Zyzzogeton Presenters and Abstracts
2016

Hussein Abdullahi
Dr. David Hanson
Chemistry/Physics
Size Distribution of Photochemically Formed Particles via NanoParticle Sizer Followed by Diethylene Glycol Condensation

The size distribution of particles composed of sulfuric acid and water were measured in a Photolytic cylindrical Flow Reactor (PhoFR, inner diameter 5 cm, length ~ 100 cm). In the reactor, nitrous acid, water and sulfur dioxide gases along with ultraviolet light produced sulfuric acid. The particles formed from these vapors were detected with a scanning mobility particle spectrometer equipped with a diethylene glycol condensation particle counter (Jiang et al. 2011). For a set of standard conditions, particles attained a log-normal distribution with a peak diameter of 6 nm, and a total number of about 3x105 cm-3. The distributions show that ~70 % of the particles are between 4 and 8 nm diameter (lns ~ 0.37). These standard conditions are: 296 K, 25% relative humidity, total flow = 3 sLpm, ~10 ppbv HONO, SO2 in excess. With variations of relative humidity, the total particle number varied strongly, with a power relationship of ~3.5, and the size distributions showed a slight increase in peak diameter with relative humidity, increasing about 1 nm from 8 to 33 % relative humidity. Variations of HONO at a constant light intensity (wavelength of ~ 360 nm) were performed and particle size and total number changed dramatically. Size distributions also changed drastically with variations of light intensity, accomplished by turning on/off some of the black light flourescent bulbs that illuminated the flow reactor. Comparisons of these size distributions to recently published nucleation experiments (e.g. Zollner et al., Glasoe et al.) as well as to simulations of PhoFR reveal important details about the levels of sulfuric acid present in PhoFR as well as possible base contaminants.

Hamdi Adam and Chung Lip
Dr. Matthew Beckman
Biology
TBX1: A Potential Genetic Cause in Hypoplastic Left Heart Syndrome (HLHS)

The purpose of this research is to identify a possible cause of HLHS. Previous studies have led us to believe that there is a genetic component: a gene called TBX1 which correlates with the underdevelopment of the heart's left side. To test this hypothesis, we propose to implement a gene knockout experiment in a sheep heart development model. Re-insertion of TBX1 into underdeveloped hearts via virus will be done to reverse the phenotypic effects of the missing gene in a rescue experiment. Analysis of the heart through non-invasive imaging will be done at time-points during development. We believe that this gene-therapy approach is and innovative strategy which has potential to treat HLHS.

Michael Alves
Dr. David Hanson
Chemistry
Detection of Amines and Ammonia with an Ambient Pressure Mass Spectrometer using a Corona Discharge Ion Source in an Urban Atmosphere and in a Teflon Film Chamber

Amines and ammonia are an important group of molecules that can greatly affect atmospheric particle formation that can go on to impact cloud formation and their scattering of thermal and solar radiation, and as a result human health and ecosystems. In this study, an Ambient Pressure Mass Spectrometer (AmPMS) that is selective and sensitive to molecules with a high proton affinity, such as amines, was coupled with a newly built corona discharge ion source. AmPMS was used to monitor many different nitrogenous compound that are found in an urban atmosphere (July 2015, Minneapolis), down to the

single digit pmol/mol level. Simultaneous to this, a proton transfer mass spectrometer also sampled the atmosphere through an inlet within 20 m of the AmPMS inlet. A similar AmPMS was attached to a large Teflon film chamber at the Atmospheric Chemistry Division at NCAR. Exploratory studies are planned on the sticking of amines to the chamber walls as well as monitoring oxidation products. Depending on the success of these studies, results will be presented on the reversibility of amine partitioning and mass balance for these species in the chamber.

Karla Arredondo Payan
Dr. Lars Christiansen
Sociology
Board of Directors representation: A comparative study of Minneapolis Neighborhood associations

The purpose of this investigation is to examine how neighborhood organizations and associations engage and achieve inclusion of residents of color, and especially their Board of Directors. This study seeks to understand how the structure of boards and roles of board members in a neighborhood association impacts the recruitment of new residents who are representative of the neighborhood. This is a comparative study focusing specifically on the Minneapolis neighborhoods of Harrison, Cleveland, McKinley and Bottineau. Data for the analysis comes from interviews of representatives of neighborhood groups including executive directors and board members, field research at neighborhood organization meetings and other relevant events, and a content analysis of print and online (social) media from neighborhoods and their organizations. The significance of this project is its relevance for understanding contemporary neighborhood and urban planning, and citizens' roles therein. This research refers to social concerns regarding institutionalized racism, patterns of exclusion that have had the consequence of diminishing the voices of residents of color in urban planning. If we can understand the reasons neighborhood associations often lack diverse representation, then we may be able to develop strategies to achieve correctives and set neighborhood planning on a more inclusive path.

Vision Bagonza
Dr. Jennifer McCormick and Dr. Carmen Radecki-Breitkopf
Bioethics
Biobank Participant's Views on Receiving Genetic Research Results

Background: As of 2013, much had been reported regarding the Return of Genetics Research Results in clinical settings. The American College of Medical Genetics and Genomics (ACMG) released a comprehensive guideline for the reporting of these results, focusing on the return of secondary or Incidental Findings (IF's) in clinical genome-scale sequencing1, but there is a lack of studies involving research participants, such as those of the Mayo Clinic Pancreatic Cancer Biobank, first opened in 2011, with approximately 35,000 participants as of now.
Not only is there a lack of understanding on patient's thoughts towards receiving genomic-sequencing test results, but there is not much known about whether their reactions change over time, and what their true intentions are for choosing to learn these results. A big question has also been whether researchers are even in a position to be offering, and ultimately, sharing these results with the participants, and in what manner this should be done.

Objective: Gain insight on the thoughts and opinions of research participants in genetic research studies, both immediately and over time, as well decipher the difference between motives for research participation.

Nattacia Bailey
Dr. David Crowe
Biopsychology
Inferential Learning of Latent Properties

Numerous studies have been conducted on the process whereby one learns. However, few researchers have studied how the human brain infers properties of objects that are not observed directly, based on how those objects interact. Inferential learning can be described as the process of learning about objects' latent properties by observing their interactions. For example, people learn that objects with a metallic character have a high density. Density is a latent property of a metallic object. We studied inferential learning by having 20 subjects perform an experiment in which they had to determine a latent property (mass) based on a visible property (color) of two spheres. In each trial, three spheres – moving, stationary, and goal – appeared in an aligned formation. The moving sphere would collide with the stationary sphere and subjects were given ten seconds to guess whether the stationary sphere would end up inside the goal sphere after the collision. Sphere color ranged continuously from light blue to dark blue, with spheres in the darker half of the spectrum a constant light mass, and with lighter spheres a constant heavy mass. We found that most subjects reached a criterion of 80% correct trials (out of 20) during the experiment, with a median time to criterion of 60 trials. However, no subject fully reached a performance level of > 90% correct. Further, every subject performed better on trials in which the spheres' colors were more distinctly dark or light (as opposed to the colors falling near the light/heavy cutoff). The results of this experiment have helped define a parameter set that can be used to evaluate inferential learning in future human brain imaging studies, with the main finding that having to categorize a binary mass based on a continuous color was too difficult in this experiment.

Hannah Bech
Dr. Diane Pike
Sociology
Emotional Labor and Community for Plus Size Women: An Analysis of Plus Size Instagram Bloggers

As beauty standards for women appear to be changing to become more size inclusive, what impact does this have on plus size women who exist at the forefront of a movement for size equality? Studies of aesthetic labor have indicated that emotional labor is performed by people who take on roles that must adhere to aesthetic standards to represent a brand or ideology. Plus size women who act as figureheads for curvy physiques must perform aesthetic labor and emotional labor through participation in fat talk when other women criticize their own bodies. This study of 75 total posts by 25 plus size female Instagram bloggers analyzes post content and comments to identify emotional labor performed by bloggers, as well as the existence of a supportive online community for plus size women. Evidence of a supportive community was found with little evidence of emotional labor, but new issues came to the light in terms of how plus size women want to be represented.

Blair Stewig and Vision Bagonza
Dr. Benjamin Stottrup and Dr. Joan Kunz
Physics
A Comparison of Monolayer Phase Behavior for Hydroxycholesterols Lipids Systems

Hydroxycholesterols play an integral role in the management of cholesterol levels in the cell membrane. Hydroxycholesterols are oxidized versions of cholesterol containing a second hydroxyl functional group. Isomers exist that vary in the position of the second hydroxyl group, which influences the physical behavior of hydroxycholesterols. The behavior of the hydroxycholesterols 7ß-OH, 20-OH, 22(R)-OH, 22(S)-OH, 25-OH and 27-OH, are explored in a 1,2-Dimysristoyl-sn-glycero-3-phosphocholine (DMPC) monolayer using a Langmuir Trough, fluorescence microscopy, and image analysis. Isotherms for each isomer at a variety of compositions were recorded, and show interesting features dependent on the isomer. Taking fluorescence images of hydroxycholesterol-rich domains and phospholipid-rich domains provides a physical look at the phase-behavior of the hydroxycholesterol/lipid system. These sterol rich domains are observed after a phase change which occurs at different pressures, depending on the sterol. The behavior between 22(R) hydroxycholesterol and 22(S) hydroxycholesterol has proved to be particularly interesting. The optical activity influences the observed phase behavior and provides insight into the conformations of the two optical isomers.

Kathryn Block, Trewayne Flatgard and Jolene Catudio
Dr. Nancy Steblay
Psychology
Eyewitness Accuracy: Predictions based on Witness Verbalizations

This study examined the relationship between identification accuracy of real eyewitnesses to crime and their verbalizations while viewing lineups. A representative subset (n=108) of lineups from a larger data set (n=494) was obtained from the American Judicature Society field project. The materials included audio recordings and transcripts of the interaction between real eyewitnesses and lineup administrators during identification procedures. Two primary variables were measured for the current study. First, eyewitness verbalizations were coded for categories of witness decision strategies. The second variable was whether the real eyewitness identified the police suspect or a lineup filler (a known error). We hypothesized that witness comments indicating automatic decision making (e.g., whole face recognition, placing the face in context of the crime) would be associated with greater accuracy than comments indicating deliberative decision making (e.g., mentioning specific facial features, using a process of elimination or relative judgment, and use of verbal hedges). Preliminary analysis indicates that automatic witness decision processes are associated with more suspect and fewer filler identifications, $X^2(1)=7.91$, $p=.005$, r = .28.

Kathryn Block, Ali Kanan, Anabel Chavez and Margaret Hiniker
Dr. Nancy Steblay
Psychology
Lineup Administrator Behaviors and Eyewitness Identification Decisions

DNA exoneration cases reveal that 72% of these wrongful convictions have involved eyewitness identification error. Eyewitness researchers have developed lineup procedural reforms to reduce mistaken identifications. A core recommendation is the use of double-blind lineup procedures in which the lineup administrator does not know which lineup member is the police suspect and which lineup members are fillers (known innocents). The current study aims to extend this research by examining whether even double-blind lineup administrators can inadvertently influence eyewitness decisions. A representative subset (n=104) of double-blind lineups from a larger data set (n=494) was obtained from the American Judicature Society field project. The materials included audio recordings and transcripts of the interaction between real eyewitnesses and lineup administrators during identification procedures. Two primary variables were measured for the current study. First, administrator verbalizations were coded for potentially influential behaviors, including deviations from prescribed lineup script or protocol. The second variable of interest was whether the real eyewitness identified the police suspect or a lineup filler. Lineups conducted with influential administrator behavior were associated with 17% more filler picks and 17% fewer suspect identifications compared to lineups with no administrator influence, X2 (1) = 3.12, p = .08, r = .17.

Samantha Boline and Jake Kraft
Dr. David Matz
Psychology
Objectification in same sex and opposite sex targets

Sexual objectification is a problem in western cultures because it implies that people do not need to treat women as people and that they can be seen solely for their sexual components. In the present study, we examine gender differences in the objectifying gaze, the influence of task orientation (being appearance vs. personality focus), and the attire of the target individual on the manner in which participants attend to images of women and men. By including images of men we examine the possibility that men;s greater tendency to exert an objectifying gaze may be explained in part by a tendency for men to focus more on the bodies of all targets (and less on the faces) than do women.
Results indicate that, as expected: 1) male participants attended more to the body regions of the models than did female participants, 2) the bodies of female models were attended to more than the bodies of

male models, and 3) participants who were appearance focused attended more to the body regions of the models than those who were personality focused.

Marimar Bustos
Dr. Audrey Lensmire
Education
"They ripped out the flower, but the roots grow among us": The Story of El Salvador Told through Culturally Relevant Literature

The purpose of this research was to closely examine the historical context of El Salvador, particularly during the Civil War of 1980-1992, in order to create a work of culturally relevant literature -- defined as a book which authentically reflects one's experience -- which is aimed for young adult readers. The bulk of the research consisted of reading a variety of non-fiction works pertaining to Salvadoran history and society, as well as fiction books that were culturally relevant in nature. Additionally, I conducted an open-ended interviewed with one woman who escaped El Salvador during the beginning of the war. Essentially, El Salvador has been and continues to be a country marred by corruption and inequality. It has had oligarchic rulers, authoritarian leaders, and as of late tenuously democratic presidents. The crime rate in the country is amongst the highest in the world, with no lasting solution in sight. Knowing this, it becomes evident why many Salvadorans make the difficult decision to immigrate to the United States. A number of these immigrants are children, most of whom did not receive adequate education in El Salvador. In order for them to feel more comfortable with reading, a book which authentically reflects their experience would be an invaluable resource. The aim of this ongoing research is to create such a book, one that is immensely powerful and also eye-opening to those who want to know more about Salvadoran history.

Emily Campbell
Dr. Diane Pike
Sociology
Regional Approaches to the Destigmatization of Urban Homelessness in the United States

Homelessness has long been a problem of social interest and the target of public policy, government funding, and charities. The way in which homelessness is presented by the agencies that seek to end it provides a framework for how the larger society views and addresses the problem. This study explores how homelessness is portrayed by the websites of nonprofit agencies through a content analysis of 60 websites from organizations in 15 urban centers in the United States. Findings suggest that while minor differences exist between regions of the country, the presentation of homelessness is relatively consistent nationwide. Overall, analysis indicates that agencies in cities across the country are seeking to reduce stigmatization of homelessness through the images, vocabulary, and information included on their websites.

Bruce Clark
Dr. Stacy Freiheit
Psychology
Gratitude Journaling and its Impact on Anxiety

Gratitude journaling has been shown to be an effective way to cultivate gratitude over time (Emmons & McCullough, 2003). Gratitude is an important emotion to study because previous research has shown the emotion to be consistently linked to several aspects of mental health, particularly depression (Wood, Maltby, Gillett, Linley, & Joseph, 2008). Gratitude may also impact anxiety, however results from previous research have been mixed (Froh, Sefick, & Emmons, 2007; Ruini & Vescovielli, 2013). The present study was conducted to determine if gratitude journaling can be an effective intervention to decrease anxiety and depression. Thus far, 66 college students were randomly assigned to engage in gratitude journaling, hassles journaling, or events journaling for five consecutive days. The college students had their anxiety

and depression levels assessed before and after the five day mark. Results indicated a significant difference between pre-anxiety scores and post-anxiety scores in the participants ($F(1, 64) = 12.78$, $p = 0.001$) and a marginally significant difference in the time-by-journal interaction ($F(2, 64) = 5.64$, $p = 0.066$). Results also indicated a significant difference in pre-depression scores and post-depression scores in the time-by-journaling interaction ($F(2, 64) = 3.27$, $p = 0.045$). Journaling in general appears to have a significant impact on anxiety and depression.

Austin Conery, Dan Zeng, Samantha Boline, Tser Cheng and Sean Adams
Dr. Nancy Steblay
Psychology
Evaluating the Fairness of Real Police Lineups

Eyewitness scientists have produced recommendations for police lineup practice as a means to reduce the likelihood of eyewitness identification error. For example, to meet requirements for a fair police lineup, each lineup member must match the eyewitness's description of the culprit.
Structural lineup bias allows the eyewitness to identify the suspect without reliance on recognition memory and places an innocent suspect at risk of false identification. The most direct measure of lineup fairness (or bias) is the proportion of suspect identifications made by laboratory mock witnesses (who did not see the crime). Suspect identification rate for a fair lineup would be 16% (1/6 lineup members). This on-going laboratory study tests 120 real photo lineups from violent crime cases in four U.S. cities. The research question is whether the lineups are biased against the suspects. Using a mock-witness procedure, 100 lineups have been tested thus far. On average, the lineups are fairly-constructed (16% suspect ID rate by mock witnesses), but substantial variability in bias exists across lineups.

Jeff Cornell
Dr. Nancy Fischer
Urban Studies
Women and Urban Cycling

The purpose of this study is to uncover the current facilitators and barriers of engaging women in cycling as transportation. The study focused specifically on women cycling in an urban setting. Five transportation advocates, as well as seven women who bicycle, were interviewed to uncover these facilitators and barriers. In addition, field research was conducted at several bicycle paths in Minneapolis. Helmet use and type of bicycle were recorded for both women and men in order to uncover trends in equipment, safety perceptions, and infrastructure preferences.

The interviews identified several key barriers preventing women from bicycling as transportation: Gendered roles as caretakers of children and homemakers, a male dominated cycling culture, cultural expectations on women's appearance, gender-based harassment and violence, and current bicycle infrastructure. In addition, several major facilitators were discovered: Social events, community events, educational opportunities, and in certain contexts, infrastructure. Field research discovered that bicycle paths with a physical separation from motor traffic yield the highest ridership for women cyclists.

The challenges and successes of integrating bicycling into women's daily habits was the overarching theme that was taken away from the study. It was unclear whether cultural factors or the built environment more greatly affected women's decisions to bicycle. However, both cultural factors and the built environment were seen to be in need of changes in order to engage more women in bicycling.

Claire Cripps
Dr. Anthony Clapp
Exercise Science
Predicting Maximal Oxygen Consumption For General Skating Population with a Single Stage Skate Test

Maximal oxygen consumption (Vo2max) is the most accurate measure of cardiovascular function. Vo2max testing entails exercising incrementally until exhaustion and oxygen consumption apexes. Flaws of maximal testing include high physical demand, expensive equipment, time consuming, and risk of injury. Submaximal assessments are a valuable alternative in providing a cost effective and less strenuous method to determine Vo2max. The purpose of the study was to devise a submaximal skate test generating a regression formula that accurately predicts Vo2max. 42 subjects representing the general public, 21 males and 21 females between the ages of 20 and 60 self-classified as competent skaters participated (age=31.9 ± 6.6 yrs, ht.=68.3± 4.6 in, wt.=168.3 ± 23.3 lbs). All subjects completed a maximal graded exercise test with expired O2/CO2 gas analysis then completed the submaximal skate test. Through regression analysis, skate time was the only factor that indicated a moderately weak correlation; all other factors had no significant correlation in our regression analysis. The regression formula generated: Vo2max = 54.27 – (2.57 x skate time) where p = 0.0149, R-squared = 0.13, and SEE = 5.604 ml/kg/min. This study revealed that this on-ice single stage, steady state, skating assessment produced a standard for estimating VO2max. As a resulting culmination of this investigation, a submaximal skate assessment may provide a useful means to derive an accurate predicted VO2max value.

Caitlin Crowley
Dr. Phil Adamo
History
Augsburg College: Celebrating 150 Years of History through 150 Objects

Augsburg College is celebrating its sesquicentennial anniversary in 2019. With the guidance of Professor Phillip Adamo, we researched a variety of topics in Augsburg's history to contribute to his book. Telling the history of the school through objects is a unique way to present an institutional history that has allowed us to explore Augsburg from many perspectives and tell Augsburg College's story in a way it has never been told before. We have chosen two of our topics to present at Zyzzogeton. Caitlin's topic, "The House That Rum Built," discusses the complicated relationship between Augsburg College and alcohol.

David DeKrey
Dr. Ann Impullitti
Biology
Physiological changes of soybean due to the disease Brown Stem Rot

The fungal pathogen Phialophora gregata causes the disease brown stem rot (BSR) of soybeans (Glycine max) and is known to decreases crop yield. BSR can be difficult to diagnose due to the lack of symptoms of disease during the long latent phase of the disease. Previous studies have shown that stress caused by diseases can modify the light reactions and carbon fixation during photosynthesis. Therefore, we investigated the physiology of soybeans at different stages in order to determine if the impact of BSR could be detected during asymptomatic infection. Resistant and susceptible varieties of G. max where inoculated with type A, which causes foliar symptoms, and type B, which does not cause foliar symptoms of P. gregata. The light reactions were assessed by measuring chlorophyll fluorescence and non-photochemical quenching and the carbon fixation reactions were measured by CO2 assimilation every two weeks post-inoculation. The presence of the pathogen was confirmed by using a polymerase chain reaction (PCR) with primers specific to type A and B of P. gregata. In the future quantity of the pathogen in the plants will be determined using real-time quantitative polymerase chain reaction (qPCR).

Abigail Dickinson and Macalester Holm
Dr. Michael Wentzel
Chemistry
Fries Rearrangement by Microwave and Convection Heating

In recent years, microwave reactors have gained attention for their unique ability to carryout reactions in a faction of the time. Microwave heating is able to complete certain syntheses in 10 minutes that would take

up 24 hours by normal reflux conditions. Even more recently, microwave heating has been shown to produce unique and specific isomers in certain reactions. This has gained the attention of pharmaceutical companies looking to produce specific isomeric compounds in short amounts of time. In this method, Fries Isomerization was carried out in both microwave and convection heating conditions. Each unique heating method produced a specific isomer of the given product. The products were identified by both GC/MS and NMR analysis.

Arianna Flowers and Amina Iman
Dr. Ralph Butkowski
Biology
Improved Preparation of Blood Coagulation Proteins

Fibrin is the major protein component of blood clots. Fibrin is formed from fibrinogen in a controlled process where one of the regulators is histidine-rich glycoprotein (HRG). Besides its role in fibrin assembly, HRG may also function in degradation of blood clots by tethering fibrin to plasmin, a fibrin-degrading enzyme. HRG is suggested to play roles in numerous other processes from immunity to anti-microbial functions. A recent publication suggests HRGs proposed roles are aren't always confirmed when cleaner preparations of the protein are studied, suggesting that some earlier results are suspect. To conduct our studies of the molecular interactions between fibrinogen, HRG and zinc, it was necessary to improve the purification method. Variables from extraction of HRG from plasma, pH and ionic strength of buffers and chromatography media were separately investigated. We found that high salt precipitation of plasma removed interfering proteins and that optimization of buffer pH and chromatography methods improved quality of HRG. Studies in progress aim to enhance fibrinogen preparation and measure metal binding to HRG and fibrinogen.

Jossel Franco
Dr. Roberta Kagin
Music Therapy
The William W. Sears Collection: A Case Study of Multidisciplinary Thinking in Music Therapy

The William W. Sears Collection, donated to Augsburg College in 2013, is the personal library of the pioneer music therapist after which the collection is named, Dr. William W. Sears. Active in the early days of the music therapy profession, Dr. Sears is most known for creating the foundation of music therapy theory. The Sears Collection, containing almost 2,000 books, journals, and papers, reflects the kinds of ideas that influenced the development of Dr. Sears's theories and his understanding of music therapy. This study seeks to understand how broadly William Sears thought about music therapy by classifying the contents of the collection to identify the main subjects that interested him. The Library of Congress Classification system served as a model for organizing the contents of the collection. Additionally, Margaret Sears, Dr. Sears's wife and donor of the collection to Augsburg, was interviewed in order to better understand Dr. Sears's personal philosophy towards music therapy. The contents of the collection were ultimately classified into one of 16 distinct groups such as music, psychology, mathematics, and social sciences. The wide variety of subjects in the Sears Collection reveals Sears's multidisciplinary approach towards music therapy, reflective of his philosophy that music therapy relates to all human experiences.

Rebecca Freese
Dr. Miles Ott
Biostatistics
Transgender Coping Strategies: A Factor Analysis

Transgender individuals face an enormity of issues related to their gender identification, and yet few studies have been conducted to investigate how these issues impact transgender health. Although

previous research has explored the relationship between coping skills and depression in a population of LGBTQ identifying people, this study aims to take a deeper look at a measure of the Brief Cope in a group of transgender and gender non-conforming individuals in the United States, which has not been done prior to this study. Data was collected from an online survey where 341 participants answered questions relating to demographic information, their levels of depression, anxiety, and stress, substance use, HIV-status, discrimination, violence, expectations of rejection, concealment, coping, social support, and sexual risk. The coping category consisted of 28 questions. A factor analysis was preformed to reduce these 28 measures to a four-factor model that explains 45% of the total variance. This factor analysis could be used to better understand coping strategies in the transgender and gender non-conforming population.

Hilena Frew, Kyle Johnson, Thu Nguyen, Ariane Vartanian, Catherine Murphy and Christy Haynes
Dr. Vivian Feng
Chemistry
Investigation of molecular interactions between cationic Au nanoparticles and cell-wall defected B. subtilis

Developing a molecular-level understand of the surface interactions between nanomaterials and bacteria is an important task for both antibacterial drug design and nanotoxicology fields. In this study, using a model gram positive bacterium, *Bacillus subtilis*, we aim to investigate the molecular components in bacterial cell wall that are responsible for interacting with cationic nanoparticles. We hypothesized that the negatively charged wall teichoic acid (WTA) moieties are the primary sites of interactions. By using genetically mutated strains of *B. subtilis* with defected WTA (*tagE* or *dltA*), we compare the bacterial cell surface potentials with zeta-potential measurements, degrees of surface binding to a model cationic 3-mercaptopropylamine gold nanoparticle (MPNH2-AuNP) with flow cytometry, as well as bacterial viability upon exposure to nanoparticles with a high throughput plate reader assay.

Ryne Gagne
Dr. Anthony Clapp

Exercise Science
Effects of a Free Throw Shooting Routine and the Success Rate in DIII Male Collegiate Basketball Players

Many factors influence optimal performance in athletics. Factors may include social facilitation, self-confidence, threats, and distracters. The free throw shooting routine in basketball can be influenced by these factors. Athlete's settle into a routine because it supposedly helps with focus, calming nerves, block distractions, and ultimately mental preparation for success. There is a widespread belief that pre-performance routines will have a positive impact on performance. PURPOSE: To determine if basketball players will have greater success with free throw shooting when they do their own unique routine, rather than when they don't use a routine at all. METHODS: The investigation consisted of 15 male collegiate basketball players (age=20.3 ± .99 yr, ht. = 187.78 ± 8.38 cm, wt. = 83.64 ± 8.67 kg) shooting 100 free throws with a typical routine and 100 free throws without a routine (catch-pause-shoot), for a total number of 200 shots. The players were allowed to use their own unique free throw routine to shoot the first 100 free throws which they have been doing for their entire collegiate career. One week later, for the second 100 free throws, the players were no allowed to do any part of their routine, all they were allowed to do was receive the ball from the observer and shoot. Statistical Analysis: Independent t-test was used to analyze the data collected during the shooting sessions with a p-value of .05 set as the level of significance. RESULTS: When using a free throw shooting routine the athlete's mean free throw made was (M=82.4, SD=1.84) and while shooting without the normal routine the mean free throw made was (M=78.2, SD=2.31). Thus, independent t-test revealed a p-value of 0.023. With a p-value less than .05, the data confirms that the free throw shooting routine produces better results than free throw shooting without a routine. CONCLUSION: This study revealed that athletes shooting free throws with a

consistent pre-shot routine produce a significantly higher free throw shooting percentage compared to shooting free throws without their normal routine.

Karina Genis
Dr. James Vela-McConnell
Sociology
Rampage Shooters: Media Portrayals of Shooters Based on Race and Sex

The term “active shooter” was coined in 2012 by the FBI as a response to the rise of rampage shootings. They refer to incidents involving multiple victims at random or for symbolic purposes, shooters who are related to the location they are targeting, and occur before an audience. One rarely finds any news media discussing these incidents through the lenses of race and gender; rather, most media focuses on the number of victims while typically proposing explanations like “mental illness” and background details, such as a “rough upbringing,” and so on. The fact that between 56% and 67% of rampage shooters from 1990-2013 were white and 97% were male demonstrates that there is an important part of the overall picture that is missed in news coverage of these shootings. This study focuses on how rampage shooters are portrayed through in the news based on the their race and gender by examining 63 print and televised stories in order to compare four white male shooters, four shooters of color, and one biracial shooter. It was found that stories discussing shooters of color often had several direct references to race. In comparison, stories about white shooters contained few if any refrences to race. The failure to mention race in the incidents involving white shooters while consistently refrencing the race of the non-white shooters creates a distorted view of the relevance of race in these incidents. The shooters’sex is rarely mentioned; if it was, it was done through the use of pronouns. Given the high proportions of shooters who are male, it is clear that sex is largely taken for granted despite the fact that socilized gender norms of masculinity are relevant to a complete understanding of this phenomenon.

Emily Gregg
Dr. Kevin Potts
Biology
Spatial Models of Region-Specific Threats of Primate Diversity Decline and Zoonotic Disease Outbreak Using Geographic Information Systems (GIS)

The emergence of infectious zoonotic diseases and the loss of primate diversity are closely intertwined in equatorial Africa, and are linked specifically through human encroachment upon natural areas and intense extraction of primates as bushmeat. It may therefore be the case, in a general sense, that regions most at risk of primate diversity impoverishment are also those most at risk of zoonotic pathogen outbreaks. We examined this hypothesis by constructing a spatial model of risks of primate diversity loss and zoonotic disease outbreak as functions of human population density, protected area locations, bushmeat hunting attitudes and practices, diversity of Endangered and/or Critically Endangered primates (based on IUCN assignment), land use, non-bushmeat protein availability, and cropland coverage. Overall, areas where primate diversity was most at risk were also those in which the risk of zoonotic disease spillover was predicted to be high. For example, the Northern Albertine Rift landscape in Western Uganda is an area of emergence of zoonotic infectious disease and an area of rapid decline and degradation of natural habitats. However, our model predictions also suggested that a number of equatorial regions are characterized by high risk of primate biodiversity decline or by high risk of disease spillover, but not both (e.g., north-central Democratic Republic of Congo). This and other similar spatial modeling schemes can be usefully applied to help construct region-specific management plans.

Kayla Grover
Dr. James Vela-McConnell
Sociology
Catholic Identity After Sex Abuse Scandal

While stigma is usually theorized as a phenomenon affecting individuals of certain identity classes, social stigma can also be applied to broadly stigmatize an institution as a whole. The Catholic Church, beginning in 2002, has been characterized as having an “epidemic of child sex abuse” enabled by church leaders suppressing evidence of abuse and transferring “pedophile priests” between congregations in an effort to cover up allegations. Media coverage of the scandal typically stigmatizes the church leadership and hierarchy, rarely targeting members of the church. This paper explores how those associated with the organization but not directly involved in the sex abuse scandal responded to the stigmatization of the Catholic Church. Utilizing an analysis of 152 responses to National Public Radio Coverage of the scandal, comprising all comments by former and current Catholics from 2008 to 2010, this paper asserts: 1) Members of a stigmatized organization will respond to negative media coverage by constructing destigmatizing counter-narratives; 2) A focus on reconciliation will be more prevalent among those connected to the organization than those who express no affiliation; and 3) An individual’s commitment to an organization is unlikely to be weakened by the organization becoming stigmatized.

Duina Hernandez
Dr. James Vela-McConnell
Sociology
Through Their Eyes: Latino Immigrant Groups’ Perceptions of U.S. Immigration Policy

This qualitative study examines how immigrant Latino groups—i.e., undocumented, documented, legal residents, naturalized citizens, and leaders in the community—perceive, frame and respond to U.S. immigration policy. Twenty-four participants were divided into five focus group interviews. Participants watched and responded to a prompt of Obama’s executive action order on immigration issued on November 20th, 2014. Based on the analysis, a typology of immigrant perceptions was created, including a pessimistic, a realistic and an optimistic perception of U.S. immigration policy. Engaging in what Herbert Blumer identifies as the meaning making process, immigrants reacted to U.S. immigration policy on the basis of the meanings that it has for them. The meanings assigned to U.S. immigration policy derive from, or arise out of, the social interaction an immigrant has with one’s fellows. The analysis allows this meaning-making process to be traced through the interactions that took place in the context of the focus groups. Findings suggest all twenty-four immigrants have a cynical approach to immigration policy. Such cynicism is higher among immigrants with a pessimistic perception and lower among immigrants with an optimistic perception.

Andrew Jewell
Dr. David Crowe
Biology
Modelling NMDAR-Dependent Action Potential Coincidences Using a Spiking Neural Network

Background: Spiking neural networks can be modeled using a set of differential equations. Using the model put forth by Xiao-Jing Wang and Jaciento Pereira in their 2014 paper, I assembled a Leaky-Integrate and Fire model, approximating the function of a fully connected network of 2500 neurons in Matlab programming language. This model will be used to test hypotheses related to schizophrenia. Our laboratory has recently obtained data that systemic injection of the NMDA receptor antagonist phencyclidine decreases the number of action potential coincidences in the prefrontal cortex. The goal of the current research is to test this behavior in the model and to quantify the parameters that give rise to this effect.

Results: Assembling the model was a challenge due to the limited scope of the initial parameters that the model is functional for. I tested the model for varying amounts of randomized external input to find what amounts would cause the network to replicate biologically plausible neural activity. In addition to these tests, I performed voltage clamp-style experiments on the network to determine the value of various other parameters such as the external magnesium ion concentration or the differential equation’s modeling time step (the accuracy to which each millisecond is modelled). The model is currently close to the point where

I will be able to mimic NMDA receptor blockade by decreasing the NMDA conductivity variable in the model neurons.

Ashley Johnson
Dr. Ann Impullitti
Biology
The use of endophytes to reduce growth of the soybean pathogen Sclerotinia sclerotiorum

Soybean diseases are managed by host resistance, agronomic techniques, or pesticides, but biological control is a rarely used tactic. Endophytes could be integrated into disease management since endophytes colonize plants asymptomatically and are known to reduce disease. The role of endophytes within soybean is unknown, and we investigated whether soybean fungal endophytes or their metabolites would inhibit growth of Sclerotinia sclerotiorum (Ss) in vitro and in planta. Antagonism assays were completed by plating one of thirty endophytic fungi and Ss onto PDA. Growth of Ss was reduced by 15% of the endophytes assayed, with antibiosis being the most common form of antagonism. Endophyte metabolites were also screened for antagonism to Ss. Ss was plated on PDA amended with metabolite concentrations of 0%, 0.05%, 0.5%, 5%, and 10% (v/v). Metabolites of nine endophytes reduced growth of SS by 40 – 60% when metabolite concentrations were 5 and 10%. These nine endophytes were assayed in planta by planting soybean seeds with endophytes, inoculating plants with Ss, and ranking disease severity every three days. In a single experiment, there was no difference between inoculated soybeans planted with endophytes compared to soybeans planted without endophytes. This could suggest the endophyte application method was not effective, or that metabolites should be directly applied rather than the fungal cultures.

Julie Johnson and Nicole Krenz
Dr. Ben Denkinger
Psychology
Line-up procedures in older adulthood identification accuracy

Research on age-related differences in eyewitness identification accuracy indicates that older adult eyewitnesses make significantly more identification errors than younger adults. One suggested revision to traditional lineup procedure is to use a sequential presentation of photos (one at a time) rather than simultaneous presentation (all photos at the same time). This change has resulted in a reduction of misidentifications for younger adults. What remains unclear is the effect of the sequential lineup format for older adult eyewitnesses. In a 2X2X2 design, identification accuracy was measured for older vs. younger eyewitnesses under conditions of sequential versus simultaneous lineup format and culprit-present versus culprit-absent lineups. Young (18-28 years) and older (60-80 years) adult witnesses viewed a videotaped crime incident followed by a six-person lineup. Witnesses could respond to the lineup with yes (identify a specific lineup member), no (reject the lineup), or not sure. It is predicted that older adults will make more identification errors than younger adults, but this difference will be reduced (smaller effect size) with a sequential (vs. simultaneous) lineup procedure.

Kathryn Johnson
Dr. Joseph Underhill
Political Science (Environmental Studies)
The Endangered Species Act

The endangered species act is something that has been in use for many years and has been modified many times adding more information from research. Though it has been around for many years people don't really think about how effective it has been throughout its history. While canoeing down the Mississippi River I got to see firsthand the effects of this act. I looked at the Higgin's Eye Pearly Mussel along the northern part of the river and the Pallid Sturgeon in the south. Both of these species have suffered greatly and the Endangered Species Act is working on reversing the negative effects that have

come from various events and decisions that have been made in regards to the river. Along with looking at these species I was also looking at the interactions between the government organizations that have an impact on either the species directly or the habitat in which they reside. I looked at how often and in what cases they work together and when they are in conflict and can slow down progress. All of these organizations want the same result but they all have different ideas about what is the best way to reach that result. They have to keep in mind all of the other pieces of legislation that have been put into place when coming up with their plans. I also talk about many of these and how they can affect the decision-making process of these organizations.

Ashley Johnson
Dr. Tim Pippert
Sociology
The Social Impacts of the North Dakota Oil Boom

In the 1870s, railroad expansion in the Dakotas led to increased productivity of wheat farming, and the rapid growth made it possible for North Dakota to become the 39th state in the union. However, prioritizing a single economic resource created instability, as there was no guarantee for long-term prosperity. The state's economic reliance shifted to include oil after discovery in 1951, resulting in North Dakota's first oil boom. A second oil boom was driven by high demand for fuel as prices soared in the 1970's. After a decades-long lag, another boom reignited the state's economy and unemployment rates plummeted to the lowest in the country. But what are the negative impacts? How are they being addressed?

One of the major issues in North Dakota boomtowns is the escalation of sexual exploitation. The organization iEmpathize filmed and produced the documentary BOOM to educate audiences on sex trafficking in the oil producing communities of western North Dakota. One component of my research assessed the persuasive impact of the film through secondary data analysis of pre- and post-screening surveys designed and administered by iEmpathize. A total of 145 subjects ranked their attitudes, knowledge, and motivation before watching BOOM, and again immediately afterwards. A paired-samples t test revealed a significant increase in knowledge and concern after watching the documentary. Additionally, my research included an exploration of North Dakota's boom history and examined the social impacts of the current oil boom from a sociological perspective.

Ashley Johnson and Zach Swingen
Dr. Ann Impullitti
Biology
Augsburg Urban Arboretum

The Hagfors Center for Science, Business, and Religion will provide the campus a hallmark building for interdisciplinary education. In addition to the HCSBR, the college is in the process of developing an urban arboretum. An arboretum is a collection of cultivated trees that serves a serious educational purpose, supports research, and is open to the public. The Augsburg urban arboretum will be a distinguishing feature of campus and will provide an outside classroom for our students and community, beautify the neighborhood, and provide a showcase of native Minnesota trees and shrubs. Since fall 2015, we have worked to identify and catalog the tree species in Murphy Square and on campus grounds. Currently, we have collected samples and GPS coordinates from all deciduous trees on campus. We are working on identifying the deciduous trees and mapping their locations. We are also working to identify the coniferous trees on campus. In the future, visitors to campus will have access to trees labeled with their common and Latin name, and access to smartphone apps for walking tours of the Augsburg urban arboretum.

Sean Jordan, Jake Kraft, and Hannah Hansen
Dr. David Matz and Dr. Nancy Steblay
Psychology
The influence of appearance change instructions on eyewitness attention and identification accuracy

An appearance-change instruction (ACI) is often used by police departments during lineups. The ACI informs eyewitnesses that the culprit's appearance may have changed since the time of the crime. We examined the impact of the ACI on attention to specific suspect features and lineup identification accuracy. After viewing a video of a crime, participants were shown a lineup of six suspects. The lineup included one of three target pictures: the culprit, the culprit with changed appearance, or an innocent suspect. Half of the participants in each lineup condition received the ACI. Participants' eye-movements were tracked as they viewed the lineup. Results indicate that the ACI decreases both correct identifications of the guilty suspect and false identifications of the innocent suspect. The ACI does not appear to impact eyewitnesses' ability to identify a guilty suspect who has changed appearance and does not drive attention toward specific suspect features.

Bryce Kadrlik and Andrew Jewell
Dr. Shana Watters
Computer Science
Game Design and Procedural Level Generation for use with Machine Vision

In Volodymyr Mnih et al.'s paper "Human-level control through deep reinforcement learning", the authors demonstrated that use of a deep-Q reinforcement neural network could cause significant increases in the machine learning efficiency over a variety of tasks. Mnih et al. used Atari 2600 games to demonstrate the effects of this learning algorithm. In this project, we constructed a similar game to the Atari game "Breakout," using Java. We constructed both the game engine and the Graphical User Interface to make this game playable by both humans and eventually the neural network, in further research.

Ali Kanan
Dr. Ben Denkinger
Psychology and Exercise Science
Investigating the Influence of Motivation Orientation on Exercise Persistence

Adults in the United States report not having enough leisure time as one of the primary reasons for failing to incorporate exercise into their daily routine. In order to understand why individuals embrace or abandon exercise routines, one must contextualize factors relating to motivation orientation- i.e. intrinsic and extrinsic motives, and time perception. Past studies have insufficiently examined these motives and the potential effects they may have on an individual's subjective experience of time during exercise. The effects of motivational orientation can help us understand whether those who are predisposed to be intrinsically or extrinsically motivated towards exercise perceive time as either passing by faster or slower during an exercise task. In order to gauge the connection between motivation orientation and time perception during an exercise task, we examined 52 participants, all of whom were administered a series of personality measures and put through three exercise tasks. Prospective time estimations were collected and analyzed using independent samples t-tests. A non-significant trend shows that those classified as having high extrinsic motivation towards a task tended to overestimate time during the tasks compared to the those classified as having low extrinsic, high intrinsic, and low intrinsic motivation towards a task who underestimated time during the same tasks. An external incentive (extrinsic motivation) seems to be imperative when encouraging people to begin or continue engaging in an exercise regimen, but the promotion of intrinsic motivation, provided by the Health and Fitness professional, may be crucial for them to remain engaged. Future research will focus on understanding the reasons that individuals resist being engaged during physical activities, relative to external rewards and the perception of time, in order to prevent the individual from abandoning or, even worse, refusing to engage in a regular exercise regimen.

Michael Kantor
Dr. Ana Ribeiro
Exercise Science
Assessing Physical Activity Levels and Motivation in an Urban Midwest Private Liberal Arts College

Recent research indicates that over one third of American adults are obese (Ogden, Carroll, Kit, and Flegal, 2014) and only 48% of adults meet the recommended physical activity (PA) guidelines (U.S. Department of Health and Human Services, 2008). In this context, understanding what makes people engage or not in PA becomes of key importance when attempting to prevent obesity and its related comorbidities.

Purpose: To assess the PA and motivation levels of students, faculty, and staff in an urban Midwest Private College.

Methods: Participants completed an anonymous online survey (n=119) on PA and Exercise Motivation. Fitness levels were tested and obtained from wellness assessments (n=74). Multiple regression statistical models were used to test age, body composition, and gender effects on motivation, PA engagement and fitness factors.

Results: Less than half of participants met the 2008 PA Guidelines. BMI was a significant predictor of overall fitness. Males were more motivated by competition and age was a significant predictor on 5 subscales of motivation. Males had greater muscle strength and endurance, while females were more flexible.

Conclusion: PA and obesity prevalence matched national averages. Results suggest that age and gender are significant predictors of fitness and motivation to exercise.

Joseph Kempf
Dr. Michael Wentzel
Chemistry
Synthesis of a Poly-lactide Co-Polymer Using Pentaerythritol as an Initiator

Even though polymers compose a large portion of our modern society, the principles of polymer chemistry are rarely communicated in an undergraduate education. For the most part, polymer synthesis is prohibitively costly; requiring complex procedures, toxic solvents, and specialized facilities. This bench-ready procedure is designed to introduce students to principles of polymer chemistry while also demonstrating concepts of green chemistry. Previous bench-ready polymer procedures have resulted in a poly-lactide with good bending and stress resistant characteristics. However, the use of hydrogen chloride gas as a catalyst remained cumbersome and presented risks to students and the environment. To this end, safer catalysts are being investigated for polymer synthesis. The use of Diphenyl Phosphate (DPP) is considered as a possible catalyst to replace HCl gas. The effectiveness of DPP was confirmed using 1H-NMR analysis. The physical characteristics of the poly-lactide were found to be tunable by varying the amount of monomers as well as the specific initiator compound used.

Roman Khadka
Dr. Naoko Shima
Biology
Combined reduction of dormant origins and TLS-polymerase (REV1) activity lead to chromosome instability after UV exposure

Maintenance of genomic stability requires an extraordinary degree of fidelity in processes including DNA replication, DNA repair and chromosomal segregation. Defects in any of these activities can result in genomic instability and cancer development.

While cells contain highly redundant mechanisms to restore damaged DNA to its original state, they employ a unique mechanism known as Translesion Synthesis (TLS) to replicate through unrepaired lesions during DNA replication. TLS requires a set of error-prone DNA polymerases. Among such enzymes, REV1 plays a key role in TLS in response to lesions induced by an environmental mutagen ultraviolet (UV) radiation. REV1 works together with other TLS polymerases to replicate through UV-induced lesions in a mutagenic

manner. This role of REV1 contributes to the completion of DNA replication, thereby supporting cell survival.

Alternatively, UV-induced lesions can stall replication forks before TLS mechanisms. In such cases, we hypothesize that cells use dormant origins to rescue arrested replication forks. Dormant origins are backup origins that are generated during the process termed origin licensing. If our hypothesis holds true, we expect that a reduction in the number of dormant origins causes an increase in UV-induced chromosome damage.

To test this idea, we used cells derived from Mcm4chaos3 mouse model in which dormant origins are reduced to a 50% of wild-type mice/cells. By using Mcm4chaos3 cells that are also deficient for REV1, we further investigated functional interplay for the rescue of UV-induced stalled forks between dormant origins and REV-directed TLS. Chromosome damage was detected as forms of micronuclei (MN) and 53BP1-nuclear bodies (53BP1-NBs) by cytokinesis-block MN assay.

Mary Kirchdorfer
Dr. Peter Hendrickson
Historical Musicology
Gendered History of the Harp

This project's goal is to track the history of the harp instrument through gendered lens on a transnational level. There is already a lot of scholarship written about the harp as both a masculine or feminine instrument, and it changes depending on the time and place in history. One could make the claim that any instrument was once masculine because there was time when it was socially unacceptable for women to play most instruments. With the harp, it began to be viewed as increasingly feminine when this idea of a "cultured woman" came about in Western, aristocratic societies. In these societies, women were encouraged to play the harp (or piano or sing Etc.) because they were told it would raise their chances of marriage. It was also considered a "harmless activity for women to pursue in the home" where women could be very proficient, but not make it their career. While these perspectives are important to understand, there is no scholarship yet about the harp viewed as an androgynous or ambiguous instrument in terms of gender. This research project is hoping to show that there was a time in history when the harp was not considered masculine or feminine, and not associated with any gender. Since there is no scholarship found in databases exploring this avenue of the harp as an androgynous instrument, this project will support this claim through the use of music iconography and primary sources. The main proof this project has discovered is that harps were portrayed in art mostly being played by gender-less beings: cherubs. Cherubs are neither male nor female, they often have wings and capture a childlike innocence which is neither masculine or feminine. Adding this level of androgyny to a heavily gendered instrument historically will create a fascinating and new foundation of scholarship about the harp instrument.

Mac Kittelson
Dr. Anthony Clapp
Exercise Science
Effect of High Intensity Exercise and Shot Accuracy among Division III Collegiate Female Hockey Players

Skate sprints are a central component of hockey games; however, a paucity of data describes the effect of repeated skate sprints on game-like performance. Every line-shift and every game the hockey player deals with fatigue. Sprinting up and down the ice is the central component of hockey; however, a paucity of data describes the effect of repeated skate sprints on game-like performances. PURPOSE: The purpose of this study is to determine if fatigue will have an effect on shot accuracy among D III collegiate female hockey players. METHODS: Eleven collegiate athletes from a D III women's hockey team (age=20.1 ± 1.9 yr., ht. = 65.0 ± 4.6 in, wt. = 146.2 ± 5.9 lb) were recruited for this study. The athletes were randomly selected one time each week for 6 weeks and conducted a pre skate accuracy baseline

followed by a weekly fatigue trial to determine the effects of skate sprints on accuracy. All skaters completed a ten shot sequence at a standard hockey net with a shooting sleeve (corners exposed) during a week 1 pre practice skate. Each successive week, skaters would take time after practice and skate in a down and back sequence until the heart rate of the athletes fell between 170-180 bpm. Athletes then completed another ten shot sequence with the same goal set up. All shots were taken within the offensive slot on the ice rink. Statistical Analysis: Anova was used to compare the means of the two samples of the related data with post-hoc test. RESULTS: Anova revealed there was a significant difference ($p < 0.05$) in accuracy. Baseline shots made (3.27 ± 3.21) were significantly higher for shot accuracy compared to week 4 (1.91 ± 0.84), week 5 (2.0 ± 1.21), and week 6 (1.91 ± 2.09). CONCLUSION: These results indicate that shot accuracy decreases in female collegiate ice hockey player with weekly progression after repeated skate sprints when compared with a baseline control condition. Therefore, coaches logically could incorporate “game-like” conditions during practice that include repeated sprints-while focusing on maintaining high shooting accuracy to promote goal scoring.

Andrew Konieczny
Dr. Matthew Beckman
Biology
Modulating effects of 5-HTR agonist and antagonists on swimming in Daphnia magna

In this study the effects on Daphnia magna swimming force production of serotonin receptor (5-HTR) agonists and antagonists were tested. Daphnia magna are keystone species in many freshwater ecosystems worldwide. Freshwater reservoirs are often contaminated by drugs and chemicals, some of which interact with the serotonin neurotransmitter system. To better understand how these contaminants affect animal behavior we wanted to know if Daphnia magna swimming was modulated by 5-HT receptor activation or inhibition. A force transducing instrument that employed a calibrated fiber to record the force exerted was used to collect data. Two synchronized cameras were used to record, 1) animal swimming and 2) fiber displacement from different perspectives, simultaneously. Custom software was employed to analyze data and perform statistical tests. Preliminary data suggests a change in swimming force and swimming episodes when treated with differing concentrations of Xaliproden, a 5-HT1A agonist. Further experiments are required to determine the role that the 5-HT1A receptor signaling pathway plays in Daphnia magna. This study provides the first data we are aware of that documents the role of 5-HT1A signaling in Daphnia magna swimming and suggests this is a useful model organism to study the role of 5-HT in motor control.

Jacob Kraft
Psychology
Dr. Bridget Robinson-Riegler
Social Anxiety and Attentional Biases: An Anti-Saccade Paradigm

Because those high in social anxiety (HSA) fear negative evaluation, angry faces are especially salient to them. Those with HSA also have been shown to have an attentional bias towards observers with a direct gaze upon them, as it may indicate negative evaluation. HSA individuals also have been shown to have a wider Cone of Direct Gaze (CoDG), which indicates how far a gaze must stray from direct to still be interpreted as direct. I expected that during an anti-saccade task those with HSA would have higher error rates and longer initial saccade latencies when the facial expression was angry and fearful than when happy; the errors rates or latencies should not vary for those with low social anxiety (LSA). Those with LSA were predicted to have higher error rates and latencies with the direct gaze than the indirect gaze. Because HSA individuals have a wider CoDG, the error rates and latencies for those with HSA would not vary by gaze direction . 71 participants were tested using an anti-saccade task and were classified as high or low social anxiety based on a social anxiety scale. The stimuli task included 3 valenced faces (angry, fearful, neutral), each presented in three gaze directions (direct, left, and right gaze). Error rates and initial saccade latencies were recorded. Results indicated that social anxiety scores did not seem to mediate error rates or initial saccade latencies for any facial condition or gaze direction.

Elise Linna
Dr. Emily Schilling and Ron Lawrenz
Biology
*Exploring the habitat preferences, geographic distribution, and colonization history of the Spatterdock darner dragonfly (*Rhionaeschna mutata*) in Minnesota*

Our research addresses knowledge gaps on the habitat preferences, geographic distribution, and colonization history of *Rhionaeschna mutata* (Spatterdock Darner dragonflies) in Minnesota. A breeding population of *R. mutata* was recently discovered at the Warner Nature Center, in Marine on St. Croix, MN. This location is the only known *R. mutata* breeding site in Minnesota, and the farthest north and west that the species has ever been found. This species is rare within its range and is listed as a species of concern in most states where it is known to occur. Evidence suggests that it does not coexist well with fish and has other habitat requirements that might limit its distribution. We used a multipronged approach to garner information that may be useful for conservation planning for this species in Minnesota, including: 1) identifying other potential breeding ponds based on site characteristics, 2) surveying a subset of potential breeding ponds to catalog invertebrate communities, water quality, and habitat characteristics, 3) searching for adult dragonflies and their exuvia , 4) extracting and rearing eggs oviposited into lilypad stems, and 5) analyzing pond sediments to determine if paleolimnological techniques could be useful for determining colonization history. No adult or larval *R. mutata* were found during our six week (end of May through mid July, 2015) field season. Additionally, no dragonfly remains were discovered in our sediment samples,suggesting that paleolimnological analysis of their colonization history is not feasible. These results are preliminary, and our initial field season lays the groundwork for continued study of potential *R. mutata* breeding sites.

Simona Mackovichova
Dr. Evren Guler
Psychology
The Role of Executive Function in Autobiographical Memory Retrieval: Does the Type of Cue Word Matter?

Autobiographical memories are memories for personally experienced life events. Previous research has revealed individual differences in this ability. Some studies suggest such differences can be attributed to the varying capacity of executive function but there is paucity of research in this area. Executive function refers to a set of cognitive processes such as attentional control, planning, working memory, reasoning and inhibition which allow for cognitive control of one's behavior. Participants in the present study were asked to complete the following measures of executive function: Flanker Inhibitory Control and Attention Test which measures inhibition of automatic responses, Dimensional Change Card Sort Test which measures set shifting (ability to switch between tasks) and List Sorting Working Memory Test which measures working memory capacity. Moreover, participants completed an autobiographical memory task in which they were asked to recall a memory connected to a given cue word. Two different types of cue words were selected based on previous research. High-imageable cues (concrete words) are thought to lead to effortless, direct retrieval of a specific event through bottom-up processing, whereas low-imageable cues (abstract words) are thought to lead to an effortful, generative retrieval through top-down processing. In the present study, we hypothesized that executive function will be positively correlated with specificity of the recalled memories and that this correlation will be stronger for abstract cue words than concrete cue words.

Stephanie Magill
Dr. Jennifer Bankers-Fulbright
Biology
The Effect of Human Airway Lung Secretions on Pseudomonas aeruginosa Twitching Motility

Background: Pseudomonas aeruginosa irreversibly colonizes the lungs of and is the leading cause of death in people with cystic fibrosis (CF). P. aeruginosa has two main modes of motility – flagella-mediated

swimming through fluid and type IV pili-mediated twitching on a surface – and motility is associated with increased virulence. Twitching motility is likely critical for the spread and colonization of P. aeruginosa in the CF lung. Because P. aeruginosa is prevented from colonizing the non-CF lung, we proposed that non-CF lung secretions would inhibit the twitching motility of P. aeruginosa whereas CF-lung secretions would not, thus promoting permanent colonization of the CF lung. Methods: We established a functional, microscopic, pseudo-quantitative twitching assay for the PA14 strain of P. aeruginosa and harvested apical secretions from a monolayer of wild-type and CF-like Calu-3 cells. PA14 was pre-treated with the airway secretions before twitching analysis Results: Twitching motility was consistently observed on the edges of PA14 growth at 37°C. Addition of non-CF airway secretions did not significantly inhibit PA14 twitching, but did cause consistent anomalous bacterial movement in limited areas of the field of view. Conclusions: Normal airway secretions did not globally inhibit P. aeruginosa twitching motility, but did induce some aberrant local movements that may reflect interference with quorum sensing or other inter-bacterial communication.

Taylor Mattice and Colin Skerrett
Dr. Emily Schilling and Ron Lawrenz
Biology
A pond with a fishy past? Searching for Chaoborus americanus *in pond sediments to understand fish colonization history*

The aquatic phantom midge, *Chaoborus americanus*, does not coexist with fish. Their chitinous mandibles are preserved in pond sediments, making this species an excellent bioindicator of historical fish absence in waterbodies with unknown fish colonization history. We used paleolimnological techniques to study the fish colonization history of a pond at the Science Museum of Minnesota's Warner Nature Center. This particular pond is of interest, because a breeding population of rare species of dragonfly, *Rhionaeschna mutata* (Spatterdock darner), was recently discovered there [see poster by Elise Linna for more information]. Similar to *C. americanus*, *R. mutata* do not coexist with fish. We collected a sediment core from the center of the pond and examined the deepest sections of the core to infer historic conditions. We searched for *C. americanus* mandibles in small aliquots of deflocculated sediment under a stereoscope at 50x magnification. Mandibles were mounted on slides using DPX mounting media and identified to species using a taxonomic key. Several *C. americanus* mandibles were present, indicating that this pond was likely historically fishless. A recent discovery of fish in this historically fishless pond indicates that there has been a shift in the natural foodweb, which may affect the ability of *R. mutata* to persist in this habitat.

Kelsey Merck
Dr. Nidanie Henderson-Stull
Biology
Site-Selective Tagging of the Cellular Sarcoma Protein

This research project is focused on creating a novel internal site for tagging the cellularSrc (c-Src) protein without disrupting its function. We hypothesized that c-Src could tolerate a six amino acid insertion in its SH3 domain as the functional neuronal isoform of the protein, n-Src, contains a six amino acid flexible loop insert in its SH3 domain. We designed mutagenic primers to insert DNA sequences encoding either the n-Src loop or a tetracysteine amino acid tag at the site of the n-Src insert in c-Src. The first amplification step of the *c-src* gene with mutagenic primers encoding the n-src loop sequence yielded fragments of appropriate size, which are subsequently being used to create the final product via overlap extension PCR. PCR conditions are still being optimized for the introduction of the gene sequence encoding thetetracysteine tag. The n-Src loop insert will serve as a control for Src function in our *in vivo* assays and the tetracysteine tag will allow visualization of c-Src protein in normal and cancerous cells.

Aisha Mohamed and Anthony Jenks
Dr. Nidanie Henderson-Stull

Biology
Tagging the BCR protein with GST

Chromosomes occasionally break preferentially at sites throughout the genome called breakpoints. A series of at least six breakpoints on chromosome 22 cluster within one gene called the breakpoint cluster region (BCR). Normally these breaks are harmless because the chromosome can reattach before DNA replication and cell division. Occasionally, a breakage on chromosome 22 coincides with breakage at the ABL gene on chromosome 9. When this occurs it is possible for the fragment from each chromosome to reattach to the wrong chromosome. The BCR gene has three specific breakpoints which can yield 3 different Bcr-Abl protein products, which induce three blood cancers of different blood cell lineages (1) .We hypothesize that Bcr may have a role in hematopoietic differentiation. To understand the role of Bcr in blood cell differentiation, we seek to sub clone, express, purify and study the structure and function of the fragment of BCR that leads to lymphoid cancers. However our protein has been insoluble when prepared alone. GST, a highly soluble protein, is sometimes added to insoluble proteins to make them soluble. We are shifting to a GST vector and varying our constructs to achieve soluble expression and affinity purification of the protein. We will sub clone and express the oligomerization and kinase domain fragment (1-413), the kinase domain (162-413) and full length BCR in the GST containing pGEX-6p-1 vector. We are currently at the sub-cloning stage and have successfully amplified all three constructs of the BCR gene. However the digestion, ligation and transformation reactions have not yielded significant results.

Chau Nguyen
Dr. Bernard Walley
Economics
Monetary Policy Shocks in Emerging Economies: Brazil – A VAR Approach

This research studies the effects of monetary policy shocks on domestic economic activity in emerging countries, with a special focus on Brazil from 1996 Q1 –2014 Q4. Using the structural vector auto regression (VAR) method, we investigated the dynamic behavior of aggregate economic activity in response to shocks to US interest rate, country interest rate, and depreciation rate. We also use variance decomposition to study how much of the innovations in domestic economic variables is explained by monetary policy shocks. The key findings of this paper are as follows: (1) In response to a positive shock to US interest rates, inflation rates rise sharply first then experience a steady decrease, and this behavior is similar to how inflation rates react to a positive shock to country interest rates; (2) As country interest rates increase, output decreases; (3) As country interest rates increase, trade balance decreases slightly in the period of impact, and then gradually increases; (4) Country interest rate shocks explain about 50 percent of the changes in output; (5) US interest rate shocks explain about only 1 percent of movements in aggregate activities; (6) Country spreads explain about 14 percent of trade balance.

Cuong Nguyen
Dr. Brian Rood
Psychology
A comparison of transgender and cisgender medical health to examine significant differences

According to Ilan Meyer's Minority Stress Model, individuals with a minority identity (e.g., person of color, sexual minority), compared with individuals with a majority identity, tend to experience higher levels of stress. These stressors could include discrimination, internalized stigma, and identity concealment. Of the limited research available, transgender individuals consistently report weighted levels of stress. Therefore, it is critical to understand how their stress levels might contribute to health problems. Yet, no population-based data exist specific to transgender health. Thus, we examined the health of transgender individuals compared to cisgender (i.e., non-transgender) individuals who received medical services at a community health center in St. Paul, Minnesota. We examined existing medical records, which included a total sample of 6,216 medical patients, with a sub-sample of 149 transgender patients. When comparing between transgender and cisgender groups, the data analysis revealed significant health differences in

the following areas: (1) personal medical history, (2) general health, and (3) sexual health and family planning. The findings suggest that there is a need for health interventions as a way to address health disparities in the transgender community. Additionally, Meyer's model suggests that coping and social support play a vital role in mitigating the stress associated with a minority identity. Therefore, we suggest health providers promote and strengthen functional copings skills and provide necessary support resources (e.g., referrals to transgender-specific services). Critically, our study shows that there is a need for more research on transgender health given the general lack of published data.

Thu Ha Nguyen
Dr. Vivian Feng
Chemistry
Method Development in Assessing DNA Damage in Model Bacterium by Engineered Nanoparticles

In the wake of significant development in and industrial applications of nanotechonology, the production of engineered nanoparticles continues to grow. The process of nanoparticle fabrication, and disposal inevitably lead to potential exposure material to the environmentally important bacterial species. B. subtilis is a Gram-positive environmental friendly bacterial that is found in soil and human gastrointestinal tract. Potential DNA damage of B. subtilis induced by cation gold nanoparticles (AuNPs) with different surface stabilizes was assessed using the Single Cell Electrophoresis method (a.k.a the Comet Assay). The Comet assay is a fast-yet-sensitive method to examine DNA damage has been applied to mammalian cells extensively, but has rarely been used to facilitate research on bacterial, especially in the field on nanotoxicology. With appropriate modification and adaptation to the assay, the results have revealed that the cationic polymer coating used to stabilize the AuNPs led to significant DNA damage to B. subtilis.

Ryan Nichols
Dr. John Schmit
English
Indelible Shadows: Perception, Time, and Meaning in Watchmen

A look at how graphic novels use multimodal strategies to provide a variety of complex avenues for meaning making. Alan Moore and Dave Gibbons's Watchmen is examined for its use of visual motifs, intertextual references, and self reflection to involve its readers in a conversation about the limits of human perception in regards to time and meaning. In particular, the "Hiroshima Lovers" motif, a series of silhouette images of two people embracing, is analyzed to reveal how intertexts and visual motifs divert the reader's attention to earlier points on the narrative timeline in order to prompt the creation of new interpretations. Further, the motif is used as an example of Watchmen's self reflexive form in which characters engage in a meaning making process which mirrors that of the reader.

Nancy Oretga
Dr. Laura Boisen and Dr. Lois Bosch
Social Work
An Analysis of How Dual Relationships are Manifested with Latino Clients

In the United States, social workers and other social service providers are expected to maintain strict professional boundaries in their professional practice with clients to avoid the risk of exploitation and potential harm to the client [National Association of Social Workers Standard 1.06 (c), 2008]. However, according to recent studies on culturally responsive practice, forming some dual relationships may be beneficial towards the therapeutic relationship with clients (Cottone, 2010; Lazarus, 2002; Nguyen, 2007; Reamer, 2014). The purpose of the present work is to investigate this claim specifically focused on exploring dual relationships with Latino clients and social service providers. Using focus group methodology, 16 social service professionals were interviewed. In addition to the focus groups, a written survey containing 25 questions was used to measure the risk that specific dual relationships pose to

either the client or the worker. Following completion of the survey, seven discussion questions were asked to initiate a discussion on dual relationships with Latino clients. It was found that most practitioners abide by strict ethical standards when addressing most dual relationships but are flexible in situations in which they are faced with unavoidable/circumstantial dual relationships and when they are presented with small gifts as a gesture of gratitude.

Oscar Martinez-Armenta
Dr. Vivian Feng
Chemistry
Toxicity Assessment of Nanoparticles in Lithium-based Battery Materials to Model Bacterium

Nickel manganese cobalt oxide (NMC) constitutes a family of lithium compounds with the composition. NMC nanoparticles are employed as cathode materials for rechargeable lithium-ion batteries due to high battery performance at reduced cost. With rapid commercialization of NMC and ineffective recycling strategies for lithium-ion batteries, there is concern about the environmental impact of NMC release and exposure. To address this concern, we investigate interactions between model NMC material with Bacillus subtilis, a gram-positive, environmentally beneficial soil bacterium via a high throughput microplate reader analysis assay and respirometry. The toxicity mechanism to this bacterium through ion dissolution of NMC is tested and compared to prior experiments with Shewanella oneidensis, another environmentally relevant model bacterium.

Riley Parham
Darcey Engen, M.F.A.
Theater
Nam et Cum (For and With) Theatre

I conducted my research first hand, working on and performing in Sod House Theater's summer tour of The Hoopla Train, a lively vaudevillian piece devised to not only entertain, but unify its audience. Early in the rehearsal process, a reporter interviewed our cast about the production and referred to the piece as "community theatre." Darcey Engen, Co-Artistic Director of Sod House, explained The Hoopla Train was something different altogether. This interaction sparked my interest to explore in what genre this production truly belonged. While traveling to many historically significant ballrooms on our five week, 23 show tour, I paid specific attention to how our audiences responded and became involved. Ultimately, I determined that while having some similarities with community theatre, The Hoopla Train joins a new style of theatre that I am calling Nam et Cum, which is Latin for "For and With." My research will illustrate both the clear and subtle differentiating factors between community theatre and Nam et Cum theatre.

Ali Plieseis
Dr. Michael Wentzel
Chemistry
Benzylic Amide formation via a heterogeneous catalyzed continuous flow reactor

Amides are an essential part of the human body as they are the key chemical connections of proteins. They are also widely used in synthetic applications and are present in a substantial amount of pharmaceutical drugs. The current method for amide formation is incredibly general, but comes with challenges of temperature control, lack of scalability, and waste generation. To avoid these obstacles, a heterogeneous catalyzed continuous flow reactor was used for amide synthesis in an efficient and cost effective manner. Derivatives of phenylacetonitrile and various amines were used in an equivalence of 1 to 8 in order to synthesize the highest yield of product. This appealing process for the formation of amide bonds is useful for the development of new pharmaceutical drugs.

Casey Regnier
Dr. Nancy Steblay
Psychology
Witness Description and Lineup Bias

Eyewitness scientists have produced recommendations for police lineup practice to reduce the likelihood of eyewitness identification error. For example, police identification procedures begin with the creation of a six-member lineup consisting of one suspect and five fillers (known innocents). To meet requirements for a fair lineup, each lineup member must match the eyewitness's description of the culprit. This study explores the relationship between the witness's description and subsequent lineup fairness, using eyewitness descriptions and photo lineups from a previous field study of real eyewitnesses to crimes by the American Judicature Society. Two variables are examined. First, eyewitness descriptions of the culprit were coded for distinctiveness. Second, lineup fairness measures were obtained from mock-witness laboratory tests in a related study. The most direct measure of lineup fairness is the proportion of suspect identifications made by laboratory mock witnesses (who did not see the crime): suspect identification rate for a fair lineup would be 16% (1/6 lineup members). Preliminary analysis of 82 lineups indicates that more distinctive eyewitness descriptions are associated with significantly higher levels of lineup bias (29% suspect IDs) than less distinctive descriptions (16% suspect IDs), $t(80) = 3.50$, $p = .001$, $d = .80$.

Hannah Ross
Dr. Ben Denkinger
Psychology
The Influence of Motivation on Attention to Temporal Feedback

This experiment was designed to explore the effects of external motivation and temporal feedback on task performance. Utilizing a 2 x 2 between-subject design participants were assigned to one of four conditions. The motivation condition was manipulated by telling participants before the start of a visual search task that they either had a chance to win a monetary prize or no further external motivation was offered. The timer condition was manipulated by either presenting participants a meaningful timer or a random display of numbers. All participants underwent 11 visual search tasks during which they were presented one of the two timers. Data on the number of objects correctly identified and average length spent looking at the timer was collected. Results showed that those who were given a random timer correctly identified significantly more objects than those given a meaningful timer. The type of timer presented had no significant effect on the average length of time spent looking at the timer. There was no significant main effect for motivation on either the number of correct object identifications or average length of time spent looking at the timer.

Ryan Gilmer
Dr. Bernard Walley
Economics/Math
Monetary Policy in Advanced Economies and the Influence of Short-Term Interest Rates on Inflation Targeting

This paper reviews recent conduct on monetary policy and central banks' interest rate setting behavior in advanced economies. An open economy reaction function is used to test whether central banks short-term interest will affect the overall inflation targeting policy of the economy. This reaction function is based on the year-by-year inflation rate, output gap, the real effective exchange rate, the real effective exchange rate of the previous year, and short-term interest of the previous year. Overtime the decreasing short-term interest rate benefits economic activity within advanced economies can help: spur business spending on capital goods, household expenditures, and improve lending of financial institutions. Analysis indicates of advanced economies, the modified Taylor Rule represents a larger variance then the original model. In most economies output gap seems to hold significance proving its relevance to economic policy, while the volatility in exchange rates causes an inverse relationship with short-term interest suggesting stabilization to be feasible in the long run.

Mohamed Nazih Safi
Dr. John Zobitz
Mathematics
Classifying Ecosystems Using the Gini Index

The Gini Coefficient is a measure used in economics for evaluating the equitability of a resource distribution. This project applied the Gini Coefficient as a classification method within different environmental observation data in relation to environmental variables. We applied the Gini Coefficient on fluxes between plants' photosynthetic process and respiration. We graphed the flux distributions relative to their daily flux values and calculated the Gini Coefficient across a growing season. By analyzing the data in this manner we can compare inter-annual variability of a Gini Coefficient. Additional comparisons included calculating the Gini Coefficient for carbon intake and carbon respiration when sorting respective fluxes according to environmental variables such as incoming sunlight, moisture stress, and temperature. Beyond calculation of the Gini Coefficient, we calculated the percentage of the growing season that occurs at the median of the cumulative productivity or the cumulative respiration. The Gini Coefficient and the midpoint value provide knowledge about the ecosystem's flux distribution during the growing season. For this site there is an inequitable distribution of carbon uptake or release within the growing season. Future work will extend this analysis to additional sites from ecosystem databases, thereby having the Gini Coefficient as a classification method for ecosystem flux distribution.

Savannah Seeger
Dr. Jennifer Bankers-Fulbright
Biology
The Effects of Human Airway Secretions on Pseudomonas aeruginosa Biofilm Formations

Background: Pseudomonas aeruginosa causes severe disease in patients with cystic fibrosis (CF), though it rarely causes airway disease in people without CF. The formation of a bacterial biofilm in the CF lung is likely an initial step in colonization and, once formed, the biofilm would largely protect P. aeruginosa from immune clearance and antibiotic treatment. Human lung secretions typically contain substantial antimicrobial activities, though these are often not present or reduced in CF lung secretions. We hypothesized that non-CF airway secretions would inhibit and/or that CF-airway secretions would promote P. aeruginosa biofilm formation in vitro. Methods: The PAO1 strain of P. aeruginosa was allowed to form biofilms in the presence or absence of apical secretions from wild-type or CF-like Calu-3 cells. Biofilm formation was quantitated using crystal violet staining of the biofilm and measurement of OD in a plate reader. Results: We established a robust, static biofilm assay using PAO1. Addition of wild-type (non-CF) Calu-3 secretions to the bacteria significantly inhibited biofilm formation compared to controls. Conclusions: Wild-type (non-CF) airway secretions inhibit PAO1 static biofilm formation and preliminary findings suggest this inhibition is likely due to a protein or proteins present in the secretion.

Markus Singh
Dr. Ann Impullitti
Biology
Use of Endophytic Fungal Metabolites to Reduce Growth of the Soybean Pathogen Fusarium virguliforme

Soybeans [*Glycine max* (L.) Merr] grown in the United States are used to manufacture many different soy- based products around the world. However, many soybeans are damaged by *Fusarium virguliforme*, which cause Sudden Death Syndrome. One potential way of addressing the problem of diseased soybeans is to use endophytes as a means of biological control. Therefore, we investigated the use of endophytic fungal metabolites to reduce pathogenic growth of *F. virguliforme* in soybeans. We grew 23 native Minnesota fungal endophytes in potato dextrose broth (PBD). After 7 days, the fungal mass was removed by vacuum filtration, and the remaining fungal broth was used to make concentrations of 10%

and 20% (v/v) metabolite plates in order to determine if growth of *F. virguliforme* was reduced. The results suggest that 20% of the fungal metabolites from MN endophytes reduced growth of both pathogens. If effective when directly applied to plants, then soybean growers could then use these fungal metabolites as an alternative to chemical pesticides.

Alex Sushko
Dr. Ben Stottrup
Biophysics
Testing and expanding the functionality of the new Kibron Langmuir Trough

The intricate study of nanoparticles and lipid monolayers has fascinated many biophysicists in recent years, and continues to be a highlight of study in biophysics and materials science. This summer, my coworker and I are working to better understand the features of the Kibron Langmuir Trough, as well as to design a system where we can closely monitor and control the water level in the trough after depositing materials onto the surface. We will be testing the new software that came with the Kibron Langmuir trough and will observe how well the trough can produce consistent and reliable results in a set of several small experiments. In addition, we will use a PID controller system (through LabView) to designate directions to miniature pumps that will monitor the water level at the trough's surface. After all the setup is complete, we will most likely test our system to see if our data from the experiments proves to be more accurate and contains a better set of reliable data.

Nick Talmo
Dr. Ann Impullitti
Biology
Impact of Fungicides on Fungal Endophytes of Soybean

Fungal pathogens of soybeans cause an estimated 3.58 million acres in crop loss each year in the United States. Fungicides are applied to seeds prior to planting to inhibit the growth of these fungal pathogens, however the impact of fungicides on the non-pathogenic fungal community within soybeans is unknown. Soybean stems from two varieties of soybeans that were treated with fungicides or non-treated were collected at the V1 and V4 growth stages, surface sterilized and used for culture dependent (CD) and culture independent (CI) analysis. For the CD analysis, cross sections from above and below the soil line plated onto acidified MEA to produce fungal cultures for DNA extraction and identification. For CI analysis, DNA was extracted from tissue samples, DNA amplified using fungal specific primers (ITS1F and ITS4), and then sequenced. Fungal morphotypes were separated by color, hyphal growth pattern and rate of growth and preliminary results from CD analysis indicate that 30 morphotypes were identified. Currently we are amplifying the fungal DNA from the soybean tissue using the fungal specific primers ITS1F and ITS4 in order to sequence and identify fungal species. Once fungi are identified and impacts are assessed, knowledge of this diverse community can be used to study endophyte interactions, further increasing crop yields and sustainable agriculture.

Kaitlyn Terrio
Dr. Jennifer Bankers-Fulbright
Biology
Identifying the Protein(s) in Lung Secretions that Inhibit P. aeruginosa Swimming Motility

Background: In human lung secretions there are many anti-microbial proteins that help prevent bacterial colonization. However, lung secretions from patients with cystic fibrosis (CF) show reductions in antimicrobial activity. Previous studies in our lab demonstrated that wild-type, but not CF-like, airway secretions inhibited P. aeruginosa swimming motility in vitro. P. aeruginosa is the leading cause of death in CF and its swimming motility is associated with increased virulence. Subsequent preliminary experiments suggested that this inhibition is mediated by a protein between 50 and 250 kDa in size. The goal of this research is to identify the protein(s) responsible for inhibition P. aeruginosa swimming motility

which is active in non-CF airway secretions but is less active or inactive in CF-like airway secretions. Methods: Swimming of the P. aeruginosa PA14 strain was quantitated using microscopic and computer analysis. Apical secretions from Calu-3 cells (wild-type) grown in air-interface monolayers were collected in PBS and used to pre-treat PA14 cultures before and during swimming analysis. Size-exclusion spin columns and gel electrophoresis were used to separate proteins in wild-type apical secretions for analysis and use in the swimming assay. Results: Boiling and fractionation of wild-type secretions removed the inhibition activity in wild-type secretions. Gel electrophoresis of both wild-type Calu-3 secretions showed multiple protein bands between 50 and 250 kDa. Conclusions: Comparison of gel electrophoresis results with the published proteome of apical airway secretions limits the potential candidates present in wild-type Calu-3 secretions to less than 15 known proteins, some with known or suspected anti-microbial activity.

Juan Tigre Lazo
Dr. Sarah Veatch
Biophysics
Fast Spatiotemporal Image Correlation Spectroscopy Utilizing Photoactivatable Fluorescent Proteins

The mammalian cell plasma membrane forms the boundary between the cell and the outside world. All information passes between the cell and its external environment through processes such as receptor signaling, exocytosis, and endocytosis. The diffusion of fluorescently labeled proteins within the plasma membrane can reveal important physical parameters about the membrane, such as viscosity and composition, as well as the density of cytoskeleton anchoring points that a protein experiences while diffusing in the plasma membrane. To measure how diffusion responds to very small structures in the plasma membrane, such as cytoskeleton pinning sites and compositional fluctuations, it is necessary to achieve framerates on the sub-millisecond timescale and nanometer length scale. This experimental regime is problematic due to the small amount of fluorescent signal obtained with these camera integration times which prevent traditional particle localization methods. Here, we utilize fast spatio-temporal image correlation of transiently expressed lipid anchored PALM probes to measure the diffusion of membrane anchored proteins on the millisecond timescale with step-sizes around 50 nm. Analytical considerations for working with data-sets with incomplete sampling in both time and space will be discussed. With this approach, we compare the diffusion of several minimal plasma membrane anchored peptides in order to quantify how anchor structure impacts protein mobility on over a range of time and distance -scales.

Miles Turk
Dr. Michael Wentzel
Chemistry
Synthesis of Amides from Aniline Derivatives with a Continuous Flow Reactor

Aniline derivatives were used to synthesis Amides using a TiO2 catalyzed continuous flow reactor. This is a continuation of research where temperature, flow rate and stoichiometry were varied to produce optimal reaction conditions. Those conditions being 200 C, a 0.25 ml/min flow rate and a 1:8:1:4 (aniline:nitrile:H2O:THF) molar ratio. In efforts to obtain higher yields of amides collection time and size of column in the reactor were varied. By varying these conditions, optimal collection time was found collecting product for 1hr and 54min. A 5 micron fritted column consistently gave higher yields. The 2 micron fritted column was less consistent in obtaining high yields and more prone to clogging.

Joaquin Vences
Dr. Michael Wentzel
Chemistry
A Silane Protecting Group for Primary Amines

More than ever the pharmaceutical industry has invested a great deal of time and money for more efficient and environmental friendly syntheses. Tri-tert butoxy chlorosilane (TBOS) is able to mono-protect primary amines and has the potential to allow for the mono-alkylation of amines. In this research, we investigated the synthesis of TBOS to a variety of anilines. Various aniline derivatives were explored to either change the sterics or the electron properties of the compounds. Reaction progress and final structure elucidation were determined by GC/MS and 1H-NMR analysis respectively.

Amal Warsame
Dr. Andrew Aoki
Political Science
An Analysis of the Effect of the Model Minority Stereotype on Public Policy

In the 1960's, as the United States confronted questions surrounding race and civil rights, a New York Times Magazine article drew attention to the idea of Japanese Americans as a model minority. This stereotype has expanded over the years to include other Asian Americans, suggesting that they have achieved success on their own merit, through hard work, education, and are a model for other minority groups to follow. This concept has helped lead to the disqualification of Asian Americans for federal programs. The primary goal of my analysis was to examine the workings of the model minority concept in public programs such as McNair, and some of the National Science Foundation programs. I examined public comment and other documents dealing with the negotiated rule making for the implementation of the McNair program, as well as program rules for McNair and several NSF programs. For McNair, I examined public comments on the negotiated rule making for the 1986 and 2008 re-authorization of the Higher Education Act of 1965. Asian Americans are excluded from many programs such as McNair, and a few run by the National Science foundation. I looked closely at who is considered to be "underrepresented" While Pacific Islanders were added to the list of those considered to be underrepresented in graduate school, Asian Americans continue to be excluded from the list. This seems to reflect the lumping of all Asians in the model minority stereotype, despite huge differences between Asian American subgroups. In future re-authorization of the Higher Education Act, the "Asian American" category should be examined more closely.

Devin Wiggs
Dr. James Vela-McConnell
Sociology
The Sex Scandal of the Catholic Church: A Stigmatized Structure

Beyond micro or interactional analysis, stigma's applicability to an organization has been underrepresented and largely unexplored. This paper examines the stigmatization of the Catholic Church from the sex scandal that persisted through the early millennia to examine the process by which an organization becomes stigmatized. Beginning in 2002, media sources framed the Catholic Church as having a "culture of secrecy" and a clerical structure that enabled child abuse — one where "Irresponsible Bishops" covered up the abuse of "Pedophile Priests." Using a content analysis of 200 media publications, this paper asserts: 1) An organization's hierarchal structure can be specifically stigmatized; 2) hierarchal roles that have a stigma label attached to them are imperative for an organizational structural stigma to accrue; 3) an organization moves from a "discreditable" to "discredited" label if its structure is stigmatized; and 4) Goffman's reference to "abominations of the body" can be theoretically extended to reflect an organizational stigma based on organizational structure.

Zhou Yang
Dr. Stella Hofrenning
Economics
School Choice Decisions: Public Schools versus Private Schools

American education at the elementary and secondary levels is dominated by the tax-supported public

school system. Yet, there is a private school sector that requires tuition payments by students and receives no direct public financial support. Over the past decade, there seems to be a decline in private school enrollment but an increase in homeschooling and charter school enrollment. This paper analyses the choice of public versus private schooling. The model is estimated using data from the American Community Survey 2013 on school age children, augmented by data on private school tuition and an algorithm for identifying religion. The analysis reveals a significant negative price effect and positive income effect. Important effects of religion, parental education, and region also emerge from the analysis. The significant price effect indicates that educational vouchers and tuition tax credits would expand educational opportunities and increase enrollment in private schools.