-SURFACE TEXTURES ON MARS REGOLITH ANALOG VOLCANIC TEPHRA HWMK101 AND THEIR ENVIRONMENTAL SIGNIFICANCE

Quinn Costello, Josiah Quinn, Ian Welsch

Poster: 487

Mentor(s): Michael Velbel (Earth and Environmental Sciences)

The purpose of this experiment was to determine the frequency of occurrence of certain geological features on Mars based on regolith analog HWMK101 from Mauna Kea volcano. A sample was observed under a scanning electron microscope (SEM) and 146 individual grains were photographed. Each grain was examined by three researchers, who determined which features were present. The surface features of interest are vesicles, glassy surfaces, adhering grains, and cracks. A vesicle is created when a bubble of vapor is formed within molten material (e.g., magma). After cooling and solidification of the melt, the grain is fractured or broken up, exposing a hole or depression. A grain with a glassy surface will show up as a smooth grain with a light shade when observed by SEM. As the lava cools it will often solidify to rock with a glassy surface. Any particle stuck or attached in some fashion to the main grain is considered an adhering particle. The location of our sample from Mauna Kea may explain the 100% frequency of adhering particles on the sampled grains. Cracks are characterized by a separation within a grain. They may be hairline or more significant. Cracks are often caused by heat and pressure that are common in a volcanic area. From the grains imaged: 7% contained vesicles, 100% contained adhering grains, 36% contained cracks, and 13% contained glassy surfaces. Pyroclastic eruptions like those indicated at Mauna Kea may also have produced regolith like at the Phoenix landing site on the surface of Mars.

VISUALIZATION OF DATA ON NUCLEAR CHARGE RADII

Anthony Incorvati

Poster: 488

Mentor(s): Paul Mantica (Chemistry)

There are more than 3000 nuclei that have been discovered, and with such a large data set it is challenging to visualize global and local trends in nuclear properties. This project took two approaches to developing a coherent means to display current experimental data for nuclear charge radii. The first method consists of a "Chart of the Nuclides" constructed in Microsoft Excel in which the known nuclear charge radius values are displayed on a grid of neutron number versus proton number. The chart utilizes conditional formatting to allow for the observation of trends in charge radius with respect to proton and neutron number, and is printed on poster board. In the second method, MATLAB was used to generate surface plots of nuclear charge radii as a function of proton and neutron number, providing a 3D visualization of trends in those values. The chart and MATLAB software application access the same nuclear charge radius database that was developed in Microsoft Excel and can be readily updated. Both visualization tools were developed to provide guidance in identifying opportunities to improve or extend current knowledge on nuclear charge radii.

DIVERGENT TOPOLOGIES IN ZINC AND CADMIUM SUBSTITUTED ISOPHTHALATE COORDINATION POLYMERS CONSTRUCTED FROM LONG-SPANNING DIPYRIDYLAMIDE LIGAND PRECURSORS

Abigail Meyers

Poster: 489

Mentor(s): Robert LaDuca (Chemistry)

Crystal structures made up of inorganic metallic elements combined with organic connections and acids are created under high pressure in hot water. This is called hydrothermal synthesis. With slightly differing reactants, they result in original compounds that possess different shapes, connections, and topographies. The structures also vary in dimensionality. The crystal function is unknown when first putting the ingredients together, but analyzed after filtration through a series of tests. Hydrothermal reaction of zinc or cadmium nitrate, a 5-position substituted isophthalic acid, and the long-spanning dipyridylamide ligand 1,6-hexanediaminebis(nicotinamide) (hbn) resulted in coordination polymers whose dimensionalities depend on the nature of the ring substituent and the metal coordination environment. The new phases were characterized by single crystal X-ray diffraction. $\{[Zn_2(hip)_2(H_2O)_2(hbn)] \cdot 2H_2O\}_n$ (1, hip = 5-hydroxyisophthalate) shows a 1D ladder topology with $[Zn(hip)(H_2O)]_n$ uprights spanned by disordered hbn rungs. (2, tbip = 5-tert-butylisophthalate, nic = nicotinate) shows trimeric $[Zn_3(OCO)_2]$ clusters connected into a 3D 8-connected 42464 bcu net by tbip and in situ generated nic ligands. (3, mip = 5-methylisophthalate) manifests a 2D (4,4) grid topology based on linked dimeric $[Cd_2(OCO)_2]$ units. Luminescent properties and nitrobenzene detection capability were probed.

RENORMALIZATION GROUP FOR SIMPLE NUCLEAR MODELS

Samuel Phiri

Poster: 490

Mentor(s): Scott Bogner (National Superconducting Cyclotron Laboratory), Heiko Hergert (National Superconducting Cyclotron Laboratory)

Renormalization group (RG) transformations provide a powerful means to identify the most important degrees of freedom in calculations of nuclear properties. By focusing on these degrees of freedom, microscopic calculations of nuclei are simplified significantly. Approximations that are necessary to implement the RG in practical applications are usually harmless, but can sometimes lead to uncontrolled errors. Here, we apply these transformations to simple nuclear matrix models to diagnose the conditions under which such errors occur.

MAMAINSE POINT RHYOLITE: DIFFERENTIATION WITHIN LARGE IGNEOUS PROVINCES

Eric Sattler

Poster: 491

Mentor(s): Tyrone Rooney (Earth and Environmental Sciences)

Within large igneous provinces, flood basalt magmas may stall in the crust resulting in magmatic differentiation. This differentiation can take the form of either fractional crystallization or magma mingling. Generally, mixing between basaltic and rhyolitic magma is difficult because of the contrast in temperatures. However, we observe evidence of magma mingling and a high-temperature polymorph of quartz in thin section, implying elevated temperatures. Therefore, we hypothesize that the rhyolites from the Mid-Century Rift in Ontario are the result of high-temperature

crystallization processes. To test this hypothesis we will model fractional crystallization using rhyolite-MELTS and using the Ti-in-quartz thermobarometer.

FELSIC VOLCANISM; THE TERMINATION OF CONTINENTAL FLOOD BASALT ERUPTIONS IN THE MIDCONTINENT RIFT

Jacob Bonessi

Poster: 492

Mentor(s): Tyrone Rooney (Earth and Environmental Science)

Silicic volcanism is associated with many tectonic settings and represents the most violent eruptions recorded on the planet. At rifted margins, silicic lava production frequently accompanies flood basalt eruption, and can represent a considerable portion of the volcanic stratigraphy in these regions. However, in these settings, silicic volcanism is often overlooked in favor of the volumetrically superior basaltic lavas. While these basaltic lavas provide constraints on magma generation, the silicic lavas reveal processes of magma evolution in the Earth's crust. The 1.1 billion year old Midcontinent Rift (MCR) of central North America represents a failed rifted margin. During the formation of the MCR, lavas filled valleys as they erupted via fissures that were created as the crust pulled apart. We hypothesize that silicic volcanic products represent mafic magma that stalled in the crust during its ascent, and then subsequently differentiated before eruption. We will specifically examine the processes that created silicic magmas during the terminal stages of the MCR by probing the youngest magmatic products found in the MCR. By creating geochemical fingerprints of the samples with laser-ablation inductively-coupled plasma mass spectrometry and X-ray fluorescence, we will deduce evolutionary trends and consider the processes that acted on ascending magma in the MCR. Our research will ultimately provide insight on end-member volcanic products and processes that operated in crust during the final stages of the MCR.

PLANT SCIENCES

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

THE EFFECT OF FLORAL POLLEN AVAILABILITY ON BEE VISITATION

Katie Boyd-Lee

Poster: 495

Mentor(s): Rufus Isaacs (Entomology)

Habitat loss and reduced floral resource availability have been linked to observed patterns of bee decline globally. Pollen is a key component of a bee's diet and is responsible for reproduction and brood provision due to its composition of essential amino acids and lipids. Bees exhibit foraging selectivity and vary in their pollen preferences, and we expect bees to exhibit behavior that maximizes pollen collection for consumption. Here, we assessed the impact of pollen abundance on visitation rate of Michigan bee species. We determined pollen availability in 48 native perennial plant species while monitoring the occurrence of bees on these flowers. There was variation in the amount of pollen per flower between plant species and the visitation rate of bees. We found a positive relationship between the amount of pollen produced by plants and their total floral area ($P=0.02$). We also determined that pollen quantity and floral area are both drivers of wild bee visitation ($p<0.001$, $p=0.002$), but not honey bee or bumblebee visitation. Our results suggest that the availability of pollen may be more important for wild bees, and that honey bees use different plant cues for floral selection.

IDENTIFICATION OF AN AROMATIC COMPOUND PRODUCING GENE IN NEOCOSMOSPORA VASINFECTA

Megan Burgess

Poster: 496

Mentor(s): Frances Trail (Plant Biology)

Fungi, although often overlooked, are immensely important in our everyday lives. We use them in food, in medicine production, and for recycling organic material. However, for all of their positive qualities, fungi also have their fair share of undesirable traits. Most of our crop plants are vulnerable to fungal diseases, and it can be difficult to halt the spread of fungal diseases in plants due to the ability of fungi to rapidly disseminate. Previous research has demonstrated that spore forming fungi, like *Neocosmospora vasinfecta*, can use beetles as vectors to disseminate. In this study, we hypothesize that the aromatic compound released by *Neocosmospora vasinfecta* during sexual development functions as an attractant to lure beetles. The objective of this study is to discover the gene responsible for the production of the

aromatic compound. Terpene synthase and polyketide synthase gene expression profiles were created using RNA sequencing to identify genes that were expressed more heavily during sexual development. Based on its elevated expression level, a terpene synthase gene, designated TC2, was chosen for the study. Gene knockout procedure was used to create a *Neocosmospora vasinfecta* mutant that was lacking the TC2 gene. The TC2⁻ mutant did not exhibit any changes in the production of the aromatic compound. Future studies will involve knocking out other polyketide synthase and terpene synthase genes in order to identify the gene responsible for the production of the compound. Additionally, chromatography will be used to determine the identity of the compound.

SALINITY EFFECTS ON INTERACTIONS BETWEEN RHIZOBIA BACTERIA AND NATIVE CALIFORNIA LEGUME PLANTS

Dixxon Darlington

Poster: 497

Mentor(s): Emily Grman (Eastern Michigan University), Maren Friesen (Plant Biology)

A critical question in ecology is to understand how interactions between organisms and their environment affect community structure and the distribution of species. These interactions can be affected by both biotic factors, such as competition, and abiotic factors, such as salinity. *Trifolium* plants have a mutualistic relationship with *Rhizobium* bacteria and this mutualistic interaction could be altered by these biotic and abiotic factors. To examine how different *rhizobium* strains affect plant communities in different environments, we conducted a greenhouse experiment where we grew each of three *Trifolium* species alone and then in competition (one three-species community). This treatment was crossed with 5 *rhizobium* treatments (uninoculated, two *rhizobium* strains isolated from high salinity environments in the field, and two *rhizobium* strains isolated from low salinity environments) and 2 salinity treatments (high and low). Results from this study can help explain whether biotic factors (competition, mutualism) or abiotic factors (salinity) determine *Trifolium* species abundance and distribution. We can also learn how salinity and different strains of *rhizobium* play a role in shaping communities.

THE EFFECTS OF HABITAT FRAGMENTATION ON HERBIVORY AND GROWTH OF *CARPHEPHORUS BELLIDIFOLIUS* AT DIFFERENT LIFE-STAGES

Meg Kargul

Poster: 498

Mentor(s): Lars Brudvig (Plant Biology)

Habitat fragmentation threatens biodiversity by isolating populations and disrupting species interactions. To mitigate these negative effects, corridors - strips of habitat used to reconnect fragments - are commonly employed in conservation. Our understanding of corridors remains incomplete which is problematic because corridors may promote negative interactions like increasing rates of herbivory on plants of conservation concern. We evaluated whether corridors affect plant-herbivore interactions within a large-scale fragmentation experiment at the Savannah River Site, SC, where experimentally-fragmented landscapes contain patches that are either connected by a corridor or isolated from each other. We hypothesized that corridors would affect predation through influences on connectivity, patch shape (edge-to-area ratio), or distance to an edge. We tested this by studying herbivory and growth of the native forb *Carphephorus bellidifolius* at the established seedling life-stage (2015) and at the seed stage (2016). We found that there was no effect of habitat fragmentation on herbivory of established seedlings. We added a set amount of seeds to exclosures and pseudo-exclosures and surveyed for survival, size, and growth to test for effects of habitat fragmentation on predation and germination of seeds. Total germination was affected by distance to edge - having an average of 142% more seedlings in edges than centers. Our results demonstrate that corridors do not negatively impact *C. bellidifolius* through seedling-stage herbivory, but distance to an edge plays a significant role in seed germination. This adds to literature illustrating the positive aspects of corridors can outweigh potential negative impacts.

AN EXAMINATION OF PLANT CELL MORPHOGENESIS USING AN UNTARGETED METABOLOMICS APPROACH

Katherine Magoullick

Poster: 499

Mentor(s): Emma Gachomo (Plant Pathology), Simeon Kotchoni (Computational and Integrative Biology)

Trichomes are small, single-celled leaf hairs that are shaped by the actin cytoskeleton, which plays an important role in plant cell growth, division, and structuring. *Arabidopsis thaliana* has non-glandular trichomes that have been shown to distort when certain genes are knocked out. In addition to mutated trichomes, some mutants also show smaller, more tightly packed stomata, while others grow much more quickly and have an earlier flowering time. It is important to not only examine genomics and proteomics, but also the metabolomics of plants. Metabolomic reactions are important because they typically represent the end of a long chain of interactions. By identifying specific metabolites or metabolic pathways that are altered in *A. thaliana* mutants, it may be possible to make them phenotypically normal by the addition

of certain compounds. Furthermore, wild type plants could also be made to grow more quickly by the addition of certain compounds. I was able to examine the metabolic pathways of several *A. thaliana* mutants and determine areas in which their pathways diverged.

COII PROTEIN IN ARABIDOPSIS INTERACTS WITH AVIRULENCE PROTEIN E TO CAUSE DISEASE IN PLANTS

Delaina May

Poster: 500

Mentor(s): Kyaw Aung (Plant Research Laboratory)

This study was designed to identify the target gene of Avirulence Protein E (AvrE) in *Arabidopsis thaliana*. AvrE is one of many effector proteins in the *Pseudomonas syringae* bacterial strain DC3000, and is highly toxic to plants upon contact. In order to accomplish this, a plant mutant line that suppressed the activity of the effector protein AvrE was generated, and mutation sites were identified using chromosome mapping and DNA sequencing. This led to many different candidate genes, although only one gene, COII, seemed like a viable option. Subsequent experiments included testing protein expression of this gene product after infiltration with bacteria (both wild type and effector deletion strains) and performing disease assays to determine the bacteria count after infiltration with bacteria. Results suggest that AvrE interacts with the COII gene to promote pathogenesis in plants.

THE EFFECT OF PLANT DENSITY AND COMMUNITY COMPOSITION ON POLLINATION SUCCESS OF CHAMAECRISTA FASCICULATA (PARTRIDGE PEA)

Ballindile Motsa

Poster: 501

Mentor(s): Susan Magnoli (Plant Biology)

Plants and pollinators form important mutualistic interactions that are beneficial to the survival of both species. Many factors including plant density, plant community composition and the identity of pollinators can influence the success of these interactions. *Chamaecrista fasciculata* is a native annual legume that is commonly used in prairie restorations. It has mutualistic interactions with bumble bees and sweat bees which act as pollinators for the plants and they get pollen in return. I explored how density and competition for pollinators affects pollination success. A pollination observation was conducted at the Kellogg Biological Station Great Lakes Bioenergy Research Center site (KBS GLBRC) using two restored populations that vary greatly in plant density and flowering plants. The experiment looked at the success of pollination in naturally occurring plants on the two different sites and looked at the diversity of pollen deposited by bees on *Chamaecrista*. *Chamaecrista* density does not affect pollination success. In addition to this there appears to be pollen limitation in the prairies. Floral abundance of other plant species in the surrounding community does not affect seedpod production and fruit set of the partridge pea plant. The success of plant-pollinator interactions can have important effects on plant population establishment and persistence. These findings can be used to inform efforts to establish populations in ecological restorations.

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

USE OF CRISPRs FOR STRAIN TRACKING OF THE FIRE BLIGHT PATHOGEN ERWINIA AMYLOVORA IN MICHIGAN

Bailey Begley

Poster: 504

Mentor(s): George Sundin (Plant Soil and Microbial Science)

Clustered regularly interspaced short palindromic repeats (CRISPRs) are found in the genome of many bacterial species. CRISPRs function as an adaptive immune system enabling bacterial cells to defend against foreign phages or plasmids. When a bacterium comes in contact with a foreign invader, short sequences of this foreign DNA are integrated into the bacterial genome. These sequences ultimately function to recognize and prevent future incursions by potential invaders. CRISPRs can be unique between otherwise closely-related bacterial strains, as strains come into contact with different invaders through the years. These CRISPR sequences can be identified and mapped to help track different strains of bacteria all over the world. I used this knowledge of CRISPR sequences to help map the occurrence of different strains of the plant pathogen *Erwinia amylovora* across Michigan using comparative sequence analysis. A total of 88 strains are currently being examined with more strains to be isolated in the summer of 2017. These strains were isolated from all areas of the state with a more specific focus on the western counties. As well as running a comparative analysis of their CRISPR sequences, the strains were also tested for sensitivity to streptomycin and kasugamycin. I detected varying levels of resistance all across the state. The CRISPR analyses will aid me in tracking these resistant strains among

orchards and counties. We hope from this study, that we will be able to learn more about how *E. amylovora* spreads in orchards and how to combat fire blight disease.

THE ROLE OF DIAZOTROPHS IN PLANT GROWTH PROMOTION OF SWITCHGRASS IN MARGINAL LAND CROPPING SYSTEMS

Jake Hare

Poster: 505

Mentor(s): Maren Friesen (Plant Biology), Jeff Norman (Plant Biology)

Switchgrass, (*Panicum virgatum*), is an important biofuel crop grown in the midwestern United States. Importantly, it can be grown in marginal farm lands, which are unsuitable for traditional agriculture, that are depleted of resources necessary for the growth of plants, specifically nitrogen. We sought to investigate the role that nitrogen-fixing bacteria (diazotrophs) play in switchgrass growth without the addition of fertilizer nitrogen on marginal lands. We isolated bacteria from the soil and roots of switchgrass collected at Lux Arbor, a Great Lakes Bioenergy Research Center marginal land site. Diazotrophs were identified by PCR amplification of a nitrogen fixing gene (*nifH*). Experiments to test mechanisms of plant growth promotion of Switchgrass by diazotrophic isolates are in progress. These include tests of auxin production capability in pure culture, effects of inoculation on Switchgrass seed germination efficiency, and effects of inoculation on Switchgrass growth in green house experiments. Isolates will be screened for auxin production by incubation in the presence of L-tryptophan followed by colorimetric analysis. Effects of diazotroph inoculation on seed germination efficiency will be determined by comparing percent germination of inoculated seeds with percent germination in uninoculated controls. Effects of diazotroph inoculation on Switchgrass growth will be assessed by comparing growth metrics including shoot height, plant dry weight, and root biomass, in diazotroph-inoculated plants with uninoculated controls.

IDENTIFICATION OF POLLEN USED FOR OFFSPRING PROVISIONING WITHIN THE GENUS MEGACHILE

Michael Killewald

Poster: 506

Mentor(s): Rufus Isaacs (Entomology)

To feed the ever-growing human population, farmers are expanding their fields to meet nutritional demands. Although this provides a benefit to humans it decreases the food and nesting resources that are essential for healthy pollinator populations. Since many of these important resources have been depleted, it has become increasingly necessary to identify which floral resources are most beneficial to pollinators and to encourage the use of these resources through conservation programs that provide resources for bees. To identify which species of flowering plants are primarily used for offspring provisioning of *Megachile*, four nesting boxes containing 250 stem nests of various sizes and materials were placed at the Michigan State University Clarksville Research Center in early May. From May-July a total of 1581 *Megachile* cocoons were released to encourage nesting. These boxes were checked weekly from May until October for completed stem nests. Completed stem nests were removed and individual pollen provisions were processed using acetolysis and placed onto slides to examine defining characteristics of the pollen grains within. High quality pictures of pollen provision slides were compared with reference slides to determine the proportion of each individual pollen type in stem nest provisions. It was determined that nesting *Megachile* females have a preference for 4mm inside diameter paper nests over larger paper and bamboo nests.

BAD BUGS: SEED PREDATION IN FIRST YEAR PRAIRIE RESTORATIONS

Mary Linabury

Poster: 507

Mentor(s): Lars Brudvig (Plant Biology)

Across the United States, prairie range has been reduced to a fraction of historic values. To restore these ecosystems, seeds are first sown, but seed predators, or granivores, can impede these efforts. These predators influence biodiversity and community structure through differential predatory behavior towards habitat type and seed species; however, the exact nature of these preferences is not well understood. In this experiment, we investigated how distance from habitat boundaries, granivore type (arthropods and mammals), and seed preference affects seed predation in prairie restorations. To study these influences, we deployed trays containing seeds from ten focal prairie plant species into twelve first-year prairie restoration sites. Trays also assessed the specific impact of granivore type; one tray type allowed access to only arthropods, while the other allowed in all granivores. Trays were placed in pairs at three distances from habitat boundaries, allowing us to study whether these boundaries created a gradient of granivore activity. After 26 days, seeds were recounted to determine granivory. First, no difference was observed in seed removal across trays at different distances from habitat boundaries. Second, arthropods accounted for the majority of seed removal, consuming an average of 22.24 seeds per tray, compared to mammals, which removed 12.40 seeds. There were also seed

preferences among granivore types. Small mammals consumed the seeds *Echinacea purpurea* and *Elymus canadensis* at a faster rate than arthropods, while arthropods were responsible for removing nearly all *Rudbeckia hirta* seeds.

UNLOCKING ESSENTIAL BIOFUELS BY FURTHERING MODERN UNDERSTANDINGS OF PLANT ELONGATION PROCESSES

Andrew Millar

Poster: 508

Mentor(s): Jacob Jensen (Plant Biology)

Biology is a diverse field of science that unravels the many mysteries of life. This diversity would not be possible without plant life, the sturdy base that holds most all other life together. But what holds plants together? Plant cell walls are primarily composed of polysaccharides that interact to form rigid structures. These cell walls play crucial roles in plants, such as: maintaining structural support, regulating growth, and storing energy in the form of carbohydrates. This energy storage is especially relevant to humans given its potential application as a sustainable biofuel. Effectively accessing this wealth of energy involves a further understanding of the genes and mechanisms that are fundamental to the growth and creation of these carbon-rich structures. This research aims to elucidate the cell wall formation during and immediately after cell elongation using a combination of transcriptomics and cell wall characterizations. During this period, much of the cell wall rearrangement and *de novo* synthesis occur, providing an opportunity to study these specific processes in detail. To do this, we are using the small grass *Brachypodium distachyon* and elongating tissues in seedling, stem and seed as model systems. The relatively recent introduction of accessible transcriptomic technology has allowed for a higher resolution than ever before when mapping genes actively involved in stem growth. Methods involved in characterizing the cell wall include: analyzing the composition of stem tissue, utilizing high-resolution microscopy techniques to further reveal plant cell wall structure, and evaluating the mechanical properties of cell wall material.

IN SITU BIOMECHANICS TESTING ON PINUS STROBUS

Kwamina Otseldu

Poster: 509

Mentor(s): Jameel Al-Haddad (Plant Biology), Frank Telewski (Plant Biology)

As an addition to our current un-published data set on plant biomechanics, we have decided to expand our study by performing similar stress strain tests on live tree branches in the field in order to measure modulus of rupture (MOR) and modulus of elasticity (MOE). This is to better understand the mechanics of living tree tissues and the effects of dormancy and temperature on these traits. Like our initial study all trees tested have known genetic information. Bending tests are performed on living branches which simulate snow/ice loading on trees using an apparatus of our own design. We have collected data sets for varying temperatures within winter and spring and will compare those with our full data sets from our previous trials.

A TIME AND PLACE FOR EVERYTHING: THE SHIFTING PREDICTORS OF GENETIC DIVERSITY IN THE OAK CHLOROPLAST

Kasey Pham

Poster: 510

Mentor(s): Andrew Hipp (The Morton Arboretum)

High rates of hybridization in oaks (*Quercus*, Fagaceae) have caused their chloroplast genomes to reflect other relationships beyond shared evolutionary lineage. At the tips of the oak plastome phylogeny, individuals group by geographic proximity due to high interspecific gene flow, while deeper branches reflect population and species divergence history concordant with the nuclear genome. In this study, we partition the effects of geographic proximity and nucleome-inferred phylogenetic history on the oak plastome phylogeny at different evolutionary scales corresponding to major clade divergences. Our study compares pairwise phylogenetic distances based on complete plastome sequences, pairwise phylogenetic distances from nuclear restriction site-associated DNA sequences (RADseq), and pairwise geographic distances from provenance data for 34 individuals of the white oak clade representing 24 North American and Eurasian species. Within the North American white oak clade alone, phylogenetic history has essentially no effect on plastome variation, while geography explains 11–21% of plastome phylogenetic variance. However, across multiple continents and clades, phylogeny predicts 30–41% of plastome variation, geography 3–41%. Decrease in phylogenetic informativeness at the tip of the plastome phylogeny means that it has little use in solving phylogenetic questions, but can still be a useful barcoding or phylogenetic marker for resolving questions among major clades, especially when used in tandem with nuclear data.

TRAIT DIFFERENCES IN PRAIRIE SEED SOURCES

Alexandria Walus

Poster: 511

Mentor(s): Lars Brudvig (Plant Biology), Chad Zirbel (Plant Biology)

Throughout North America, native prairies have all but been destroyed for the use of agricultural land and urban development. With this, it is increasingly important to restore native prairies onto former agricultural lands to make up for the increase in habitat destruction and fragmentation of native landscapes. However, restoration outcomes can often times be unpredictable. Two key considerations that are often overlooked during restoration and may lead to more predictable outcomes are local adaptation and seed source. In this study, we measured functional traits on 12 prairie species from 3 seed sources (local, Midwestern, and southern) to answer the following questions: (1) Are there trait differences between the 3 seed sources? (2) Do trait correlations differ between the 3 seed sources? We measured growth rate, chlorophyll content, root length, and seed mass and compared them between the sources. We also assessed the correlation between traits within each of the seed sources. We found significant trait differences between the seed sources. For example, the southern seed source had a faster growth rate than both the local and Midwestern source in four of the species. These results are important because they can have implications for restoration success especially relating to climate change which may cause species adapted to warmer conditions to be more likely to survive into the future.

PSYCHOLOGY

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

THE EFFECT OF SOURCE-TYPE ON STUDENTS' ABILITY TO ACQUIRE INFORMATION.

Adithya Bala, Mari Dowling

Poster: 514

Mentor(s): Kimberly Fenn (Psychology)

There is a growing concern in the United States that STEM (science, technology, engineering, and math) education needs improvement in order to empower students in a technologically advanced society. In the current study, we investigated how technology influences actual and perceived learning. Participants read facts about animals from either an Internet website or a traditional printed book that was identical to the website. The following day, participants were first asked how much information they believed they retained from the prior day and then answered free response questions about the information using either a computer or paper. Finally, participants were asked how much they would have retained if they had studied the information on the opposite source. Based on our prior work, we predict that participants who studied on the Internet will recall more information than those who studied from the book. We further predict that participants who read the information on the Internet will believe they would have learned significantly more if they had studied the book. These results indicate a discrepancy between perceptions of learning and actual performance, suggesting that, although participants may prefer traditional book sources, learning via an online environment may be just as effective as learning from a more traditional environment. This new insight could encourage educators and students alike who may be unsure on whether learning information through the internet is as effective as traditional book sources to utilize additional internet resources despite what they may inherently believe or prefer.

THIS IS YOUR BRAIN ON MISTAKES

Rachael Slate

Poster: 515

Mentor(s): Jason Moser (Psychology)

The error-related negativity and error positivity are two event-related brain potentials (ERPs) that are elicited in simple speeded-response tasks that provide moment-by-moment insights into the neural dynamics of error processing. Researchers have used these ERPs in many contexts, including evaluating cognitive performance, and in clinical applications and psychopathology studies. Previous studies have established adequate internal reliability and test-retest reliability of the ERN and Pe. One study examined cross-task correlations of ERPs, which is problematic given the variety in tasks used. Thus, it is unclear whether ERN findings from one task generalize to other tasks. Studies examined correlations between flanker, go/no-go, and stroop tasks in college students, and found adequate cross-task correlations. Establishing these relationships in a more diverse sample (e.g., community adults) is crucial for evaluating

the clinical utility of these ERPs. We evaluated ERN, Pe, and difference waves in flanker and go/no-go tasks among a sample of adults recruited from the community (N=70). The ERN was highly related across tasks ($r = .66$). The Pe was also correlated across tasks ($r = .47$). These same-ERP cross-task correlations were higher than the discriminant correlation of ERN and Pe: the flanker task ERN was not significantly related to the go/no-go Pe at $r = -.02$ and the go/no-go ERN was not related to the flanker task Pe at $r = .14$. These findings illustrated that the ERN and Pe are highly correlated across tasks. These data provide insights into relationships between tasks that elicit different types of errors.

THE EFFECT OF MEMORY STRENGTH AND DECISION MAKING STRATEGIES ON EYEWITNESS IDENTIFICATIONS

Azza Kineish, Claudia Fuderer, Parul Gupta

Poster: 516

Mentor(s): Kimberly Fenn (Psychology and Social Science)

In the United States, approximately 20,000 people are incarcerated for crimes they did not commit. Incorrect eyewitness identifications are the single leading cause of known false convictions. Laboratory studies that have investigated eyewitness memory have found that the use of an absolute decision making strategy leads to better identification accuracy. There is little work investigating the relationship between memory strength and decision-making strategies. In the current study, we investigated the effect of memory strength, by manipulating duration of exposure, on the ability to identify a perpetrator of a crime and also assessed the decision-making strategy used. Participants watched mock crimes, presented in picture slide format, that were presented for duration of 1 second, 3 seconds, or 7 seconds each. After a distractor task, participants were asked to identify the perpetrator in a simultaneous target-present or target-absent lineup. They then completed a questionnaire that assessed their decision-making strategy. The participants in the 7-second exposure duration utilized a relative strategy more often than the other two groups. There was not a significant effect of exposure duration on identification accuracy. There was a direct relationship between decision-making strategy and identification accuracy. In a target-present lineup, participants who reported using an absolute strategy were more likely to correctly identify the perpetrator. In a target-absent lineup, those who reported a relative strategy were more likely to falsely identify the perpetrator. These findings could change the way eyewitness testimonies are taken into consideration and reduce the amount of false convictions related to eyewitness testimonies.

SLEEP DEPRIVATION AND ITS EFFECTS ON EYE WITNESS MEMORY AND DECISION-MAKING STRATEGIES

Parul Gupta, Navreet Bhangu

Poster: 517

Mentor(s): Kimberly Fenn (Psychology)

Every year in the United States, many people are wrongly convicted of crimes that they did not commit. The primary piece of evidence that implicates these individuals is incorrect eyewitness testimony. Prior research has shown that sleep deprivation can be linked to an increase in false memories. As such, we predict that this could result in an impaired eyewitness testimony. Research has shown that sleep deprivation leads to decreased performance across multiple cognitive abilities, and can increase false memory formation. However, there does not seem to be a correlation between sleep deprivation and incorrect identification as research has not directly tested this. Our study is the first of its kind to empirically investigate the two. In the study, the researchers are creating a false memory and participants are asked to identify the perpetrator from a target-absent lineup. Participants then received a questionnaire to assess confidence and decision-making strategies. Data collection is ongoing, but we predict that the sleep-deprived group will perform significantly worse than the control and thus, would wrongly identify an innocent man when the actual perpetrator is absent. We also predict that the sleep group will be more likely to use an absolute decision-making strategy and the deprivation group will be more likely to use a relative strategy. We hope this study will provide insight on how sleep deprivation can lead to incorrect eyewitness identifications and help push for reforms in the legal system.

THE ROLE OF PERSONALITY, MOTIVATION, AND INDIVIDUAL EXPERIENCE IN PREVENTATIVE HEALTH BEHAVIORS AMONG COLLEGE STUDENTS

Melissa Snyder

Poster: 518

Mentor(s): Richard Lucas (Psychology)

As the connection between psychology and health continues to be a topic of interest among researchers and clinicians in their respective professions, it is increasingly evident that a number of factors play a role in the practice of certain health behaviors. Recent research has focused specifically on the relationship between personality and health habits. Although it is well established that certain personality factors contribute to health-promoting behaviors, the question remains as to how individual experiences with health and underlying motivations work with personality to elicit various health behaviors. The present study seeks to answer this question via a daily study of health habits and motivation across 6 days involving health behaviors such as sleep, diet, exercise, and substance use. This daily questionnaire will

follow an initial survey assessing personality, well-being, and general health background. This study will allow a better understanding of the psychology of health by examining potential interactions between Big Five personality traits, personal experience with health, and varying motivations in predicting certain health behaviors.

DIURNAL AFFECT RHYTHM IN CHILDREN AND ADOLESCENTS

John Wenzel

Poster: 519

Mentor(s): Emily Durbin (Psychology)

Affect changes over the course of the day, and identifying the patterns of these changes throughout different stages of human development can improve our understanding of emotional development and stability. The current study examined diurnal affect rhythms in children aged 0-17 in order to identify and describe the patterns of positive and negative emotions in children and adolescents, as well as to compare these findings to adult affect patterns. Amazon's Mechanical Turk (MTurk) online crowdsourcing system was used to recruit 983 caregivers of 1596 children. Caregivers completed a survey for each of their children that they had seen in the past hour, and rated the intensity of their child's emotions during that time. Emotions included joyful, happy, lively, proud, energetic, and active for positive affect, as well as miserable, scared, sad, mad, gloomy, upset, bored, ashamed, and embarrassed for negative affect. Time of day and the child's most recent activity were also provided. This data was used to (1) identify and describe diurnal patterns of affect in the sample; (2) observe changes in these patterns across different ages and developmental periods; and (3) investigate potential interactions between children's recent activities and their diurnal affect rhythms.

EXTERNAL AND INTERNAL ATTENTION IN WORKING MEMORY

Tierra Whitfield

Poster: 520

Mentor(s): Susan Ravizza (Psychology)

Working memory is strongly influenced by attention. Previous studies have shown that recall is strengthened for items that are attended (Schmidt, Vogel, Woodman, & Luck, 2002; Ravizza, Uitvlugt & Hazeltine, 2016). An effective way of engaging attention to some items over others is by manipulating the probability that an item at a cued location must be recalled. One study, however, indicated that attention may work differently if directed externally to items in the environment compared to items in memory (McNab & Dolan, 2014). Participants who were most proficient at directing attention at encoding were not necessarily the most proficient at directing attention internally. The aim of this study is to examine whether attention can be allocated in a linear fashion when directed before or after (precue) encoding (retrocue). Participants in this study were cued to remember one of two different face stimuli either before or after encoding. The cue indicated the probability that the face at one of the locations would have to be recalled with either a 50%, 60%, 70%, 80%, 90%, or 100% likelihood. After a short delay, participants were presented with a face and had to decide whether it matched one of the faces they had been shown. We predict that recall will increase linearly with the cue probability when attention is directed externally but not internally. This may be because items are bound together once they enter memory making it difficult to attend one item over others.

RHYTHM PERCEPTION IN TYPICAL AND ATYPICAL LANGUAGE DEVELOPMENT

Marilyn Zahrt, Fred Ahmadi, Sarah Hamming

Poster: 521

Mentor(s): Carrie Kroger (Psychology), J Devin McAuley (Psychology)

There is increasing evidence that rhythm plays an important role in language acquisition. Specifically, rhythm and timing patterns have been proposed to help listeners segment continuous speech into meaningful units. Consistent with this view, previous work has revealed that better auditory rhythm discrimination is associated with greater grammatical competence in typically-developing children (Gordon et al., 2014). The present study extends this previous work by comparing rhythm discrimination abilities of typically-developing children and children with specific language impairment (SLI) – a developing language disorder characterized by grammatical deficits. Here, we hypothesized that children with SLI would show a rhythm impairment relative to typically-developing children. To test this hypothesis, typically-developing children and children with SLI (ages 5 – 10 years) at Michigan State University and Vanderbilt University completed a battery of tasks, including a rhythm discrimination task, an artificial language learning task that assessed the use of rhythmic expectations in word learning, and an assessment of non-verbal IQ. Results revealed that children with SLI showed worse rhythm discrimination than typically-developing children, and do not show a rhythm effect on word learning in the artificial language learning task, even after controlling for non-verbal IQ. Overall, these results are consistent with the rhythm deficit hypothesis for SLI.

PSYCHOLOGY
POSTER PRESENTATIONS, SECTION 2
LAKE HURON ROOM, 11:00 AM – 12:30 PM

CAN INTERPARENTAL CONFLICT AND PARENTAL EMPATHY HELP EXPLAIN DISCREPANCIES IN PARENTS' RATINGS OF CHILD SYMPTOMS?

Carolyn Andrews, Jazmine Skala-Wade

Poster: 524

Mentor(s): Susan Frank (Family Counseling and Psychiatry)

In both clinical and research settings, discrepancies between informants' reports of children's behavior are more the rule than the exception. Correlations between parents' ratings of their child's behavior are usually in the low to moderate range depending on what is being rated. Previous studies attempting to identify moderators of parental agreement have examined characteristics such as child demographics and presenting problems as well as parental depression and socioeconomic status. This study aims to extend this body of research by examining two additional variables, interparental conflict and parental empathy, as potential moderators of interparental agreement on rating of child behavior in an outpatient clinical setting. Parents of 230 children and adolescents completed the Child Bipolar Questionnaire (CBQ) which measures a range of overt and covert symptoms commonly found among children with severe mood disorders. Parents also completed standardized questionnaire measures of interparental conflict and parental empathy. We hypothesize that, in general, parental agreement for symptoms assessed by five symptom factor scales identified for the CBQ will be higher for overt symptoms (i.e., aggression and oppositional behavior) than covert symptoms (i.e., depression, inattention, and sensory problems). In addition, we predicted higher agreement among parents reporting a) relatively high levels of empathy and b) relatively low levels of interparental conflict. These results can help clinicians better understand discrepant results on parent-report questionnaires in clinical settings.

THE EFFECT OF GENDER ON LEADERSHIP ROLES: A GLASS CLIFF INVESTIGATION

Rebecca Clancy

Poster: 525

Mentor(s): Debby Kashy (Psychology), Ann Marie Ryan (Psychology)

Prior research shows that women are underrepresented at top management-level jobs for many reasons. The most common reason is attributed to the well-known yet invisible barrier, the "glass ceiling", which prevents women from reaching upper level positions in the workforce because of their gender (Cotter, Hermsen, Ovadia, & Vanneman, 2001). However, women have a better chance to break through this barrier during times of organizational decline. The glass cliff phenomenon refers to the idea that women's perceived suitability for senior positions is likely to increase under conditions of organizational crisis (Ryan & Haslam, 2007). Stereotypically feminine traits associated with managerial success, such as being understanding, creative, and intuitive, are seen as especially beneficial during times of crisis. This study's central focus is to investigate if individuals choose women for leadership roles during organizational decline because of the desire for these communal characteristics, because of gender, or because of the fit between the two. Participants will view a manipulated profile of a job applicant for a senior level position, a job posting that the applicant is applying to, and then evaluate the applicant. The profile will vary based on the gender of the applicant, verbalization of traits describing the applicant through their coworker recommendations (agentic vs. communal), and the company's performance mentioned in the company's job posting (improving vs. declining). The results will be examined using an Analysis of Variance (ANOVA). This research can be used to further understand the glass cliff phenomenon.

CHANGES IN MEDIA COVERAGE ON POLICING: INVESTIGATING TONALITY AND TAINTS

Kate Den Houter, Abigail Hishon, Amal Mohamed

Poster: 526

Mentor(s): Deepshikha Dia Chatterjee (Psychology), Ann Marie Ryan (Psychology)

Prior research has shown that members of the public perceive policing as a physically, socially, and morally tainted profession (Chatterjee & Ryan, 2016). In our ongoing interviews with police officers, we find that officers often cite the media's inflammatory rhetoric towards police shootings (Chatterjee & Ryan, 2017) as having played a key role in exacerbating the taints on the profession. Thus, the overarching purpose of this study is to evaluate if media reports on police-related stories are now more negative than before. The time frame for this study, 2011-2016, is centered around the media's heavy coverage of the shootings of Trayvon Martin in 2012 (not involving police) and Eric Garner in 2014. We included the year 2011 to gain perspective from a year 'unaffected' by these major shooting stories. An archival search (Archive.org) was conducted and clips of news footage from FOX News and CNN were collected then coded.

FOX News and CNN were chosen as the focal news outlets as they individually represent conservative and liberal media viewpoints respectively (Mitchell, et al., 2012). To narrow our search results, we used “police shooting”, “United States”, and “police brutality” as search criteria. We coded video clips for whether (a) the speakers portrayed a negative, positive, mixed, or neutral message; (b) the incident involved a police officer or citizen shooting; and finally, (c) the taint was described as physical, social, or moral.

EXPERIENCES OF MUSLIM STUDENTS AT MSU

Amal Mohamed

Poster: 527

Mentor(s): Farha Abbasi (Psychiatry), Ann Marie Ryan (Psychology)

Over the past decade there has been a rise of religious harassment claims in the United States. Religious discrimination in this nation can manifest in different forms from failure to accommodate religious beliefs to disparate treatment. The political climate from the 2016 post-elections has unleashed an increase of hate crimes that targeted religious communities all throughout the nation - mostly Muslim Americans. Previous research has focused on religious discrimination but from an observer’s point of view. The purpose of this study is to help understand the experiences of religious discrimination for Muslim students on campus and how that affects their Muslim identity management. This research includes an anonymous survey via Qualtrics where the individuals are unidentifiable and participation is voluntary. The data will be stored on a secure server in the Psychology department and the results will be analyzed through the use of descriptive statistics. The participants will be recruited through the Muslim Students’ Association and other related organizations. They will be informed about the study and provided a link to the survey site. Since the survey is anonymous, the participants will be more likely to provide an honest response without any fear of retribution. The results would give insight to the types of experiences Muslim students encounter on campus.

HOW MACHISMO IS DETRIMENTAL TO MENTAL HEALTH IN THE PERUVIAN ANDES

Katherine Edwards

Poster: 528

Mentor(s): Rene Rosebaum (Human Ecology)

The purpose of the study is to uncover how the known problem of “machismo” or patriarchy, in the northern Andes region of rural Peru, affects the mental health of men, women and children. I hypothesized that when surveying women of Huamachuco and the surrounding area, machismo would be positively correlated with rurality and negatively correlated with education. With the assistance of the Leoncio Prado Hospital psychology staff, I interviewed 48 women of different ages and communities, which allowed us to paint a picture of the relationships between violence, machismo (or patriarchy), education, and mental health. The results were consistent with the hypothesis. When higher levels of machismo were found, it poorly affected education, age of marriage, mental health and self-esteem, writing, reading, and communication abilities, therefore to eliminate the negative one must target the source: machismo.

THE CORRELATION BETWEEN ERROR RELATED NEGATIVITY MAGNITUDE AND PARENT REPORTED ADHD SYMPTOMS

Briana Ermanni, Milena Lai

Poster: 529

Mentor(s): Emily Durbin (Psychology), Allison Gornik (Psychology), Sharon Lo (Psychology)

Attention deficit hyperactivity disorder (ADHD) compromises a child’s ability to sustain attention in daily activities, especially school related ones, and to inhibit certain actions and emotions. One possible brain marker of these processes is the Error Related Negativity (ERN), an event-related potential that is generated when a person makes an error in a simple decision-making task. It is hypothesized that children with attentional problems will have a smaller ERN that partially accounts for their problems with inhibition and attention. We measured the ERN via EEG in two developmentally appropriate tasks and ADHD symptoms via parent report in a sample of 35 children. As hypothesized, we found a positive correlation between parent-reported child attention problems and the magnitude of the ERN.

ANXIETY AND PARENT-CHILD CONFLICT PREDICT SOMATIC COMPLAINTS IN MIDDLE CHILDHOOD

Kersten Gant, E Elsa Carsten, Peiqi Lu

Poster: 530

Mentor(s): Alexandra Burt (Psychology)

Somatic complaints are common among anxious individuals and significantly interfere with daily life by increasing school absenteeism, functional disability, and emotional distress. Negative parenting behaviors and family conflict are predictive of anxiety, depression, and related problems among adolescents, but their impact on somatic complaints in

children are less well understood. Additionally, most studies only measure maternal behavior and ignore how paternal parenting style influences child functioning. Therefore, the current study examined how maternal- and paternal-child conflict moderate the association between anxiety symptoms and somatic complaints in middle childhood (N=2068). Twins reported on conflict with their mothers and fathers separately using the Parental Environment Questionnaire and parents reported their child's anxiety symptoms and somatic complaints via the Child Behavior Checklist. Moderated regression analyses, conducted via multi-level modeling, revealed that anxiety problems predicted somatic complaints according to both maternal and paternal reports. Conflict with their fathers also predicted somatic complaints, but the interaction between father-child conflict and child anxiety did not. Oppositely, mother-child conflict was not predictive of somatic symptoms, but it did moderate the relationship between anxiety and somatic symptoms. The relationship between anxiety and somatic complaints was stronger in children with lower mother-child conflict. These findings suggest that mother-child and father-child conflict influence children differently. Somatic complaints in anxious children may be associated with better mother-child relationships because mothers may respond to them in a more nurturing way than do fathers. Alternatively, children with higher mother-child conflict may express their emotional distress in externalizing, rather than internalizing, ways.

PSYCHOLOGY
POSTER PRESENTATIONS, SECTION 3
LAKE HURON ROOM, 11:00 AM – 12:30 PM

WHO IS HAPPIEST? THE RELATIONSHIP BETWEEN DEMOGRAPHICS AND LIFE SATISFACTION

Jaazaniah Catterall

Poster: 533

Mentor(s): Richard Lucas (Psychology)

This project uses the Behavioral Risk Factor Surveillance System, a nationwide survey conducted in the United States by the Center for Disease Control that records data from hundreds of thousands of participants, to determine the relationship between demographic characteristics, life circumstances, and how happy people are with their lives. The BRFSS combines health, demographic, and socioeconomic data with a measure of life satisfaction, allowing us to directly compare such indicators to an individual's level of satisfaction. Previous studies such as Wadsworth (2016) have used this data for narrower purposes, but this massive dataset has yet to be tapped for the purpose of comparing life satisfaction to such a wide variety of indicators. We will investigate how age, race, gender, income, education, employment status, marital status, and health predict people's responses to a single-item life satisfaction measure. Based on previous research, we predict life satisfaction will be higher among married couples, people with jobs, people with more education, whites, and those who self-report as generally healthy. Life satisfaction should be higher in older people and those with higher incomes, to a point. We expect little, if any, correlation between sex and average levels of life satisfaction, though women may be more likely to report both extremely high and extremely low satisfaction. Investigating these connections will introduce the BRFSS to the field of subjective well-being on a large scale and lay the groundwork for future research into the effects of these variables on life satisfaction.

ASSESSING THE CONTRIBUTIONS OF ATTENTION AND AROUSAL TO RESPONSE INHIBITION IMPAIRMENTS IN SCHIZOPHRENIA: A PUPILLOMETRY STUDY

Kassidy Fifer

Poster: 534

Mentor(s): Katharine Thakkar (Psychology)

Schizophrenia is a neuropsychiatric disorder in which a patient experiences an assortment of positive symptoms including separation from reality and negative symptoms such as loss of speech and movement control. Disabling cognitive deficits are also common in schizophrenia, particularly in the domain of executive functioning, which refers to those cognitive functions involved in the higher-level control of behavior. These deficits are related to social disability and poor occupational outcome. One important aspect of executive functioning is response inhibition. Previous studies have shown that patients with schizophrenia are less efficient at inhibiting themselves from executing planned eye movements. The mechanisms of this inhibition impairment are unclear, but can possibly be connected with general attention and arousal and possibly norepinephrine release – which is associated with attention. One way of indexing arousal and attention is with pupil sizes because pupils dilate when aroused, stimulated, or during concentration. In addition, pupil size correlates with norepinephrine release. In the current study, we will assess the role of attention, arousal, and possibly norepinephrine release during an oculomotor inhibition task in patients with schizophrenia and healthy controls by analyzing pupil dilation during an oculomotor inhibition task. This information might contribute to our understanding the mechanisms of cognitive impairments in schizophrenia. Given the link between response

inhibition impairments and impulse control problems (e.g. substance use) and unemployment, these findings have potential clinical relevance.

ARTIFICIAL SWEETENERS

Autumn Massey, Niccollete Russell

Poster: 535

Mentor(s): Alex Johnson (Neuroscience)

Epidemiological studies suggest that individuals that consume non-caloric artificial sweetened beverages, show a paradoxical increase in weight gain (obesity) and susceptibility to diabetes. This research project investigates the effects of artificial sweetener consumption on weight gain in mice. The rationale of this study is that the association between taste and calories is important for normal regulation of metabolism, thus the consumption of non-caloric artificial sweeteners is predicted to lead to metabolic impairments, including weight gain. A number of parametric studies were conducted to determine the optimal parameters for establishing the negative consequences of artificial sweetener consumption on metabolic control. Mice were exposed to either non-caloric artificial sweeteners (saccharin, sucralose) or remained on water (control mice) during the start of the dark cycle, a period of time in which mice naturally consume fluids and foods. We examined the extent to which exposure to non-caloric artificial sweeteners enhanced the vulnerability to weight gain that follows 21 days unrestricted access to a 45% high fat diet. Throughout testing the intake of the assigned solution and high fat diet, along with body weights were recorded daily. The implications of these findings are discussed with respect to disruptions in learned metabolic control via interactions with neuropeptide systems in the hypothalamus.

ONLINE CONSTRUAL: A MACHINE LEARNING PERSPECTIVE

Raven Dominguez, Christopher Semaan

Poster: 536

Mentor(s): Christopher Dishop (Psychology)

Construal theory, an explanation for how people mentally represent objects or events under consideration, has recently helped describe how psychological distance influences human perception and, ultimately, behavior. Despite empirical backing, the theory has not been tested in an online setting, where natural obstacles may mitigate the influence of distance on behavior. That is, because individuals modify their online behavior to create "ideal" images of themselves, the influence of distance on subsequent behavior may be diminished. On the other hand, presenting information online to others has inherent temporal and spatial distance components, and therefore the influence of distance may be exaggerated. This study seeks to address this paradox. A variety of existing Youtube videos will be coded and transcribed. Each video will contain an individual describing their opinions surrounding a single event (e.g., hurricane Katrina). Videos will then be grouped by one psychological distance variable (time or space in the current study). A topic modeling algorithm will then be used to uncover the underlying topic structure of a given video. We hypothesize that, consistent with construal theory, individuals describing near events will do so using greater amounts of topics. Moreover, the greater topic amounts in low construal videos will also have diminished boundaries between them. In other words, individuals describing near events will do so using more categories, but those categories will be muddled.

LACK OF SLEEP AND ITS EFFECTS ON COGNITIVE FUNCTION: A META-ANALYSIS

Nicholas Nicoletti

Poster: 537

Mentor(s): Kimberly Fenn (Psychology)

Due to increasing demands of academic and working life in America, the quality and duration of sleep have decreased dramatically over the past one hundred years. Sleep plays a vital role in maintaining health and has been shown to significantly impair cognitive function. Sleep restriction occurs when a person receives a limited amount of sleep for one or more nights. Evidence shows that sleep restriction impairs cognition, however, there has not yet been an examination of exactly how damaging sleep restriction is on cognition. We are investigating the strength of the effect of sleep restriction on cognitive function (e.g. attention, memory and vigilance). Using multiple literature search engines, over 9,000 relevant studies were collected and filtered based on predetermined criteria. From this, we compiled approximately 4,000 empirical papers. We are currently analyzing these articles to determine if the methods and results of each experiment fit within our criteria for our final data-set. We will then determine the strength of each effect using Cohen's d as our measure of effect size. We predict that the strength of impairment on cognitive ability, due to sleep restriction, is large. Moreover, we expect a dose response curve such that the effect will be greater for studies that restrict sleep for fewer hours or test after more days. These results would suggest that low amounts of sleep can be as damaging as one night of total sleep deprivation. From this, we will be able to make informed recommendations regarding sleep duration and optimal cognitive performance.

WORRYING "ALPHA" NOTHING

Ling Peng

Poster: 538

Mentor(s): Jason Moser (Psychology)

In this presentation, I will discuss the results of a re-analysis of a previous study examining associations between emotion regulation and worry (Moser et al., 2014). The data were reanalyzed to explore the relation between cue-locked alpha activity and worry during an emotion regulation task. Higher alpha activity is thought to indicate internal focus, thereby indicating less attention to the task at hand. It was previously suggested that individuals with higher self-reported worry practice anticipatory preparations to reappraise unpleasant pictures, which would be reflected in less alpha activity. To test this possible relationship between cue-locked alpha activity and worry, a repeated measures analysis of variance (ANOVA) was conducted that included cue-locked alpha activity for regulation and passive viewing trials and Penn State Worry Questionnaire (PSWQ) scores entered as a covariate. Results indicated that higher worry scores were related to more overall cue-locked alpha activity – across both regulation and passive viewing trials -- at the frontal electrode site Fz ($r = .27, p = .04$). These findings suggest that worriers may allocate more attention to their internal mental environment which results in reduction of resources dedicated to the emotion regulation task at hand. This research provides initial insights into the minds of worriers as they prepare to engage in emotion regulation processes.

DISTORTED EATING SCREENING FOR ATHLETES

Moshlur Rahman, Andrew Lee, Ali Moshrefi

Poster: 539

Mentor(s): Samantha Kennedy (Psychiatry)

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

PSYCHOLOGY

POSTER PRESENTATIONS, SECTION 4

LAKE HURON ROOM, 11:00 AM – 12:30 PM

SPEECH UNDERSTANDING IN NOISE

Stacey Rowland, Alyssa Cleland, Klea Doko, Vixey Silva

Poster: 542

Mentor(s): Devin McAuley (Psychology)

Understanding speech in noise (SpIN) relies on the ability to distinguish an individual speaker from background sounds, such as conversing in a nightclub. Recent research suggests that individuals with extensive musical training are better able to understand SpIN than non-musicians. Parbery-Clark et al. (2009) found that highly-trained musicians outperformed non-musicians on SpIN tasks; Slater and Kraus (2015) found that percussionists outperformed non-musicians on SpIN tasks, attributing this to enhanced rhythmic abilities. The present study extends past work on the effect of musical training on SpIN to a larger sample of participants and tasks. One-hundred ninety-seven participants completed a battery of tasks that included assessments of hearing, SpIN ability, cognitive ability, and a comprehensive assessment of music training/experience. SpIN tasks included the WIN (words-in-noise) and QuickSIN used by Krauss and colleagues, which require participants to repeat back the last word of a spoken sentence or whole sentence that is embedded within background babble. Overall results revealed no significant correlation between years of formal music training and WIN ($r = .104, p = .168$) or QuickSIN ($r = .115, p = .127$) thresholds. Comparing just highly-trained musicians and non-musicians revealed no significant difference between groups on either WIN, $t(79) = 1.03, p = .31$, or QuickSIN, $t(79) =$

0.29, $p = 0.77$. Results did reveal a relationship between verbal IQ and QuickSIN ($r = -0.24$, $p < .001$), but not with WIN ($r = -0.05$, $p = .51$) thresholds. Overall, the results of this study suggest the conclusion that music training enhances understanding SpIN is premature and may be driven by other factors.

PERCEIVED BARRIERS TO USING PARENT-MEDIATED INTERVENTIONS FOR MARGINALIZED FAMILIES WITH CHILDREN ON THE AUTISM SPECTRUM

Seth Rowles

Poster: 543

Mentor(s): Brooke Ingersoll (Psychology), Katherine Pickard (Psychology)

Autism spectrum disorder (ASD) is characterized by deficits in social communication and the presence of restricted, repetitive and stereotyped patterns of interest (APA, 2013). Over the past two decades, there has been a rapid growth in the number of youth being diagnosed with ASD as well as growth in the early intervention services aimed at improving the long-term outcomes of individuals with ASD and their families. Parent-mediated intervention is one such example of an evidence-based intervention for families of children with ASD that involves teaching parents how to use intervention strategies with their child with ASD, which serves to increase their efficacy and empowerment, while also increasing the amount of intervention services that their child receives. Despite the effectiveness of parent-mediated intervention, there are a great numbers of barriers to accessing this type of treatment. This study aims to better understand these barriers as it relates to a particular evidence-based, parent-mediated program called Project ImPACT. Specific research questions include: 1) do families from lower SES backgrounds report greater barriers to accessing Project ImPACT; 2) Among risk factors such as parenting stress, child symptom severity, income, and ethnicity, what are the most important predictors of perceived barriers to using Project ImPACT?; and 3) does a more accessible program diminishes these perceived barriers?

INFORMAL SOCIAL CONTROL AND FEAR OF CRIME PREDICT LIFE SATISFACTION IN DISADVANTAGED NEIGHBORHOODS

Hannah Sislow

Poster: 544

Mentor(s): Alexandra Burt (Psychology)

Police play a vital role maintaining a community. However, in neighborhoods with lower socioeconomic status, which tend to have higher population densities, police are unable or unwilling to monitor the increased resident interaction. This lack of police presence may result in higher levels of informal social control among residents, which is the willingness to intervene in situations related to child welfare, delinquency, crime, and safety. Prior research has shown that informal social control moderates the association between neighborhood disadvantage and neighborhood crime and delinquency. However, it is unclear whether the protective nature of informal social control extends to other areas of interest, such as quality of life. Therefore, the goal of the current study is to examine how informal social control and fear of crime interact to predict life satisfaction in a diverse sample of adults ($N = 1880$) residing in disadvantaged neighborhoods. Participants self-reported their own fear of crime, perception of neighborhood informal social control, and life satisfaction. Moderated regression analyses, adjusting for the non-independence of neighbors within Census tracts, revealed that the relationship between fear of crime and life satisfaction was moderated by informal social control, such that individuals with a lower fear of crime and who live in neighborhoods with higher levels of informal social control reported the highest levels of life satisfaction. Consequently, resources that create social connections among neighbors, such as community centers, parks, or a neighborhood watch, may raise informal social control and, in turn, increase quality of life in disadvantaged communities.

GENDER REPRESENTATION IN I/O: AN INTROSPECTIVE LOOK

Megan Snoeyink

Poster: 545

Mentor(s): Danielle Gardner (Psychology), Ann Marie Ryan (Psychology)

Recently many academic fields have started to take an introspective look at gender representation within in their fields. However, the field of industrial and organizational (I/O) psychology has neglected to examine this matter. This study seeks to join the conversation by reviewing gender representation in I/O based on four major criteria: (1) faculty ranks, (2) high-ranking society position (3) society award winners and (4) authorship in the field's top journal. Results show that there is a clear gender gap in each criteria, although the causes remain unclear. This study allows for easier understanding of the current state of the field providing a "jumping-off point" for future research. In the future, research should investigate possible methods to correct for these gaps and explore other issues of demographic representation within field.

THE EFFECT OF OBJECTIVE AND SUBJECTIVE TIME PRESSURE ON CREATIVE PERFORMANCE: ROLE OF SELF-EFFICACY

Megan Snoeyink

Poster: 546

Mentor(s): Kevin Ford (Psychology)

In today's highly competitive global economy, creativity is highly valued by organizations. Employee's creative behavior has been found to unfold under a variety of stressors, including time pressure. It has been found that time pressure can have a large impact on creativity. However, the direction of this impact is unclear. It is also unclear on whether this time pressure is objective or if its effect is dependent on how time pressure is subjectively framed. This study not only aims to find the impact that time pressure has on creativity, but it also aims to find the interaction between subjective time pressure and objective time pressure. This study will also look at the mediation effects of self-efficacy. In this study, a survey will be administered to university students where they will be asked to complete a task measuring creative performance while under time pressure. Four conditions will exist with combinations of High Objective Time Pressure, Low Objective Time Pressure, High Subjective Time Pressure and Low Subjective Time Pressure. Subjective time pressure will be implemented by framing time constraints as being high pressure or low pressure. The results from this study will be analyzed by using descriptive statistics and regression analyses. The implications of this study will impact the way organizations implement time pressure as well, as how they frame time pressure in order to maximize employee's creative performance.

GENDER DIFFERENCES IN THE PREDICTORS OF DATING VIOLENCE PERPETRATION

Courtney Goetz

Poster: 547

Mentor(s): Alytia Levendosky (Psychology)

In a sample of 113 male and 116 female university students, internalizing and externalizing mental health problems are examined as predictors of dating violence in college students, using gender as a potential moderator. In addition, it is examined whether there is a stronger relationship between dating violence victimization and mental health outcomes or between mental health problems and dating violence perpetration, and again testing the effect of gender. It is predicted that externalizing mental health problems will better predict perpetration for male college students, and internalizing mental health problems will better predict perpetration for female college students.

ENVIRONMENTAL IMPACTS ON PERSONALITY DEVELOPMENT

Danielle Stewart

Poster: 548

Mentor(s): Emily Durbin (Psychology)

It is important to understand the relationships between environmental factors and their impact on personality development. Several studies have found links between a variety of external influences and patterns in personality development, including normal and atypical patterns of personality trait development. The current study will expand on this literature by investigating the influence of individual differences in social relationships (relationships with peers and parents) and more adverse experiences (physical and sexual abuse) on patterns of personality development from early adolescence through young adulthood. We hypothesize that relationships will have an effect on personality development, but that effects will be even larger for adverse experiences. Participants are from 3 longitudinal studies from the Minnesota Center for Twin and Family Research with data on personality and the environmental factors focused on in this study. Analyses will evaluate if there is a statistically significant influence of these factors on meal level personality trait change in individuals from late adolescence to early adulthood.

HARDINESS CONTROL BUFFERS THE RISK OF PARENTIFICATION ON DEPRESSION AMONG TYPICALLY DEVELOPING SIBLINGS OF INDIVIDUALS WITH AUTISM SPECTRUM DISORDER

Megan Wright

Poster: 549

Mentor(s): Amy Nuttall (Human Development and Family Services)

Hardiness is a set of attitudes allowing individuals to transform stress into personal growth (Kobasa & Maddi, 1981). Hardiness buffers depression risk among mothers of children with autism spectrum disorder (ASD; Weiss, 2002) but has not been examined among typically developing siblings (TDS) of children with ASD who are also at risk for depression (Orsmond et al 2007). Parentification refers to children's burdensome caregiving roles (Kerig, 2005) common among TDS (Lamorey, 1999). Parentification is associated with depression (Peris et al 2008) and there is a paucity of research examining protective factors against parentification (Nuttall & Valentino, 2016). The present study examined hardiness

as a potential buffer of the risk of parentification on depression among TDS (N=113). As hypothesized, hardiness moderated the association between parentification and depression (Figure 1). This finding supports parentification theory arguing that an individual's traits influence their experiences of parentification and subsequent adjustment (Nuttall & Valentino, 2016).

PSYCHOLOGY POSTER PRESENTATIONS, SECTION 5 LAKE HURON ROOM, 3:00 PM – 4:30 PM

SOCIOECONOMIC STATUS AND WORKING MEMORY

Sena Al-Ado

Poster: 552

Mentor(s): Joseph Cesario (Psychology)

Past studies have found those who came from low income households tend to have lower cognitive working memories (CWM) than those from higher income households. The present study hypothesized the reason for this difference came from the brain's investment in social working memory (SWM), causing limited CWM development. Participants were required to come twice, two weeks apart. During the first visit, they provided information related to socioeconomic status, such as their parents' income. They were also required to provide names of ten friends, and rank them on 45 personality traits, on a scale of 0-100. Two weeks later, part two tested their social and cognitive working memories. To test SWM, 2-4 of the names participants provided in part one appeared for 4 seconds on the screen, then a name of a trait would appear for 1.5 seconds. Using SWM, participants answered questions by recalling how they ranked their friends in part 1. To test their CWM, participants alphabetized the 2-4 names on the screen after they disappeared. The data showed there was no correlation between the participants' sense of status in society and SWM and CWM performance. There was a small significant, positive correlation between SWM and CWM. Data also showed participants from high income households did significantly better on the CWM and SWM memory tasks to the same extent. This data shows household income has a positive relationship with both social and cognitive working memory. It can be concluded there is no development trade-off between SWM and CWM.

IS EMOTIONALITY INHERITED?

Hannah Chung

Poster: 553

Mentor(s): Emily Durbin (Psychology)

The purpose of this research is to study the relationship between parent personality and offspring temperament. Through data collected about parents via self-reported questionnaires and laboratory observed temperament traits in their children, we are able to search for correlations between corresponding traits across parents and offspring. If temperament has a biological basis, one would expect similarity between biologically related family members. Specifically, we expected positive correlations between parent and child scores for the traits of Positive Emotionality/Extraversion, Negative Emotionality/Neuroticism, and Effortful Control/Constraint.

ARE COWORKER RELATIONSHIPS ON SOCIAL MEDIA IMPACTING THEIR RELATIONSHIP IN THE WORKPLACE?

Brittney Dawson

Poster: 554

Mentor(s): Courtney Bryant (Psychology), Ann Marie Ryan (Psychology)

The similarity-attraction paradigm states that individuals who are more similar to each other will be more attracted to each other. In the present study, we examined how the similarity-attraction paradigm will influence coworker relationships when coworkers are connected on social media. We developed an online between-person study where participants were partnered with a coworker that had similar or dissimilar demographic characteristics and values. Participants were then shown social media posts of their coworker that expressed strong opinions for controversial topics. We then tested to see if participants were more or less likely to help their coworker on a work task. We predicted that if the coworkers disagreed with the values implicit in the social media posts, they would be less likely to assist one another because their views are dissimilar. Preliminary data suggest that participants are more likely to help their coworker if they have similar demographics despite the level of similarity or dissimilarity in values. Future research and implications will be discussed.

BRAIN REGIONS CORRESPONDING TO THE THEMES IN JANE AUSTEN'S MANSFIELD PARK

Jacob Frazier

Poster: 555

Mentor(s): Natalie Phillips (English)

The emerging field of literary neuroscience explores the neural circuits implicated in processing complex literature and how they may be modulated by different attentional states. Previous neuroimaging studies in the field have been limited to single word or phrase, timed presentation parameters. The present study gathered functional imaging data from 18 English PhD candidates who read chapter two of Jane Austen's *Mansfield Park*. The text was divided into 32 short blocks, half of which the participants read with heightened attention to literary devices (close reading) and half of which they read to enjoy the text (pleasure reading). They were then asked to write a short essay about the blocks they close read. Some participants quoted directly from the text without being able to reference back to it, sparking an analysis of the quotes themselves and the topic matters they supported in the literary essays. Brain activity of participants was analyzed to test differential activation between topics, using participant's own quotes to assign topics to each block of text. We anticipate increased activation in the frontal lobes associated with processing of syntax and spatial awareness, and hope to explore connections between this and other regions according to thematic connections within the text. Finally, when it comes to the two differential methods of attention in reading, we predict a more left-lateralized circuitry during the close reading condition because of its dependence on analytical abilities, and a more bilateral circuitry during the pleasure reading condition.

CYBERBULLYING IN COLLEGE ASSOCIATED WITH DELINQUENT PEER AFFILIATION

Kersten Gant, Erin Carsten, Peiqi Lu

Poster: 556

Mentor(s): Sybil Burt (Psychology)

With the modern proliferation of social media and digital technology, cyberbullying is a rapidly growing public health concern that is associated with serious negative mental health outcomes in victims, including decreased school performance, depression, anxiety, and suicidality, but often goes unreported. Because of this, risk factors that may aid in predicting cyberbullying are not well understood. Prior research suggests that negative affect and delinquent peer affiliation are independently predictive of engaging in cyberbullying, but no study has examined how these risk factors interact to predict cyberbullying. Therefore, the current study assessed whether negative affect moderates the relationship between delinquent peer affiliation and cyberbullying in undergraduates (N=666). Participants self-reported the delinquency of their peers, their negative affect, and frequency of their cyberbullying activities. Moderated regression analyses revealed that delinquent peer affiliation significantly predicted cyberbullying behavior, but negative affect and the interaction between negative affect and peer affiliation did not. These results support the previously established link between cyberbullying and delinquent peers, but suggest its association with negative affect may be less robust and could be moderated by additional risk factors. One possible explanation for our findings is that negative affect may be more predictive of cyberbullying in individuals who are both victims and perpetrators as studies have found increased negative affect among adolescents who have experienced both cyberbullying and cyber-victimization. Because cyberbullying occurs within social networks, it is also possible that antisocial peers are more strongly predictive of cyberbullying than other risk factors like negative affect.

EMOTIONAL PROCESSING AND BRAIN ACTIVITY STUDY

Grant Burton

Poster: 557

Mentor(s): Jason Moser (Psychology), John Waller (History)

The aim of this study is to examine whether activating a female stereotype has an effect on emotional processing as measured by brain activity. Specifically, prior research has shown that female stereotype threat has detrimental effects on behavioral performance. We expect that female stereotype threat will increase worry and increase emotional reactivity. The hypothesized mechanisms will be assessed using a between-subject, multi-method design involving self-report, behavioral, and neurophysiological measures. Participants will include 40 Michigan State undergraduate females, and are randomly assigned between a gender-based emotion stereotype threat condition and a control condition. Electroencephalography (EEG) equipment is used to implicitly measure emotional reactivity via observing an event-related potential (ERP) called the late positive potential, or the LPP, which is an ERP robustly demonstrated to reflect emotional experience. Participants view pictures from the International Affective Picture System (IAPS), which reliably elicit an LPP brain response. On each trial, participants are presented randomly with either a neutral or unpleasant picture at the center of the computer screen for 5 seconds. During instructions, participants in the stereotype threat condition are told that these pictures replicate previous findings that women are more emotional than men, whereas participants in the control condition are told that these pictures replicate previous findings that looking at unpleasant

pictures can evoke emotional responses. A series of self-report questionnaires about emotions and behavior are used as a second measure for the effects of a stereotype threat on emotion and also help identify any confounding variables.

THE EFFECTS OF B-VITAMINS AND CAFFEINE ON COGNITION

Kelsey Pagorek, Trusha Patel

Poster: 558

Mentor(s): Kimberly Fenn (Psychology)

Energy drink consumption is popular across the United States, especially among young adults. Sales of energy drinks are estimated to grow to \$21.5 billion in 2017. Along with caffeine, energy drinks often advertise having large amount of B-vitamins and are sometimes marketed as cognitive enhancers. Many studies have shown that caffeine can improve cognitive performance in humans. However, few studies have evaluated the effects of the B-vitamins on cognition in healthy young adults, and there are no known studies that examine the additive role of B-vitamins in caffeinated beverages on cognition. The current study examines the effects of B-vitamins and caffeine, both separately and together, on vigilance, working memory, and short-term memory. We used a double-blind, placebo controlled design. Participants were randomly assigned to one of four drink conditions: placebo, caffeine, B-vitamins, or caffeine with B-vitamins. Approximately one half-hour after drink consumption, each participant completed a vigilance task to measure attentional vigilance, the n-back task to assess working memory, and a word recall task to test short-term memory. Results are still being analyzed, but we predict that B-vitamin intake, in conjunction with caffeine, will benefit cognition more than intake of either B-vitamins or caffeine alone.

SOCIAL SCIENCE: GENERAL

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

THE FLINT WATER CRISIS AND THE INTERSECTION OF EXPERT KNOWLEDGE AND EMERGENCY MANAGEMENT

Allison Kelly

Time: 11:00 AM

Mentor(s): Jennifer Carrera (Sociology)

My research explores how the 2014 water crisis developed in Flint, Michigan, leaving the people of Flint, a majority low-income, nonwhite population, without clean water. The role of the Emergency Manager in the crisis has often been discussed, as it was the Emergency Manager who allowed the city's water source to switch from the Detroit River to the Flint River, leading to lead contamination of the city's drinking water. Also discussed is the failure of the EPA and DEQ experts whose job it is to make sure that water sources are safe. My research aims to understand the intersection of the knowledge of EPA and DEQ experts with the role of emergency management in the city. Some questions I consider are: What specific decisions were made by experts that lead to the contamination of the water? Out of what context were these decisions made, and how did that context develop? With these questions and my analysis, I discuss how emergency management and existing structures of inequality ultimately lead to the Flint Water Crisis.

PRETEND TO BE SMART: LINK BETWEEN PRETENDING AND COGNITIVE DEVELOPMENT

Rachel Nelson, Simone Alhagri

Time: 11:15 AM

Mentor(s): Claire Vallotton (Human Development and Family Studies)

This study seeks to understand the development of social-cognitive skills throughout toddlerhood. Pretending is vital for young children because it allows them to label and learn about mental states (e.g. emotions), and have a better understanding of human behavior in their culture, thus increasing their socio-emotional skills. Previous research suggests a relationship between pretend play and children's mental state talk (Hughes, C., & Dunn, J. 1997), emotional understanding (Lindsey, E. W., & Colwell, M. J. 2003), and their understanding of thoughts and feelings (Youngblade, L. M., & Dunn, J. 1995). However, no studies have looked at the development of these pretense skills in toddlers nor their association with other domains of development. Therefore, we describe the development of toddler's abilities to empathize with story characters, represent their emotions, and test whether these skills are associated with both social emotional and language skills. To assess the child's emotional representations, they were told a series of six stories and asked to label and represent the characters emotions. We described the average number of emotions at ages at 18-30 months. To determine whether social-cognitive skills are associated with emotion or language skills, we correlated the

children's emotional representations by using two subscales of the Bayley Scales of Infant Development (Bayley, 2006); a parent reported social emotional measure and language test.

UNDERGROUND AND OVERLOOKED: AMERICA'S WASTEWATER INFRASTRUCTURE CRISIS

Sarah Wrase

Time: 11:30 AM

Mentor(s): Elizabeth Mack (Geography)

Many of the nearly 800,000 miles of public sewer mains that provide service to residents in the United States were constructed in the infrastructure spending boom of the late 1940-50s. These sewer systems have reached the end of their useful lives and are in dire need of repair and replacement. This urgent need is the result of decades of disinvestment at all levels of government. Consequently, consumers have experienced dramatic increases in sewer costs in recent years to close the gap between the \$300 billion needed to fix America's aging infrastructure and the current level of investment. In this presentation we discuss our findings on the reported costs of needed wastewater infrastructure expansions, improvements, and replacements at the county level. We also identify the categories of wastewater infrastructure that are generating these costs.

MEASURING THE EFFECTS OF FM RADIO IN AFRICA THROUGH IRREGULAR TERRAIN MODELING

Arhin Acheampong, Connor Berdy, Karan Dhillon, Jesse Forraht, Matthew Suandi

Time: 11:45 AM

Mentor(s): Jeffrey Conroy-Krutz (Political Science)

FM radio is the most important source of political information for most Africans. Newspapers require regular purchases and require literacy skills, while televisions require access to electricity and relatively expensive receivers. Radio, on the other hand, is cheap for consumers to access, does not require literacy, and can reach mass audiences by broadcasting fairly inexpensively in a range of vernaculars. The removal of state controls on media ownership and a growth in the availability of private capital have led to a significant proliferation in radio stations in most African countries since the early 1990s. The amounts and types of stations to which people are exposed could have significant effects on political knowledge, attitudes about democracy, political polarization, and even participation in violence. However, identifying causal relationships between media exposure and various outcomes of interest is complicated by the fact that individuals typically self-select the media they consume. To alleviate such endogeneity concerns, we take advantage of exogenous determinants of radio station accessibility; namely, the number of stations available to individuals is determined by factors largely outside of their control, such as proximity to transmitters, those transmitters' technical characteristics, and the surrounding terrain. Using Irregular Terrain Models, which take these factors into account, we estimate maps of radio propagation for hundreds of stations in four African countries: Ghana, Kenya, Senegal, and Zimbabwe. We specifically explore the consequences of station exposure on individuals' attitudes and decision-making around the 2016 general election in Ghana.

WHICH DO YOU CHOOSE, AND WHY? COLLEGE STUDENTS' PREFERENCE OF MENTAL HEALTH TREATMENT

Juan Contreras

Time: 12:00 PM

Mentor(s): Jason Moser (Psychology), Hans Schroder (Psychology)

The number and severity of mental health problems has been increasing over time. In fact, the number of people who seek treatment is only half of all Americans needing treatment, according to the surgeon general. The primary goal of this study was to better understand the reasons behind college students seeking or not seeking different kinds of mental health treatment. To examine these reasons, nearly 700 Michigan State University students were recruited to answer self-reports measures about treatment preference. Students described why they chose a particular treatment and linguistic analyses of these essays for cognitive and emotional reasons were conducted. Participants were presented with a hypothetical mental health situation requiring them to seek help or not. Each participant had the choice to choose no treatment, medication, therapy, or combination therapy and medication, and then explain their reasons for their choice. A one-way ANOVA with the factor Hypothetical Treatment Choice (No treatment, medication, therapy, or combination therapy and medication) yielded a statistically significant effect for Cognitive ($F(3, 682) = 9.18, p < .001$) and emotional ($F(3, 682) = 10.75, p < .001$) reasons. Post-hoc tests showed that individuals who chose combination therapy and medication wrote significantly more Cognitive reasons than those who chose other options, and those who chose Medication used significantly more emotional reasons. Controlling for depression, gender, and overall word count did not alter these findings. Results point to underlying motives for choosing different mental health treatments such as speaking to therapists directly or wanting fast results with medication.

SURROGACY IN THE UNITED STATES

Zachary Crewes, Marlee Maher

Time: 12:15 PM

Mentor(s): Mark Largent (James Madison College)

We hope to delve into the intricacies of surrogacy in the United States. Understanding the history of surrogacy is paramount to the understanding of the topic, and because there is no federal laws regarding surrogacy, every state has its own regulations of surrogacy and In Vitro Fertilization. We hope to understand the laws of every state and how they differ from each other in practice and what the implications of those laws are. We also hope to fully understand the mental and physical risks associated with surrogacy in regards to both the surrogate mother and the intended parents.

RACIALIZATION OF ARAB AMERICANS POST 9/11

Breanna Escamilla

Time: 12:30 PM

Mentor(s): Najib Hourani (Anthropology)

This presentation examines race relations and larger structures of power that shape the experiences of marginalized communities—specifically Arab Americans. Foundational to the infrastructure of American society is the Black and White binary framework that places groups into categories effectively shaping the social landscape of lives across racial and ethnic groups. This dichotomous framework is one that tethers identity to others producing groupings subject to change as the social landscape continuously shifts; therefore, it is imperative that we are cognizant of how race and ethnicity are contingent upon social tensions. For people of color who are not necessarily considered socially white, but classified as legally white navigating spaces in a society that does not allow for in-between existences leads to issues of placement on the racial hierarchy of America. Specifically, for Arab-Americans who have no option other than White on the U.S Census their classification is often contradictory to their lived experiences. Identity then becomes a function of variables such as phenotype, culture, religion, and language. For people of Middle Eastern descent living in contemporary America it is arguable that their identities are more than ethnically classifying, but rather I will argue that the reactionary treatment of Arab Americans post 9/11 has cemented Arab-Americans as a racial category as evident by racialized violence, discriminatory practices that tether Arab Americans to stereotyped images, and through the voices of racially conscious Arab Americans.

KEEP IT QUERQUE: SPINOFF DYNAMICS OF ALBUQUERQUE, NEW MEXICO

Babs Hough

Time: 12:45 PM

Mentor(s): Elizabeth Mack (Geography)

The study of entrepreneurial ecosystems is critical to understanding temporal, industrial and regional factors that influence spinoff dynamics. Spinoffs are firms formed by former employees of private companies, government agencies, or colleges and universities. These firms are important because they are a source of new firm growth for regional economies. This presentation will examine temporal, industrial, and spatial trends in spinoffs for Albuquerque, New Mexico, which is an entrepreneurial environment (ecosystem) in a developmental stage, as determined by the Kauffman Foundation's Index of Entrepreneurship. This project compiled spinoff data for companies, as well as lists of economic development organizations, venture capital groups, and trade associations through online research, surveys and interviews. These data will be visualized in a spinoff map to represent a variety of information about the regional environment in which spinoffs are generated, including the companies, industries, and years that produce the most spinoffs. A better understanding of spinoff dynamics is important to the design of policies and economic development strategies that encourage this type of new firm formation.

**SOCIAL SCIENCE: GENERAL
POSTER PRESENTATIONS, SECTION 1
LAKE HURON ROOM, 9:00 AM – 10:30 AM**

THE BI/PAN EXPERIENCE: EXPOSING BI/PAN MARGINALIZATION ON MICHIGAN STATE UNIVERSITY'S CAMPUS

Katrina Groeller, Alyse Maksimoski

Poster: 562

Mentor(s): Stephanie Nawyn (Sociology)

Bisexual and pansexual erasure is unfortunately a common practice in Western societies. We hoped to allow our participants to express their unique perspective into how they experienced marginalization rooted in their sexual orientation on a public, conservative college campus. As students at Michigan State University, we surmised that our participants would find the campus environment toward their sexual orientation to be slightly negative overall. Over a period of three weeks, we interviewed 13 individuals using survey research data in accordance with feminist research methods. The students were asked both quantitative questions (such as their Kinsey Scale number and age) and qualitative questions (such as how they first came out and feelings about safety on campus). Their answers were recorded in their entirety. While most of our participants had positive experiences on campus, a significant number of others did not. These results are imperative, as they address a marginalized population and label ways that LGBTQIA+ organizations, faculty, staff, and individual allies on campus can better address these issues.

AN EVALUATION OF STATE FUNDED PROGRAMS TO PREVENT SEXUAL ASSAULT

Connor Berdy

Poster: 563

Mentor(s): Matt Grossman (Institute for Public Policy and Social Research)

Sexual assault and misconduct has become an issue of great controversy and attention in recent years. Many universities and colleges have attempted to measure the scale of this issue and find ways to successfully identify and address this issue. State governments have put funding into awareness and prevention campaigns to help reduce sexual misconduct. I have reviewed various surveys conducted by universities to better understand the scope of this issue and the effect that awareness programs have had, if any.

REGULATIONS, POLICIES, AND VOLUNTARY PROGRAMS ADDRESSING NON-POINT SOURCE POLLUTION IN LAKE ERIE AND LAKE CHAMPLAIN

Emily Jenkins

Poster: 564

Mentor(s): Mark Axelrod (Fisheries and Wildlife)

Nonpoint source pollution contributes to eutrophication in Lakes Erie and Champlain; excess nutrients like nitrogen and phosphorus run into these lakes and can result in the growth of harmful algal blooms (HABS). This original dataset documents policies, regulations, and voluntary programs at federal, state, and local levels with the goal of combating nonpoint source pollution. This research aims to determine the number, type, strength, and incentive associated with policies and regulations pertaining to nonpoint source pollution. To create a dataset compiling the regulations and policies from each respective state, county, or national government, government websites, legislation, and reports were searched in order to find relevant policies. 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 the states and provinces that fall within the relevant lake watersheds were researched. The information was then analyzed and categorized depending on type of policy, strength, and type of incentive. The resulting original dataset compiles all information relevant to nonpoint source pollution at the local, state, or federal level. This information is useful because it reveals the prominence of agricultural policies at the state level and urban runoff regulations at the local level. The strength scale can allow researchers to understand whether certain policies are more effective than others, and demonstrates the popularity of voluntary programs. This dataset will help those constructing new policies regarding nonpoint source pollution, as well as those evaluating current regulations.

FORCED STERILIZATION AS GENOCIDE: A MULTIDISCIPLINARY APPROACH TO EXAMINING THE HISTORY OF STERILIZATION OF INDIVIDUALS WITH DISABILITIES

Tess Jimkoski

Poster: 565

Mentor(s): Christina DeJong (Criminal Justice)

Across societies, people voluntarily subject themselves to various methods to control their fertility, including the act of sterilization. Sterilization is defined as a process or act that renders an individual incapable of sexual reproduction. However, during the early to middle twentieth century, individuals with disabilities were subjected to forced sterilization. This act was primarily conducted against individuals that either expressly refused the procedure or were not given an opportunity to provide consent. This forced sterilization not only inhibited them from reproducing but stripped them of bodily integrity. The goal of this project is to resolve questions that coincide with genocide to this forced act and examine this issue in an interdisciplinary approach to uncover the associated psychological, economic, social, and anthropological effects. During this research, information connected to eugenics, politics, and other socio-cultural topics will be delivered to the audience. While these genocidal acts are not able to be examined in a current experimental setting, research will be conducted through previous case studies and will be cited in this project. Only by integrating ideas from these various disciplines that are affected by this act will the core to human integrity and the individual rights of one's body be revealed. It is through this research that two questions will be answered: when does sterilization become genocide, and what rights do individuals with disabilities lose in the process?

WE NEED TO TALK: HOW TODDLERS' LANGUAGE INFLUENCES PARENTS' MENTAL STATE TALK

Michaella McBratnie, Emily Rusher

Poster: 566

Mentor(s): Claire Vallotton (Human Development and Family Studies)

This study looks at how parents' mental state talk changes over time and how the toddlers' communication influences parents' mental state talk. The development of toddler communication follows a typical pattern in which the child's communication attempts become more explicit (Buckley, 2003), and parents respond by using more complex language (Goldin-meadow et al, 2007). Caregivers' interpretations of the intentions behind children's behaviors using mental state talk motivates the child to communicate further (Buckley, 2003). The frequency of caregivers' mental state talk affects language acquisition (Meins & Fernyhough, 1999), attachment (Meins et al, 2011), and emotional regulation (Taumoepeau & Ruffman, 2006). In early toddlerhood parents focus their comments on children's desires, then shift to talk more about emotion and cognition in later toddlerhood. However few studies have looked at how the overall frequency of parent mentalization changes over time, nor how toddlers' communication influences parents' language use. Utilizing transcripts from 5-minute free play interactions when children were 12, 18, 24, and 30 months, we hypothesize that parents' frequency of mental state talk will increase over time, and will be associated with children's language skills.

SOCIETAL AND SCIENTIFIC NORMS AND THEIR IMPACT ON THE HETERONORMATIVITY OF ALTERNATIVE METHODS OF CONCEPTION

Laura Pavliscak, Paige Bimberg

Poster: 567

Mentor(s): Mark Largent (Lyman Briggs)

Non-traditional methods of conception, like IVF, are ways in which a gay or lesbian couple can conceive a child. These methods, however, do not eliminate the challenges members of the LGBTQ community have to face during this time. More specifically, gay men are the most affected by the heteronormative and female-normative nature of starting a family. Through this project, we set out to explore the challenges gay and lesbian couples face when conceiving a child and how these challenges are rooted in scientific and societal norms. We will also acknowledge the struggles and lack information about the challenges that other LGBTQ communities-- bisexual, transgender, and nonbinary people-- face.

**SOCIAL SCIENCE: GENERAL
POSTER PRESENTATIONS, SECTION 2
LAKE HURON ROOM, 11:00 AM – 12:30 PM**

ALTERING PERCEPTIONS TOWARDS REFUGEES

Teresa Azzam

Poster: 570

Mentor(s): Stephanie Nawyn (Sociology)

Refugees have become an increasing issue around the world that has been intensified by the negative views held by citizens in the receiving countries. The United States has a very extensive and secure vetting process for refugees, yet an irrational fear remains. This fear can be seen as stemming from three core motivators: symbolic threats, realistic threats, and intergroup anxieties. Symbolic threats refer to issues of identity and fear caused by uncertainty which can be exacerbated by the media. Realistic threats pertain to primarily economic concerns such as refugees stealing American jobs. Finally, intergroup anxieties can be seen how two groups interact and why tensions are formed between refugees and locals. Our study tested whether favorable statistics on refugees or personalized narrative from the popular Facebook page, Humans of New York (HONY) were more effective in invoking compassion and positive attitudes among citizens in host countries. This research was successful in that of the 15 survey questions, 10 of them most significantly impacted by the HONY stories rather than the favorable statistics.

ARTIFICIAL INTELLIGENCE IN MENTAL HEALTH

Nicole Jedding, Yena Berhane, Qi Huang, Kyle Jones

Poster: 571

Mentor(s): Heather McCauley (Human Development and Family Studies), Andrea Wittenborn (Human Development and Family Studies)

This poster concerns the role of computers in medical diagnostics. The goal of primary care physicians is to deliver and coordinate comprehensive care for patients, but busy medical practices are demonstrably ineffective venues for the identification of depression and intimate partner violence. Currently, primary care practices only screen less than 50% of the time for depression in postpartum women. Even when problems are apparent and physicians have access to validated instruments, they do not always respond appropriately: in one study just 60% of screen-positive women had follow-up depression evaluations and 35% were reportedly treated. For this reason, attention has turned to finding out if artificial intelligence (AI) might be less fallible than human clinicians. This proposed presentation presents the results of an extensive literature review of studies in which AI has been used to diagnose or treat mental health and in which computers have been pitted against the performance of qualified humans. We show that, when completing computer-assisted self-interviews (CASI), patients are more likely to divulge sensitive information than during interviews with a physician. CASI is superior with respect to the disclosure of domestic violence and of mental issues such as depression and suicidal ideation. Moreover, studies indicate that computers are more accurate and objective and that they are better at considering multiple factors; in contrast, humans are easily influenced by external factors like suggestion, prior experience, and distractions. Just as impressively, AI performs at the same level or outperforms humans in creating a rapport with patients.

PARENTAL NAVIGATION OF ADOLESCENT SEXUALITY

Sara Burnosky, Monica Williamson

Poster: 572

Mentor(s): Fredy Rodriguez (Social Science)

I hypothesized that as women continue to enter the workforce alongside male counterparts, family dynamics of childrearing are shifting. Using data from open-ended interviews with 3 sets of parents and 2 teachers, they detailed their first experiences with “crush-like” behavior displayed by their child(ren). Unlike other research this study focuses on a white, working class demographic. I found the core complaint of the parents to be the lack of one-on-one time they have with their child(ren). This lack of interpersonal communication contributes to a barrier between parents and children while expressing emotions relating to the “crush-like” experience. In the acknowledgement from the parents that school was a place where their children spent the majority of their time, I then interviewed teachers. The teachers involved with this study made a key point in detailing the uncertainty as educators of what constituted as appropriate situations for them to voice opinion or provide counsel to the children under their care. They recognized their role has a specific influence on the children. In conclusion my research showed that due to work demands parents are less able to spend daily time with their children while teachers expressed spending a large amount of time with these children but

due to legal obligations are unable to confidently provide guidance for the observed behavior they believe to be connected to sexual adolescent frustrations. This results in a lack of sexual education for the adolescents involved.

HEALTH OUTCOMES OF DACA RECIPIENTS

Claudia Cabrera-Rodriguez

Poster: 573

Mentor(s): Pilar Horner (Social Work)

The purpose of this research is to identify how DACA (Deferred Action for Childhood Arrivals) influences health outcomes for its recipients. DACA is an immigration policy that provides work permits and temporary legal presence to eligible undocumented youth. Created on June 15, 2012 by the Obama Administration, this policy offers two years of deferred deportation that is renewable to those who meet the requirements. Today there are approximately 655,000 recipients. The impact of DACA on the health of unauthorized youth is essential to understanding benefits and disadvantages the program has had on the recipient's lives. We searched for available literature that provides information on the outcomes of DACA so far using search engines like google scholar, MSU Libraries Search Plus and ProQuest. Over the course of our review we developed eight categories: acculturation, economics, education, health outcomes, substance abuse, methods and recommendations for future research. In our review of literature, we found substantial evidence for economic improvements and increased educational attainment. Most reported overall that recipients felt a greater sense of belonging after receiving DACA. Only one research article mentioned health and it was in regards to attainment of health care as a result of their occupational attainment. The small amount of data on the health outcomes of DACA despite its relevance to the overall success of the program, proves that it is vital for researchers to invest time and funds in this area.

TRACING THE PRODUCTION OF SOCIAL SPACES AND THE SOCIAL IMAGINATION IN AN ONLINE CHINESE STUDENT MAGAZINE

Yunting Cao, Yisi Fan

Poster: 574

Mentor(s): Steven Fraiberg (Writing Rhetoric and American Cultures)

In this study, we attend to the complex ways that Chinese international students are developing hybrid and cosmopolitan identities as they move back and forth between home and host cultures. To study these issues, we examine an online international student magazine established by students at MSU and jointly produced at the university in coordination with complex network of students distributed across the U.S., China, and other regions of the world. Central to the analysis is not only the processes through which the students are producing stories linked to the reconstruction of Chinese identity, but also, in the process constructing complex sets of relationships. In order to examine these issues, we have performed a rhetorical analysis of articles published in the magazine, interviewed writers and editors at the magazine, and observed them producing stories. Triangulating our various data points, the study foregrounds key issues surrounding social, cultural, and class shift within modern China. It further points to how the students' underground economies and literacies are bound up in the production of a transnational social field mediating the reconfiguration of social spaces and the social imagination.

GROWING POPULARITY IN BIKE SHARING PROGRAMS AND THEIR IMPACTS ON CITIES

Rebecca Jackson

Poster: 575

Mentor(s): Matt Grossmann (Public Policy)

Access to public transportation has shown to have ample benefits for community members with making it a more efficient and environmentally conscious alternative to city travel. Bike sharing has become a concept that is being adapted by more and more cities because of its economic and environmental benefits along with its ease of implementation. This study is focused on a cities that have implemented bike sharing programs and how over time they have affected cities: environmentally, socially, and economically with a larger focus on crime rates. Furthermore there is a comparative analysis on why some bike sharing programs have done well and expanded while others have failed and what factors lead to failing programs.

IMPACT OF PUBLIC POLICY AND URBAN ENVIRONMENT ON ASTHMA RATES

Alexander Lafler, Crystal King, Alexander Lindamood

Poster: 576

Mentor(s): Ashton Shortridge (Geography Environment and Spatial Sciences)

This project looks at factors influencing Asthma Rates in urban areas, where they are most prevalent. By understanding public policy in place to combat asthma, we look to understand how it relates to the impact of the urban environment and the access of care to asthmatic patients. The results show that policy changes may have an impact on urban asthma rates, and should be considered heavily when determining the factors affecting long-term asthma care. The relationship between human-environmental interaction is displayed through the functionality of created policy with the high asthma rates in such small locations, and how the local landscape affects said asthma rates.

SOCIAL SCIENCE: GENERAL POSTER PRESENTATIONS, SECTION 3 LAKE HURON ROOM, 11:00 AM – 12:30 PM

ASSOCIATION BETWEEN SELF-REGULATION, POVERTY, AND HOME LEARNING ENVIRONMENT IN CHILDREN

Kerry Celmer, Payas Shah

Poster: 579

Mentor(s): Lori Skibbe (Human Development and Family Studies)

Self-regulation is defined as a broad construct which represents skills involved in controlling, directing, and planning emotions, along with the functional aspect of behavior, including classroom activities and tasks (Ponitz et al., 2008). Poverty can have a negative impact on self-regulation because poverty can impact children's emotional development through perinatal factors and prenatal factors which can impact neurological, attentional, and affective development (Raver, 2004). Home-based involvement is predicted to have a positive impact on children's academic achievement. Parents' with lower incomes spend less time involving their children in home-based learning and self-regulation activities such as reading to their children, having conversations with their children, and going to educational places such as museums or libraries (Wen et al., 2012). In this study, we examine relations between self-regulation, poverty, and home learning environment. We will analyze data from children (n = 118), including a direct measure of self-regulation (i.e., Head Toes Knees Shoulders) as well as parents' reports of their home learning activities and level of income. We hypothesize that home-learning activities such as books and book reading, which enhance the child's vocabulary, and conducting games and songs, which expose children to numeracy concepts, positively relates to the scores on a self-regulation measure. In addition, we predict that children with lower self-regulation will be more likely to live in lower income neighborhoods.

WHO WINS A STAMP OF APPROVAL FOR COMMUNITY DEVELOPMENT?

Alex Cull

Poster: 580

Mentor(s): Richard Hula (Political Science)

Poverty tends to have a strong spatial aspect. A few miles make a world of difference in factors such as possible social mobility, level of interaction within job networks, or quality of education. How to attack concentrated poverty is convoluted and complex, yet left untreated, society faces continued segregation and isolation for poor people. This research examines one attempt to address concentrated poverty- the New Market Tax Credit (NMTC). The NMTC was enacted by the 106th Congress as part of the 2000 Community Renewal Tax Relief Act. Although other antipoverty programs have received significant cuts in the past decade, the NMTC has not only been renewed but continually extended and increased. The program attempts to leverage private investment in economic development projects through targeted public subsidies. The NMTC is implemented by a financial intermediary called a Community Development Entity (CDE). CDEs receive tax credits from the Department of Treasury and enter a principle-agent relationship linking the Treasury Department's Community Institutions Fund to a private network of investors who invest in projects expecting near guaranteed profits. The key assumptions are that: (1) Investment targets centers of concentrated poverty (2) Infusing private investment triggers local economy to grow and (3) A growing economy helps residents escape poverty. To begin to assess the impact, three issues will be explored (1) What are the common demographic indicators of targeted census tracts? (2) What "types" of census tracts receive a larger or smaller investment? (3) Does political influence play a role in public or private investment?

GENDER BIAS IN LINGUISTICS

Bethany Dickerson

Poster: 581

Mentor(s): Karthik Durvasula (Linguistics Germanic Slavic Asian and African Languages)

This study examines to what extent there exist gender biases in the academic field of linguistics. Particularly of interest is whether there are differences in the gender balance between faculty members and invited speakers at conferences, and how the proportion of women in the field changes at each step in the academic process. Invited speaker data was obtained online from conference websites and coded for year of conference, conference subfield, and speaker sex. Faculty data was obtained online from university websites, and coded for faculty sex and subfield. Finally, student data was gathered from universities via survey or from the universities' websites, and coded for sex and, when available, subfield. The proportions of women students, women faculty, and women invited speakers were examined. The difference between the proportions of women faculty members and women invited speakers is not statistically significant, $\chi^2(1, N = 1335) = 0.006, p > 0.05$. The difference between the proportion of women faculty and the proportion of women students at various levels of their academic career is statistically significant, $\chi^2(4, N = 3353) = 55.12, p < 0.001$. There are biases in the field of linguistics that work against women: the proportion of women decreases at every academic stage. Potential solutions should be aimed at recruiting women students to stay in the field at every stage of the academic process, rather than focused on inviting more women speakers to conferences.

THE ELEMENTS OF MAKING

Vienna George, Jeremy Check, Erik Coman

Poster: 582

Mentor(s): William Heinrich (The Hub for Innovation in Learning and Technology)

For the past decade, the maker movement has been gaining momentum in areas such as engineering, education, and recreation. The purpose of this qualitative study will be to study factors that affect how people make. These factors include previous experiences, where they are making, with what materials, who they are making with, and their process. Maker culture is a trend that parallels with constructivist theory and supports a do-it-yourself mindset, while encouraging hands-on work and collaboration. Makerspaces have been sprouting across the globe as physical locations that create an environment to provide materials and support for the purpose of innovating or enhancing new ideas and products. We will focus on describing and interpreting the collective mindset of makers as a cultural group by collecting data through observations of different makerspaces throughout the Lansing community and the Michigan State campus, and also by interviewing people directly involved, such as the managers, administrators, and participants of these makerspaces. To analyze the data, we will search for patterns, such as common themes and experiences, from observational accounts and our interviews based on what our findings are on elements that change how and what people make. We are doing this study because understanding the impact of aforementioned components could enhance the ability to better utilize present makerspaces around the world, as well as develop more effective ones in the future.

CONTENT ANALYSIS OF COURSES WITHIN AN ONLINE BACHELORS DEGREE IN EARLY CHILDHOOD EDUCATION EXAMINING SUPPORTS FOR UNDERSTANDING AND WORKING WITH DIVERSE CHILDREN AND FAMILIES

Troye Green, Taylor Reid

Poster: 583

Mentor(s): Hope Gerde (Human Development and Family Studies)

Due to the ever-increasing diversity of families, and thus, children served by early childhood education programs in the US, there is a pressing need to ensure that early childhood educators are prepared to educate and support the needs of diverse children and their families. This means creating inclusive citizens who value and disseminate anti-bias education, that is, teaching which promotes the unique qualities belonging to individuals and families from varying backgrounds. This is done by incorporating into pre-service, teacher preparation degree programs coursework providing content, strategies, and opportunities to demonstrate skills in working with diverse children and families to develop professionals who respect the myriad of individuals that seek their services. This research examined coursework from two courses offered in a fully online bachelor's degree in early education to identify supports for working with diverse children and families. This was accomplished by engaging in content analysis to code all course materials including readings, lectures, discussion board questions, assignments, and syllabi for any statement of diversity or mobility. To search, diversity and mobility were defined and key words reflecting the definitions were established. Each statement within the text materials was coded. Codes identified the frequency of statements focused on diversity/mobility and the category of diversity or mobility targeted. In addition, quality was examined by identifying whether the code focused on content, strategies, or opportunities to work with diverse populations. Results will include descriptive analyses and quality indicators of the course content. Course strengths and potential revisions will be discussed.

A COMPARISON OF POLICE INTEGRITY, INTERNATIONAL CRIME VICTIMS SURVEYS, AND TRANSPARENCY INTERNATIONAL CORRUPTION PERCEPTIONS INDEX ACROSS 11 COUNTRIES

Jaehong Ha

Poster: 584

Mentor(s): Sanja Ivkovich (Criminal Justice)

The Rotten Apple Theory or Bad Apple Theory was widely used to explain police misconduct and corruption during the 1970s. However, the limitation of the theory was that it explained police misconduct as individuals' moral problem, while independent commission reports indicated that the problem of police corruption is more organizational in nature. In 1994, Klockars and Kutnjak Ivkovich developed an organizational theory--Theory of Police Integrity--and the accompanying methodology. Over the last two decades, the theory and methodology have been used extensively to survey over 30,000 police officers from 30 countries. Yet, the validity of the methodology has not been tested. The purpose of this paper is to assess the validity of the methodology by comparing the results of the police integrity study with the results of other data sources: International Crime Victims Surveys (ICVS) and Transparency International Corruption Perceptions Index (CPI). Based on the police integrity survey completed in 11 countries in the late 1990s/early 2000s, this paper studies the relation between the country measure of police integrity and two other country measures of corruption. The findings indicate a high validity of the police integrity methodology. First, the results show a high correlation between the police integrity data and the International Crime Victimization data measure of police bribery. Second, the results indicate a high correlation between the police integrity data and the Transparency International Corruption Perception Index score.

PARENT-COMMUNITY GROUPS AND THE IMPORTANCE OF EFFECTIVE COMMUNICATION: THE LANSING SCHOOL DISTRICT'S PARENT COMMUNITY ADVISORY COUNCIL

Sabrina Hirsch

Poster: 585

Mentor(s): Louise Jezierski (James Madison College)

This presentation examines the Lansing School District's Parent Community Advisory Council (PCAC), a federally mandated district-wide parent-community group. PCAC is focused on improving the Lansing School District, educating parents and community members on what is happening in the district, and addressing issues or concerns of parents and community members. There are over 11,000 students enrolled in the Lansing School District, and PCAC serves as an important bridge between parents and community members in the district and the administration. PCAC provides parents and community members access to district administrators that they may not otherwise have. However, for a district of over 11,000 students, PCAC's membership is low, and as such many parents and community members are not currently accessing the opportunities PCAC affords them. PCAC's membership size is in large part due to their lack of communicative capacity and struggle to inform parents and community members of who they are, what they do, and why they are such a valuable resource. Subsequently, this presentation examines PCAC's communicative capacity, the effects of struggling communication on the organization, and what the organization can do moving forward to increase their communicative capacity.

**SOCIAL SCIENCE: GENERAL
POSTER PRESENTATIONS, SECTION 4
LAKE HURON ROOM, 1:00 PM – 2:30 PM**

WHAT IS A "GOOD" MAKER? AN INQUIRY INTO MAKING MINDS

Jasmine Czajka, Sadhana Chinnusamy, Sana Hakim, Tim Roback

Poster: 588

Mentor(s): Leigh Graves Wolf (The Hub for Innovation and Learning and Technology)

The purpose of this inquiry is to gain a deeper understanding on the Maker Movement broadly and specifically, makers. In this study, we will interview and observe makers on how they assess and understand quality when they are in the process of making. In addition to studying makers, we are also interested in the context of Maker Spaces and we will analyze the importance of the spaces in which they make. Transcripts of the interviews and observational notes will comprise the data. Once data collection is complete, we will use the data to formulate qualitative observations and insights in relation to our main research questions: 1. How do makers think about the quality of making? How do they understand the concept of "good" in relation to what they do? In relation to what others do? 2. What relationships do we see between space and making with regard to our question?

IT'S ALL JUST CHILD'S PLAY, YET IT CHANGES AS I GROW: HOW PARENTS' ROLES IN CHILDS' PLAY CHANGES OVER TIME

Caroline Kane

Poster: 589

Mentor(s): Claire Vallotton (Human Development and Family Studies)

Parents involvement in childs' play predicts their language, cognitive, and social development (Nokali, Bachman, & Votruba-Drzal, 2011). As infants develop, their games become more complicated, and caregivers are able to take on different roles during play. These relationships change through the span of a child's life. As children's skills develop, they take on more active roles in choosing and directing their own play, which influences the role a mother takes during play (e.g., Fein & Fryer, 1995). For example, parents become less directive, but continue their involvement on the sidelines (Haight & Miller, 1993). This study has a goal of understanding the transition of roles a parent takes during childs play, as toddler develops. Using observations of parent-child free-play video-recorded across toddlerhood (12 and 30 months of age), this study documents the different types of involvement parents have in their child's play and how this changes over time. We looked specifically at the roles director, facilitator, manager, co-player, hands off, or disengaged. We test the hypothesis that from early to later toddlerhood parents will become less directive and more facilitative in their child's play. Associations between parent's roles and other qualities in their interactions will also be explored. This research may have important implications for parenting interventions such as those treating mothers with postpartum depression.

HOW DOES TEMPORAL CONTEXT AFFECT THE PERCEPTION OF GROUPING IN MUSICAL RHYTHMS?

Shay Robison, Sarah Dec, Audrey Drotos

Poster: 590

Mentor(s): Lauren Amick (Psychology), Devin McAuley (Psychology)

A fundamental feature of rhythm is the sense that some events are grouped and others are perceived to be isolated in time. This study investigated how temporal context influences the perception of grouping. In the first experiment, listeners heard two tones with a variable inter-onset-interval (IOI) and were asked to judge if the pair of tones sounded grouped or not. Results revealed that as the time interval between tone onsets increased beyond 2 seconds tones were no longer perceived to be grouped. In a second experiment, participants listened to a sequence of three tones and were asked to judge if the final tone sounded grouped with the first two tones or sounded isolated in time. The time interval, T, between the first two tones was held constant, and the time interval between the last tone and the preceding tone varied between 0% and 500% of T. Results of this experiment revealed that some participants showed an oscillatory response pattern and grouped tones when they fell on multiples of the beat, established by the referent interval, T. A third experiment is examining the effect of the number of sequence intervals on the strength of the oscillatory response pattern. Increasing the number of intervals in the context sequence is predicted to increase the likelihood that participants will produce an oscillatory response pattern. Overall, results of the study tend to support entrainment (beat-based) models of timing over interval models.

THE ECONOMIC EFFECT OF INTERNATIONAL STUDENTS IN THE UNITED STATES

Nicholas Lazich

Poster: 591

Mentor(s): Jeffrey Wooldridge (Economics)

Since the 1960's, the enrollment of international students in American universities has greatly increased and has even led to some universities having an international student population that accounts for a significant proportion of the overall student population. This research aims to measure and assess the relational effect that the enrollment of international students has had on the economic growth of local and state economies while focusing on the growth of key areas like businesses, cities, and universities.

THE LEGISLATIVE RESPONSE TO MASS SHOOTINGS

Madeline MacLean

Poster: 592

Mentor(s): April Zeoli (Criminal Justice)

It is the duty of US lawmakers to ensure the safety of their constituents, and they attempt to fulfill this duty through enacting legislation that they believe will reduce the potential for harm to the public. In recent years, mass shootings have been seen as a major public safety threat in our society, garnering a large amount of media attention and public concern. With this research, I attempt to 1) determine how reactive legislators are to highly publicized mass shootings in terms of introduction and passage of firearm policy, 2) determine the messages being communicated by legislators

regarding firearms and public safety, and 3) compare what is being said by legislators to the body of research evidence. I tracked firearm legislation in 5 politically and geographically diverse states across the nation. These states were chosen because 5 highly publicized mass shootings occurred within their borders from 2011 to 2015. For each of these states, I searched through their online bill repositories for each session, using keywords “firearms,” “background check,” “semiautomatic,” “magazine limit,” and “waiting period.” After accessing bills in these five domains, I successfully located floor speeches and debates for 20% of these bills. Using qualitative analysis techniques, I conducted a content analysis of these speeches, the results of which will be presented.

CONTRASTING THE MEDIA’S PORTRAYAL OF TERRORIST AND CORPORATE CRIMES

Kaitlyn McCullough

Poster: 593

Mentor(s): Brandon Sullivan (AntiCounterfeiting and Product Protection)

Although a large amount of research has examined how crime is presented in the media, little to no research has focused on the media’s portrayal of terrorist and corporate crimes or the differences in the quantity and quality of coverage of these two crime types. The proposed study is a content analysis of media coverage of two 2013 incidents: the Boston Marathon Bombing and the West Fertilizer Company Plant Explosion. The co-occurrence of these two crimes in the same week provides a unique opportunity to examine and critique news media coverage of two very different types of crime, each of which resulted in both immediate death and injury as well as broader societal harm. The study will use a “meta-search” engine that simultaneously searches multiple web search engines to collect all relevant newspaper articles about the two incidents published in the three months following the events. These articles will be coded and analyzed for five content categories (cause, harm, responsibility, focus, and sources) along with several additional relevant variables (publication outlet, date published, frequency of coverage, story and coverage length). This study will conclude with a discussion of implications for further understanding these two types of crimes as social problems.

SOCIAL SCIENCE: GENERAL POSTER PRESENTATIONS, SECTION 5 LAKE HURON ROOM, 1:00 PM – 2:30 PM

APPLICATION OF OBJECT-BASED IMAGE ANALYSIS TO WILDFIRE IMPACTS ON JACK PINE FORESTS IN THE UPPER PENINSULA OF MICHIGAN

Derek McNamara

Poster: 595

Mentor(s): Raechel White (Geography)

Forest management is a topic of increasing interest and importance as many of the world’s forests are being destroyed by natural disturbances such as fire, climate change, or invasive insects; as well as human impacts from urbanization, agriculture, and the lumber industry. Having adequate knowledge of forest structure, function, and health, through comprehensive GIS data, is crucial to formulating an effective and sustainable management and recovery plans post wildfire. The overarching goal of this research is to assess the utility of GEOBIA (Geographic Object-Based Image Analysis) for analyzing high spatial resolution satellite imagery for mapping forest fire impacts on jack pine forest stands. This information will aid in forest management data collection techniques, as well as allow for more comprehensive and detailed forest management plans to be formulated after a fire disturbance.

PHYSICIAN PERSONAL BELIEFS AFFECTING ADMINISTRATION OF IN-VITRO FERTILIZATION

Lauren Mileto, Brittany Brown, Emma Osterholzer

Poster: 596

Mentor(s): Mark Largent (Lyman Briggs)

Physicians hold the ability to treat or turn away patients based on their sexual orientation. Our goal for this project is to find out if and how homosexual patients are discriminated against when requesting the procedure of in-vitro fertilization (IVF). We conducted our research by calling the top ranked fertility clinics in Michigan using a standardized script to find out if they treated homosexual patients and the respective costs variances. Ranking was based on “live birth rate per transfer” according to www.fertilitysuccessrates.com. The research delved deeper by looking into clinics that refuse to perform IVF on homosexual couples and whether that was the physician’s decision or a decision made by company that they work for. This research provides a window into the hardships of childbearing for homosexual couples and how a physician’s personal beliefs can affect the care that they administer.

IS EMOTIONAL EXPRESSION REALLY UNIVERSAL? CULTURAL AND GENDER DIFFERENCES IN EARLY EMOTION SOCIALIZATION

Kaitlin Morain, Sahlithi Chinnam

Poster: 597

Mentor(s): Claire Vallotton (Human Development and Family Studies)

Maternal emotion socialization strategies in early childhood affect children's later quality of friendships (Blair, 2014), and interest in learning and educational success (Concha Delgado-Gaitan, 1992). Gender differences in emotional expression occur as early as preschool (Chaplin, 2005). In addition to gender differences, considerable ethnic differences in emotion judgments and expressions exist within the United States (Matsumoto, 1993), as well as between the U.S. and other countries (Davis, 2012). However, no studies have investigated these gender or cultural differences in toddlerhood. In this study, we investigate possible gender or culture socialization of emotional expression throughout toddlerhood. Our prior research indicates cultural differences in expression of emotion at 12 months, but no gender differences at that age. The current study examines gender difference in expression of emotion in toddlerhood indicating gender differences in early emotion socialization. We also test whether culture moderates gender differences to determine whether gender differences in emotion socialization are culturally based. A series of challenging and rewarding tasks designed to elicit emotional expressions were administered to 130 subjects at 12 and 24 months in the U.S. or Chile. These tasks were video-recorded and analyzed to find the subject's most intense positive and negative expressions of emotion. Two second dynamic excerpts for each chosen expression were coded for intensity based on position and movement of individual facial features (forehead, eyebrows, eyes, mouth) and body parts (head, shoulders, chest, arms, hands, legs). Gender, age, and cultural background was collected and recorded through a demographic questionnaire.

DOES THE EFFECT OF BREASTFEEDING ON MATERNAL SENSITIVITY VARY ACROSS CULTURES? COMPARISON OF THE U.S. AND CHILE

Chuhao Nie

Poster: 598

Mentor(s): Claire Vallotton (Human Development and Family Studies)

Research has shown that breastfeeding has significant effects on both the mothers and infants. Although prior studies have examined associations between duration of breastfeeding and its sequelae (infant cognitive development, infant attachment, maternal responsiveness, maternal sensitivity), few studies have focused on the effects of breastfeeding on maternal sensitivity in different ethnic groups. In this inter-country, comparative study, we test whether the effects of breastfeeding on maternal sensitivity are different in the United States and Chile. Possible causes of variation include opinions about breastfeeding in public, cultural beliefs, and availability of nursing rooms in developing countries such as Chile. Compared to the United States, Chileans have more accepting perspectives about breastfeeding in public and consider it a natural process. In the current study, participants from U.S. and Chile were selected from child care 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. Linear regression analysis was used to investigate the relationship between the length of breastfeeding and maternal sensitivity, and whether this relationship was moderated by culture. The analyses controlled for background variables including maternal education, age of child care entry, and birth order.

USER TIME VS. SECURITY: USING REVISITATION CURVES TO CORRELATE PASSWORD STRENGTH AND WEBPAGE REVISITS.

Robert Novak

Poster: 599

Mentor(s): Emilee Rader (Media Information), Rick Wash (Media Information)

All internet users revisit websites, and most utilize multiple passwords to keep their online accounts secure. In order to understand how users value time versus security, we correlated website re-visitation patterns with the strength of user's passwords. By analyzing web visits of n=134 users on 19,465 distinct websites, we were able to calculate times between visits. These calculations reveal re-visitation patterns for each website, and when those re-visitation patterns are clustered together by frequency of visits, unique groups emerge. We then compared the re-visitation patterns of each group to the strength of passwords on those webpages. I will present the results of the re-visitation time calculations, and how they correlate to password strength. The results will provide more insight into when user's utilize strong passwords versus weak passwords, and when ease of use becomes a higher priority than security.

DRAWING ANALYSIS UNCOVERS PEOPLE AND EXPERIENCES THAT INFLUENCE GEOSCIENCE CAREERS

Eleanor Rappolee

Poster: 600

Mentor(s): Julie Libarkin (Earth and Environmental Sciences)

The geosciences are composed of fields that seek a better understanding of the natural world and how humans impact the planet. Attention to global issues, such as climate change and clean water, as well as a growing job market, have turned attention to factors that can help increase diversity of scientists in the field. This study is based in the theory of social capital, the notion that connections with people provide us access to resources and opportunities. In particular, we investigated how individuals in the geosciences accessed resources and opportunities, which eventually led to their entering the discipline. Surveys were distributed to volunteers visiting a professional geoscience conference in fall of 2016. These surveys asked participants to “draw a picture of the people and experiences that have influenced your career up to this point”, with a list of suggested guidelines. Eighty completed drawings were analyzed. Each drawing was coded through a thematic content analysis, wherein salient characteristics of drawings were documented and later grouped into common themes. We found that specific people (family, professors, peers) provided access to resources (education, museums, parks) as well as experiences (traveling, hiking, research) that were instrumental in career building. The majority of participants noted important early life influences; this has implications for efforts to diversify the geosciences where those efforts focus on college students. We hope this and similar research can provide insights on how social capital can be transferred later in life to create a better system with more equal opportunities.

WHAT THE 2016 ELECTION TELLS US ABOUT RIGHT-WING AUTHORITARIANISM IN THE U.S.

Hannah Roll, Sabrina Shingleton

Poster: 601

Mentor(s): Christina DeJong (Criminal Justice)

Our research project will focus on Right-Wing authoritarianism, and the extent to which voters possess characteristics consistent with this political system. Our goal is to break down the voter population in America to determine if there is a correlation between people who score higher on the Right-Wing Authoritarianism scale, and those who voted for Donald Trump in the 2016 election. The data we collect regarding the opinions of his voters will provide us with evidence of this possible correlation. To collect demographic data concerning the characteristics of Trump supporters, we will distribute a survey to a sample of Michigan State University students in required university courses to represent the population of the Michigan State campus. The survey will consist of 15 approved statements in which the person completing it marks that they either agree or do not agree. A person's score on the survey determines to what extent they hold values concurrent with Right-Wing authoritarianism, and what else this may show about their personality.

SOCIAL SCIENCE: GENERAL POSTER PRESENTATIONS, SECTION 6 LAKE HURON ROOM, 1:00 PM – 2:30 PM

REVOLUTIONIZING WOMEN'S HEALTH: AN EXPLORATION OF "THE PILL"

McKenna Ross, Emma Dittmar, Michelle Eckardt, Sidney Howe

Poster: 604

Mentor(s): Mark Largent (Lyman Briggs)

Since its introduction in 1960, oral contraception has revolutionized women's health and approach to birth control. It has been a topic of controversy but nevertheless has led to medical advancements. This research project will delve into the social, medical, and governing aspect surrounding women's ability to choose to reproduce. Medically, birth control has changed women's lives forever, allowing them to enter careers without concern over pregnancy. We will explore how the pill gives some women control over smaller issues, such as menstruation side effects but causes medical issues for others. Socially, the pill's long history has changed attitudes on contraceptives and access to women's healthcare. We will explore the history, culture, and legislation regarding the pill.

SHAME, GUILT AND ANTISOCIAL ATTITUDES

Casie Wakeley

Poster: 605

Mentor(s): Sheila Maxwell (Criminal Justice)

It is most common for criminologists studying factors influential to antisocial behavior in young adults to focus primarily on elements relating to family life, peers, and the role of social institutions. Researchers rarely assess internal factors

such as the self-conscious emotions of guilt and shame, which also affect individuals' habits and attitudes concerning deviant conduct. This study evaluates the ways in which self-conscious emotions relate to students' attitudes towards antisocial behavior using two samples of college students at Michigan State University. The Test of Self-Conscious Affect (TOSCA) along with the Guilt and Shame Proneness scale (GASP) are assessed, firstly for reliability purposes, and secondly to determine the ways in which guilt and shame, as measured by these instruments, relate to the students' attitudes towards antisocial behaviors. Future research endeavors are discussed.

FREE MARKET GENOCIDE

Zachary West

Category: Social Science: General, Section 6

Poster: 606

Mentor(s): Christina Dejong (Criminal Justice)

The legal basis of genocide establishes the parameters of the victimized group in terms of nationality, ethnicity, race, and religious orientation. However, despite its absence from the United Nations Convention, political affiliation, particularly relating to the means of production, has been the principal characteristic to target following the Second World War. This state-sponsored mass murder is primarily perceived as communistic violence due to the scope of atrocities committed by Joseph Stalin and Mao Zedong, yet capitalistic violence is equally widespread and often endorsed by the United States of America. In an aggressive promotion of the free market, the foreign policy of the United States has largely consisted of covert espionage and overt military actions designed to topple foreign leftist governments in order to install regimes friendly to private industry. This interventionist conduct has deadly consequences and potentially leads to genocidal situations. The United States is either directly complicit in the violence or removed to a degree, but still responsible for creating the political conditions necessary for a genocide to occur. This presentation will analyze the interventionist situations that directly or indirectly resulted in Holocaust like events through the examination of genocide databases and the declassified documents of the United States government. The significance of this research rests in the refutation to the belief that democracies do not commit genocide, and in the discovery that the United State's efforts to spread democracy are just the opposite.

ON-TASK AND OFF-TASK BEHAVIORS AS RELATED TO CHILDREN'S SELF-REGULATION AND LANGUAGE COMPREHENSION

Madison Wilson, Halle Peterson

Poster: 608

Mentor(s): Haruka Konishi (Human Development and Family Studies), Lori Skibbe (Human Development and Family Studies)

Self-regulatory behaviors are skills that a person develops to alter their emotions, actions or cognitions while engaged in a task (Morrison, Ponitz, & McClelland, 2010). There can be On-Task behaviors, which describe how children are focusing on the task, or Off-Task behaviors, which are behaviors that are not related to the task (e.g., looking away). Little is known about whether engaging in on-task/off-task behaviors during an assessment relates to children's skills. We hypothesized that engaging in off task behaviors sooner would relate to poorer language and self-regulation skills. Eighty-five children ages 4 to 6 completed a narrative assessment with a wordless picture book. An assessor read a story to the child using the wordless storybook and at the end, the child told a story using the same book. Using the ELAN program, we coded the onset of off task self-regulatory behaviors that the child displayed while telling the story. The Head Toes Knees and Shoulders task (McClelland et al., 2014) was used as a direct measure of self-regulation. We coded children's language output during narrative retelling (Justice, Bowles, Pence, Gosse, 2010). Results suggest that children who engage in off task behaviors later displayed better self-regulation as measured by a direct measure and greater language knowledge. This suggests that behaviors observed during an assessment may help us to understand children's self-regulation and language knowledge.

A MARRIAGE-MARKET PERSPECTIVE OF THE GENDER DIFFERENCES IN OCCUPATIONAL CHOICES

Whitney Zhou

Poster: 609

Mentor(s): Hanzhe Zhang (Economics)

All people gamble, sometimes recklessly but sometimes deliberately. While risky decision-making could be just unconscientious behavior, we propose another reason: gambling can be a calculated investment to get ahead in a matching market. A matching market is a framework for the creation of mutually beneficial relationships, e.g. the market that matches bank lenders with entrepreneurs or the marriage market that pairs unmatched individuals. The competitive nature of matching markets induces gambling. In an equilibrium two-sided matching market, agents pick lotteries to change their matching characteristics before they match. If they manage to increase their appeal, when they match,

agents will be paired with a better partner and receive better payoff. Investment managers build risky portfolios because financial investment returns not only augment cash flow but also attract wealthy future investors. The unmarried accumulate wealth in risky ways to attract better mates in the future. We consider how the marriage market environment affects occupational choices and gender differences therein. First, we can use marriage market incentives to explain some seemingly irrational choices of occupations with lower expected earnings and high variance in earnings for both men and women. Second, we use gender differences in reproductive length to explain why men tend to choose riskier occupations than women, marry later, and have higher variance in their earnings. All of the analysis is done under risk neutrality, so we explain gender differences in risk-taking patterns without appealing to gendered preferences in risk. Preliminary empirical analysis supports the findings and will be expanded.

**SOCIAL SCIENCE: GENERAL
POSTER PRESENTATIONS, SECTION 7
LAKE HURON ROOM, 3:00 PM – 4:30 PM**

IS SEROPREVALENCE OF KAPOSI SARCOMA HERPES VIRUS RELATED TO PRIOR MALARIA INFECTION IN SOUTHWESTERN UGANDA? USING GEOSPATIAL TECHNIQUES TO ESTIMATE A PROXY FOR MALARIA EXPOSURE – ANOPHELES HABITAT

Benjamin Dougherty

Poster: 612

Mentor(s): Amber Pearson (Geography Environment and Spatial Sciences)

It is unknown whether exposure to malaria may lead to subsequent and more aggressive Kaposi Sarcoma (KS) and/or a poorer prognosis for the patient. Spatial models for predicting larval habitat for the mosquito genus that carries malaria, Anopheles, have previously been developed and rely on soil, topographic wetness, land use, and the presence of surface water. In this study, we aimed to: 1) use a previously validated model for predicting Anopheles larval habitat to generate a predicted habitat surface across a study area comprised of 26 villages in south-eastern Uganda; 2) examine the spatial distribution of herpes KSHV seroprevalence in 2,440 households in the study area; and 3) test for associations between seroprevalence and predicted probability of mosquito habitat by age, sex and other characteristics. We used geospatial techniques to predict mosquito habitat in ArcGIS. Then, we fitted logistic regression models to predict seroprevalence based on each respondent's home location probability of mosquito habitat, and individual characteristics. The findings of this research could further enhance our understanding of the synergistic relationships between infectious and chronic diseases.

PHARMACEUTICAL SUPPLY CHAIN VULNERABILITIES

Tarek Kaafarani

Poster: 613

Mentor(s): Evangelyn Alcocilja (Biosystems and Agricultural Engineering)

The drug supply chain is very vulnerable because of the various stops a drug has in the market. A drug may directly go from a producer to a pharmacy, or it may go to multiple wholesalers and re-packagers before reaching the customer. This could lead to counterfeit drugs entering the market. Counterfeit drugs could be medicine with little to none of the active ingredient needed in it. This is a huge problem that can endanger many lives. I conducted this research to see where the gaps are in the pharmaceuticals supply chain and propose how we can fix them. I started off by defining the problem, then explaining what are some of my key findings, moving to my conclusions and ending with some prevention methods to overcome the obstacles of counterfeiters.

GENDER DIFFERENCES IN CAREGIVING ROLES OF SIBLINGS WITH ASD

Keeley Roblison

Poster: 614

Mentor(s): Amy Nuttall (Human Development and Family Studies)

Previous research on siblings of individuals with Autism Spectrum Disorder (ASD) demonstrates gender differences in depression, with more depression found in girls than in boys (McHale & Gamble, 1989). It has been theorized that these gender difference in depression may be the result of girls having lower self-esteem the more they take care of their sibling (McHale & Gamble, 1989). Parentification refers to developmentally inappropriate levels of responsibility in the family of origin (Hooper, 2007). Parentification may be parent focused or sibling focused, depending on whether caregiving roles are towards parents or towards siblings (Hooper et al., 2011). Parentification is shown to have long lasting such as increased depression in adulthood (Shifren and Kachorek, 2003). In order to build on prior research on gender differences among siblings of children with ASD, we hypothesized that there would be significant gender

differences between male and female siblings of children with ASD in terms of levels of anxiety, depression, and parentification. Contrary to our hypotheses, the only gender difference was that women reported significantly more anxiety than men. Results indicate that there are few differences between male and female siblings of individuals with ASD.

ASSESSING THE STRENGTHS AND WEAKNESSES OF CURRENTLY AVAILABLE ANTI-COUNTERFEITING TECHNOLOGIES IN THE MARKET

Kayla Weaver

Poster: 615

Mentor(s): Evangelyn Alocilja (Biosystems and Agricultural Engineering), Kari Kammel (Center For Anti Counterfeit and Product Protection)

Counterfeits are ever present in the global market, especially in the food, drug, and medical devices industries where counterfeits are a threat to public health. In the United States, they make up about two percent of the drug market. To combat this and allow for their products to be distinguished from the counterfeits brand owners used a wide range of different technologies. However, what technologies work best for the cost and level of security they provide deeply depends on many factors including what products they are being used on, the visibility, and who has knowledge of said technology. The purpose of this research is to look at the strength and weaknesses of currently available anti-counterfeiting technologies in the marketplace by reading journal articles on the topic, reading regulatory reports, and talking to people currently working in the industry. By using the data and knowledge collected it is possible to look at what method is best for protecting different goods and what measures should be taken. This knowledge can also be applied to determine what future technologies could be used in the food, drug, and medical devices industries.

MITOCHONDRIAL DNA YIELD OF FORENSIC HAIR SAMPLES AFTER TREATMENTS

Sharod Williams

Poster: 616

Mentor(s): David Foran (Criminal Justice)

The inclusion of forensic science in criminal investigations has greatly aided in successful identification of victims and perpetrators of crime. One of the most important subdisciplines of forensics science is forensic biology, which primarily focuses on analysis of biological evidence, such as body fluids, skin cells, and shed hairs. In this study, the effects of bleach and heat treatments on DNA recovery from hair samples were examined. The Proctor and Gamble Corporation, which manufactures a wide variety of hair products provided hair swatches from three individuals, a third of which was left untreated (virgin), a third bleached, and a third heated, the latter two under controlled conditions. The different hair samples were individually ground using micro-tissue grinders, and DNA was isolated via organic extraction followed by column purification. Mitochondrial DNA quantities were assessed using real-time/quantitative polymerase chain reaction amplification. The results showed that untreated hair samples contained the highest quantity of DNA, while heated hair samples resulted in the lowest quantity. Surprisingly, treatment with hair bleach had little or no effect on DNA yields. Overall, the results indicate that hair treatments can affect mitochondrial DNA, although the results are dependent on the treatment type. From a forensic science standpoint, such treatments could have a profound effect on DNA analysis of this common and potentially highly informative type of evidence.

UNDERGRADUATE RESEARCH MAKERS STUDY

Mitchell Yelton, Loren King, Jacob Van Ess

Poster: 617

Mentor(s): Jeff Grabill (The Hub for Innovation and Technology)

Our research project explores makerspaces and examines the question “What relationships do we see between space and making?” with a particular focus on how makers define “good making.” Our study is currently ongoing but is using the following methods to explore that question: Survey on what people think defines “good making”, observe makers in two separate locations to compare how location can affect making, and read up on the literature tied to this subject. In observing the makerspaces and the makers within those spaces, we anticipate to find that as people have access to more advanced technology and resources, the quality of making will increase. We will observe the resources each makerspace has to offer and the products produced within those spaces. The definition of “good” produced from our survey will determine how the amount and types of resources provided affects the quality of making.

SOCIAL WORK

POSTER PRESENTATIONS, SECTION 1 LAKE HURON ROOM, 1:00 PM – 2:30 PM

USING THE GEOGRAPHIC INFORMATION SYSTEMS MAPS (GIS) TO ILLUSTRATE THE IMPLICATIONS OF CIT TRAINING

Christina Callton, Emily Rau

Poster: 620

Mentor(s): Sheryl Kubiak (Social Work), Edita Milanovic (Social Work), Daria Shamrova (Social Work)

A recent Michigan study found that 24% of persons entering jails have a serious mental illness (SMI). The Governor's Diversion Council is committed to decreasing the number of persons with SMI entering the jail through pilot interventions in 10 counties. One such intervention is Crisis Intervention Training (CIT). CIT consists of three components: 1) 40-hour police training on signs/symptoms of SMI and de-escalation techniques; 2) availability of 24-hour crisis center; and 3) community advisory boards. Although CIT has been successful at disrupting incarceration, there are few studies assessing police utilization of community resources. The goal here is to determine what major resources are utilized, where they are located, and how frequently they are being utilized. Over 700 officer call reports, obtained on all calls coded as 'mental health' or 'suicide' in 2015/2016 in one S.E. Michigan County, provided addresses and information on final disposition of the call. Various Geographic Information Systems Maps (GIS) were generated based upon call type (mental health or suicide), final disposition or service individual received (i.e, crisis center, hospital, jail, other), and the address of the site of disposition. The GIS maps show that hospitals and crisis centers were used most often, and there were no discernible differences between call type and disposition (hospitals used most/jails used least). Although there is only one crisis center in the county, the distance did not inhibit its use as officers made the choice to access even when hospitals were much closer; so more training may increase crisis center use.

GENDER DIFFERENCES IN DEPRESSION PERCEPTIONS AND EXPERIENCES AMONG PUERTO RICAN OLDER ADULTS

Carmen Ellas

Poster: 621

Mentor(s): Daniel Velez Ortiz (Social Work)

The purpose of this study was to create culturally grounded knowledge about awareness, misconceptions, and personal beliefs associated with depression among older Puerto Rican adults. Census Bureau projections show that between 2008 and 2030 the Latino population aged 65 years and older will increase by 224 percent compared to a 65 % increase for the white population aged 65 and older. Further, Puerto Ricans are the second largest Latino group in the United States with a total population increase from 3.4 million in 2000 to 4.6 million in 2010. Given this projected growth, it is alarming that research has found Puerto Ricans to have the highest likelihood of psychiatric disorders among all Latino groups. Further, mental health service utilization and outcomes have been found to be consistently poor for Puerto Rican older adults when compared to other groups of older adults. This study used focus group interviews with Puerto Rican older men (n=13) and women (n=12) in Cleveland, OH. Interview data was transcribed and thematically analyzed to identify patterns and cultural expressions as well as perceptions on depression expressed by the participants.

REVIEW OF CAMPUS CLIMATE SURVEY REPORTS

Courtney Hatfield

Poster: 622

Mentor(s): Carrie Moylan (Social Work)

The purpose of this project is to study publicly available campus climate reports that assess anonymous student opinions, knowledge, and experience of campus sexual violence for correlations. Reports (n=105) were found through web searches and contained summarized data collected from nearly 270,000 students. Content assessed in each report included undergraduate sexual violence rate and percent of students who knew the definition of sexual violence, how to report, and where to report sexual violence. Descriptive statistics and correlations were used to analyze the data. Three subsets were created out of the overall data, divided by the providing organization of each climate survey—correlations were done within and between the three subsets. While the project is still in progress, it appears that understanding of sexual assault on a campus positively correlates with the sexual violence rate on campus—this correlation is most likely due to a higher reporting rate on campuses where students are more able recognize sexual violence. Coinciding with this finding, campuses with higher response rates commonly report higher sexual violence rates. Knowledge of

resources, definitions, and reporting procedures do influence the understanding of sexual assault, and could be used to prevent sexual violence on campuses across the country.

BARRIERS AND FACILITATORS TO TYPE 2 SELF-MANAGEMENT IN OLDER AFRICAN AMERICAN MEN: MOVING TOWARDS A PILOT INTERVENTION

Chloe Hiner, Kayla Schindler, Kenneth Wirth

Poster: 623

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 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 Type 2 diabetes (T2DM). This study utilized data from 2 focus groups conducted with older-African American men with T2DM. Twelve men were recruited from the Healthier Black Elders Participant Resource Pool (PRP) located at Wayne State University. Two themes emerged that characterize gender identity and its relationship to health behavior in men: 1) manhood's influence on health behavior and 2) Individual and institutional barriers and facilitators to diabetes self-management. Conclusion: Given the lack of research on older 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 diabetes intervention targeting older African American men with T2DM.

SUPERVISED PARENTING TIME: A CHILD'S PERSPECTIVE

Sydney Kay

Poster: 624

Mentor(s): Kimberly Battjes (Social Work), Joseph Kozakiewicz (Social Work)

One action frequently employed by courts in an effort to improve the relationship between children and their noncustodial parents, is mandating supervised parenting time. Often times, children have little to no input on the court's decisions and there is very little research exploring their views. This research, conducted through Michigan State University's Chance at Childhood program, aims to gauge the effectiveness of supervised parenting time programs across the state of Michigan, from a child's perspective. Through the use of a survey dispersed to multiple programs statewide, we hope to better identify the needs and opinions of children participating in these programs. Information gained from this research can be used to adjust and structure supervised parenting time programs so that they can be more effective in the future and positively affect children's relationships with noncustodial parents. It may also be helpful information for court personnel when considering supervised parenting time.

GOT WEALTH? ASSESSING THE IMPACTS OF AN ENHANCED FAMILY SELF-SUFFICIENCY PROGRAM ON ASSET DEVELOPMENT

Anya Niehaus

Poster: 625

Mentor(s): Anna Maria Santiago (Social Work)

For nearly four decades, various federal housing programs have combined housing assistance with a variety of financial capability and asset building services designed to build the wealth of subsidized housing recipients. This study evaluates the impact of the Home Ownership Program (HOP), an enhanced Family Self-Sufficiency (FSS) program operated by the Denver Housing Authority (DHA), which incentivizes and assists participants to accrue housing and non-housing wealth. Quasi-experimental methodologies were utilized to assess the wealth building impacts of HOP for 600 DHA participants during the period from 2001 and 2009. The identification strategy used compared three levels of treatment: (1) public housing residents who purchased homes without participating in HOP; (2) participants exposed to a low or moderate intensity treatment of the HOP; and (3) high intensity participants who completed HOP and participated in the Home Buyers Club. In this study, we assessed whether high intensity HOP participants exhibited significantly greater growth in savings and other non-housing assets during and after the program as well as housing assets that accrued to homeowners post-purchase prior to (before 2009) and after the Great Recession (between 2009 and 2014). Thus, the impact of HOP participation was evaluated on four wealth outcomes: (1) the growth of savings and non-housing wealth during participation in HOP; (2) non-housing wealth growth after leaving HOP; (3) wealth accrued after homeownership but prior to the Great Recession; and (4) homeownership wealth accrued between 2009 and 2014.

A REVIEW OF CAMPUS CLIMATE SURVEY REPORTS

Jenna Randall

Poster: 626

Mentor(s): Carrie Moylan (Social Work)

The purpose of this project includes studying campus climate reports universities have made publicly available in order to assess collected data, methods used, and search for developments in the results that may allow for further campus sexual assault research or provide suggested action steps. With assistance I have specifically looked at the perpetrator factors and how they are, or are not, being measured. Reports (n=150) summarizing data collected from nearly 270,000 students were identified through web searches with terms like "campus climate survey". Each report was viewed for the content assessed, for example, student rates of victimization and reported perpetration factors. The statistics pulled were descriptive of the most prevalent victimization questions across the surveys reporting on assault factors. Six schools reported results from questions asked of perpetrators of sexual assault. 18 schools reported results of rape myth views of their students. There was inconsistency in the questions and methods of reporting the data. With assistance I ran descriptive statistics of the six schools with the closest questioning methods. Climate surveys have the potential to increase awareness, gain a better understanding of sexual perpetrators, and many other aspects of sexual assault on college campuses. The studies reviewed, however, did not standardize their surveys or report all they surveyed. Therefore the ability to implement findings and advance knowledge of the subject is hindered. As universities striving to increase the understanding on this subject, schools may want to homogenize their surveys and questions to ensure advancement of awareness and growth towards solutions.

SOCIAL WORK POSTER PRESENTATIONS, SECTION 2 LAKE HURON ROOM, 1:00 PM – 2:30 PM

COMMUNITY CAPACITY FOR CHANGE IN DETROIT

Leigh Rauk

Poster: 629

Mentor(s): Marya Sosulski (Social Work)

Neighborhoods like Lindale, Penrose, and Palmer Park have a long historical standing in the city of Detroit. These neighborhoods, which differ from each other in race, ethnicity, age, and income levels, have been evolving in their own time and place, with relatively little major change. In this study, I use an Asset Based Community Development (ABCD) model to examine neighborhood change and the impact of development that delivers an influx of economic and social capital. Themes include individuals' experiences with neighborhood change and development and their opinions on the most important considerations for future development and progress, particularly with respect to the Michigan State Fairgrounds development site. Results from original research comprising a community needs assessment survey and complementary focus groups targeting a diverse array of participant groups, including residents, business leaders, union labor leaders, neighborhood associations, and churches, provide demographic data and information about people's perceived needs and interests concerning their neighborhoods, as well as ways the community engages with influential groups to leverage community assets and influence positive outcomes in their neighborhood.

REACHING DEMENTIA CAREGIVERS IN MICHIGAN

Rochelle Rivera

Poster: 630

Mentor(s): Daniel Vlez (Social Work)

This study examined the experiences of Latino caregivers of family members with dementia in Michigan. Latinos are now the largest racial/ethnic group in the United States, representing 16.7 percent of the total population. In Michigan, the Latino population represents 4.5 percent of the total population. Between 2000 and 2010, the Latino population increased by 33.8 percent even as the total population in Michigan decreased. Older adults (65 and older) comprise 6.1 percent of the total Latino population in the United States (United States Bureau of the Census, 2004). Census Bureau projections show that between 2008 and 2030 the Latino population aged 65 years and older will increase by 224% compared to 65% increase for the white population aged 65 and older. Yet, there is a large disparity in dementia detection, care, and outcomes for Latinos (Lines, Sherif, & Wiener, 2014). Culture plays an important role in the effectiveness of health communication to influence health literacy and behaviors (Kreuter & McClure, 2004). Making programs more culturally accessible and near Latino communities must be a part of improving access and outcomes. The project consisted of focus group interviews with community-dwelling older Latino adults in areas where there is a greater concentration of Latinos across Michigan. Preliminary results show that there are unmet needs for Latino

dementia caregivers in Michigan. Furthermore, a disconnection with formal services aggravates outcomes for Latino caregivers. There is a need for new formal service models that are sensitive to the cultural needs of Latino populations.

CARING FOR PEDIATRIC TRANSGENDER PATIENTS RESEARCH STUDY

Ashley Schnaar

Poster: 631

Mentor(s): Deirdre Shires (Social Work)

Transgender youth, or those whose gender identity does not match their assigned sex at birth, experience a number of physical and mental health disparities - including increased suicide risk. However, some of these disparities can be mitigated through access to age-appropriate gender-affirming medical care. Very little is known about pediatricians' training, experience, concerns, barriers, and willingness to provide gender-affirming medical care, such as hormone blockers, to pediatric transgender patients. The study team has developed a 15 minute survey for general pediatricians to be administered to assess demographics, training related to transgender health, clinical experience with pediatric transgender patients, willingness to provide care to this patient population, knowledge, and barriers to caring for transgender youth. The online survey will be distributed to pediatricians via email and respondents will receive a gift card as a thank you for participating. The survey will be piloted with pediatricians at Henry Ford Health System in metropolitan Detroit, MI. After the pilot phase, the survey will be refined and distributed to a statewide sample through the Michigan Chapter of the American Academy of Pediatrics. Results from this study will help to identify gaps in training, knowledge, and resources needed by pediatricians to feel comfortable and willing to care for transgender youth and also be used to identify ways to support pediatricians in caring for this vulnerable patient population.

LANGUAGE AS A BARRIER AND A SUPPORT IN THE ADAPTATION OF INTERNATIONAL STUDENTS AND SPOUSES: RESULTS FROM A PHOTOVOICE PROJECT

Rachel Schwartz

Poster: 632

Mentor(s): Cristy Cummings (Social Work), Deborah Johnson (Human Development and Family Services), Dasha Shamrova (Social Work)

International students who come to the United States can face many challenges within their adaptation process. In the fall semester of 2016, Michigan State University had 7,264 enrolled international students from 133 different countries (OISS, 2017). In this group, language challenges and adjustment strain are related to lower levels of academic success (Poyrazli & Kavanaugh, 2006). This research project seeks to explore the ways in which language acts as a barrier and as a support to the academic success of international students, as well as the successful adaptation of international students and their spouses. Photovoice methodology, a qualitative community-focused participatory action approach, was utilized. A purposive sampling strategy was implemented (n=18). Participants were asked one question about adaptation per session, and brought responses in the form of two photographs over three weeks of sessions. Three chosen photographs per session were discussed in detail. Dedoose was used by two coders to independently code transcripts with an iterative review conducted for inter-rater agreement. Relationships were identified between English language challenges and barriers to academic resources and health services, as well as poor emotional well-being, and lack of community acceptance. Native language was identified as a supportive factor, related to identity and positive community acceptance. English language service needs were identified. Understanding the simultaneously challenging and supportive roles of language for this vulnerable group can help the MSU community to identify gaps in resources for international students and spouses, while helping to inform practices furthering the overall success of these individuals.

MENTAL HEALTH LITERACY WEBSITES FOR COPMI YOUTH ABSTRACT

Angela Terranova

Poster: 633

Mentor(s): Joanne Riebschleger (Social Work)

Millions of children in the U.S. and other nations have a parent with a mental illness (COPMI). These at-risk children are in need of accurate, non-stigmatizing mental health information to help them make sense of their parents' illness-related behaviors. Youth-targeted mental health literacy (MHL) websites can be a powerful tool in delivering this information. This descriptive qualitative study was guided by two research questions: 1) What English language MHL websites exist for COPMI adolescents and 2) What kinds of content are listed on the identified MHL websites for adolescents. The investigators engaged in a systematic search of the Internet to identify English language MHL websites for children, especially for COPMI youth. Adolescent websites contain content about/for teenagers and/or at least some content with an 8th grade or lower reading level (age 14). A content analysis identified themes of the MHL websites: 1) There is a paucity of web-based MHL information available for COPMI adolescents, especially in the U.S. Most is found in Australia. 2) Emerging analytical themes of general MHL websites include emphases on diagnosis and psychopharmacological

treatment. Emerging COPMI websites include emphases on parental behaviors and youth reactions. There is a clear need for COPMI accessible web-based information. The findings from this study will be utilized to prepare a COPMI targeted MHL website in the U.S.

HOUSING PROGRAM FOR INDIVIDUALS INVOLVED IN CRIMINAL JUSTICE SYSTEM AND RECIDIVISM RATES: GENDER AND RACE PERSPECTIVES

Chelsea White

Poster: 634

Mentor(s): Sheryl Kubiak (Social Work), Dasha Shamrova (Social Work)

Individuals involved in the criminal justice system constitute a higher proportion of the homeless population than the general public. Homelessness is likely a risk factor that increases chances of recidivism and continues the cycle of imprisonment. To break this cycle, there has been continued effort to provide safe and stable housing for individuals reentering the community. This study aims to evaluate the reentry housing program in Kalamazoo, MI by comparing recidivism rates between individuals accepted to the program (n=32) and individuals denied from the program (n=37). Two research questions have been posed: (1) What is the difference in number of days spent in jail within 6 months prior and post program referral date for those accepted into the housing program compared to those who were denied? (2) How do gender and race impact the recidivism rates for those accepted into the housing program compared to those who were denied? The administrative dataset of the Kalamazoo housing program was merged with jail data for this evaluation. Descriptive analysis, including frequencies and mean differences, was utilized. The results show that there is a difference in average change in number of days in jail between those accepted in housing (~~ΔM~~) and those denied from housing (~~ΔM~~) within 6 months prior and post acceptance/referral to the program. Also, this study suggests that housing programs might have varying effects on different populations as the outcomes were inconsistent between male and female participants and between white and minority participants.

INTIMATE PARTNER VIOLENCE AND HELP SEEKING STRATEGIES IN COLLEGE STUDENT RELATIONSHIPS

Aleya Williams, Ryan Kunz

Poster: 635

Mentor(s): Hyunkag Cho (Social Work)

Intimate Partner Violence (IPV) is victimization and perpetration of violence between any two romantic partners which includes psychological, physical, and sexual violence. The purpose of this study was to view survivor and service provider's perspectives of help seeking. We studied factors of help seeking, the type of help seeking and the satisfaction with that. With this literature, college students did not seem to be a focus. College students being a large population where IPV can occur, causes there to be a gap in what researchers have presented. This gap established there needs to be more information on college students of all backgrounds with their IPV experiences as well as their help seeking actions and satisfactions. A survey was sent out early to 24,000 random students at Michigan State through a MSU listserv. This survey showed 24.9% of the sample were forced to have sex when they did not want to. 12.5% of participants identified being hit by a partner. 36.7% of participants identified their partner as putting them down and name calling. This survey went through the ways that survivors seek help, and 64.5% of survivors seeking help from immediate family and 93.6% of survivors sought help from friends. These two support systems were utilized the most by survivors compared to any other support system. Currently we are interviewing providers on campus to better understand services provided and the barriers of seeking these services.

TOXICOLOGY

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

METHYLMERCURY EXPOSURE ALTERS AMPA RECEPTOR EXPRESSION IN SPINAL CORD SLICES OF MICE EXPRESSING THE HUMAN CU²⁺/ZN²⁺ SUPEROXIDE DISMUTASE (HSOD1) GENE MUTATION

Brooke Brauer

Poster: 638

Mentor(s): William Atchison (Pharmacology and Toxicology), Jordan Bailey (Pharmacology and Toxicology)

Mice expressing the human Cu²⁺/Zn²⁺ superoxide dismutase 1 (hSOD1) gene mutation (SOD1^{G93A}) are used to model Amyotrophic Lateral Sclerosis (ALS). This model has been used to describe the role of gene X environment interactions in the onset and progression of ALS. Previous work has shown that the environmental neurotoxicant methylmercury

(MeHg) can hasten the onset of the ALS-like phenotype in these mice, on endpoints of motor function and intracellular calcium (Ca²⁺) dysregulation. MeHg-induced Ca²⁺ dysregulation in SOD1^{G93A} mice occurs in part through α -amino-3-hydroxy-5-methyl-4-isoxazolepropionic acid receptor (AMPA) mediated pathways. The purpose of this study was to identify if changes in gene expression occur in the AMPARs after MeHg exposure, leading to observed alterations in Ca²⁺ and early motor dysfunction in SOD1^{G93A} mice. Here, we describe the effects of 20 μ M MeHg exposure in spinal cord slices from SOD1^{G93A}, SOD1^{HuWT} and wild type mice of both sexes on GluA1-4 subunits of the AMPA receptor. In a second experiment, motor function as determined by gait analyses (via the Digigait® system) was compared between these genotypes over the course of disease progression. Acute MeHg exposure caused upregulation of the GluA1 and GluA2 subunit in SOD1^{G93A} and SOD1^{HuWT} mice; MeHg exposure led to a decrease in expression of all subunits in wild type. These data suggest that MeHg alters AMPAR subunit expression and interacts with the SOD1^{G93A} mutation to enhance neuronal dysfunction. These data support the hypothesis that a gene X environment interaction is relevant in ALS.

FINE PARTICULATE MATTER CO-EXPOSURE ENHANCES PULMONARY NEUTROPHILIC, BUT NOT EOSINOPHILIC, INFLAMMATION IN A MURINE MODEL OF OZONE-INDUCED NON-ATOPIC ASTHMA

Elyse Eldridge, Amy Freeland

Poster: 639

Mentor(s): Jack Harkema (Pathobiology and Diagnostic Investigation), Jim Wagner (Pathobiology and Diagnostic Investigation)

Epidemiological associations have been made between the onset of asthma and childhood exposures to increasing levels of ambient ozone. We have recently found that repeated exposures to ozone induce type 2 immunity, eosinophilic inflammation that is dependent on innate lymphoid cells. The present study was designed to explore the effects of fine particulate matter (PM2.5) co-exposure on ozone-induced airway inflammatory and epithelial responses in the lungs of non-atopic mice. Male C57BL/6Tac mice were exposed to 0 or 0.8 ppm ozone, 4h/day, for 9 consecutive weekdays. In the last four days, mice were also intranasally instilled with 0, 10 or 50 ug of ambient PM2.5, prior to each daily ozone exposure. Ambient PM2.5 was collected from an urban/industrial airshed in Dearborn, MI. One day after the end of the 9-day exposure, mice were sacrificed and bronchoalveolar lavage fluid (BALF) was collected for cellular analyses. Lung tissues were processed for histopathologic examination, digital quantitative pathology (morphometry) and molecular analyses (qRT-PCR). Ozone exposures caused both neutrophilic and eosinophilic inflammation and mucous cell metaplasia in the pulmonary airways. PM2.5 co-exposure did not enhance ozone-induced, type 2-associated inflammatory and epithelial responses, but it markedly enhanced ozone-induced neutrophilic inflammation at both the low and high doses (2x greater than ozone-exposures alone). These initial pathology findings in mice suggest that co-exposure to PM2.5 may enhance ozone-induced neutrophilic inflammation, rather than eosinophilic inflammation, in children or adults with new onset non-atopic asthma.

REGULATION OF STROMAL-DERIVED FACTOR-1 IN HEPATOCYTES BY HYPOXIA-INDUCIBLE FACTOR-1?

Dominique Garrison

Poster: 640

Mentor(s): Bryan Copple (Pharmacology and Toxicology)

Stromal-derived factor-1 (SDF-1) is a chemokine that plays a major role in activation of the stem cell compartment in the liver after injury. According to studies, several types of cells, including hepatocytes, highly express SDF-1, which leads to the recruitment and retention of circulating progenitor cells. It is unknown by which mechanism SDF-1 is upregulated in the cell after injury. In present studies, we have tested the hypothesis that the transcription factor, hypoxia-inducible factor-1 (HIF-1) in hepatocytes. To test this hypothesis, primary mouse hepatocytes were isolated from control mice and mice deficient in HIF-1 to activate HIF-1. Life At Hypoxia upregulates SDF-1. Upregulation of SDF-1 was prevented in hepatocytes of HIF-1 knockout mice. hepatocytes by hypoxia requires autocrine release and activation of transforming growth factor- β (TGF- β). Hepatocytes were treated with SB-431542, a TGF- β receptor antagonist, prior to exposure to hypoxia to determine whether TGF- β is required for upregulation of SDF-1 by hypoxia. Pretreatment with SB-431542 completely prevented upregulation of SDF-1 by hypoxia. Treatment of hepatocytes with TGF- β upregulated SDF-1. This upregulation of SDF-1 by TGF- β did not require HIF-1. TGF- β is a TGF- β dependent HIF-1 independent process that upregulates SDF-1. hypoxia upregulates matrix metalloproteinases or thrombospondin-1 in hepatocytes, which could be responsible for activation of latent TGF- β . These results indicate that hypoxia activates HIF-1 in hepatocytes, of latent-TGF- β . TGF- β then acts in an autocrine fashion to upregulate SDF-1.

THE BET BROMODOMAIN INHIBITOR I-BET-762 SUPPRESSES ADIPOSE TISSUE-STIMULATED EPITHELIAL CELL TRANSFORMATION.

Vladislav Jdanov

Poster: 641

Mentor(s): Jamie Bernard (Pharmacology and Toxicology)

c-MYC contributes to the pathogenesis of the majority of human cancers. Historically, it has been difficult to pharmacologically target this oncogene because of diverse mechanisms driving its aberrant expression and the difficulties of interfering with protein-DNA interactions. Epigenetic strategies in the form of bromodomain inhibitors, such as I-BET-762, now exist to interfere with c-MYC expression at the transcriptional level. Previous studies from our lab demonstrate that adipose tissue-stimulated transformation (the stage/steps a cell undergoes to become malignant) involves the induction of c-MYC. Therefore, we hypothesized that I-BET-762 prevents adipose tissue-stimulated transformation by inhibiting the induction of c-MYC. To test this hypothesis, we stimulated non-tumorigenic, epithelial cell lines to grow in soft agar with adipose tissue filtrates made from high-fat diet-fed mice. Growth in soft agar is an anchorage-independent proliferation assay, in which only transformed cells can grow to form colonies. Colonies are counted to quantify the number of transformed cells. We found that I-BET-762 dose-dependently inhibited the number of transformed JB6 P+ skin epidermal cells and NMuMG mammary epithelial cells. These data suggest that I-BET-762 may be an effective therapeutic strategy for preventing adipose tissue-promoted cancers, a problem of growing concern due to the steeply-rising prevalence of global obesity.

EFFECTS OF GLUCOCORTICOIDS ON MUCINS LEVELS IN THE SMALL AND LARGE INTESTINE

Allison Shinouskis

Poster: 642

Mentor(s): Laura McCabe (Physiology)

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

THE EFFECTS OF GESTATIONAL EXPOSURE TO BISPHENOL-A AND BISPHENOL-S ON FETAL PANCREATIC BETA CELL MASS

Alysha Yoe

Poster: 643

Mentor(s): Almudena Veiga-Lopez (Animal Science)

During gestation, the environment can have a lifelong impact on the health of an individual (1). Endocrine disrupting chemicals (EDCs) are chemicals which interfere with hormone function. Bisphenol-A (BPA) and bisphenol-S are EDCs used in many household products (2). Prenatal exposure to BPA has been shown to lead to insulin resistance later in life in the offspring (4), a forerunner of type 2 diabetes. Beta cells, the insulin-secreting cells of the pancreas, play an important role in regulating glucose levels in the blood. Dysfunction and/or depletion of these cells can lead to the development of type 2 diabetes (5). Other pollutants such as polychlorinated biphenyls have been shown to be a cause of beta cell failure and type 2 diabetes (6). We have examined the effects that gestational exposure to the endocrine disruptors BPA and BPS may have on the development of beta cells using sheep as an animal model. Pregnant sheep were divided into three groups; control (C; n=8), BPA (A; n=8) and BPS (S; n=7) and treated subcutaneously with BPA or BPS from days 30-100 of gestation. Fetal pancreatic samples were collected on day 120 of gestation to evaluate pancreatic beta and alpha cells using fluorescent immunohistochemistry. Images from stained tissue sections were captured using fluorescent microscopy and processed using ImageJ software. Because we know that prenatal exposure

to BPA leads to the onset of insulin resistance, we hypothesize that there will be a decrease in beta cell mass in the subjects exposed to these chemicals.

BROMODOMAIN INHIBITORS AND THEIR EFFECT ON CHEMOKINE LEVELS AND P-STAT3 IN PANCREATIC CANCER

Kayla Zydeck

Poster: 644

Mentor(s): Ana Leal (Pharmacology and Toxicology), Karen Liby (Pharmacology and Toxicology)

Pancreatic cancer is a lethal disease with a five-year survival rate of 7-8%. With prevalence increasing in the U.S., it is estimated that pancreatic cancer will be the third deadliest cancer in the next decade. These trends illustrate a need for the development of new drugs that are more effective in reversing this dismal prognosis. Bromodomain inhibitors, such as I-BET 762, are novel drugs that target BET proteins, impairing their ability to bind to acetyl-lysine residues and therefore interfering with transcriptional initiation and elongation. BET proteins regulate several genes responsible for cell cycle, apoptosis and inflammation. The LSL-KrasG12D/+;LSL-Trp53R172H/+;Pdx-1-Cre (KPC) mouse model is commonly used to study pancreatic cancer because these mice will develop the full spectrum of the disease. When KPC mice were treated with I-BET 762 for eight weeks, the chemokines CXCL12 and CCL2 were reduced in pancreas extracts. These chemokines play an important role in the proliferation of cancer cells and are predictive of a poor prognosis when present at elevated levels. CXCL12 coats the surface of cancer cells and its inhibition promotes T-cell accumulation. CCL2 recruits inflammatory monocytes to promote tumor proliferation. Treatment with I-BET 762 also reduced the levels of p-STAT3, a protein that regulates the tumor microenvironment, in pancreas extracts of KPC mice, as measured by immunohistochemistry and western blot. In conclusion, this study showed that bromodomain inhibitors suppressed chemokines correlated with tumor growth. In the future we will look at immune cell populations via flow cytometry to determine additional effects of these drugs.

Research Mentors

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Denice Blair, *Teacher Education*
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Babak Borhan, *Chemistry*
Joanna Bosse, *Arts & Humanities*
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Sayli Bote, *Chemical Engineering & Materials Science*
Janette Boughman, *Integrative Biology*
Lisa Boughner, *Microbial Ecology*
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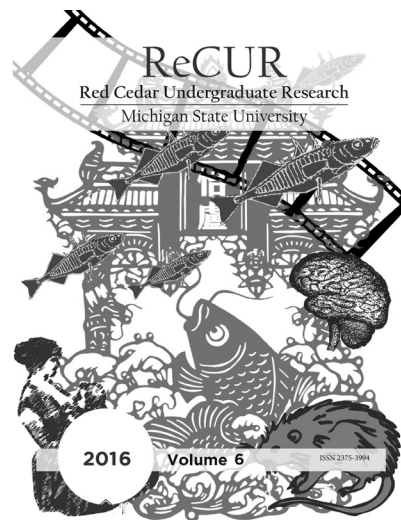
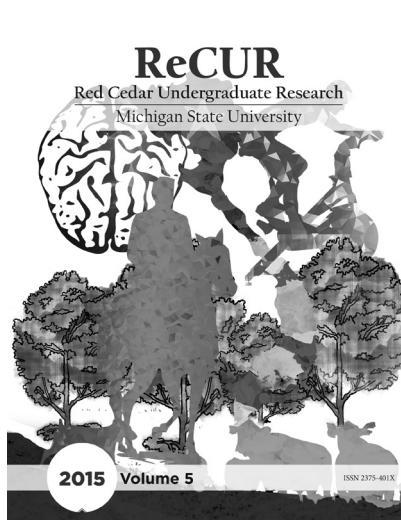
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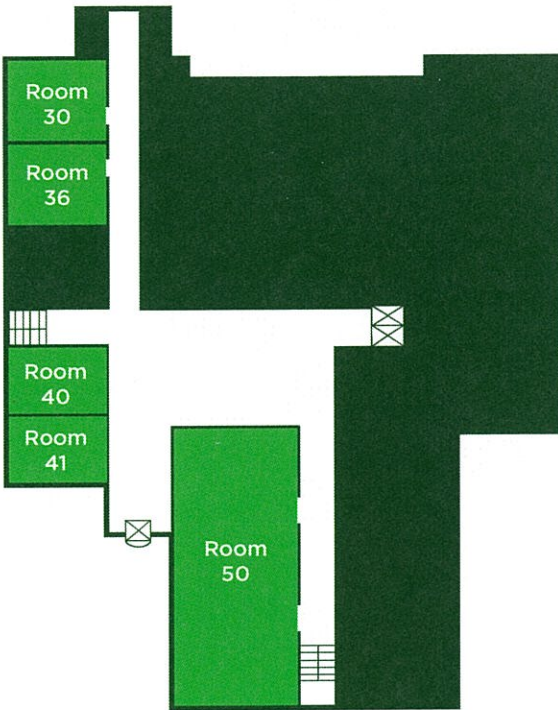
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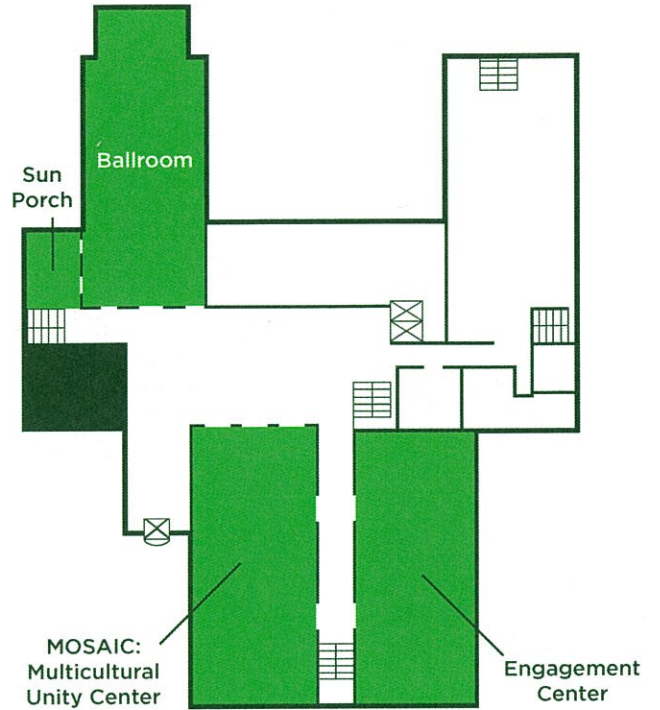
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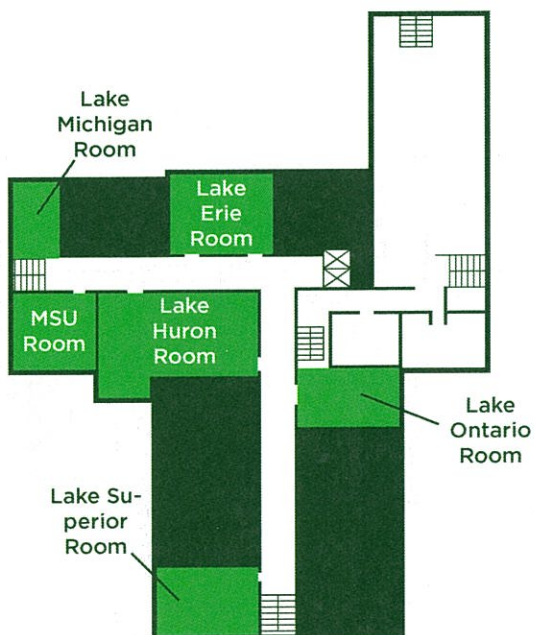
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