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April 23, 2021

ReCS 2021 in Canvas

8:50 a.m.-1:00 p.m.

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# **UNDERGRADUATE STUDENT ABSTRACTS**

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## UNDERGRADUATE POSTER PRESENTATION ABSTRACTS

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### Poster Session A 8:50 am – 9:45 am

#### **AAP.U.1 Legacy Mercury Contamination in Soils as a Tracer of Historic Fur-Trade Activity in the Great Lakes Region**

Reece Banta

Mentor: Kristofer Rolfhus, Chemistry & Biochemistry

Mercury (Hg) is an environmental pollutant and potent neurotoxin. Previous studies (2016, 2019) have indicated toxic levels of Hg contamination in soils at Grand Portage National Monument, MN (GRPO). It's believed the contamination is linked to vermillion, a mercury-bearing cinnabar-ore, and a trading item used by French Voyageurs in the 1700-1800s. Soil samples were again collected from trade depots, Forts Charlotte and XY, in September 2019. Samples were analyzed at UW-L via thermal decomposition/atomic absorption spectroscopy for total mercury concentration. Results produced a more thorough concentration map of the sites, the highest samples over 100-fold greater in concentration than regional background soils. Stable isotopes will be employed to confirm whether these high levels of contamination are connected to the vermillion-ore residue. Combustion studies were conducted on the September 2019 samples to determine how controlled burns would affect Hg in such contaminated soils. Samples were placed in the muffle furnace at 250°C and 500°C for periods of 1, 3, and 5 hours. Initial results indicated significant loss in Hg concentration (up to 99.999%) in contaminated soils at these temperatures. All results will be made available to GRPO staff to help determine how best to protect native populations and visitors from contamination.

#### **AAP.U.2 Effect of Exosomes on Differentiation in Exercising vs Non-exercising Participants**

Anna Buss and Jennifer Klein

Mentors: Jennifer Klein, Biology; and Daniel Freidenreich, Exercise & Sport Science

Exosomes are vesicles secreted by cells that contain small amounts of genetic material called microRNAs (miRNAs) that can regulate cell processes. We intend to determine the effects of exosomes on muscle cell differentiation from myoblasts to myotubes, which fuse with muscle fibers to repair damage. We will measure this by isolating muscle exosomes from regularly exercising people and non-exercising people. We hypothesize that exosomes from exercising people will contain miRNAs that increase muscle cell differentiation, while exosomes from non-exercising people will contain miRNAs that have no effect on differentiation. We will apply the two groups of exosomes to mouse myoblasts, which are muscle cells that have not yet fused into myotubes. We will observe the cells before, during, and after differentiation using cell proliferation (growth) assays and immunofluorescence microscopy. Finally, we will determine the level of expression of genes that are very important for muscle differentiation using quantitative PCR, which measures the level of mRNA. This work is crucial in determining what kinds of signals muscle cells receive to regulate their regeneration after damage. Determining the effects of exercising versus non-exercising peoples' exosomes will facilitate treatments for muscle injury and aging.

#### **AAP.U.3 Investigating Quantal Differences of Perineuronal Nets Surrounding the Hypothalamus between Hyperphagic and Hypophagic Hibernating Ground Squirrels**

John Butrum

Mentor: Christine Schwartz, Biology

The ground squirrel experiences extreme changes in physiology during and in preparation for hibernation. Preliminary data showed that plasticity-restricting perineuronal nets (PNN) surround neurons in the cerebral cortex and hypothalamus in the thirteen-lined ground squirrel. Previous work indicates that there was a seasonal difference in the PNN coverage in the paraventricular nucleus of the hypothalamus (PVN) when comparing summer (non-hibernating) and hibernating ground squirrels. Here, we quantified PNN expression in the PVN of the hypothalamus over the fall transition, specifically comparing hyperphagic ground squirrels (eating a lot, not hibernation ready) to hypophagic ground squirrels (reduced feeding, hibernation ready), finding that PNN coverage is significantly increased in hypophagic animals compared to hyperphagic animals ( $P < 0.05$ ). We also verified that PNNs do not surround parvalbumin expressing neurons in the PVN like they do in the cerebral cortex. The PVN is involved in a lot of important functions for hibernation, including things like food intake and control over the autonomic nervous system

through connections to the brain stem. This work shows that PNN coverage changes during the fall transition, suggesting that this change is important for hibernation readiness.

#### **AAP.U.4 Investigating the Potential of Infrared Remote Sensing in Archaeological Survey**

Cody Dobson

Mentors: Constance Arzigian, Archaeology & Anthropology; and Niti Mishra, Geography & Earth Science

Archaeological walking survey continues its prominent use in data collection and public outreach to this very day. Although it is continuously used, limitations arise due to its reliance on participants' physical ability and their prowess for seeing and recognizing archaeological remains. Unmanned aerial vehicle remote sensing, commonly known as drone photography, has the ability to maintain the practice of volunteers while expanding site identification accuracy, range, and efficiency. In creating spectral curves, which show an object's reflectance of light at different light wavelengths, for fire-cracked dolomite, we attempt to find a common semi-homogeneous archeological remain that can be used to identify it through unmanned aerial vehicle remote sensing. If these curves are statistically different from dolomite, fire-cracked dolomite may very well be a means of identifying archaeological sites in the Midwest and beyond. The underlying objective is to develop a 95% confidence interval for the wavelengths of diagnostic light absorption of fire-cracked dolomite. The definition of these wavelengths offers surveyors wavelengths they can then use to image and identify fire-cracked dolomite in a laboratory setting. Statistically different signatures would allow surveyors features useable in the identification of sites more likely marked by human manipulation of fire, instead of displaced dolomite.

#### **AAP.U.5 Synthesis of Manganese Dioxide via Electrodeposition for Use in Primary Alkaline Batteries**

Evan Draxler

Co-authors: Samuel Rasmussen, Lee Fuller, Seth King, and Sujat Sen

Mentor: Sujat Sen, Chemistry & Biochemistry

Manganese dioxide ( $MnO_2$ ) is a promising material for use as cathode in low-cost aqueous batteries due to its high theoretical capacity of 308 mAh/g during a typical charge-discharge process.  $MnO_2$  can exist in many different crystal structures or phases known as polymorphs. However, one of the six commonly occurring polymorphs, Akhtenskite ( $\epsilon$ - $MnO_2$ ), has shown the highest experimental capacity for charge-discharge in the literature. Furthermore, the particles of  $MnO_2$  can adopt various shapes based on how they were synthesized, which has also been shown to effect resulting capacity. Manganese dioxide particles of less than 1 micron size can be synthesized in several ways, two of which we have focused on are (i) chemical oxidation-precipitation reaction and (ii) electrodeposition. Initial efforts with chemical synthesis have successfully yielded  $MnO_2$  with a particle size of less than 500 nm and plate or flower-type morphology, but with a low experimental capacity of <100 mAh/g. Our recent efforts of using electrochemical methods to deposit  $MnO_2$  have shown more promising results, which will be discussed further. We report on the structure and morphology of  $MnO_2$  assessed via X-ray diffraction studies (XRD) and electron microscopy (SEM), as well as the electrochemical capacity.

#### **AAP.U.6 Use of Regenerable Water Trap Sources in Synthesis of Curcumin**

Kyle Faivre

Co-author: Valeria Stepanova

Mentor: Valeria Stepanova, Chemistry & Biochemistry

Curcumin has demonstrated a plethora of medicinal applications that range from inhibition of viruses and bacteria to anticancer properties. The curcumin can be obtained from plants by extraction or separation processes, it is often referred as a natural curcumin. Unfortunately, the natural curcumin is isolated from the roots of the *Curcuma Longa* plant as a mixture of at least two more compounds with structures similar to that of curcumin and known as curcuminoids. For reproducible biological performance pure samples of curcumin of known composition are necessary. Separation of a natural extract using high-performance liquid chromatography produces high purity curcumin but a high cost. The alternative approach is synthesis of curcumin offers a solution to the purity problem and allows a route to obtain structural modifications of compounds. The first practical synthesis of curcumin developed in 1960 requires use of up to five additional organic compounds that each serve a role in the synthesis but are not part of the product structure. For industrial large-scale production generation of substantial hazardous organic waste is not desirable. In this study I have explored a possibility of substituting an organic compound used as nonenvironmentally friendly water

scavenger in curcumin synthesis with a renewable inorganic substitute. I present my work on transitioning of the procedure and my preliminary findings on the synthesis of curcumin and curcuminoids.

#### **AAP.U.7 Temperature Sensitive 13-lined Ground Squirrel Platelet Conformation Reduces Blood Clot Formation**

Sierra Furger, Erika Monson, Joe Bolduc, and McKenzie Nisius

Mentor: Scott Cooper, Biology

Platelets are small cells in the blood that can trigger blood clotting. Normally, storage in the cold damages human platelets. Hibernating 13-lined ground squirrels (*Ictidomys tridecemlineatus*) are unique in the sense that their platelets adopt two different conformations: discoid and rod shaped and are resistant to cold storage. The squirrels' platelets are locked in the rod conformation during their six-month hibernation period, due to cold temperatures and hyperpolymerization of microtubules. The rod conformation prevents the formation of blood clots. Our research investigated the effects of temperate, cold storage specifically, on squirrel and human platelets to better understand what role the rod conformation of squirrel platelets has on long term storage, and how this conformation could be applied to human platelets for blood transfusions. Our assay was designed to study the effects of temperature on platelet activation, when cold platelets transition from the rod to discoid conformation. Some platelets were treated with ADP to induce activation, and some samples were treated with taxol to lock them into the inactive rod conformation. Samples were treated with fluorescent fibrinogen and activation was determined via flow cytometer, which detected mean fluorescence. Trends in our data indicate that platelet activation increases in response to increased temperature following cold storage and the addition of ADP in squirrel and human platelet samples.

#### **AAP.U.8 “Less Fun and Happiness”: Student Perceptions of the Pandemic College Experience**

Taylor Halvensleben, Alyxandra Holvick, and Ellen Rozek

Mentor: Ellen Rozek, Psychology

Social interactions and academics are two main components of college. Most students look forward to meeting new people and higher-level coursework. The COVID-19 pandemic changed the typical “college experience” in many ways. New and returning students had to adjust their lives and face new challenges. In this study, undergraduate college students completed a survey about the impact the pandemic has had on their social lives and academic lives. Additionally, students compared their experiences in the fall of 2020 (prior to the pandemic) with fall of 2021 (during pandemic). We conducted a thematic analysis of their open-ended responses. Using an iterative process, themes were developed out of the responses. One global theme student reported was negative feelings about the changes to their academic and social lives. Students commonly reported increased challenges to meeting new people and engaging in social interactions. Academically, many students reported that online learning was a significant adjustment. As the pandemic continues to affect the college experience, students and the university community will need to adapt and address the student concerns highlighted in these qualitative themes.

#### **AAP.U.9 Effect of Differing Substrate on Slimy Sculpin (*Cottus cognatus*) Station Holding Endurance**

Avery Lettenberger

Mentor: David Schumann, Biology

Coldwater streams in the Driftless region of Southwestern Wisconsin are sensitive to increased inputs of fine sediments that limit the interstitial space between larger substrates that are crucial to benthic fishes. Detrimental land-use practices and climate change threaten to increase the fine sediment load of these streams through overland flow. Freshwater sculpin (*Cottus* spp.) are adapted to minimize energetic demands maintaining position in flowing water by anchoring into large substrates that can be completely embedded with increased fine sediment inputs. We describe the influence of embedded fine sediments in coldwater streams on the swimming and station-holding abilities of Slimy Sculpin (*Cottus cognatus*). Slimy Sculpin swimming performance was measured in a 10-L Brett-type flume using failure time using an endurance protocol that measures time-to-failure. An experimental pool of sculpin ( $n = 70$ ) were tested on unembedded gravel (Mean Gravel Diameter =  $8.3 \pm 2.4$  mm,  $n = 100$ ) and gravel fully embedded by fine-sand using an endurance protocol at seven velocity increments (i.e., 5, 10, 15, 20, 25, 30, 40  $\text{cm s}^{-1}$ ). Failure time was recorded when the sculpin became impinged on the downflow grate for  $>10$  s with a maximum time of 200 min and no longer respond to a physical stimulus. It is assumed that once the 200 min maximum is reached that the fish can sustain its position at this velocity indefinitely. The endurance curve for this species ( $y = -0.0258x + 2.3121$ ) in the unembedded gravel trials suggests that increasing velocity has little impact station holding ability. From the equation of the trendline, endurance at  $35 \text{ cm s}^{-1}$  is projected to be 25.7 min for the gravel test group. Endurance for Pallid Sturgeon  $>115$  mm without gravel

substrate has been found to be 9.7 min ( $y=-0.059+3.052$ ) in swimming endurance trials (Hoover et al. 2005). Embedded substrate trials are still ongoing and will be completed and analyzed in March 2021. Slimy Sculpin in the region are already under stressors as result of a climate change and are preyed on by non-native Brown Trout (*Salmo trutta*) that are well researched. However, research focused on the risk of sedimentation on sculpin energetics are rare despite the potential negative population level effects. The distribution of Slimy Sculpin could be influenced by the landscape changes that alter sedimentation rates.

#### **AAP.U.10 Optimization of Bacteriocin Production in *Carnobacterium* LV66**

Kaylan Marshall

Mentor: Bonnie Bratina, Microbiology

Bacteria are required to compete for resources just like any other organism. One method some bacteria employ is the production of compounds that kill or inhibit the growth of neighboring bacteria. When produced in large quantities, these compounds called bacteriocins can be exploited for human benefit and used in food products to prevent the colonization of organisms that cause food-borne illness. *Carnobacterium* LV66 is a lactic acid bacterium that produces bacteriocins capable of inhibiting the growth of *Listeria monocytogenes*, a known food-borne pathogen. Unfortunately, the amount of bacteriocin produced is very small. To determine if a growth factor increases bacteriocin production, LV66 is grown in different conditions and its inhibitory effects against *L. monocytogenes* are measured. At this time, the effects of bacteriocin production in the presence of magnesium and manganese ions have been tested. No increase in bacteriocin production was found when LV66 was grown in media containing magnesium ions. Further testing is needed to determine the effect of manganese ions on bacteriocin production as preliminary testing has been inconclusive. The level of bacteriocin production when LV66 is cultured in the presence of *L. monocytogenes* is another growth condition to be studied. The goal of the project is to optimize bacteriocin production to a level at which it may be cost-effective for industry and applied to commercial food products.

#### **AAP.U.11 Characterizing the MicroRNA Content of Muscle Exosomes Isolated From Young and Old Human Subjects**

Emily Mauch

Mentor: Daniel Freidenreich, Exercise & Sport Science

Muscle's ability to repair and regenerate itself decreases with age. The aim of this project is to identify and compare the differences in the microRNAs (miRNAs) present in muscle exosomes of younger and older subjects. We will collect blood samples from human subjects with varying exercise patterns and age. We will also mimic the effects of oxidative stress in cell lines using hydrogen peroxide to mimic aging. To determine the components of various exosomes, we will need to isolate exosomes from human and media samples, then use qPCR to both identify and quantify miRNAs present. I hypothesize that exosomes isolated from older human subjects will have a similar miRNA profile to exosomes isolated from cultured muscle cells that have undergone mild oxidative stress. These experiments will provide valuable information on the causes of changes in muscle fibers' ability to repair and regenerate as age progresses.

#### **AAP.U.12 The Effects of Stress on Intestinal Epithelial Barrier Function**

Caroline Sargent

Mentor: Sumei Liu, Biology

The intestinal epithelium is the first line of defense for protecting the body from allergens and pathogens, while allowing the absorption of nutrients. Tight Junctions glue together the adjacent intestinal epithelial cells and contribute to the barrier function. Disruption of the intestinal barrier has been linked to irritable bowel syndrome and other intestinal issues. Stress has been known to disrupt the intestinal epithelial barrier. A common stress model is Neonatal Maternal Separation/Deprivation (NMS/ NMD). This stress increases marker permeability across the intestinal epithelium. The interleukin proteins IFN- $\gamma$  and IL-4 show an increase in mRNA expression. These proteins increase the permeability of tight junctions. Additionally, water avoidance stress (WAS) has also been found to increase intestinal permeability to markers. Corticotropin releasing factor (CRF) and urocortins (UCN1, UCN2, and UCN3) are hormones that are involved in intestinal stress-related disorders. The aim of this study is to investigate the roles of CRF and urocortins in stress-induced increases of intestinal permeability. Mice will be subjected to WAS. Ussing Chamber recording will be used to measure intestinal permeability. We predict that WAS will increase CRF and urocortin levels in the gut and that CRF receptor antagonists will block the effects of WAS on intestinal permeability.

### **AAP.U.15 How Advanced Civilizations Might Solve a Planet-Wide Lighting Problem**

Raffy Traas  
Mentor: Shauna Sallmen, Physics

For planets that always have the same face toward the star they orbit—a phenomenon called “tidal locking”—one day lasts as long as one year. Having one face in constant sunlight and the other in eternal darkness would dramatically affect the climate of a planet and render the surface uninhabitable. However, an advanced civilization could avoid this fate by launching large (1 square km area), lightweight (1000 kg) mirrors into orbit that would redirect sunlight onto the dark side of the planet. Ideally, a mirror would orbit far enough away to not crash into the planet but close enough to not be flung out of orbit. This project builds off an existing project called ‘eSims’, which uses simulations to investigate how a trajectory around an Earth-like planet habitably distant from its star varies as a function of star type, initial orbit radius, and the impact force of light on the mirror—radiation pressure. Radiation pressure effects can be neglected for most orbiting satellites but are an important factor for these large-area, low-mass mirrors. In the endeavor to allow eSims to perform simulations for one million orbits, this project implements a method enabling the periodic output of simulation data products in order to prevent data loss if the simulation code encounters errors during execution.

### **AAP.U.16 Synthetic Efforts Towards Nitrogen-Containing Curcuminoids**

Claire Trudeau  
Co-Author: Valeria Stepanova  
Mentor: Valeria Stepanova, Chemistry & Biochemistry

In recent years curcumin and compounds that are its analogous known as curcuminoids have found numerous medicinal applications. Multiple studies demonstrated the potential of these compounds to be successful inhibitors of bacteria growth and viruses, and even anticancer efficiency. The major limitation of the broad medicinal use is lipophilicity of curcumin-type compounds. Although very potent these compounds have very limited water solubility. Since water is the main solvent in cells this severely restricts the consumption of the active ingredient. This results in a decreased biological effectiveness of compounds. One of the potential solutions is modification of compounds’ structures to increase water solubility. In our study we probed an introduction of nitrogen atoms in the core structure of curcumin. Our hypothesis was that since this modification does not affect electron count of the molecule the biological potential will remain, while due the high affinity (“love”) of nitrogen to water this change will enhance water solubility of resulting compounds. Here I present my findings on synthesis of nitrogen-containing curcuminoids.

### **AAP.U.17 Childhood Adversity and Its Relationship to College Students' Quality of Life and Stress**

Melissa Vanoskey and Paige von Mende  
Mentor: Tesia Marshik, Psychology

Recently childhood trauma has become a hot topic in American society, in part because it is becoming more apparent that childhood trauma is more widespread than originally thought. Research has discovered many adverse effects of childhood trauma, trauma can stem from physical, social, emotional, sexual, verbal abuse as well as imprisonment in the family, divorce, a new child, or a new marriage. For decades researchers have been using the Adverse Childhood Experiences (ACE) survey to assess traumatic events in a child’s life. Trauma often leads to academic, social, emotional, physical, and behavioral problems that carry on into adulthood. This study looked at ACE scores and their relationship to optimism, life satisfaction, sense of purpose in life, and current stress levels. We predicted that higher ACE scores will be associated with lower optimism, lower life satisfaction, less of a sense of purpose in life, and higher stress levels. With the coronavirus (COVID-19) pandemic, we also predicted that it would have a negative impact on each of the measurements.

### **AAP.U.18 Oneota Subsistence Patterning Associated with Seasonality across Different Sites**

Jade Wahlgreen  
Mentors: Constance Arzigian, Archaeology & Anthropology; and David Andersen, Archaeology & Anthropology

The Mississippi River Valley was once home to a large Indigenous presence, namely the Oneota (1300-1625 AD). Oneota is a term given to the archaeological assemblage comprised of the ancestors of the Ioway, Otoe, and Ho-Chunk that lived in the La Crosse locality and were grouped together based on their material culture. I will be comparing three

sites: Tremaine, Pammel Creek, and the Sanford Archaeological District (Downtown La Crosse). I am specifically comparing the ratio of corn cupules to corn kernels within each site to discuss the greater implications of seasonality, how the abundance differs throughout these sites, and what it can tell me about past human activities. Different past human activities produce a different result in the archaeological record. Corn cupules are waste products, whereas corn kernels are food products, thus creating different disposal patterns. I will be taking floral data that I've collected at Tremaine, combining with other researchers' data from these sites and running statistical analyses to answer greater questions involving seasonality and how it shows up in the archaeological record. This type of environmental research is incredibly prevalent in today's changing climate and may help us improve our future conditions.

#### **AAP.U.19 SMOkE and Mirrors: How Starlight Affects Mirror Orbits that Are Initially Elliptical**

Jamin Wilson  
Mentor: Shauna Sallmen, Physics

An exoplanet orbiting a star outside the solar system may be tidally locked, similar to our moon, so one side of the planet always faces the star. An advanced alien race may want to make the dark side of their planet usable. To accomplish this they could put into orbit large, lightweight mirrors to redirect sunlight onto their planet's dark side. Due to their size, the force of starlight would act on these mirrors and affect their orbits. Those with longer survival times despite the effects of this radiation pressure will require the least fuel to remain in orbit. As investigated by our team, the initial mirror orbit parameters, such as the mirror orbit's size, orientation relative to the star, and ellipticity all significantly affect the survival time of the mirror. Previous analysis focused on orbits that started out circular. This raises the question of what initial eccentricity, which describes how much an elliptical orbit deviates from a circle, would work best for a mirror orbiting a planet. Our team ran 1512 simulations ranging from nearly circular orbits to very elliptical orbits. By comparing mirror survival times for a variety of situations we can determine which eccentricity is likely to be the most effective. A teammate discovered that at least in some situations an eccentric orbit lasts dramatically longer than an initially circular one. I will present preliminary analysis of how common this is and if it typically happens for a certain level of eccentricity.

#### **Poster Session B 9:55 am-10:50 am**

#### **BAP.U.1 The Effect of Circadian Rhythm Disruption on USP8 and Per Gene Expression**

Anna Bower  
Mentor: Alder Yu, Biology

Many neurodegenerative diseases are associated with disrupted circadian rhythms; however, it is not known if neurodegeneration is a cause or effect of circadian disruption. We seek to identify a potential link between living with a disrupted circadian schedule and neurodegeneration by measuring gene expression levels of genes associated with these functions. Last summer, we examined the gene USP8, a gene involved in circadian clock regulation as well as neurodegeneration through its role in Parkin mediated mitophagy. We found decreased rhythmicity and amplitude expression levels after exposure to an altered circadian schedule. After finding abnormal expression levels in USP8, we wanted to examine the effect of the abnormal schedule on a core clock gene to identify whole clock dysfunction associated with USP8 dysfunction. The gene selected was Per, a gene involved in the molecular mechanism of the circadian clock in *Drosophila melanogaster*. To investigate this potential link, this study intentionally disrupted the circadian rhythm and measured expression of USP8 and Per, using *Drosophila melanogaster*, which contain the genes USP8 and Per, which have functional homologs in humans, as well as similar circadian clock structure and regulation to humans. We hypothesize that by intentionally disrupting the circadian rhythm, expression patterns of Per will be disrupted in the form of phase advance or amplitude decrease based on the disrupted schedule chosen and past results.

### **BAP.U.2 Inactivation of Tulane Virus, a Human Norovirus Surrogate, in Water Using Yeast Coated Beads**

Hunter Charles  
Co-author: Xinhui Li  
Mentor: Xinhui Li, Microbiology

Diseases caused by waterborne pathogens are a major public health concern. Human norovirus is the leading viral pathogen that causes waterborne illness in the United States. Chlorination is a common water disinfection method. However, chlorine levels  $>4$  ppm are unsafe for drinking and human norovirus is moderately tolerant to chlorination. Recently developed yeast-coated beads that can be charged with chlorine could be an alternative method for water disinfection because high concentrations of chlorine can be bound to yeast coated onto the plastic beads while free chlorine levels in the water stay low. The efficacy of yeast-coated beads prepared with chitosan as the binding agent in inactivating Tulane virus, a human norovirus surrogate, in water was evaluated earlier. This project aims to evaluate the efficacy of yeast-coated beads using zein as the binding agent in inactivating Tulane virus in water and compare the results with those when beads prepared with chitosan were used.

### **BAP.U.3 Investigating the Technological Style of the Anatolian Bronze Age Sites Tell Atchana and Kültepe by Chemical Analyses**

Josh Courtney, Heather Walder  
Co-authors: Michael A. Johnson (Stell Environmental Enterprises)  
Mentor: Heather Walder, Archaeology & Anthropology

As a region rich in natural resources, Anatolia has played host to a multitude of diverse ancient cultures that used complex craft production strategies. Because of this and economic relationships with their neighbors in Europe, North Africa, and the broader Near East, Bronze Age Anatolian cultures utilized extensive trade networks, which facilitated the development of large cities in the Anatolian highlands. Several bronze artifacts and ore samples that were collected from archaeological investigations of the major Bronze Age cities of Tell Atchana and Kültepe were analyzed for their chemical and lead isotopic composition. These results provide insight into patterns of similarity and difference between the metallurgical practices at Tell Atchana and Kültepe. This research contributes to ongoing investigations of the sources of ore and alloying strategies in the production of these artifacts, which enable further assessment of the technological style of each site's metallurgical practices. Analyzing the technological style of metallurgy from the contrasting sites provides insight into the nature and structure of their connections to one another and the broader region of Bronze Age Anatolia.

### **BAP.U.4 Applications of LIDAR in Site Identification in the Mississippi River of Southern Wisconsin**

Cody Dobson  
Mentors: Constance Arzigian, Archaeology & Anthropology; and Niti Mishra, Geography & Earth Science

The Upper Mississippi River Valley of southern Wisconsin offers an intimidating challenge to archaeologists. Past excavation has revealed the area has been continuously occupied since 11,000 BP with a large number of sites located on the region's bluffs, floodplains, and islands. Through the manipulation and use in ratios of numerous bands of light captured in satellite imagery, an estimate of shoreline erosion and deposition along the islands and main shoreline of the Mississippi can be attained. Such estimates allow archaeologists to better understand past and presently occurring change that permanently damages or destroys the region's rich archaeological record. This work will create a methodology and products through the use of freely available data and data processing platforms useful to archaeological researchers interested in understanding shoreline change. With such results available to archaeologists and researchers, more efficient surveys of riverine regions can be attained, allowing for more complete and rapid data recovery and identification of cultural resources threatened by erosion.

### **BAP.U.5 Why the 2020 Dodgers Are the Greatest Team of All Time, at Least Statistically**

Sean Floersch  
Mentor: Chad Vidden, Mathematics & Statistics

This paper explores the use of sports analytics in an attempt to quantify the strength of Major League Baseball teams from 1920-2020 and then find which team was the greatest team of all time. Through the use of basic baseball statistics, ratios were created that demonstrate the strength of a baseball team on offense and defense. To account for slight year to

year differences in the ratios, standard deviations to the yearly mean are used and the Flo Strength metric is used with the standard deviations. This allows the ratios to be compared across all seasons, with varying rules, number of teams, and number of games. These ratios and Flo Strength metric go through statistical testing to confirm that the ratios are indeed standardized across seasons. This is especially important when comparing the strange Covid-19 2020 baseball season. After quantifying all the team strengths, it is argued that the 2020 Los Angeles Dodgers are the greatest team of all time.

#### **BAP.U.6 Using Genetic and Structure-Guided Functional Assays to Explore the Unknown Mechanism of DcrB, a Copper-Resistance Protein of *Salmonella enterica***

Sara Gonske  
Co-author: John May  
Mentor: John May, Chemistry & Biochemistry

*Salmonella enterica* is a major bacterial cause of foodborne illness and invasive disease. *Salmonella* establishes infections by evading host macrophages; host immune cells that engulf the bacteria and destroy the foreign body using harsh chemical compounds such as toxic amounts of copper metal ions. Research at UWL has previously demonstrated that DcrB, a protein possessed by *S. enterica*, conveys resistance to toxic concentrations of copper ions, and thereby may play a role in *Salmonella*'s survival within the host. The copper-resistance mechanism of DcrB is unknown, but its structure has been solved. DcrB shares a similar fold with proteins Mog1 and PsbP, and when structurally aligned, three amino acids on DcrB's surface are conserved (H73, D77, and Y144). We have performed site-directed mutagenesis to engineer three *S. enterica* strains; each with one conserved amino acid's possible interactions removed. These strains will be used in future plate assays to determine each individual amino acid's role in the copper-resistance mechanism of DcrB. Additionally, we have created a transposon library using a *dcrB* knockout strain and have identified several mutants that are able to grow in high concentrations of copper ions similar to wildtype. The location of these transposon mutations may provide information about other proteins involved in DcrB's copper-resistance mechanism. This knowledge could be used to develop novel antibiotics targeting bacterial copper resistance.

#### **BAP.U.7 An Alternative DNA Structure Formed by A-tracts Influences the Dynamic Properties of Nucleosomes**

Colin Griffin  
Mentor: Dan Grilley, Chemistry & Biochemistry

Nucleosomes, formed from protein and DNA, control access to the genetic information stored in the DNA in our cells. The locations of nucleosomes are controlled in part by the presence of regions rich in A and T nucleotides. These so-called A-tracts are thought to be stiffer than other DNA sequences. Previous research in the lab has shown that biologically important properties of A-tracts are determined by their interactions with specific cations. This study seeks to extend these previous studies by looking at the effects of A-tracts on the dynamics of DNA in nucleosomes, and how specific cations may affect those dynamics. The results of these studies will impact our model for how the machinery inside of our cells gains access to the genetic information of the DNA that is stored inside of nucleosomes.

#### **BAP.U.9 Consumer Convenience - The Future of Marketing**

Jordan Jossie and Marshall Pecore  
Mentor: Nese Nasif, Marketing

Consumers of the 21st century are captivated by the concept of convenience. The constant search for minimal exertion is completely changing the world of marketing. In addition, an ongoing, global pandemic of COVID-19 has altered the routes in which consumers want to receive their products, searching for minimal exposure and maximum convenience. With this being said, our data collection and research shows an immense rise in e-commerce, a link between the pandemic and convenience, and an overall prioritization and demand of consumer convenience. Our research will additionally touch on the future of marketing. As mentioned above, marketers have identified this trend growth and began to use the interest of peak convenience products and services to their advantage. The question that remains is how will the future of marketing continuously adjust to the rise of time poverty among consumers? What will their next scheme be when all of the promotions and advertisements targeting convenience begin to blur together?

### **BAP.U.10 Social Inequality in Bronze Age Europe: A Zooarchaeological Perspective**

Emily Kinney

Mentors: Amy Nicodemus, Archaeology & Anthropology; and Tim McAndrews, Archaeology & Anthropology

The European Bronze Age (2000-1500 BC) was a period of cultural change and increased social inequality. These changes were manifested in every aspect of life, including foodways; high-status individuals typically had much greater access to high-quality foods. This study analyzes faunal remains from two Maros culture sites: Pecica “Șanțul Mare” and Kiszombor-Új-Élet. These settlements are located in modern-day Romania and Hungary, respectively, and differed significantly in their size, population, and regional influence. The goal of this study is to determine the desirability of the meats consumed at the two sites, based on meat utility, age, and taxon. This study also compares the consumption patterns at both sites and finds little variability. These results contribute to archaeologists’ understanding of increasing complexity during a significant period of human history.

### **BAP.U.11 Determining the N-Terminus of the Hemolytic Region of Hemolysin A in *Proteus mirabilis***

Macy Klabunde

Mentor: Daniel Grilley, Chemistry & Biochemistry

The overarching goal of this project is to understand the molecular mechanism by which a toxic protein produced by the bacteria *Proteus mirabilis* is able to function inside a human host. Previous research in the lab demonstrated that a short fragment taken from the beginning of the protein is sufficient to catalyze the activation of inactive full-length protein. This template assisted activation has a characteristic lag phase that we demonstrate is related to the autocatalytic activation by full-length protein. Previous research in the lab had also noted that active full-length protein becomes inactive over time. We have demonstrated that previously active protein is capable of activating new protein, even if when inactive itself. The full-length protein is extremely large and previous research suggests that only a portion of it is necessary to break open (lyse) red blood cells. Using the discoveries above to modify our activation experiment, we are determining if we can remove portions of the beginning of the protein and still lyse red blood cells. The results of this work will allow us to more easily characterize the molecular mechanism for this toxic protein.

### **BAP.U.12 Effect of the ESCRT pathway on HPIV3 budding**

Kirstyn Loyva

Michael Hoffman, Microbiology

Human parainfluenza virus type 3 (HPIV3) is a common cause of upper and lower respiratory tract infections in children and the elderly. The M protein plays an important role in the formation of virus particles and their subsequent release from cells. To coordinate assembly and release of virus particles, the M protein interacts with other viral proteins and host cell components. The ESCRT machinery pathway, consisting of normal host cell protein complexes which are responsible for the manipulation of lipid bilayers, may play a role in HPIV3 budding as it does in other viruses such as the Sendai virus and HIV. To test whether this pathway is used in HPIV3 release, VPS4, an essential protein for ESCRT pathway function, was depleted within cells. Assays to monitor knockdown of VPS4 and release of virus particles from VPS4 knockdown cells were developed as part of this results. Results have been inconclusive regarding the effect of VPS4 knockdown on virus release from cells. Understanding assembly and release of virus particles could lead to the development of new antiviral treatments.

### **BAP.U.13 It's a Mental Game: The Effects of Imagery on Psychological Factors after Anterior Cruciate Ligament Reconstruction**

Maria Nelson and Lauren Conley

Co-author: Naoko Giblin

Mentor: Naoko Giblin, Exercise Sport & Science

The purpose of this study was to investigate the effects of imagery training on psychological measures in those with a recent history of anterior cruciate ligament reconstruction (ACLR). We investigated this relationship by comparing the psychological status of participants (n=9) before and after completing imagery intervention that took place over the course of 7 weeks. All participants were within one year of returning to full activity after ACLR, and 4 of the 9 total participants had undergone ACLR more than once in their lifetime. The psychological status of the subjects was

measured using the Tampa Scale for Kinesiophobia (TSK), Psychological Readiness to Return to Sport Scale (RSS), and the ACL Return to Sport after Injury Scale (ACLRSI). Statistically significant differences in the TSK and RSS suggest that imagery practice could play a role in decreasing kinesiophobia, and increasing readiness to return to sport, in recovered ACLR patients. This provides supporting evidence that patients could benefit from the implementation of imagery techniques in post-ACLR rehabilitation practices prescribed by healthcare providers.

#### **BAP.U.16 Can Shifting Focus of Attention Change the Way You Run?**

Erick Sells

Co-authors: Naoko Giblin, David Tarr

Mentor: Naoko Giblin, Exercise & Sport Science

Previous research has investigated the effects of various gait retraining strategies to reduce the risk of overuse injuries in endurance runners; however, the effectiveness of using verbal cues and other attentional foci to retrain running gait is relatively understudied. The objective of this study was to compare the effects of three attentional focus strategies on altering running biomechanics. We recruited 27 habitually rearfoot striking runners to run at a self-selected pace for 35 minutes during each of the three separate sessions. During the second session, each participant was randomly assigned to receive one of three types of feedback: an internal-focused verbal cue, an external-focused verbal cue, or auditory extrinsic feedback. Kinetic and kinematic data were collected using three-region force sensor insoles and a digital camera, respectively. The measured variables included peak vertical ground reaction force (vGRF) from each region, cadence, and the foot, shank, ankle, and knee angles at initial contact. Data processing is currently ongoing. The results of this study will benefit runners, coaches, and clinicians by providing further understanding of how shifting focus of attention can alter one's running biomechanics and possibly reduce the risk of injury.

#### **BAP.U.17 Effect of Gut Microbes on Circadian Rhythms**

Dylan Tousey and Ashton Osterhaus

Mentor: Alder Yu, Biology

The naturally occurring cycles that can cause changes in behavioral, mental, and physical systems in an organism are called circadian rhythms. An organism's circadian rhythm impacts the rhythms of its gut microbiota. Gut microbiota are the microorganisms living inside the digestive tracts. These microorganisms maintain immune and metabolic homeostasis by secreting molecules that nourish and signal to the host. In this study, we will research whether or not gut microbiota can impact the circadian rhythm of *Drosophila*, also known as fruit flies. The microbiota will be removed from the fruit flies by sterilizing wildtype fly embryos, and their activity levels will be monitored with a system connected to an online data analysis program. The activity rhythms of fruit flies without microbiota will be compared to the activity rhythms of fruit flies with microbiota. We will also use PCR to ensure that the fruit flies are in fact germ free. If the microbiota affects the host circadian rhythms, we expect behavioral rhythms to degrade in constant darkness. If it is found that the gut microbiota affects the circadian rhythms, we will ask if reintroducing bacteria will restore circadian rhythms back to normal.

#### **BAP.U.18 Understanding the Hemolytic Function of HpmA Using Aspartate Mutants**

Christopher Weier

Mentor: Daniel Grilley, Chemistry & Biochemistry

This project is focused on a hemolytic protein called HpmA that is produced by the bacteria *Proteus mirabilis*. A hemolytic protein is one that causes red blood cell lysis. *Proteus mirabilis* and other bacteria are similar in that they use a two-partner secretion pathway to transport virulence factors such as HpmA across the outer membrane. Not only does secretion transport the protein outside of the cell, but it also allows HpmA to adopt its correct structure. This correct structure allows it to be functional. We seek to understand how HpmA is secreted and what interactions lead to an active functional protein. To do this, we studied and designed mutations in a small fragment of HpmA and determined how these changes impact the ability of HpmA to fold and become active. These studies will impact how we understand the process utilized by pathogenic bacteria to secrete the toxic proteins they use to invade their human hosts.

**Poster Session C**  
**11:00 am-11:55 am**

**CAP.U.1 Fumarase "Knocking" Our Socks Off**

Allison Alberts  
Mentor: Basudeb Bhattacharyya, Chemistry & Biochemistry

Fumarase is an important enzyme that is a key component of the Krebs's cycle, which is required for central metabolism. Understanding how fumarase works will be beneficial since the enzyme has regained interest for its link to the development of cancers in humans, along with cellular energy, hypoxia, and metabolic pathways. The purpose of this project is to further our research in analyzing fumarase's B site in the model organism, *Escherichia coli*. The B site may serve as a regulatory site for the enzyme's active site. We have tested and identified a series of amino acids within the B-site based on the 3D structure of the protein that plays a role in this regulation. Through a series of mutations, this project will characterize two of these amino acids (arginine 126, known as R126, and histidine 129, known as H129) genetically in a fumarase knockout background. Next, this project will allow us to finish the crystalized 3D structure of fumarase. With higher resolution, we will be able to learn even more about this protein, genetically and biochemically. This data will facilitate our understanding of fumarase's function which will ultimately spark new opportunities in research.

**CAP.U.2 Determining the Functional role of the GOX1969 Protein in *Gluconobacter oxydans***

Ky Ariano and Meg Zumsteg  
Co-author: Paul Schweiger  
Mentor: Paul Schweiger, Microbiology

Acetic acid bacteria are used in many industrial processes (vinegar, vitamin C, antidiabetic drug miglitol production, etc.). These industrially important reactions are mainly done by an arsenal of membrane-bound dehydrogenases that shuttle electrons directly into the respiratory chain. Among these dehydrogenases, GOX1969 in *Gluconobacter oxydans* was characterized as a PQQ-dependent dehydrogenase of unknown function. However, dehydrogenase activity has not been detected after multiple analyses by a number of labs. Reanalysis of the protein sequence reveals similarities to the BamB protein that functions as a subunit of the  $\beta$ -barrel assembly machine (BAM) complex that is responsible for the assembly of  $\beta$ -barrels in the outer membrane of gram negative bacteria. To test if the actual physiological function of GOX1969 is as the BamB subunit of the BAM complex, we introduced the *gox1969* gene into an *Escherichia coli* K12 mutant that lacks BamB. Growth deficiencies in the mutant lacking BamB were restored when *gox1969* was expressed on the plasmid pBamB. This provides the first evidence that GOX1969 is functionally acting as a BamB in *G. oxydans*. Functional information of uncharacterized genes will provide new insights that will allow a more accurate modeling of metabolism and more rational strain design.

**CAP.U.3 Constructing a Bicistronic TetR Regulation System to Control Gene Expression of Acetic Acid Bacteria**

Monica Bertucci  
Co-author: Paul Schweiger  
Mentor: Paul Schweiger, Microbiology

The role of acetic acid bacteria, such as *Gluconobacter oxydans*, in the incomplete breakdown of carbon substrates into sugars and alcohols is well known. As such, acetic acid bacteria prove effective in catalyzing many industrial reactions such as the production of vinegar, vitamin C, and antidiabetic drug miglitol. Metabolic engineering of acetic acid bacteria would improve production efficiency and yield by allowing tunable expression of genes and proteins. However, the molecular tools necessary for regulating this gene expression are not widely available. To this end, the well-known constitutive TetR promoter/operator system was cloned into the pBBR1MCS2 plasmid. This system was promising and led to regulatable gene expression. However, unwanted background activity was high when the system was not induced with anhydrotetracycline. To mitigate this unwanted background activity, a bicistronic TetR expression system was constructed. Reporter gene assays were done to assess the effectiveness of this approach to reduce the uninduced background activity, producing a low-cost induction system in acetic acid bacteria. The development of a successful bicistronic system of gene expression for *G. oxydans* would have valuable implications industrially by improving production efficiencies and product yields.

#### **CAP.U.4 A Graphical User Interface for a Genetic Algorithm and Simulation**

Eric Coursin  
Mentor: David Mathias, Computer Science

Genetic algorithms are approximation algorithms that employ principles of Darwinian evolution to evolve solutions in a more time efficient form than performing an exhaustive search for the best solution to a given problem. For this project, we work with a genetic algorithm that establishes some values for a swarm intelligence problem. An issue in using an algorithm for the first time is not having enough information to know which parameters will have great consequential effects on runtime and output. Additionally, it can be increasingly helpful to have a graphical user interface (GUI) in order to manage parameter values and automate file I/O for quick and easy simulation output. The focus of this project is to create a GUI for a genetic algorithm and simulation that would allow future students who will work on this swarm intelligence project an easier and faster way to experiment with the genetic algorithm and visualize the outcome of the simulation.

#### **CAP.U.5 Analyzing Mutations of a Response Regulator that Restore Motility of *Myxococcus xanthus***

Marissa Duggan and Ivy Klabunde  
Mentor: Daniel Bretl, Microbiology

*Myxococcus xanthus* is an environmental bacterium that utilizes two-component systems (TCS) to regulate behaviors such as motility. A TCS is composed of a sensor kinase that is activated by autophosphorylation upon recognition of an environmental signal. That phosphoryl group is transferred to a response regulator (which turns it “on”) that regulates gene expression to adapt to that signal. One of the response regulators that contributes to *M. xanthus* motility is known as NmpR. In the absence of a different response regulator that is normally required for motility, *pilR*, mutations occurred in the *nmpR* gene which resulted in NmpR that is permanently “on”. Our hypothesis is that these mutations turn the NmpR protein on by resulting in a protein that either does not require phosphorylation or has a structure that promotes phosphorylation. To test our hypothesis, we constructed plasmids containing the “on” *nmpR* mutations with or without a second mutation that prevents NmpR from being phosphorylated. These plasmids were transformed into a nonmotile  $\Delta nmpR$  *M. xanthus* strain. To date, only resulting strains with a plasmid containing a version of NmpR that could be phosphorylated had observed motility, indicating that the NmpR “on” mutations promote, but still require, phosphorylation. Continued investigation of these mutants will allow us to better understand how response regulators turn “on” and may lead to new antibiotics targeting TCS important for bacterial physiology.

#### **CAP.U.6 Curcumin and Novel Curcuminoids Inhibit the Lytic Cycle of Epstein-Barr Virus**

Jenna Hayes  
Kelly Gorres, Chemistry & Biochemistry

Epstein Barr Virus (EBV) is a virus commonly associated with mononucleosis and various cancers. Previous research has shown valproic acid (VPA) and other compounds to be inhibitors of the lytic cycle; however, not much is known about the mechanism of how these compounds inhibit the lytic cycle. The purpose of this research is to gain insight into the mechanism that allows different drugs to inhibit the lytic cycle of EBV. Further investigation into EBV is important because it can lead to possible preventions and treatments for diseases associated with EBV. This experiment will explore the possible interactions between curcumin and the lytic cycle of EBV. Previous studies have proved curcumin to be an effective inhibitor of the lytic cycle. Curcumin is the active compound found in turmeric, a common spice with potential health benefits. The purpose of this study is to use a pure curcumin structure as opposed to the impure compounds commercially available. In addition, substituents will be moved around the ring structures to establish which part of the compound is responsible for its inhibitory effect. Initial data shows that curcumin is an effective inhibitor of the lytic cycle, but more research is needed to characterize the curcuminoids and mechanism of inhibition.

#### **CAP.U.7 Using Thermography to Identify Sleep in an Herbivorous Pest Species**

Mallory Keating  
Co-authors: Barrett Klein and Kévin Tougeron (Université catholique de Louvain)  
Mentor: Barrett Klein, Biology

Sleep is a crucial behavior, exhibited potentially by all animals, yet very little is known about sleep regarding the largest and most diverse group of organisms, the insects. Pea aphids (*Acyrtosiphon pisum*) are a common plant pest and were

the focal species of this study. Sleep is commonly identified in insects through monitoring movement. Aphids live a largely stationary life, feeding from the plants that they live on meaning that movement is not an effective form of identifying sleep in this species. Instead, the temperatures of the insect and its surroundings were measured using thermography throughout 24-hour periods. If aphids slept, then their body temperature should indicate some form of a circadian rhythm. Periods of low temperature, a proven indicator of sleep in animals and honeybees, would then suggest periods of sleep in aphids. Our preliminary data suggests that thermography, similar to movement, is not an effective indicator of sleep-in aphids.

#### **CAP.U.8 A Review of Trends and Stressors Related to Hexagenia Mayfly Populations to Determine Future Research Development**

Heidi Koehnke

Co-author: Ross Vander Vorste

Mentor: Ross Vander Vorste, Biology

Mayflies are aquatic insects that play a vital role in maintaining river health and are an important part of the aquatic and terrestrial food chains. Recent evidence suggests that mayfly populations are in decline, however, there remains little consensus on what environmental factors may be driving population dynamics. We reviewed existing literature using Web of Science on population trends and stressors of Hexagenia mayflies to explore what is known and to identify research gaps. The majority of the articles indicated that the population of mayflies were declining, due to a combination of stressors. Most existing research was focused on temperature, which had the majority out of the 298 total articles. However, several other stressors, such as toxic and salinity had very limited articles connecting them to the actual search term, making it difficult to find articles useful to the review. There were several gaps identified including research involving mayflies in the surrounding Great Lakes and the Mississippi River.. There has been little research centered around the idea of warming temperatures in an environment and how this could impact the future of mayflies. More research should be centered around Hexagenia because of their significance and being a focal aspect to the cleanliness and health of rivers and waterways. There remains little consensus on which environmental factors drive mayfly population trends, leaving opportunities for future research in the field and lab.

#### **CAP.U.9 Generating a Mutant Library that Restores Motility in *Myxococcus xanthus***

Jordan Kucksdorf and Matthew Vanselow

Mentor: Daniel J. Bretl, Microbiology

*Myxococcus xanthus* is an environmental bacterium capable of responding to extracellular stimuli via two-component systems (TCS). Specifically, through protein phosphorylation, sensor histidine kinases (SK) recognize external signals and further the cascade via phosphorylation of a response regulator (RR) that then initiates transcription of specific genes. Here we characterize a TCS that regulates motility through the RR NmpR. In previous work, the Bretl lab demonstrated that in a non-motile strain of *M. xanthus* mutations of nmpR were capable of restoring motility. We hypothesize these mutations keep NmpR in a constant “on” state, which allows for expression of genes necessary for motility. In order to expand the library of known nmpR “on” mutations, we assayed non-motile strains on soft-agar plates and isolated mutant strains that generated colony flares which represented cells that acquired a mutation that allowed for restored motility. In order to determine if these mutations were in nmpR, we isolated genomic DNA from these strains and PCR amplified nmpR. Once confirmed, the amplified nmpR gene was then sequenced to determine if and at what nucleotide position nmpR was mutated. By this method we found six new mutations located in nmpR, none of which were the same as previously identified mutations. By characterizing the functional outcome of these nmpR mutations we will learn about how similar RRs are regulated in their “on” and “off” state.

#### **CAP.U.10 Functional Characterization of Fumarase C from *Salmonella enterica***

Ryan Maki

Mentor: John May, Chemistry & Biochemistry

The Citric Acid Cycle (CAC) is a biological process found in all aerobic organisms on Earth. Different proteins function together in sequential steps to break down sugars into usable energy, carbon dioxide, and water. Without this important pathway, aerobic organisms (including humans) would not be able to gain the necessary energy from the food they eat to grow and reproduce. The same pathway present in our bodies is also found in many of the bacteria which can infect us and make us sick. In particular two of these bacteria, *Salmonella enterica* and *Escherichia coli*, pose a major threat for foodborne illness. This project focused on one of the proteins within the CAC cycle for *S. enterica*: Fumarase C

(FumC). This enzyme catalyzes up the chemical reaction of fumarate to malate, and the reverse. Fumarate conversion to malate in a necessary piece of the CAC cycle, and *S. enterica* has been shown to be unable to cause infection when this enzyme is removed or inhibited. How FumC is affected by different potential antibiotics can be determined by testing its kinetics (the rate at which the reaction occurs). The kinetic characteristics of *S. enterica* fumarase and the importance of studying them are the focus of this research.

#### **CAP.U.11 Location! Location! Location! Proteins Need to Be in Precise Locations to Pass Signals Effectively**

Connor Martin, Regan McElfresh, and Erin Stueber  
Co-authors: Joshua Krause, Audrey Mattmiller, and Kaleb Myhrwold  
Mentor: Jaclyn Wisinski, Biology

Just like with real estate, the location of proteins inside the cell matters. The location of small G-proteins, a group of proteins that pass signals inside cells, is dictated by moieties in one region of the protein. The moieties hold the small G-proteins to membranes via a lipid anchor that inserts into membranes and a region of positive charge that interacts with negatively charged membrane lipids. A subset of small G-proteins is modified by phosphorylation between the lipid anchor and the positively charged region. The Wisinski lab members explored the published literature to identify the consequences of phosphorylation on small G-protein location and signaling. For each small G-protein investigated, phosphorylation led to a change in intercellular location. Also, phosphorylated small G-proteins interacted with proteins that could recognize the phosphate and simultaneously bind the lipid anchor. The phosphorylation-dependent protein interaction had two distinct consequences. As a consequence, the new protein-protein interactions prevented the small G-protein from signaling. Another consequence of the phosphorylation-dependent protein-protein interaction was the small G-protein was able to contribute to a different signaling pathway. The general mechanisms described will help us understand the spatial and temporal relationships of signals within the cell to better understand cellular outcomes.

#### **CAP.U.12 Annotation of the Lst8 Gene in Drosophila Species**

Aubrey Schoenboom and Jon Neubauer  
Mentor: Alder Yu, Biology

Insulin is the only hormone in the body that lowers blood sugar. The insulin signaling pathway is the mechanism in which our bodies can process blood sugar by allowing cells to uptake the glucose and store it as glycogen. Insulin also halts the potential of the reverse reaction where glycogen is turned back into glucose, thus maintaining blood sugar homeostasis. Gene annotation is the method in which genes and coding sequences of an organism are located and identified. Once the gene is identified, the information is validated using approaches such as genomic position, intron-exon boundaries, and gene names. This allows for the study of the same genes in different species so that we may better understand biological function, regulation and interactions, and expression of a gene or gene pathway. We are studying the Lst8 gene, that codes for a conserved TOR-binding protein. TOR proteins (target of rapamycin) are vital in cell growth regulation. Using BLAST-based methods to identify coding sequences of the Lst8 gene in *Drosophila bipectinata* and *Drosophila persimilis* species, we will add our findings to a larger annotation project, administered by the Genomics Education Partnership, aimed at better understanding the evolution of the insulin signaling pathway.

#### **CAP.U.14 A Powerful Force: Does the Method of Presentation of Information about Human Trafficking Influence Advocacy Behaviors?**

Leah Williams  
Mentor: Suthakaren Veerasamy, Psychology

Entertainment media is often used to make statements and start conversations; entertainment-education elevates those statements by mobilizing the audience to change behaviors. Albert Bandura's social cognitive theory has become the foundation for the development of entertainment-education using our understanding of learning through modeling and imitation to create media that encourages and enables behavior change. This research project aims to understand the most effective form of communication to use when educating and mobilizing a community to advocate for human trafficking survivors. It also will explore if giving audiences a list of resources for things they can do to help increases the likelihood they will help. Approximately 90 participants will be in one of three presentation conditions: a documentary, a lecture, or control group. Both quantitative and qualitative data collection will be conducted to understand the general trends and demographic patterns as well as a more intricate understanding of participants' perceptions of their behavior change. We hypothesize that the documentary condition will be the most effective at changing audience behaviors. The results of this study could possibly affect the way we approach educating and creating advocates for social change in our communities and universities.

## **CAP.U.34 Studies of Selected Ligands Interacting with Hen Egg White Lysozyme**

Conrad McPherson

Mentor: Kelly Gorres, Chemistry & Biochemistry

Lysozyme is a common enzyme found just about everywhere there is if bacteria is involved. It can be considered a part of our immune system as it helps to fight bacterial infection. Lysozyme's function is to cleave polysaccharides via hydrolysis. We intend to study how lysozyme from hen egg white interacts with its known ligands along with a new ligand recently found to bind (Glucosamine-6-sulfate). Glucosamine-6-sulfate has been recently found to bind to hen egg white (hew) lysozyme (Gorres, unpublished results). This is very similar molecularly to another ligand known to bind to lysozyme (N-acetyl-glucosamine). The purpose of this project is to determine how these ligands bind to the active site of hen egg white lysozyme using protein crystallization and computational resources. From protein crystallization, we expect to add the selected lysozyme structure (1hew) with our selected ligands in optimal solutions that cause these to crystallize with each other. This data can be used for further analysis on how they interact on a molecular level. Computational modeling gives us a good idea of what ligands can and cannot bind to lysozyme before we decide to test experimentally in the lab. If these experiments prove successful, a new ligand may be identified that could be an inhibitor of lysozyme.

**Poster Session D**  
**12:05 pm-1:00 pm**

## **DAP.U.1 Maximizing Solubility of a Protein with Mysterious Purpose in Kaposi's Sarcoma-Associated Herpesvirus (KSHV)**

Arini Arsana

Mentor: Kelly Gorres, Chemistry & Biochemistry

Gammaherpesvirus are a subfamily of herpesvirus that infects people around the world. Under the umbrella of the Gammaherpesvirus, is a human virus known as Kaposi sarcoma-associated herpesvirus (KSHV). KSHV is linked to blood vessel cancer called Kaposi Sarcoma (KS) and other lymphoproliferative diseases. KSHV is capable of remaining inactive within their host during the latent phase, but also proliferate during their active lytic phase. In Kaposi sarcoma-associated herpesvirus, ORF48 is a protein with unknown function and purpose in the MHV68 development stage. Nonetheless, ORF48 protein in KSHV is predicted to serve a vital role in its effect on human infection. The KSHV ORF48 protein's predicted vitality on human's infection is due to the unknown ORF48 protein's persistent appearance in all Gammaherpesvirus family. To optimize the study of KSHV ORF48 protein, the soluble form of ORF48 protein will need to be produced in mass quantities. Creating a mass quantity of KSHV ORF48 protein with three different lengths of the protein is predicted to enhance the production of soluble ORF48 protein further. The ability to produce soluble KSHV ORF48 protein will eventually open the door for further studies on how KSHV infects humans.

## **DAP.U.3 PepsiCo and the Evolution of Advertising**

Dawson Freiberg and Zach Thiel

Mentor: Nese Nasif, Marketing

Advertising and the ways companies can market themselves have evolved throughout the decades. The companies and brands that have successfully adapted to these changes share many things in common while also possessing their unique methods to survive and thrive. In this research paper, we will be analyzing how PepsiCo, one of America's most iconic companies, has managed to remain relevant and be successful through advertising. Using PepsiCo as a case study, we hope to uncover the common themes and marketing strategies that have allowed several companies to succeed over time. Through examining PepsiCo's various marketing campaigns and their sales trends, valuable insights will be gained and reveal the similarities between PepsiCo and other timeless brands. With these insights, companies who wish to market their brand effectively will have a framework to follow for long-term success in an ever-changing marketing environment.

#### **DAP.U.4 Stressed Out and Under Pressure: Decision-Making in the Healthcare Field**

Bailee Golisch  
Mentor: Ellen Rozek, Psychology

Healthcare environments are universally acknowledged to be stressful, with the constant need for professional decisions to occur within time constrained, pressure-inducing environments. Previous research has indicated that environmental factors, such as stress, have an influence on the neural decision-making process, but little information is available beyond the research solely linked to economic based decision-making. The purpose of this study is to investigate the influence of pressure on intuitive decision-making in health-related scenarios.

#### **DAP.U.5 Teacher Candidates' Attitudes toward Incorporating Music in the General Classroom**

Paige Kopke  
Mentor: J. Scott Baker, Educational Studies

This article examines the importance of utilizing music in the general classroom and how teacher candidates at one Midwest University feel about their ability to incorporate music and whether they believe it is beneficial to the classroom. TCs were surveyed regarding their feelings towards including music in their future classrooms and their emotions towards music in general. Participants shared their own experiences involving music being used in classrooms in the past and provided ideas of when it would be beneficial to integrate music into lessons. Participants also explained their lack of preparation for including music into their future classrooms and the negative impact that has on their likelihood of adding music to their lessons. Narrative inquiry is used to display the main topics collected and the results focus on the thoughts of calm, creativity, and fun, as well as, the benefits, and distractions related to utilizing music in the classroom. Keywords: teacher candidates, teaching methods, music activities, teacher candidate attitudes, narrative inquiry

#### **DAP.U.6 Effects of Circadian Rhythm Disruption on DNA Repair**

Halle McCormick and Lydia Bergerson  
Mentor: Alder Yu, Biology

Circadian rhythm is our body's internal clock that controls rhythms in physiological processes. It runs independently but can be reset by light and dark cues. It has been observed that shift workers who have their circadian rhythms disrupted have an increased risk of cancer. Faulty DNA damage repair can increase a person's chance of developing cancer. We hypothesize that circadian disruption increases inaccurate repair of DNA damage, leading to an increased chance of developing cancer. Using fruit flies as our model organism, we purposefully induced a break in their DNA and observed what method of DNA repair was performed. Accurate repair restores function of a fluorescent protein, and inaccurate repair does not. These flies were raised under two different light and dark cycles, alternating every 8 or 12 hours. If our hypothesis holds true, we expect to see more non-fluorescent flies in the disrupted 8-hour cycle compared to the 12-hour cycle. The results of the study will provide evidence to determine if there is a relationship between circadian rhythm disruption and accurate DNA repair. Further research could explore the effect of different light and dark cycles or genetic disruption of the circadian clock.

#### **DAP.U.7 Identifying Necessary Interactions for Folding/Activation of Hemolytic Protein HpmA**

Alyssa Ragon  
Mentor: Daniel Grilley, Chemistry & Biochemistry

This research is focused on a hemolytic protein, HpmA, that is secreted by the bacteria *Proteus mirabilis*. This protein lyses the host's red blood cells once it is secreted from the bacteria cells using a two-partner secretion pathway. This pathway allows HpmA to leave the cell and fold up into its active structure simultaneously. The goal of our research is to better understand the interactions that take place for this secretion and folding to occur. To understand the importance of specific parts of the protein for secretion we studied the ability of the full-length protein to be activated by a small fragment of the protein. Previous studies have suggested that there are specific interactions that occur between the fragment and the full-length protein that allow the fragment to act as a template and activate the protein. To test the specificity of these interactions, we have systematically changed positions on the HpmA protein. These changes are designed to make it harder for the interactions to occur. Thus, if we change a position that is critical, we should see a loss of function. For variant proteins that lose functionality, we have also shown that we can rescue this effect by using

a different template protein. Our results show that the templating interactions are highly specific, suggesting that it is a good substitution for studying the process of secretion of a toxic protein.

#### **DAP.U.9 It's Not You, It's Me: Communication Outcomes in Long Distance Romantic Relationships**

Heidi Skewes

Mentor: Michael Tollefson, Communication Studies

The purpose of this research project is to explore communication within young adults' long distance romantic relationships. Telecommunication has become important in long distance communication within romantic settings. Through the collection of qualitative data, this study examined which relational dialectics and tensions are commonly associated with the various types of communication couples use in long distance romantic relationships. Additionally, it discovered how long-distance couples maintain their relationships through telecommunication. Relational dialectics theory served as a lens to sift through research data and assist in the completion of these goals.

#### **DAP.U.10 Social Media and Self-Reflection**

Gabrielle Vetter

Co-author: Alexander O'Brian

Mentor: Alexander O'Brian, Psychology

Evidence suggests that increased social media use is positively correlated with increased levels of FOMO (Fear of Missing Out). The current study examined the relationship between social media use and FOMO, with the moderating influence of a mindfulness exercise on that relationship. Participants were asked to report actual social media use for the week prior to data collection and were then asked to browse a social media feed of photos and videos relevant to their personal interests. Following exposure to the photos and videos, half of the participants completed a 6-minute mindfulness exercise, and half read a neutral article about the history of UWL. All participants then completed a FOMO scale, and a measure of mindfulness.

#### **DAP.U.11 Radiation Effects on Circadian Rhythms**

Gaoying Vue

Mentor: Alder Vu, Biology

Circadian rhythms are self-sustained 24-hour patterns in organisms. They are adaptive, helping organisms predict future events. Generated by a genetically based internal clock, rhythms can continue even in constant conditions. However, these rhythms can be reset by environmental changes. During missions, astronauts show circadian rhythm disruption that is not completely attributable to schedule disruptions. One possible explanation for this is radiation exposure. Astronauts are exposed to excess radiation which could alter circadian rhythms. We are asking whether radiation affects circadian rhythms using fruit flies as model organisms. We hypothesize that radiation could affect the light sensing proteins that affect the phase of the circadian clock. We monitor fruit fly activity rhythms to determine if a radiation pulse causes a phase shift. The flies are synchronized to L:D 12:12 cycle. Flies are subjected to a radiation pulse or mock irradiated. Activity is then monitored in constant darkness to determine if radiation caused a phase shift in the irradiated relative to non-irradiated flies. The experimental groups are being exposed to variable amounts of either neutron or X-ray radiation. Preliminary results suggest that radiation may not affect phase of circadian rhythms.

#### **DAP.U.12 Extraction of DNA from Biofilm Found on Submerged Wood in Different Flow Regions**

Seth Wisowaty

Mentor: Bonnie Bratina, Microbiology

Large wood is often added to aquatic systems to improve the habitat for macrofauna, but it can also serve as a surface for colonizing bacteria. Bacterial biofilm communities form on wood surfaces in river ecosystems may be crucial in understanding their role in structural integrity of wooden structures in river systems. This project began by submerging a string of wood slices into the Mississippi River at different locations with differing flow rates. The flow rates were classified for each location as: high (1.1-1.9 m/s), medium (0.6-0.8 m/s), or low (0.0-0.1 m/s). Slices were removed from the river at five different timepoints. Layers of biofilm had formed on the surface of all the log slices. The biofilm layer was removed by scraping the surface with a razor blade in three 2 cm x 2 cm squares, for a total of 12 cm<sup>2</sup> for each slice. The amount of biofilm found on the wood slices generally increased over time. On average, 9.0 mg of

biofilm/cm<sup>2</sup> was recovered from wood slices in low flow regions. Wood slices in the medium and high flow regions had an average of 9.5 and 7.9 mg/cm<sup>2</sup>, respectively. DNA was then extracted from the biofilm samples and 7.4, 4.6, and 9.3 ng DNA/mg biofilm was found for low, medium, and high flow regions respectively. The DNA was sent off to be sequenced and will be analyzed to look at the development of the biofilm community over time, and to compare the community composition on submerged wood in the different flow regions of the Mississippi River.

## UNDERGRADUATE ORAL PRESENTATION ABSTRACTS

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### Oral Session A 8:50 am – 9:45 am

#### AAO.U.13 UWL Health Graduate and Pre-Health Undergraduate Students Race Biases in Healthcare

Shreya Shrestha and Tanmaya Cheekati  
Mentor: Justine Egner, Sociology & Criminal Justice

This project is to conduct research to assess undergraduate/graduate students in health programs at UW-L on their racial biases awareness. Based on background research, professional providers believe in myths that alter how they treat patients of different racial backgrounds. We hypothesize that undergraduate/graduate health students who have not enrolled in any racial diversity classes will believe more myths about race impacting physiology. We will send out a Qualtrics survey to undergraduate and graduate health students with questions regarding different hypothetical patient-provider scenarios and include different racial myths that are commonly perpetuated by health care providers in this country. We will also ask students if they have taken diversity related classes such as ethnic racial studies and women gender studies courses. The results will be studied through a statistical analysis software called SPSS. Our goal is to raise awareness regarding this issue within the UW-L community and hope to encourage faculty to put forward more conversations so the treatment for all patients is maximized.

#### AAO.U.14 Mitophagy Detection in Platelets of 13-lined Ground Squirrels Experiencing Torpor

Rylee Stewart, Mia Hanson, Boden Saikie, William Brown, and Zoe Yoerger  
Mentor: Scott Cooper, Biology

*Ictidomys tridecemlineatus*, commonly known as the 13-lined ground squirrel, experiences hibernation during the winter months of the year. While in torpor, their homeostatic vitals are dramatically altered with their body temperature reaching approximately 4-8°C and a heart rate decrease to 3-5 beats per minute. Due to the physiological changes endured in torpor, blood cells called platelets avoid blood clotting through many different mechanisms. This includes avoiding apoptosis (regulated cell death) by preventing the self-destruction of the mitochondria, better known as mitophagy. To observe mitophagy in platelets, blood samples were drawn from squirrels in torpor, and then again in their active state. Additionally, human blood was viewed for comparison of differing mitophagy behavior. Platelets will be observed using a mitophagy detection assay. The fluorescent mitophagy dye will accumulate in a functioning mitochondrion, once the mitochondria become damaged, they will fuse with lysosomes and the dye will emit a detectable fluorescence. Fluorescence will be measured using flow cytometry to determine if cold storage affects mitophagy differently in the squirrel and human platelets.

#### AAO.U.20 People Seeing People

Grace Quinn  
Co-author: Charlotte Roberts  
Mentor: Charlotte Roberts, Educational Studies

A wind-whipped tear slides down his icy cheek, leaving a streak of pale skin behind it. Snow falls delicately from the sky, a telling sign of winter. This captures one moment, one snapshot, of a person experiencing homelessness in the winter. How can we foster empathy and action for those experiencing homelessness through storytelling? Our three main objectives are to denormalize homelessness locally, increase connections, and decrease hardships. We, the

researchers, address the first goal through a web platform that shares the stories of people experiencing homelessness, experienced homelessness, or work with the population. These stories portray people as people, like the organization's name, and strive to bring awareness to the general public to convey that each person's story holds value. The stigma behind homelessness casts a ubiquitous shadow in not only our community but in our nation. We strive to work with the population on current "band-aid" needs as well as increase connections for more long-term stability; ultimately shedding light on systemic issues. As we move forward with our research, we plan to publish a paper, create a podcast, and continue to develop our web platform with stories that paint another part of the picture of homelessness.

#### **ASO.U.22 Effects of Organic and Inorganic Fertilizers on Freshwater Mussel Propagation**

Jarod Boyer

Mentor: David Schumann, Biology

Unionidae mussel populations have declined throughout North America and now ~70% of species are considered at-risk of extinction. Conservation efforts for mussels have benefitted from artificial cultivation; however, these methods can be further refined for many species. Fatmucket (*Lampsilis siliquoidea*) are native to the Upper Mississippi River and are amenable to extensive culture. Propagation efforts for this and other species would benefit from pond fertilization schemes that support mussels and their fish hosts so long as suitable water quality is maintained. We compared Fatmucket production and size when reared in systems treated with organic (i.e., alfalfa) and inorganic (i.e., alfalfa, urea & phosphoric acid) fertilizers. Two 1.0-acre, aerated ponds were stocked with five cages, each with 30 Largemouth Bass (*Micropterus salmoides*), that were each inoculated with ~782 glochidia. Environmental conditions (i.e., pH, temperature, nutrients) were regularly monitored and the abundance of potential food particles was measured throughout the 15-week study period. Following the study, Fatmucket juveniles were recovered from both ponds (organic=16,907, inorganic=18,745) and measured to length. Environmental conditions varied little between the ponds, but there were more incidences of pH and unionized ammonia stress in the inorganic pond. The individuals in the organic pond were, on average, 25% larger than those from the inorganic pond (organic: 9.0 mm, inorganic: 6.8 mm).

#### **Oral Session B 9:55 am – 10:50 am**

#### **BAO.U.15 Spatial Analysis of Lithics at Late Valdivia Site Buen Suceso**

Brett Sander

Mentor: Tim McAndrews, Archaeology & Anthropology

The Valdivia culture occupied the Santa Elena peninsula of coastal Ecuador from around 4400-1450 BC. Lithic tools used by Valdivia were expedient and technologically simple. Through comparisons of lithic assemblages excavated from two different locational contexts during the 2019 field school excavations of Late Valdivia site Buen Suceso we can learn not only the types of lithic tools that were being made at the site, but how they may vary from one part of the site to another. Conclusions drawn from comparisons adds more evidence to the expedience of Valdivia tools as well as concludes for evidence of the differential use of lithics spatially within the Buen Suceso site. This research furthers the understanding and builds upon the conclusions previously drawn from research of lithics at the Buen Suceso site as well as adds to the total understanding and archaeology of Valdivia lithics.

#### **BAO.U.19 Graphene Zinc Oxide Thin Films**

Jacqueline Sporie

Mentor: Seth King, Physics

Composite materials of zinc (II) oxide and graphene are currently of great interest in the materials science community because they are inexpensive, non-toxic, and boast a spectrum of useful applications. Combined, ZnO and graphene have the potential to form a transparent conductive material that would have numerous technological applications, such as in photovoltaic cells, varied sensors, and flat panel displays. Not only is the end material useful, but the process to create this material is also worthy of investigation. The low solution compatibility of graphene makes it difficult to employ conventional processing methods. Interfacial assembly of graphene platelets with zinc oxide allows for graphene and zinc oxide to combine harmoniously and in a timely cost-effective manner. Dr. King's lab at UWL has

fine-tuned this process to create graphene zinc oxide thin films, which as a material now have the potential to fill a need in numerous technological applications.

### **BSO.U.20 The Effect of Aripiprazole and Serotonin on EBV and B-lymphoma Gene Expression**

Kayla Feehan

Mentor: Kelly Gorres, Chemistry & Biochemistry

Epstein-Barr Virus (EBV) is one of the most infectious viruses in humans, with an estimated 90-100% of adults having antibodies against EBV. Most notably, EBV infections develop into mononucleosis, but asymptomatic infections are common in children. EBV will reside in the host's B cells after an active infection and enter what is known as the latent viral stage, where the virus is no longer infectious but still resides in the body. EBV is present in many cancer cells, including Burkitt's Lymphoma. EBV can reactivate into its lytic cycle, which causes damage to the host and allows the virus to spread. Previous research has found that an atypical antipsychotic, Aripiprazole, inhibited EBV lytic cycle activation. Aripiprazole binds to and blocks the serotonin receptor 5-HT<sub>2A</sub>. Since Aripiprazole and other atypical antipsychotics are antagonists of the 5-HT<sub>2A</sub> receptor, it is necessary to discover how serotonin alone affects EBV lytic cycle. This research will focus on serotonin's effects on EBV lytic cycle and then determine the cellular and viral gene expression changes resulting from Aripiprazole and Serotonin treatment.

### **BSO.U.22 The Effects of Nitrate Exposure on *Chlamydomonas reinhardtii***

Annie Panico

Mentor: Tony Sanderfoot, Biology

The presence of nitrates (NO<sub>3</sub><sup>-</sup>) in drinking water has long since initiated discussion on the possible side-effects experienced by those who consume this contaminated water. Because nitrates allow for the formation of nitrite (NO<sub>2</sub><sup>-</sup>) and toxic nitrosamines (NOC) that have shown to cause cancer in mammals, researchers believe that humans are not absent from this risk. A topic less explored that has led to contradiction within the science community is if nitrates themselves increase the risk of cancer in humans. Using the single-celled green alga *Chlamydomonas reinhardtii* as a model organism, I would like to know if drinking water that contains excess nitrate leads to cancer. Though not experiencing cancer to the degree that is evident in humans, a comparative situation in algae is unregulated cell division. I will expose *C. reinhardtii* to NO<sub>3</sub><sup>-</sup> levels found in drinking water and observe their synchronous cell cycle to look for alterations in this synchrony. I predict that variation will indicate cancer-like growth, in which the physical effects of nitrates on *C. reinhardtii* may be recorded. Additionally, I will expose *C. reinhardtii* to nitrates present in environmental samples from bodies of water in the La Crosse area to determine if NO<sub>3</sub><sup>-</sup> in the water stimulates a similar response. Through experimentally determining the observable effects of nitrates on *C. reinhardtii*, individuals may be able to test the safety of their drinking water by using *C. reinhardtii* as a model.

### **BSO.U.23 Searching Nearby Exoplanetary Systems for Extraterrestrial Intelligence**

Raffy Traas

Co-authors: Steve Croft, UC Berkeley, SETI Institute; Vishal Gajjar, UC Berkeley; Howard Isaacson, UC Berkeley, University of Southern Queensland; Matt Lebofsky, UC Berkeley; David H. E. MacMahon, UC Berkeley; Karen Perez, Columbia University; Danny C. Price, UC Berkeley, Swinburne University of Technology; Sofia Sheikh, UC Berkeley, Pennsylvania State University; Andrew P. V. Siemion, UC Berkeley, SETI Institute, Radboud University, University of Malta; Shane Smith, Hillsdale College; Jamie Drew, Breakthrough Initiatives; and S. Pete Worden, Breakthrough Initiatives

Mentors: Steve Croft, UC Berkeley; and Shauna Sallmen, Physics

Through the work of missions like the Transiting Exoplanet Survey Satellite (TESS), we are beginning to understand that Earth-like planets are common—an exciting development for Breakthrough Listen (BL), the \$10M most comprehensive Search for Extraterrestrial Intelligence (SETI) effort to date. By presuming that life might emerge in environments similar to Earth, exoplanetary systems are the best places to look for evidence of life beyond Earth. In the case that intelligent life eventually develops on these other worlds and becomes at least as technologically advanced as us, they would be detectable from the activity of their radio communication networks—their technological signature. The TESS mission has developed a list of stars likely to host Earth-like planets—a catalog of objects known as Targets of Interest (TOI). The first analysis to utilize cloud-based computing, my project searched for the technosignature of intelligent civilizations in 28 BL observations of these targets, looking for activity in the 1–11 GHz radio frequency

range. This enabled us to put one of the most stringent constraints to date on the presence of gechnosignatures across such a wide range of radio frequencies.

**Oral Session C**  
**11:00 am-11:55 am**

**CAO.U.15 Synergistic Antiviral Properties of Curcuminoids and Ultraviolet-A (UV-A) light on Tulane Virus, a Human Norovirus Surrogate**

Kory Holder

Co-authors: Xinhui Li and Valeria Stepanova

Mentors: Xinhui Li, Microbiology; and Valeria Stepanova, Chemistry & Biochemistry

Human norovirus is the leading cause of foodborne illnesses in the US. It is estimated that 19-21 million cases of foodborne illnesses are caused by human norovirus each year in the US. Foods commonly associated with norovirus outbreaks include leafy greens, fresh fruits and shellfish because they are usually not or minimally processed before consumption. Therefore, effective methods to control and inactivate human norovirus in those foods are highly desirable. Research on human norovirus can be difficult because it is difficult to cultivate human norovirus. Tulane virus, a virus that is closely related to human norovirus and easily cultivated, can be used as a surrogate for human norovirus. Curcuminoid, which includes curcumin and its derivatives, are compounds within turmeric (*Curcuma longa*), a Southeast Asian plant that can be ground into powder and used as a spice. Recent literature shows synergistic antibacterial effects of curcuminoid(s) and ultraviolet (UV-A) light, and the potential of using the combination for inactivating bacteria on fresh produce surfaces. In this study, we will examine whether Tulane virus can be reliably inactivated by different curcuminoids combined with UV-A light.

**CAO.U.16 The Impact of Influencer Marketing**

Roman Kryshak and Sam Witter

Mentor: Nese Nasif, Marketing

The prevalence of social media has facilitated a new type of promotional marketing strategy: influencer. Stemming from its roots in native marketing, a marketing tactic in which the informational and persuasive objectives of the promotional objectives are blurred, influencer marketing utilizes partnerships with popular social media users to market a brand to the follower base of the social media influencer. Influencer marketing has the potential to have a powerful and lasting effect on a brand's image. The benefit (or detriment) of this effect on the image of the brand is determined by other accompanying marketing strategies of the brand. This research will survey four real cases of the use of influencer marketing in the recent prior years, including those that helped with brand image and those that harmed it. Implications for marketing managers will be discussed, and potential future research will be suggested.

**CAO.U.17 Rebecca Bunch's Misguided Hunches: Examining Comedy, Tragedy, and Guilt in Crazy Ex-Girlfriend**

Heidi Skewes

Mentor: Michael Tollefson, Communication Studies

This textual analysis contributes to the discourses of rhetorical theories relating to romantic comedies and mental health. The television show *Crazy Ex-Girlfriend* focuses on the tribulations of mental illness and relationships, which are often difficult topics, and spins them in a way that leaves audience members entertained by including comedic relief and musical numbers throughout. Through the use of comedy and tragedy, the larger plot points of the show can be understood and the application of guilt to select actions taken by certain characters assists in analyzing deeper meanings in the text. The analysis not only serves an academic purpose, but it also can help viewers of the show recognize and understand the issues in their own relationships and hierarchies, along with identifying the positive aspects in them.

### **CSO.U.18 Experimental Archaeology: Evaluating the Functions of Oneota Scrapers from La Crosse**

Danielle Beisecker

Mentors: Constance Arzigian, Archaeology & Anthropology; and Heather Walder, Archaeology & Anthropology

The Oneota were hunters, gatherers, fishers, and farmers who occupied the Midwestern United States from about 1000 A.D. to 1650 A.D. and in a major cluster in La Crosse, Wisconsin from about 1300-1600 A.D. Scrapers are type of stone tools found in the highest frequency at La Crosse Oneota sites. These are a type of tool with an angled working edge above a flat surface used in a scraping motion pulled towards the user. While Oneota scrapers are most associated with dry hide processing, it is possible that they could have been used for other purposes. Using experimental archaeology and microscopic use-wear analysis, I examined how different materials leave distinct use-wear patterns on scrapers and compared my experimental sample to an archaeological one to determine their functions. The information gained from scraper use-wear analysis can help reconstruct past lifeways of the Oneota including providing information about subsistence, environment, and aspects of culture that don't preserve such as hide or wood working.

### **CSO.U.19 Roman Influence over Iron Age Burial Practices in England**

Shannon Casey

Mentors: Amy Nicodemus, Archaeology & Anthropology; and David Anderson, Archaeology & Anthropology

The aftermath of the Roman conquest of England, which spanned from AD 43 to AD 87, resulted in changes to the cultural landscape that had previously existed. These changes also had a profound effect on the previous burial practices of the Iron Age groups in this region. This paper seeks to identify the changes in burial practices that occurred following the conquest, by examining specifically what changed. This was done by examining specific aspects of burials; types of grave goods, evidence of formal cemetery usage, how bodies were oriented within graves, evidence of urn usage in cremation burials, and what type of burial was used. This study finds that burial practices typical of the Romans had a profound influence over those used by the native groups of Iron Age England. These results help archaeologists better understand the cultural influence that the Romans had over these native groups and how greatly it affected their burial practices.

### **CSO.U.20 Effects of Mental Health Labels**

Kelly Griffa

Co-author: Daniel Hyson

Mentor: Daniel Hyson, Psychology

This research study focuses on the “labeling effect” and how a mental health label on a student influences the attitudes of their teachers. This study examines the use of diagnostic labels on children to study the effects these labels have on teachers' attitudes, their willingness to take on an extra student, and how likely they would provide additional help to a student. During the study, participants were evaluated on their knowledge of mental health through the KMI Test. Participants were given a short vignette about a student with symptoms of childhood mental illnesses. Then the participants were evaluated with Likert scales to assess their attitudes towards the student. Knowledge about mental illness and a diagnostic label did not affect the rate at which participants accepted the child into their classroom. However, the participants' knowledge about mental health did come into play when measuring the confidence of participants' ability to stay calm and to get along with the child. This is also true when participants were asked about their willingness to spend extra time with the student. Participant's knowledge didn't affect the acceptance of the child in the classroom but did affect their confidence and willingness to help in the classroom.

### **CSO.U.21 The Effects of Acute vs. Chronic Caffeine Consumption on Athletic Performance Markers**

Joseph Koenecke, Trenton Adams

Mentor: Karen Skemp, Exercise & Sport Science

Caffeine is the most widely used psychostimulant used among professional and recreational athletes and exercisers. It is well documented that caffeine has an effect on aerobic performance, and a growing body of literature suggesting its benefits on anaerobic performance as well. It is also known that chronic caffeine users develop a tolerance to the ergogenic effects of caffeine when they regularly consume the stimulant. The goal of this research is to add to the small, but present, body of literature investigating how detrimental, if at all, development of a caffeine tolerance is on athletic

performance. Our research assessed healthy college aged and enrolled students with one or more years of consistent resistance training experience. These participants were tested on one occasion at the time of writing for agility (DOT Drill), speed (100m row), power (vertical jump), and strength (3RM on barbell back squat & barbell bench press). The participants all received 3mg/kg/bw of caffeine prior to beginning this trial and were afterwards split into a placebo or trial group. The trial group was instructed to consume 3mg/kg/bw per day of caffeine, and the placebo group was instructed to take a placebo daily. Participants were given and instructed to follow a four-week workout plan. Upon completion they will meet for posttests consisting of the same performance tests. Results will be determined after statistical analysis is performed upon completion of the data collection period.

### CSO.U.22 Flag-Tag Mutants Involved in HPIV3 Protein Expression

Dom Smith  
 Co-author: Halle Pavelski  
 Mentor: Michael Hoffman, Microbiology

Human parainfluenza viruses (HPIV) are acute respiratory viruses that are separated into four types: HPIV1 – HPIV4. Collectively, HPIV affects young children, the elderly, and the immunocompromised thereby causing a significant disease burden globally and causing a large economic expense. In order to better understand HPIV, specifically HPIV3, and to possibly develop vaccines or treatment, viral protein:protein interactions are studied. In the HPIV3 lifecycle, the last steps are assembly and release. One protein critical for these processes is the matrix (M) protein. In infected cells, the M protein self-associates. To further investigate the M:M dimerization and interactions between the M protein and other viral proteins, regions in undefined loops on the outer surface of the M protein membrane were identified. Then, we constructed PCR products that contained flag tag mutations in these regions, specifically at nucleotides 77, 166, 217, 266, and 317. These variants will be used to conduct co-immunoprecipitation assays to determine if the M:M interaction is maintained in mutants. We can also use the flag-tagged M proteins to conduct virus like particle release assays to determine if the insertion interferes with its ability to assist in release of other viral proteins.

### CSO.U.23 Anti-Schur Number to $x+y=z$ in $[m] \times [n]$

Laura Zinnel, Joe Miller  
 Co-authors: Kean Fallon (Iowa State University); Ethan Manhart; Hunter Rehm (The University of Vermont); Nathan Warnberg  
 Mentor: Nathan Warnberg, Mathematics & Statistics

Consider the equation  $x + y = z$  and the set of integers  $[n] = \{1, 2, 3, \dots, n\}$ . A **solution** to the equation is a set of three integers that satisfy the equation. For example,  $\{2, 5, 7\}$  is a solution in  $[8]$  but  $\{3, 8, 11\}$  is not a solution in  $[10]$  since 11 is not in  $[10]$ . Now we are going to color each integer in  $[10]$  and let  $r = red$ ,  $b = blue$ ,  $g = green$  and  $y = yellow$ .

1	2	3	4	5	6	7	8	9	10
<i>r</i>	<i>b</i>	<i>r</i>	<i>b</i>	<i>g</i>	<i>g</i>	<i>y</i>	<i>r</i>	<i>y</i>	<i>b</i>

Once a set of integers has been colored we can describe a rainbow solution. A **rainbow solution** is a solution where each element in the solution is a different color. Thus,  $\{3, 4, 7\}$  is a rainbow solution and  $\{1, 3, 4\}$  is not. The problem we will be discussing is how to use as many colors as possible in the set  $[m] \times [n]$  while avoiding rainbow solutions. Solutions in  $[m] \times [n]$  are sums of ordered pairs of integers. For example,  $\{(2, 3), (1, 5), (3, 8)\}$  is a solution to  $x + y = z$  in  $[4] \times [8]$  since each of the first components are in  $[4]$  and each of the second components are in  $[8]$ . However,  $\{(2, 3), (1, 5), (3, 8)\}$  is not a solution in  $[4] \times [5]$  since 8 is not in  $[5]$ .

**Oral Session D**  
**12:05 pm-1:00 pm**

**DAO.U.15 Dark Side of the Moon? Surprising Aspects to Lighting up an Exoplanet's Dark Side**

Hannah Bechtel  
Shauna Sallmen, Physics

While we have discovered a great many planets orbiting other stars, only about 20 of those are potentially capable of sustaining life. Even potentially habitable planets might have one side in perpetual darkness or have a temperature unsuitable for a particular civilization's needs, so a civilization might wish to alter the energy reaching a planet's surface. Using large, lightweight mirrors to redirect starlight could be a way to do this, but there are technical issues involved. One issue we need to understand is radiation pressure (RP), since starlight can push such a mirror off course. My research group has run many simulations for mirrors in initially circular orbits. I wanted to know how radiation pressure would affect initially non-circular orbits and if in some situations those orbits are more stable than initially circular ones. Orbits which are somewhat stable even when including the effects of RP will require less fuel to maintain. In summer of 2020, I ran over 1500 simulations. I compiled a list of simulation results, including survival times and trends based on plots that I made, such as the evolution in a mirror's distance from the planet or a mirror's velocity. The list of survival times and plots were used to determine if a particular orbit would be quasi-stable, stable with external help, or not stable at all. I will present details of the process, an overview of the results, and details for selected situations.

**DSO.U.16 Magnetic Moment of Proton from a Novel Zitterbewegung Model**

Micah Atkins  
Co-authors: Steve Verrall  
Mentor: Steven Verrall, Physics

A fully relativistic zitterbewegung model of the proton is presented. The proton's charge is modeled as being dissociated from its mass. This can explain charge quantization. It is proposed that the fields of a circularly polarized circulating photon generate two oppositely charged massless shells. These charged shells exist on the surface of a spindle torus. It is explained how these charged shells generate the proton's magnetic moment. Via a simple equation, based on fully relativistic zitterbewegung motion, the proton's magnetic moment is calculated to within 0.15%. Without requiring renormalization, an algorithm is then used to revise this calculation to 12-digit precision. This model incorporates the original concept of quarks by dividing the proton into three masses. This mass division can explain the mysterious shapeshifting of the proton. This model also calculates the proton's size consistent with experimental results.

**DSO.U.17 Developing a Video Game That Can Multitask**

Zach Goethel  
Mentor: Samantha Foley, Computer Science

Users interact with computer graphics every day. Video games, web browsing, and many other applications use the computer's graphics hardware to quickly generate images to present to the user. Modern computer systems have both a multicore CPU, for general purpose processing, and specialized GPU processors for performing specialized graphics tasks many times faster than CPU could. Multicore CPUs can perform multiple tasks at once, however the GPU is only designed to talk to one task at a time. This is a challenge for graphics developers to manage multiple tasks on the CPU which want to work with the GPU. This project addresses this problem by creating a library to manage the multiple tasks on the CPU and GPU efficiently, and makes the programming interface simpler for the developers. Lemon allows users to focus on high level details like the data and operations, while the library handles the multithreading and synchronization of access to the GPU in an efficient manner leading to an end result of smooth graphics for the application.

## **DSO.U.18 College Students' Perceptions of Eating and Physical Activity Behavior Changes Associated with COVID-19 Pandemic Restriction**

Ethan Thompson  
Mentor: Peg Maher, Biology

Around March 2020, COVID-19 appeared in the United States, leading to restrictions for schools, businesses, and public transit to decrease transmission. This survey assessed college students' perceptions of changes in their eating and physical activity habits before and during the pandemic. A random sample of undergraduate (2000, 500 per classification) and graduate (500) students (1405 female, 995 male, ages 18-56 years) were invited to participate, and 317 (276 female, 76 male, 2 non-binary) finished the survey. A majority reported changes in their eating habits (61.3%) and that it was harder to engage in physical activity (68%). More reported eating less healthy (57%) versus healthier (18%). Stress/anxiety, food availability and depression were most often identified as contributing to changes in eating patterns and food intake. Weight gain (48%) was reported more often than weight loss (20%) compared to before pandemic restrictions. More reported an increasing intake of sugary snacks, savory snacks, alcohol, and caffeinated beverages and a decreasing intake of fruits and vegetables during the restrictions. Reported eating changes varied by gender and meal plan status. These results suggest physical and mental health associations with eating that merit attention by students and campus leaders in future public health challenges.

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## **UNDERGRADUATE EXHIBIT PRESENTATION ABSTRACTS**

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### **Exhibit Session A 8:45 am – 9:45 am**

#### **AAV.U.21 Mantra: "Leave This Place Better Than It Started"**

Allision Rehrauer, David Widenski, and Haley Radewan  
Mentor: Nese Nasif, Marketing

Sustainability is becoming increasingly popular among consumers as they become more aware of the world around them and has a strong impact on their purchasing decisions. Established in 2017, locally owned La Crosse Distilling Co. is making an impact on sustainability and is doing what they can to support the local environment. Not only are they meeting the basic sustainability expectations of their consumers, but they are also setting a standard for other locally owned businesses. Since their start only four years ago, La Crosse Distilling Co. has established relationships with local farmers and has found environmentally friendly ways of running their business. This company goes above and beyond to ensure that every detail of their business aligns with their mantra to leave this place better than it started.

### **Exhibit Session C 11:00 am – 11:55 am**

#### **CSV.U.24 How Volunteers in La Crosse Use Reflexive Modernization to Engage in Sustainable Development at the Kane Street Community Garden**

Malcom Nelson  
Mentor: Christine Hippert, Archaeology & Anthropology

What does sustainable development mean to volunteers at the Kane Street Community Garden in La Crosse, Wisconsin, and how do they participate in sustainable development? The significance of this paper is to gain understanding of what sustainable development is to local volunteers its significance is to community building. In Fall 2019, pilot research with The Hunger Task Force of La Crosse helped build rapport with regular volunteers through volunteering. During summer 2020, rapport was strengthened by performing participant observation through conversation and agricultural

tasks. Five informal interviews aided learning about what sustainable practices volunteers do. 50 surveys on sustainable practices were distributed to volunteers and collected, and 5 follow-up, semi-structured interviews were completed. Results indicate motivations for gardening are social opportunity, environmental activism, and supporting local food producers. My findings coincide with anthropological literature and conclude that reflection on lifestyle impacts engagement in sustainable development.

**Exhibit Session D**  
**12:00 pm – 1:05 pm**

**DAV.U.19 Impact of Face Masks on Confidence of Facial Expression Recognition**

Alison Stangler and Andrina Savor  
Mentor: Alexander O'Brien, Psychology

In response to the COVID-19 Pandemic of 2020, worldwide mask use, particularly in public, has become common. Given the high level of non-verbal communication conveyed by the face, the purpose of this research was to determine whether the ability to recognize facial expressions is significantly impacted by the presence of a face mask. We hypothesized that individuals will be less confident and less accurate when perceiving a facial expression that is covered by a mask. Participants were presented with images of individuals conveying the seven universally accepted facial expressions both with and without a face mask. Those expressions included anger, contempt, disgust, fear, joy, sadness, and surprise. Participants then chose the emotion that they perceived, in addition to rating their confidence in that choice.

# **GRADUATE STUDENT ABSTRACTS**

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Poster Session A  
8:50-9:45 am

**AAP.G.23 Comparison of Knee Biomechanics during Baseball Batting with Different Footwear Conditions in College Athletes**

Cait Atchison  
Co-author: Naoko Giblin  
Mentor: Naoko Giblin, Exercise & Sport Science

The purpose of this study is to compare knee biomechanics during batting between two different footwear conditions (metal cleats and indoor turf shoes) in collegiate baseball athletes utilizing a 3D motion capture system. The study included 10 male NCAA Division 3 baseball athletes. The participants were required to attend one 1-hour session during which their tee batting movements were recorded with a 3D motion capture system under two different footwear conditions. Each session included a 5-minute standardized warm-up, followed by adhesive marker placement and then 10 practice swings followed by 3 maximal swings that were recorded, for each footwear condition. The results of this research were not statistically significant in determining a difference between cleat and turf shoe conditions on a turf surface when looking at knee valgus and knee flexion for both limbs during tee batting. However, with a larger sample size to collect data from, the difference may generate statistically significant results. Additional research needs to be done to gather more information on the interactions of footwear type, surface type, and lower extremity kinematics during baseball-specific rotational and linear movements.

**AAP.G.24 Integrating Students with Disabilities: It Begins with Teacher Attitudes**

Samantha Beckett  
Co-author: Jocelyn Newton  
Mentor: Jocelyn Newton, Psychology

While inclusion is the goal of many education teams, there are hurdles that need to be overcome. One area, teacher attitudes, is important to examine because attitudes likely predict behavior, leading some classroom teachers to be more supportive of inclusion practices as compared to other teachers. This study examines differences between experience teaching in inclusive classrooms and place of employment on teachers' attitudes towards inclusivity. School psychologists can help teachers develop ways to improve teaching in inclusive classrooms.

**AAP.G.25 Effect of Anti-Pronation Neuromuscular Taping in Runners with a Neutral to Pronated Foot Type**

Cydney Byington  
Co-authors: Naoko Giblin, Kari Emineth, and Marisa Castaneda  
Mentors: Naoko Giblin, Exercise & Sport Science; and Kari Emineth, Exercise & Sport Science

Anti-pronation kinesiology tape (KT) can increase foot and ankle function and prevent injuries. However, its effectiveness on actually reducing pronation in runners is unknown. The purpose of this study was to determine if anti-pronation KT can reduce the amount of pronation in runners. Nine competitive and recreational runners volunteered in this crossover trial. Participants attended 3 separate testing sessions which included a 3-mile run at 80% of their 5k pace on a treadmill. The first session acted as baseline (no tape). At the beginning of the second session anti-pronation KT was applied for immediate effects and left on for 48 hours for the third session. Static arch/foot postures were measured pre- and post-run at each session, and ground reaction forces were measured during the run using force sensor insoles. After each run the participants reported rate of perceived exertion (RPE), pain, and subjective stability and comfort of KT. Anti-pronation KT improved subjective comfort and stability but did not change any physical measures of pronation during a prolonged run. The increase in comfort and stability can still benefit runners, since psychological factors can affect performance or injury recovery. Future studies should investigate the effects of anti-pronation KT on injured runners.

### **AAP.G.26 Trauma Training: Impacting Preservice Early Childhood Educators' Attitudes and Knowledge**

Sierra Caine  
Co-author: Jocelyn Newton  
Mentor: Jocelyn Newton, Psychology

Approximately 70 percent of children experience three or more adverse childhood experiences by age six, which can be associated with negative impacts on their learning and development (Clarkson Freeman, 2014). This study aims to analyze the impact of trauma-informed care (TIC) training on preservice early childhood (EC) educators' attitudes and knowledge of TIC. This research will support school psychologists' involvement in providing such training and advocating for TIC training within EC educator training programs.

### **AAP.G.27 Effect of a Neuromuscular Training Program during Various States of Fatigue on the Incidence of Ankle Injuries in Soccer Players: A Critically Appraised Topic**

Christopher Cobus  
Mentors: Cordial Gillette, Exercise & Sport Science; Scott Doberstein, Exercise & Sport Science

Clinical Scenario/Background: Ankle injuries are the most common injury occurring in soccer, the most popular sport around the world. Injury prevention is an increasingly important topic that requires understanding of the current literature for athletic trainers, coaches, strength and conditioning staff, and players alike. There are several scientific studies that show the necessity of a neuromuscular training program (NTP) in reducing ankle injuries in soccer players. However, the importance of timing has not been fully addressed in the literature. Clinical Question: Does performing a preventative neuromuscular training program at various fatigue levels in adolescent and young adult soccer players have an influence on ankle injury rates? Summary of Key Findings: A review of the available literature revealed four studies directly relevant to the clinical question and therefore discussed within this appraisal. Clinical Bottom Line: Neuromuscular injury prevention strategies can reduce the risk of ankle injuries in soccer players. Standardization of exercises and exercising timing should be studied in the future to provide a gold standard available to athletic trainers, coaches, strength and conditioning staff, and players to help them most effectively reduce the risk of ankle injury when players are at their highest state of fatigue. Strength of Recommendation: A

### **AAP.G.28 Impact of Covid-19 on Aerobic Exercise Patterns in Adults**

Joshua Damro and Michaela Larsen  
Co-authors: John Greany, Kris Greany  
Mentors: John Greany, Health Professions; and Kris Greany, Biology

Introduction: The Covid-19 pandemic prompted social distancing protocols and stay-at-home orders to minimize the spread of the novel coronavirus. The purpose of this study was to survey adults on how the pandemic and public health recommendations affect aerobic exercise patterns. Subjects: 156 subjects (95 female, 60 male) between the ages of 20 and 85 were surveyed. Methods: Subjects were surveyed on the mode, location, frequency, and duration of aerobic exercise performed in the fall of 2019 and fall of 2020. Nonparametric and parametric tests were performed to analyze responses from Fall 2019 to Fall 2020. Results: There was a reduction in the number of modes and locations utilized for aerobic exercises between Fall 2019 and Fall 2020 ( $p < 0.05$ ). The majority of subjects reported no change in their frequency (65.3%) and duration (70.5%) of their aerobic exercise and approximately 22% met current exercise guidelines for both time periods. Although 47% of the subjects did not experience weight change; 29% gained weight and 19% lost weight. Conclusion: Within the restrictions of COVID-19, participants reduced the number of locations and modes utilized for aerobic exercise. However, a majority of participants were able to maintain their prior level aerobic activity.

### **AAP.G.29 Predicting Teacher Self-Efficacy in Bullying Intervention**

Nic DeKeyser  
Co-author: Daniel Hyson  
Mentor: Daniel Hyson, Psychology

Bullying in school can result in significant internalizing problems and lower academic achievement (Burger et al., 2015). Teacher intervention in response to bullying is essential and can be impacted by teacher self-efficacy. This study will analyze factors that predict self-efficacy, including administrator support, bullying intervention training experience,

teacher peer response and teacher years of experience. This research will further reinforce the role of school psychologists in supporting teachers with their bullying interventions.

### **AAP.G.30 Forest Bathing Through the Seasons - A Literature Review**

Alyssa Doughty and Namyun Kil

Mentor: Namyun Kil, Recreation Management & Therapeutic Recreation

Forest bathing encourages individuals to use various human senses while mindfully moving through nature. Research has shown that the benefits of forest bathing include mental health benefits (decreasing depression and anxiety) and physical health benefits related to the cardiovascular system, respiratory system, and immune function. Also, forest bathing can be implemented in various settings. However, there is not much information about what season of the year most forest bathing activities occurred in regarding research findings and benefits. Our purpose is to analyze which seasons forest bathing was implemented in in the most recent forest bathing studies and how it was implemented during different seasons to bring benefits to participants. A EBSCOHOST search resulted in 91 peer reviewed journal articles using the term “forest bathing” published between 2014 and 2020. Our initial review resulted in 38 useable articles. Our further review found that the primary use of the forest bathing modality occurred in the summer, spring, and autumn. There is a gap in the literature indicating what time of the year forest bathing occurs in as well as research on winter season forest bathing. Suggestions for practicing forest bathing and examining research findings throughout the year will be discussed.

### **AAP.G.31 Family-School Partnerships: Cultural Differences in Parent Perception**

Lauren Hendrickson

Co-author: Daniel Hyson

Mentor: Daniel Hyson, Psychology

To improve family-school partnerships, we must address and identify obstacles to parent participation within schools, provide options for involvement that match each family’s motivations, interests, and abilities, and inform families of ways to support their child (Jonak, 2014). The purpose of this study was to better understand these relationships and cultural differences that impact families’ perceptions of family-school partnerships. School psychologists can then support their school’s formation and sustainability of effective partnerships with families. This study found that parents of color had more positive overall perceptions of family-school partnership, but these perceptions were not significantly predictive of their overall satisfaction with their child’s school. Implications for future research and school psychology practice are discussed.

### **AAP.G.32 The Mental Health Impact of the COVID-19 Pandemic on Division III Collegiate Athletes**

Amanda Milanowski

Mentor: Cordial Gillette, Exercise & Sport Science

During the COVID-19 pandemic, college students have been faced with many changes such as transitioning to online classes, decreased social interaction, very limited to no organized activities or sports, and lack of access to equipment and space for general physical activity. Lack of physical activity, social interaction, and daily structure creates a perfect storm for mental health concerns to arise. Due to the novelty of the pandemic, there has been little to no research on the possible strain it has put on mental health status, specifically collegiate athletes. The purpose of this study was to gather and investigate mental health information from collegiate athletes to determine if or how mental health status has been affected by the pandemic. The subjects completed three surveys including the, Beck Anxiety Inventory, Harvard Department of Psychiatry/National Depression Screening Day Scale, and Insomnia Severity Index, during the 2020 pre-season and again in November to collect data on anxiety, depression, and insomnia. The results showed scores related to anxiety, depression, and insomnia have increased since pre-season collection. Females tend to have higher scores in all three areas than males. There is no difference in scores between team and individual sports. This research is important for helping identify the strain the current pandemic has on the mental health status of college athletes.

### **AAP.G.33 Diversity and Disability: Examining the Behavioral Referral Pipeline**

Chaselyn Miller  
Mentor: Daniel Hyson, Psychology

Teachers play a crucial role in the special education process, making their self-efficacy in working with diverse students an important factor to consider as it may affect referral practices. Through survey and case scenario data, this study aims to understand how a teacher's self-efficacy best predicts referral chances for diverse students with behavioral concerns. Based on the results, school psychologists can inform best referral practices to address disproportionality and relations with students from diverse backgrounds.

### **AAP.G.35 Challenging Social Stigma: How Accepting are Youth of Depressed Peers?**

Hannah Salzsieder  
Co-author: Robert Dixon  
Mentor: Robert Dixon, Psychology

Approximately one in six youth may suffer from mental illnesses like depression (Whitney & Peterson, 2019) and many of those youths may also experience stigmatization resulting in a lack of peer acceptance. This study investigated how students with depression are accepted among peers. Results will further support the school psychologist's role in advocating for and implementing mental health interventions and the potential fallout from strained social relationships in the school.

### **AAP.G.36 The Effects of Blood Flow Restriction on Upper Extremity Fatigue and Recovery during Various Occlusion Pressures**

Benjamin Thornton, Cody Carlstrom, and Malcolm Driessen  
Co-author: Alex Burton  
Mentor: Patrick Grabowski, Health Professions

**INTRODUCTION:** Blood flow restriction (BFR) is an emerging trend in the strength-conditioning and performance setting. However, understanding of important parameters in clinical settings is limited. This study compared recovery time of arm function between multiple levels of BFR following fatiguing exercise. **METHODS:** 15 participants performed 3 maximum medicine ball tosses to establish average max distance followed by 2 sets of dumbbell overhead press fatigue protocols at 60% partial occlusion (PO). After the second set, participants were asked to complete 3 max throws followed by 30 seconds rest until 95% of initial distance was achieved, or a max of 10 trials. This was repeated with 3 different randomized POs during the recovery phase (0,50,75%). **RESULTS:** The total recovery time (minutes) for each condition increased with occlusion (0%: M=2.6, SD=1.9, 50%: M=4.6, SD=3.5, 75%: M=7.2, SD=3.2). Post hoc testing found significant differences between recovery times at all occlusion levels ( $p < 0.05$ ). The average discomfort rating also increased with each pressure. **DISCUSSION:** Time to recovery and average discomfort increased at each level of occlusion. Understanding how recovery prolongs with BFR, and associated levels of patient tolerance, is important for clinical application such as using BFR for motor control training while fatigued. **CONCLUSION:** Time to recovery of arm function and discomfort increase with percentage of PO during recovery from fatiguing exercise.

### **AAP.G.37 Teachers' Attitude Towards Inclusion: Impact of Location and Experience**

Hailey Wierzba  
Co-author: Jocelyn Newton  
Mentor: Jocelyn Newton, Psychology

Inclusive classrooms have greatly impacted the educational experiences and positive lifelong outcomes that students with disabilities receive. Teachers' attitudes greatly impact their behaviors which is why it is important to analyze what shapes their current attitudes such as school location and previous experience teaching in an inclusive classroom. Implications of this study can help teachers and school officials create a more positive attitude towards inclusive classrooms and students with disabilities in general.

### **AAP.G.38 Effect of Kinesio Tape on Vertical Jump Height and Performance: A Critically Appraised Topic**

Gregory Winkelman

Co-authors: Naoko Giblin, Scott Doberstein

Mentors: Naoko Giblin, Exercise & Sport Science; Scott Doberstein, Exercise & Sport Science

Vertical jump performance (VJP) is very important in many competitive sports. Kinesiology tape (KT) is proposed to increase VJP due to the recoil effect of the stretchy tape when applied to the Achilles tendon and triceps surae area. The purpose of this critically appraised topic is to review research that met the inclusion criteria, all of which have moderate evidence that does not support KT use for increased VJP. None of the studies had higher VJP or quicker ground reaction times. Two of the studies showed increased EMG activity in the gastrocnemius throughout the jump sequence for the KT intervention groups, but this did not provide any significant benefits in VJP. It can be concluded that KT does not have any performance advantages for individuals looking to improve their vertical jump height and ground reaction time.

### **AAP.G.41 Epidemiological Analysis of Chlamydia and Gonorrhea in La Crosse, WI from 2001-2020**

Abigail Multerer

Co-authors: Loriann Stanislawski (DHS); Jen Rombalski (La Crosse County Health Department and DHS); Paula Silha, (La Crosse County Health Department); and Gary Gilmore

Mentor: William Schwan, Microbiology

Over 20 million people are diagnosed with a sexually transmitted infection each year in the United States (US). *Chlamydia trachomatis* and *Neisseria gonorrhoeae* are the two most reported bacterial infections in the US, with over 1.5 million and 500,000 cases in 2019, respectively. However, these numbers are likely vastly underreported, in part due to the asymptomatic nature of both chlamydia and gonorrhea. Despite being underreported, chlamydia and gonorrhea infections continue to rise every year in the US. In addition to rising case numbers, it has been shown that significant disparities exist in the rate of infection between age, race, and sex demographic classifications at the national level. Although, the disparities in chlamydia and gonorrhea infections have been well described in the US, little research has been done on a smaller community scale, such as La Crosse County, where both chlamydia and gonorrhea cases have more than doubled in the past two decades. Through analyzing the demographics of the cases in La Crosse County, we have found that certain demographic groups carry a higher rate of infection. The hope is that these findings can provide insight on how to better target prevention and detection of chlamydia and gonorrhea in La Crosse County.

#### **Poster Session B**

**9:55 am-10:50 am**

### **BAP.G.25 The Effect of Blood Flow Restriction on Recovery Time Following a Lower Extremity Fatigue Protocol: A Pilot Study**

Grace Gaugert, Taylor Gesch, Mackenzie Torgerson, and Alex Burton

Co-author: Patrick Grabowski

Mentor: Patrick Grabowski, Health Professions

**INTRODUCTION:** Blood flow restriction (BFR) uses a pneumatic cuff to reduce blood flow to an extremity during exercise. BFR elicits muscular fatigue, but the duration of fatigue is poorly understood. This study compared recovery time between 0, 50 and 65% BFR following a fatigue protocol. **METHODS:** 12 participants completed 3 maximum single leg (SL) hops. Participants then completed a fatigue protocol of 3 sets of SL squats with BFR on the proximal thigh. After SL squats, participants maximally hopped with 0, 50, or 65% BFR, until recovery (80% of initial hop height) or 5 minutes elapsed. After rest, this was repeated for each randomized condition. **RESULTS:** Significant differences in recovery time were observed between all conditions ( $p < 0.05$ ). The shortest recovery time was at 0% BFR ( $M=0.95$ ,  $SD=0.79$  min) followed by 50% ( $M=2.74$ ,  $SD=1.67$  min) and 65% ( $M=4.30$ ,  $SD=1.27$  min). **DISCUSSION:** This study provides insight on the duration of BFR fatigue effects. 65% occlusion elicited the longest fatigue effect and was well-tolerated. It must be noted that participants were limited to 5 minutes of hopping in each condition. During 65% occlusion, most participants were stopped at 5 minutes, indicating that recovery time is actually longer than 4.30 min. **CONCLUSION:** Percentage of occlusion affects time to recovery after fatiguing exercise in a dose-response relationship, with greater occlusion causing a longer duration of recovery.

### **BAP.G.26 Safe Spaces: How Comfortable are Educators Supporting LGBTQ+ Students?**

Kallie Horton  
Co-author: Robert J. Dixon  
Mentor: Robert J. Dixon, Psychology

School can be a hostile environment for LGBTQ+ youth who often experience harassment and victimization. Institutional supports, such as openly supportive educators, can mediate the adverse effects of discrimination for LGBTQ+ students. (Kosciw et al., 2008) The present study seeks to investigate how comfortable educators are supporting LGBTQ+ students and the factors that influence this to better understand how to cultivate supportive educators. Implications for practitioners will be discussed.

### **BAP.G.27 Survey of COVID-19 Effects on Resistive Exercise Patterns**

Zachary Mancl, Brittany Moreno  
Co-authors: John Greany, Kris Greany  
Mentors: John Greany, Health Professions; Kris Greany, Biology

Introduction: The purpose of this study was to investigate how the COVID-19 pandemic and public health recommendations have affected resistive exercise patterns in adults. Subjects: 156 adults between the ages of 20 and 85 completed the survey (Female=95, Male=60). Methods: Subjects completed self-administered questionnaires (paper or electronic) regarding mode, frequency, duration, and location of resistance exercise. Nonparametric statistical analyses were used to compare these variables between fall 2019 and fall 2020. Results: There was a significant reduction in the duration of resistive activity performed each session at a gym facility ( $p<0.05$ ) and a corresponding increase in duration each session exercising at home ( $p<0.05$ ). An age/time interaction was reported in the duration of resistive exercise per session at home; 20-year-olds increased (80%) and 40-year-olds did not alter their duration ( $p<0.05$ ). There were no differences found between 2019 and 2020 for mode or frequency of resistive exercise. Approximately 39% of individuals met or exceeded the guidelines for resistive exercise in 2019 and 34% in 2020. Conclusion: Adults adapted their exercise patterns during Covid-19 by shifting resistive exercise time from the gym to home. During the pandemic, slightly fewer individuals met ACSM guidelines of resistive exercise at least twice per week.

### **BAP.G.28 In vitro Effects of Cold Storage on Human and 13-lined Ground Squirrel Platelet Apoptosis**

Noah Splinter, James Nitz, Emily BonoAnno, and Emily Bartig  
Mentor: Scott Cooper, Biology

Human platelets have several therapeutic uses in hospitals including their administration to patients with thrombocytopenia or those that have undergone severe blood loss. Their storage time is limited at room-temperature due to microbial contamination, while the potential for cold storage remains to be seen as platelets stored at 4°C are rapidly cleared from circulation post-transfusion. The platelets of hibernating mammals such as the 13-lined ground squirrel remain in circulation following periods of time when their body temperature drops to temperatures near 4°C, making this organism a novel animal model in this research. To investigate the potential role of apoptosis, programmed cell death, in the rapid clearance of platelets from circulation following cold storage, human and ground squirrel platelets were collected and stored at room temperature or in the cold for 0-10 days, labelled with fluorescent markers for apoptosis, and analyzed by flow cytometry. Human platelets showed increased expression of apoptotic markers over time when stored in the cold. The platelets of the ground squirrel that were stored in the cold showed lower levels of apoptosis when compared to platelets stored at room temperature. These results suggest that ground squirrels have developed physiological mechanisms that prevent their platelets from undergoing apoptosis when stored in the cold, potentially contributing to the ability of their platelets to remain in circulation following hibernation.

### **BAP.G.29 The Impact of Attentional Focus on Joint Coordination during Jump Landing in Female Athletes**

Molly Stewart and Lindsey Waite  
Co-author: Thomas Almonroeder  
Mentor: Thomas Almonroeder, Health Professions

Introduction: Abnormal joint coordination is one factor that may increase female athletes' risk of lower extremity injuries during sports. Injury prevention programs promoting internal (IF) and external

focus (EF) instructions have been used to improve movement technique with the goal of reducing injury risk. The purpose of this study was to compare the influence of IF or EF instructions on joint coordination while landing in female athletes. Methods: Sixteen uninjured, young females performed landing trials with their typical landing pattern and after given instructions promoting an internal focus then external focus. Vector coding was used to examine the coordination between the hip-knee, knee-ankle, and hip-ankle during the early period of the landing phase. Results: Hip-knee intra-phase variability was significantly greater for EF ( $0.92\pm 0.03$ ) than for IF ( $0.98\pm 0.01$ ) ( $p < 0.001$ ) and hip-knee intertrial variability was significantly greater for EF ( $6.63\pm 5.32$ ) than for IF ( $2.25\pm 1.50$ ) ( $p < 0.001$ ). Conclusion: EF instructions resulted in greater intra-phase and inter-trial variability compared to the IF for the coordination between the hip and knee joint only. Increased movement variation may allow one to better adapt their movements to prevent possible injury and to optimize task performance and learning.

**Poster Session C**  
**11:00 am-11:55 am**

**CAP.G.25 Endophytic Fungal Diversity in Whitebark Pine and Spruce: Links between Species Assemblage, Biogeography, and Blister Rust Occurrence**

Dylan Baldassari and Liz Dominguez Mendez  
Co-authors: Tom Volk and Todd Osmundson  
Mentors: Tom Volk, Biology; and Todd Osmundson, Biology

An ecologically important species at high elevations in the northern Rocky Mountains, whitebark pine (*Pinus albicaulis*) has experienced dramatic population declines over the last 20 years, culminating in candidacy for Endangered Species Act protection. These declines can largely be attributed to invasive white pine blister rust (*Cronartium ribicola*). Initial research suggests that fungal foliar endophytes (symbiotic fungi living within the needles) may provide a first line of defense against the pathogen. However, little is known about these fungi and whether they interact with other conifer species in the Rocky mountain subalpine. Our project uses high-throughput DNA sequencing to illuminate the occurrence and diversity of different endophyte species as a function of host species (spruce, fir, whitebark pine), host health, habitat characteristics, and site isolation in subalpine and treelined forests in the Montana Rocky Mountains. Understanding these associations is critical for understanding the dynamic balance between fungal endophytes and their symbiotic hosts, predicting the future of whitebark pine populations, and managing ecosystem health and sustainability in the Rocky mountain subalpine zone.

**CAP.G.27 The Reliability of Heart Rate Variability Threshold**

Austin Kosmal  
Co-authors: Dominique Peckumn, Salvador J. Jaime, and Ward C. Dobbs  
Mentors: Ward Dobbs, Exercise & Sport Science; and Salvador Jaime, Exercise & Sport Science

Background: Heart rate variability (HRV) is the measure of variation between successive heartbeats that reflects the autonomic nervous systems influence on cardiovascular control. The HRV threshold (HRVT) is the point during exercise where the decrease in HRV is attenuated as workload is increased. However, the consistency of HRVT in relation to exercise intensity has yet to be established. Purpose: The purpose of this study was to evaluate the reliability of HRVT during multiple max cycling tests. It was hypothesized that a strong intra-individual association would exist between HRVT across the three trials. Methods: Eight healthy and active adults, performed three ramped cycle ergometer tests until volitional fatigue. Heart rate data was measured continuously using an electrocardiogram (ECG), and HRV was quantified in the last minute of each 3-minute stage. The HRVT was identified as the workload at which the shift in HRV between workloads was less than one millisecond. An Intra-class correlation coefficient will be utilized to quantify the reliability of HRVT. Results & Discussion: Data collection is complete, but data analysis is ongoing. This abstract is submitted as a work in progress but will be ready for dissemination prior to the symposium.

### **CAP.G.28 Computational Comparisons of How the Pesticide, Thiamethoxam, Interacts with the nAChR of Two Model Organisms**

Shayla Michel

Co-authors: Jennifer Klein and Tisha King-Hiden

Mentors: Tisha King-Hiden, Biology; and Jennifer Klein, Biology

Neonicotinoid pesticides are class of insecticides that kill insects by over-activating a receptor in the insect nervous system. They are commonly used for agricultural purposes and have garnered recent attention because they have been found to cause adverse effects in species that aren't their primary targets. Recent laboratory experiments have identified that one neonicotinoid pesticide, thiamethoxam, has the ability to cause adverse effects in some fish species. Therefore, the goal of this research was to determine how thiamethoxam interacts with the receptors in the nervous system of the target organisms, invertebrates, compared to those in a non-target group, vertebrates. The Maestro software, developed by Schrödinger, was used to visualize how thiamethoxam interacts with one receptor, the nAChR, of the invertebrate nervous system compared to how it interacts with the vertebrate nAChR. These results may offer insights about why fish still experience adverse effects after exposure to thiamethoxam, even though they aren't the intended targets of the pesticide. Combined with findings from laboratory experiments, these results can help to construct a comprehensive perspective on how fish are affected by this pesticide that is frequently present in the aquatic environment.

### **CAP.G.29 Correlation between Skeletal Muscle Saturation and Skinfold Measurement during Incremental Maximal Exercise Tests**

Dominique Peckumn

Mentors: Ward Dobbs, Exercise Sport & Science; and Salvador Jaime, Exercise & Sport Science

Purpose: The purpose of our investigation is to determine if there is a negative relationship between measures of skeletal muscle oxygen saturation and adipose tissue thickness. This information is valuable as it can further validate the accuracy of a novel and portable near infrared spectroscopy (NIRS) device and elucidate potential adjustments depending on local adiposity. NIRS is a method that continuously measures infrared light absorbance providing a measurement of oxygenated and deoxygenated hemoglobin in skeletal muscle tissue. Skinfold measurements are an indirect measure of percent body fat on an individual and are indicative of adipose tissue in a specific area of the body. We hypothesize there to be a negative correlation between the muscle deoxygenation measurement using NIRS and skinfold thickness. Methods: Nine young, healthy, and recreationally active individuals performed three maximal incremental cycle ergometer tests. Gas exchange, heart rate, skeletal muscle saturation and workload were all recorded during each trial. Results & Conclusion: Data collection and analysis is currently on going and this abstract is submitted as a work in progress. All data will be collected and analyzed prior to the date of the symposium.

### **CAP.G.30 The Influence of Heavy and Ballistic Back Squat Stimuli on Countermovement Jump Performance**

Alex Ruechel

Mentors: Ward Dobbs, Exercise Sport & Science; and Salvador Jaime, Exercise & Sport Science

Purpose: The inclusion of a stimulus performed at maximal, or near maximal effort, into a warmup has been shown to improve the performance of subsequent power events, attributing to what is known as post-activation performance enhancement (PAPE). The purpose of this study is to evaluate the influences of varying back squat techniques with equated volume loads on countermovement jump (CMJ) performance. It was hypothesized that the ballistic intervention would induce the greatest PAPE. Methods: On four separate occasions, participants will complete a standardized warm-up followed by four minutes of passive recovery before completing CMJs on dual force plates. On the first visit, participants will perform a one repetition max (1RM) back squat using a Smith Machine. In the sequential visits, participants will be asked to complete the same standardized warm-up followed by one of three additional stimuli (passive recovery, 2 repetitions at 80% 1RM back squat, or 4 ballistic repetitions at 40% 1RM back squat) performed in a randomized order. A one-way repeated measures analysis of variance will be used to investigate the influence of the warmup protocols on CMJ performance. Results and Discussion: Data collection is ongoing but will be prepared for dissemination prior to the symposium.

### **CAP.G.31 The Influence of Intermittent Cooling on Cycling Performance and Heart Rate Recovery**

Hailey Weyenberg

Co-authors: Ward C. Dobbs and Salvador J. Jaime

Mentor: Ward Dobbs, Exercise Sport & Science

Purpose: Heart rate recovery (HRR), a non-invasive reflection of parasympathetic rebound following exercise, has been shown to be improved through cooling interventions. The primary aim of this investigation is to evaluate the influence of different intermittent cooling methods on cycling performance and HRR. It is hypothesized that intermittent use of a cooling vest (systemic) and ice packs on the thighs (targeted) will improve cycling performance and HRR. Methods: Nine healthy, recreationally active adults performed four exercise trials designed to simulate varying intensities representative of a sporting event. Each exercise trial was performed on a cycle ergometer and consisted of four 5-minute exercise bouts separated by 3-minute passive recovery periods. Cooling interventions were randomly administered during recovery and consisted of no cooling (C), an ice vest (V), ice packs on the thighs (T), or a combination of an ice vest and ice packs on the thighs (V+T). A factorial analysis of variance with planned contrasts will be utilized to evaluate the influence of cooling modality on HRR and cycling performance across time. Results & Discussion: This abstract is being submitted as a work in progress. Data collection is ongoing, but results will be ready for dissemination prior to the symposium.

#### **Poster Session D 12:05 pm – 1:00 pm**

### **DAP.G.20 The Influence of Step-Down Technique on Lower Extremity Mechanics during Curb Descent**

Nicole Bednarz, Tia Demers, and Kris Mitchell

Co-author: Emily Gerstle (University of Scranton)

Mentor: Thomas Almonroeder, Health Professions

When stepping down from a curb, individuals typically make initial ground contact with either their rearfoot or forefoot. The purpose of this study was to compare lower extremity mechanics and intra-limb work distribution when individuals adopt a rearfoot technique vs. a forefoot technique, during simulated curb descent. Sixteen subjects stepped down from a platform with both a rearfoot and a forefoot technique. Sagittal plane joint kinematics and kinetics were examined for the lead limb during the step-down task. Paired t-tests were used for comparison. Subjects demonstrated greater ankle joint power ( $p < .001$ ) and negative work ( $p < .001$ ) and less hip joint power ( $p < .001$ ) and negative work ( $p < .001$ ) with the forefoot technique vs. the rearfoot technique. Total lower extremity negative work was greater for the forefoot technique vs. the rearfoot technique ( $p < .001$ ). The percent contribution to the total negative work was greater for the ankle joint ( $p < .001$ ) and less for the hip ( $p < .001$ ) and knee joints ( $p = .001$ ) with the forefoot technique vs. the rearfoot technique. Curb descent technique influenced lower extremity mechanics and intra-limb work distribution. The results of this study may provide insight into how curb descent technique can be modified to alter lower extremity loading.

### **DAP.G.21 The Effect of Virtual Versus In-Person Teaching Methods on Learning Retention: A Pilot Study**

Alexandria Cording, Erika Sesing, Kaylee Miller, Andrew Wilke, Alex Evans, and Ethan Crocker

Mentor: Thomas Greiner, Health Professions

Many studies have been conducted to examine the effects of in-person versus online learning due to the impact of 1.5 billion students being forced to adjust to online learning in 2020. However, these studies failed to demonstrate the differences in learning retention between the two methods. This study aims to examine the effects of virtual versus in-person teaching methods on learning retention in undergraduate pre-physical therapy males and females. 39 participants from the Pre-Physical Therapy program at the University of Wisconsin - La Crosse were randomly assigned to 2 groups for a neuroanatomy lecture presentation. Group 1 received instruction through an in-person presentation, while group 2 received instruction through a virtual format. Data was collected utilizing 3 different, 25-question assessments. The scores for the in-person group pre, post, and retention-test were 50.9%, 74.7%, and 66.4% respectively; while the scores for the virtual group were 48.2%, 68.4%, and 63.4% respectively. The findings suggest that there was no difference in learning retention demonstrated by the small difference between their post-test and retention test assessments. The biserial discriminations of all three assessments were proven to be adequate, indicating well-constructed assessments.

### **DAP.G.22 A Comparison of Ten Minutes of Vibration and Squat Exercise on Femoral Cartilage Thickness in Healthy Young Adults**

Jacob Dorhorest, Korl Bomkamp, Sydney Welke, Dayna Dols, Maechaela Kolpien, and Andy Dockendorf  
Co-author: Steni Sackiriyas  
Mentor: Steni Sackiriyas, Health Professions

Introduction: Loss of medial femoral cartilage thickness has been associated with radiographic and pain progression in individuals with knee osteoarthritis. Mechanical vibration on cartilage thickness has not been extensively studied in humans. Purpose/hypothesis: This study aims to determine the effects of passive lower extremity (LE) vibration compared to squat exercise on medial femoral cartilage thickness. Materials/methods: 26 participants were randomly assigned to squats and vibration groups and performed three sets of 15 repetitions of unweighted squats and 10 minutes of seated vibration to their feet, respectively. Medial femoral cartilage thickness on the right lower extremity was measured using ultrasonography at baseline and post interventions. Results: A significant group-by-time interaction effect ( $p=0.049$ ) indicated that the change in cartilage thickness from baseline to post differed between the groups. The vibration group demonstrated a moderate increase in cartilage thickness ( $p=0.013$ ;  $ES = 0.62$ ), while the squat group did not demonstrate a change in cartilage thickness ( $p=0.838$ ;  $ES = 0.02$ ). Conclusions: Preliminary results indicate that mechanical vibration may be beneficial in increasing cartilage thickness.

### **DAP.G.23 Association of Functional Ultrasound Imaging and Isometric Torque Measurement of Gluteal Muscle Activation During Gait in Healthy College-Aged Participants**

Allison Jahns, Leigh Heathcote, Jessica Ahrens, Taylor Blackman, Mason McManimon-Myers, Bill. Keane, and Drew Rutherford  
Mentor: Drew Rutherford, Health Professions

Background: The role of the gluteus maximus (GMAX) and gluteus medius (GMED) muscles during walking have commonly been studied using electromyography (EMG). While EMG can measure the timing and activation of hip muscles contributing to gait, the most accurate methods of measurement involve invasive intramuscular fine-wire electrodes. Surface electrodes address the issue of invasiveness but are highly prone to crosstalk and inaccurate readings for deeper muscles. Therefore, there is a need for a non-invasive method to measure functional activation of deeper muscles contributing to gait. Purpose: The purpose of this study is to validate use of portable ultrasound muscle imaging during gait to determine GMAX and GMED activation levels with a functional activity ratio (FAR) and compare to joint torque outputs found via motion capture and muscle models. This study will also compare the FAR of GMAX and GMED ultrasound images (USI) recorded during gait to images taken at known muscle torques using an isokinetic machine. Methods: Healthy college-aged participants received USI of GMAX and GMED during 3D motion capture of treadmill walking and isokinetic testing. Results: Future data analysis will focus on associating FAR of GMAX and GMED obtained from USI with known joint torques and phases of the gait cycle.

### **DAP.G.24 Covid-19 and Nutrition Patterns**

Kayla Litwin and Madeline Jelacic  
Co-authors: John Greany and Kris Greany  
Mentors: John Greany, Health Professions; and Kris Greany, Biology

Introduction: The purpose of this study was to investigate the effect of Covid-19 and accompanying public health recommendations on weight and nutrition patterns in adults. Subjects: One hundred and fifty-six participants (95 females, 60 males; 20 - 85 years old) completed a self-administered questionnaire in fall 2020. Methods: The questionnaire addressed body weight, shopping patterns, dining habits, and consumption of fruits, vegetables and alcohol in fall 2019 and fall 2020. Nonparametric and parametric tests were performed to analyze the difference in responses between time periods. Results: Frequency of shopping decreased ( $p<0.05$ ). Dining habits changed, with 65% of subjects reducing restaurant dining ( $p<0.05$ ). There were no differences in body weight or fruit/vegetable consumption between fall 2019 and fall 2020. Age did not affect changes in reported food consumption. A trend toward increased alcohol consumption for men ( $p= 0.07$ ) but not women was noted. Conclusion: Covid-19 did not have a significant effect on the consumption of specific food groups or body weight for the adults surveyed. There was a decrease in frequency of shopping and a reduction in restaurant dining between fall 2019 and fall 2020.

### **DAP.G.25 Autoregulation of the NmpR Two- Component System in *Myxococcus xanthus***

Colin McAllister  
Co-author: Daniel Bretl  
Mentor: Daniel Bretl, Microbiology

*Myxococcus xanthus* is a soil bacterium that uses numerous two-component systems (TCS) to regulate social behaviors including motility, multicellular development, and microbial predation. Bacterial TCS consist of a histidine kinase (HK) that recognizes signals and activates via auto-phosphorylation. The HK then phosphorylates a response regulator (RR) which binds DNA to regulate genes that respond to the signal sensed by the HK. *M. xanthus* motility, which underlies its social behaviors, is partially regulated by the Nmp TCS. The focus of this project was to characterize binding of the NmpR RR to its own promoter. I first performed an electromobility shift assay to determine the importance of two suspected NmpR promoter binding sites *in vitro*. Mutation of one site to a non-binding sequence diminished NmpR binding, and mutation of both sites abolished binding. We then sought to correlate NmpR binding with transcriptional activity *in vivo*. We constructed *lacZ* reporter fusions with promoters of either the normal wild-type or with one or two of the NmpR binding sites mutated. Our research showed that decreased NmpR promoter binding *in vitro* correlated with decreased regulation *in vivo*. This reporter fusion will be used to examine how mutations of *nmpR* alter regulatory activity. Ultimately, we will use NmpR as a model for how conserved amino acids of RR alter their activity, with implications for therapeutics targeting bacterial TCS.

### **DAP.G.27 Using Change-Point Analysis to Identify Changes in Impact Accelerations During a Repetitive Ballet Maneuver**

Paj Nra Yang, Kyle Gamoke  
Co-author: Thomas Almonroeder  
Mentor: Thomas Almonroeder, Health Professions

Change Point Detection (CPD) is a novel form of data driven analysis in biomechanics that can be used to determine if and when significant changes in a variable occur throughout a series of trials. CPD also allows for analysis of independent participants which provides insight on the unique variability that can occur between individuals without pooling the data. This study examines the potential use of CPD for identifying changes in impact accelerations of 15 individual ballet dancers across repetitions of the changement de pied maneuver to self-determined exhaustion. Twelve of the 15 dancers exhibited at least one change point during performance of the repetitive maneuver. For the 12 dancers who exhibited a change point, the number of change points identified ranged from 1 to 5. In each case, the initial change point reflected an increase in the impact accelerations. On average, impact accelerations increased from  $4.11 \pm 0.75$  g to  $4.55 \pm 0.62$  (10.71% increase) for this initial change point. Our findings demonstrate that this novel method of CPD provides a unique and individualized approach to understanding the nature of changes in force attenuation that may occur during repetitive high impacts sports with possible implications for injury prevention.

### **DAP.G.28 Achilles Tendon Loading Pattern across Running Speeds**

Bryce Ertman, Alex Bakken, Allison Blaser, Melissa Klaeser, Kali Priest, and Lucas Voie  
Co-author: Thomas Kernozek  
Mentor: Thomas Kernozek, Health Professions

Achilles tendon (AT) injuries are common in runners. Loading on the AT during running is thought to play a role in injury. Currently we do not know how these loads change during a span of running velocities. The purpose of this study was to examine the AT stress across running velocities at 0.5m/s intervals ranging from 2.0m/s to 5.5m/s. Our hypothesis is AT stress increases loading as running velocity increases to 5.5m/s. Utilizing repeated measures design, 20 healthy female subjects ran at the various velocities in a randomized order on an instrumented treadmill. Motion analysis was used to track body kinematics. Kinematic and kinetic data were used as inputs into a musculoskeletal model to estimate muscle forces using static optimization. Muscle force estimates from the gastrocnemius and soleus were summed to determine AT force during the stance phase for 6 steps at each running velocity. Ultrasound images were used to determine AT cross section area. AT stress was based on dividing AT force by each cross-sectional area. Ensemble averages of related AT loading were determined and statistically analyzed. AT loading parameters were greater with increased running velocity, as there was approximately a 93% increase found in average peak AT stress from 2.0m/s to 5.5m/s. This can be largely attributed to alterations in soleus muscle force throughout the range of running velocities. Changes to running velocity may influence rehabilitation efforts in the treatment of AT injury.

# GRADUATE ORAL PRESENTATION ABSTRACTS

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## Oral Session A 8:50 am-9:45 am

### AAO.G.34 Making a Mushroom: Gene Expression in *Flammulina velutipes*

Thomas Roehl  
Mentor: Todd Osmundson, Biology

*Flammulina velutipes*, a commercially cultivated mushroom known as “enoki” in grocery stores, is a useful model organism for studying mushroom development because it grows in two forms depending on environmental conditions: a spaghetti-like cultivated form and an umbrella-like normal form. Little is known about the genes controlling mushroom development. Previous research has examined gene expression in *F. velutipes* mushrooms, but my research is the first to analyze gene expression differences in all three major mushroom tissues (stipe, pileus, and gills), within each tissue as development progresses, and between the cultivated and normal forms. A strain of *F. velutipes* was newly isolated from the wild in Hixon Forest and induced to fruit in both forms. Samples from the mycelium, stipe, pileus, and gills were collected once the mushrooms reached one of four stages: primordium, young normal, mature cultivated, or mature normal. After sampling is completed, mRNA will be extracted from all samples and submitted for Illumina sequencing. The New Tuxedo protocol will then be used to quantify differences in gene expression levels between tissues and growth forms. So far, all four stages have been successfully sampled. The final rounds of fruiting are in progress and sequencing and analysis will begin soon.

### ASO.G.39 Production and Examination of Three Novel Nuclear Transit Mutants of HPIV3 Matrix Protein

Cara Ahrenhoerster  
Mentor: Michael Hoffman, Microbiology

Human Parainfluenza Viruses (HPIV) cause lower respiratory diseases such as croup, tracheobronchitis, and pneumonia. One subtype, HPIV3, is more common and has a higher likelihood for complications. Thus, new interventions for HPIV3 would be of great benefit to decrease the burden of disease. One HPIV3 protein that is a strong candidate for future intervention is the matrix (M) protein. This protein is responsible for gathering all viral components (virus particle assembly) and releasing virus particles from infected cells. Prior research from the Hoffman lab focused on understanding how the M protein travels in cells and interacts with viral and cellular components to accomplish these life cycle steps. Two amino acid segments within the M protein were identified as important in M protein nuclear trafficking. This testing was done by expressing (individually) and tracking the location of the wild-type M protein, or M proteins with alterations in the nuclear trafficking segments, in cells. M protein is also known to interact with other viral proteins. Thus, to test the importance of nuclear transit of the M protein in an actual virus infection, viruses containing the previously studied nuclear transit mutations will be created and their replication compared to wild-type virus.

### ASO.G.40 Monocular Vision and Sensor Fusion Based Indoor Localization

Lu Liang  
Mentor: Lei Wang, Computer Science

At present, GPS is widely used and well-known for outdoor localization applications. However, GPS technology struggles to obtain signal and accuracy in indoor environments. In most indoor cases, GPS signals will be blocked or reflected by walls, and cannot enter the room. As a result, satellite signals cannot be received properly, so it is impossible to calculate location due to the insufficient signal strength inside the room. There remains a strong demand for technologies to deliver indoor localization. Our research proposes a monocular vision and sensor fusion-based indoor localization method. The monocular vision localization method we use solves the problem that the localization technique depends on GPS signals, which are difficult to be received in indoor environments. Our proposed method of combining visual positioning and sensors reduces the accumulation of errors caused by using only sensors for positioning while filling the gap caused when visual positioning does not work. The method we propose can be implemented and instantiated on an Android phone. The experimental results show that 1) Visual positioning works well in indoor environments and receives little interference from the environment. 2) The combination of visual

localization and sensor localization via Kalman filter processing greatly reduces the accumulation of errors associated with localization using only one of these techniques.

**Oral Session B**  
**9:55 am-10:50 am**

**BSO.G.30 The Effects of Acute Beet Root Juice Supplementation on Anaerobic Power in Females**

Kaitlin Baumann

Mentors: Salvador Jaime, Exercise & Sport Science; John Pocari, Exercise & Sport Science

Beet root juice (BRJ) contains a high concentration of inorganic nitrates, previously shown to improve blood flow to skeletal muscle. Recent studies in males have found that acute BRJ supplementation can improve anaerobic exercise performance. The effects of BRJ supplementation on exercise performance in females is limited. The purpose of this study was to determine the effect of BRJ supplementation on anaerobic performance in females. We utilized a countermovement jump (CMJ) test and a Wingate anaerobic power test to observe potential differences between treatments. Results were examined under two isocaloric conditions which required supplementation of either 1) BRJ (10g) or 2) placebo (10g) before testing. Data collection is ongoing but will be ready by the symposium. Differences between testing condition outcomes within subjects will be examined using SPSS.

**Oral Session C**  
**11:00 am-11:55 am**

**CAO.G.32 How the Addition of Oil and a Surfactant to the La Crosse River Marsh Influences Bacterial Community Function**

Andrew Wells

Co-author: Bonnie Bratina

Mentor: Bonnie Bratina, Microbiology

Crude oil is a pollutant that can have a dramatic effect on a microbial community. Surfactants, chemicals designed to enhance bioremediation of oil spills via oil degrading bacteria, also have been shown to influence the microbial community. Because of this, it is important to test the effects that oil and a common surfactant might have on a vulnerable aquatic ecosystem, such as the La Crosse River marsh. Microcosms were used as a proxy to test the effects an oil spill and the addition of a surfactant would have on the La Crosse River marsh microbial community. Four replicates of a marsh water treatment, a marsh water and oil treatment, a marsh water and surfactant treatment, and a marsh water, oil, and surfactant treatment were run in 250 mL glass flasks. A total of 3 trials each lasting 2 weeks using these treatment groups were run, with a different concentration of surfactant used for each trial. Community function was characterized through measuring bacterial secondary production and enumeration via acridine orange direct counts. Trials 1 and 2 indicated that secondary production was highest in the non-surfactant treatments during the first 2 days of incubation, but secondary production in trial 3 was noticeably higher in the surfactant only treatment. Acridine orange staining revealed that bacterial counts do not appear to be significantly different between treatments, indicating that neither oil nor surfactant had a toxic effect on the microbial community.

**Oral Session D**  
**12:05 pm-1:00 pm**

**DAO.G.29 Bones, Bugs, and Bioerosion: An examination of Forensic and Archaeological Ichnoentomology**

Abraham Packard

Mentor: Barrett Klein, Biology

Observation of insect activity around remains has been used as an objective mechanism of understanding beginning in the Scientific Revolution and continuing today. Species and life-stage of insect found on a corpse formed reliable evidence for post-mortem interval by 1894 and such evidence is still sought out and presented in courts of law. Similar reasoning was used in 1908 to settle an archaeological debate on skeletal remains indicating the possibility of syphilis in Ancient Egypt. However, the study of traces left by insects (ichnoentomology) on bone received little of the attention directed towards fleshy remains and has not progressed markedly since. Forensic entomology focused on stages of decomposition where flesh remained, while research into the bioerosion of skeletal remains was left to archaeology and paleontology. Insects may have a severe taphonomic impact on skeletal remains, from surface weathering to complete destruction. The most recognized bone modifying species in archaeology, forensic entomology, and paleontology are single representatives from groups consisting of over a dozen little-studied species each. Synthesizing methods from the three fields, the importance of studying osteophilic insect species is clear. Further laboratory studies are necessary to characterize the variation and extent of bioerosion insect species are capable of authoring.

# **FACULTY & STAFF ABSTRACTS**

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## FACULTY AND STAFF POSTER PRESENTATION ABSTRACTS

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### Poster Session C 11:00 am-11:55 am

#### **CAP.F.33 The Effect of the Pandemic on College Students' Loneliness**

Ellen Rozek

Co-authors: Taylor Halvensleben and Alyxandra Holvick

As universities deal with the unique circumstances of the COVID-19 pandemic, college students are also adapting to changes. The CDC guidelines for pandemic-related health behaviors include social distancing. Social distancing has raised concerns about increasing levels of social isolation and loneliness in the population. In the fall prior to the pandemic (2019), a sample of undergraduate students were surveyed about loneliness, depression, and social connections. In the fall after the pandemic began (2020), students were surveyed about their social and academic lives, loneliness, depression, social connections, and pandemic-related health behaviors. The loneliness measures were highly correlated with one another. Students were significantly lonelier during the pandemic than before the pandemic on the De Jong Giervald Loneliness Scale ( $F(1,176) = 7.128, p = 0.008$ ) and the UCLA Loneliness Scale ( $F(1,176) = 49.66, p < 0.001$ ). However, on the single-item loneliness measures, loneliness levels were not statistically different between the fall before and the fall during the pandemic. The higher loneliness scores on the scales may be due to questions such as "How often do you feel isolated from others?" which "should" be higher with social distancing guidelines.

## FACULTY AND STAFF ORAL PRESENTATION ABSTRACTS

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### Oral Session A 8:50 am-9:45 am

#### **ASO.F.42 Does Utilizing the CANVAS Discussion Tool in Synchronous Setting Help Student's Learning?**

Recep Pekdemir, Accountancy

Co-authors: Mehmet Kocakulah, Ayca Zeynep Suer, and Sultan Kuzu Yildirim

The study has a two-fold purpose. First, it documents an experience of post and reply graded discussions in a synchronous online teaching environment of an upper-level undergraduate intermediate accounting course. Then, it examines some skills-set of the students attended to the course. The experience was realized by utilizing the CANVAS Discussion Tool of the course management system. The experience of study was planned to support the efficiency of teaching and learning in the college level accounting education. Three different small cases were provided in different periods of time then students first posted their responses without accessing others' posts, later they made comments on two peers' posts, and finally they provided their feedback about the processes of the study they are involved. Students' posts and feedback are statistically analyzed thru qualitative and empirical research methods. The results are interesting, and they encourage to continue utilizing the CANVAS Discussion Tool for increasing the learning efficiency.

#### **ASO.F.43 Rindler Wave Inertia**

Steven Verrall, Physics

Co-author: Micah Atkins

A novel model explaining inertia, called Rindler Wave Inertia, is proposed. This model assumes that inertial resistance is due to three interacting spherical quantum waves. One wave is the de Broglie matter wave, which becomes the Compton wave in fully relativistic situations. Another wave is the fundamental harmonic of a Rindler sphere, where the Rindler sphere's radius is the Rindler distance for an accelerating mass. A third wave is the fundamental harmonic of the observable Universe, which we call the Hubble wave. Relativistic equations for inertial resistance are derived. They

suggest that Zitterbewegung motion is due to the Compton and Rindler waves coinciding for spin half particles, Zitterbewegung energy is equivalent to the median energy of an Unruh photon, and that galaxy rotation curves are due to the Rindler and Hubble waves coinciding for masses with sufficiently low centripetal acceleration. A linear version of this model agrees well with the established theory of Quantized Inertia. Both the rotational and linear forms of this model provide a quantum mechanical explanation for inertia. In an algebraically straightforward manner, this proposed Rindler Wave Inertia model explains quantum effects, galaxy rotation curves, and all situations well-described by Newtonian Mechanics and Special Relativity.

**Oral Session B**  
**9:55 am-10:50 am**

**BSO.F.31 The Personal Branding Video: Telling a Story to Land a Job**

Scott Reber, Management

Searching for a job is like launching an ad campaign—and the product we market is us, our own unique combination of skills, education, and experience. Time was when the “sales promotions” we submitted to prospective employers were limited to résumés and cover letters. Nowadays, however, another channel is quickly emerging as a vehicle for showcasing our background and qualifications, for showing rather than telling: the personal branding video. My presentation features the PBRs, or video résumés, of two former students from UW-L: Ryan John Crain, a member of the Ho-Chunk Nation who joined UW-L as part of the 2-Plus-2 enrollment program that allows students to transfer to a four-year institution after completing two years at a technical college. Andrew Thompson, a former quarterback on the UW-L Eagles football team and now the founder of Aoyok activewear, a startup based in Dallas, Texas. Along with highlighting the storytelling aspects and persuasive approaches of personal branding videos, my presentation touches upon the components of this emerging genre: B-roll, stock footage, voice-overs, close-ups, landscape pans, and aerial shots. Also discussed is the strategic placement of the videos on digital hosting sites such as YouTube, Vimeo, Oculu, and LinkedIn. Symposium attendees learn how to become a known quantity, “sell themselves” in a video format, and market their professional value to the world.

**BSO.N.24 Redefining Hmong American Woman Identity in Higher Education: A Scholarly Personal Narrative**

Mai Chao Duddeck, School of Education

Recent educational trends for Hmong American women have been the pursuit of post-secondary education and the development of new self-identities as first- and second-generation college students. As the researcher and participant, I am exploring how my lived experience within the broader context of the post-secondary American educational system shaped my identity as a Hmong American woman at a predominantly White institution in the Midwest. Through qualitative research, this scholarly personal narrative study is guided by one main research question and four sub-questions. The guiding question: How has my lived experience within the broader context of the post-secondary American educational system shaped my identity as a Hmong American woman? The sub-questions include: (1) Who am I? (2) Who do I pretend to be? (3) Who do I want to become? and (4) Where do I belong? Using a postmodernist paradigm, the conceptual framework utilized the Hmong story cloth and the culturally engaging campus environment models. Three themes were identified. The researcher recommends more narrative studies about the Hmong American women experience in higher education.

**Oral Session D**  
**12:05 pm-1:00 pm**

**DSO.F.30 Course Based Research Experience (CURE): Development and Impact on Learning Experience in Organic Chemistry Courses**

Valeria Stepanova, Chemistry & Biochemistry

Incorporation of course-based undergraduate research experiences (CUREs) into the classrooms have demonstrated a documented positive impact on student learning in chemistry. Activities ranging from daily in-class laboratory exercises to multi week independent research projects have been reported. The main focus of CUREs is on the assessment and

fostering of metacognitive development in participants. In addition, research practices can promote diversity and increase inclusion in chemistry courses. However, these aspects of a CURE model remain in large part unexplored. In my continuous efforts to incorporate high-impact teaching practices in my courses I developed and embedded research activities in organic laboratory courses. Here, I summarize my stepwise approach to transitioning out of a traditional "cookbook" approach to a CURE model over last four years. The data demonstrate increased collaboration and enhanced inclusion between class members. The initial findings reveal the potential impact of a CURE-based approach on engaging a diverse group of students in chemistry courses. In addition, I will share my attempts to foster inclusion and transparency by the use of technology in both lecture and laboratory chemistry courses impacted by the COVID-19 restrictions.

**2020  
RECIPIENTS OF  
STUDENT  
RESEARCH  
GRANTS**

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**2020 RECIPIENTS OF  
UNDERGRADUATE RESEARCH AND CREATIVITY GRANTS**

<b>Name</b>	<b>Department</b>	<b>Mentor</b>	<b>Title</b>
Allison Alberts	Chemistry & Biochemistry	Basudeb Bhattacharyya	Knockout and Characterization of <i>E.Coli</i> Fumerase
Isabella Andersen	Psychology	Berna Gercek-Swing	Anxiety on Campus: The Interactions Between Number of Roommates, Relational Self-Construal, Loneliness and Anxiety
Arini Arsana	Chemistry & Biochemistry	Kelly Gorres	Maximizing Solubility of an Unknown Protein in Kaposi's Sarcoma-Associated Herpesvirus (KSHV)
Nathan Beck	Chemistry & Biochemistry	Kelly Gorres	Analysis of dUTPase Catalytic Site to Identify Targets for Inhibitors
Danielle Beisecker	Archaeology & Anthropology	Constance Arzigian	Experimental Archaeology: Developing Reference Collections for Evaluating the Functions of Oneota Scrapers from La Crosse
Monica Bertucci	Microbiology	Paul Schweiger	Constructing a Bicistronic TetR Regulation System to Control Gene Expression of Acetic Acid Bacteria
Anna Buss	Biology	Jennifer Klein	Characterize the Impact of Oxidative Stress on Stem Cell Proliferation and Differentiation.
John Butrum	Biologoy	Christine Schwartz	Investigating Quantal Differences of Perineuronal Nets Surrounding the Hypothalamus between Hyperphagic and Hypophagic Hibernating Ground Squirrels
Sophia Cannarella	Microbiology	William Schwan	Purifying a <i>Staphylococcus aureus</i> Lethal Factor Protein
Haley Castle	Biology	Alder Yu	Examining Circadian Rhythms in Gut Population of Acetic Acid Bacteria
Carly Chadd & Courtney Conway	Psychology	Bianca Basten	Mental Health and Discipline Through the Eyes of Educators

Name	Department	Mentor	Title
Hunter Charles	Microbiology	Xinhui Li	Inactivation of Tulane Virus, a Human Norovirus Surrogate, in Water Using Yeast-Coated Bead
Josh Courtney	Archaeology & Anthropology	Heather Walder	Investigating the Technological Style of the Anatolian Bronze Age Sites Tell Atchana and Kültepe by Chemical Analyses
Cody Dobson	Archaeology & Anthropology; Geography & Earth Science; Archaeology & Anthropology	Connie Arzigian, Niti Mishra, Heather Walder	Investigating the Potential of Infrared Remote Sensing in Archaeological Survey
Liz Dominguez	Biology	Todd Osmundson	Going Down with the Ship? Assessing the Host Specificity and Extinction Potential for Fungi Associated with an Endangered High-Altitude Tree Species
Kyle Faivre	Chemistry & Biochemistry	Valeria Stepanova	Improvement of Curcumin Synthesis Using Regenerable Water Trap Sources
Samantha Fake & Courtney MacPherson	Exercise & Sport Science	Joel Luedke	Comparison of Handheld Pump vs. HelmetFit Technology and the Severity of Concussions in Collegiate Football Athletes
Kayla Feehan	Chemistry & Biochemistry	Kelly Gorres	Effect of Serotonin and Dopamine on Epstein-Barr Virus Lytic Cycle Activation
Kayla Feehan	Chemistry & Biochemistry	Kelly Gorres	Effect of Taurine on Epstein-Barr Virus Lytic Cycle Activation
Bailee Golisch	Psychology	Ellen Rozek	Stressed Out and Under Pressure: Decision-Making in the Healthcare Field
Sara Gonske	Chemistry & Biochemistry	John May	Investigating the Functional and Structural Role of Residues, H73, D77, and Y144 in DcrB and Their Effect on <i>Salmonella enterica</i> Copper Resistance.
Sara Gonske	Chemistry & Biochemistry	John May	Determining if Transporter Proteins, SdaC and BtuB, Play a Role in DcrB's Copper-resistance Mechanism in <i>S. enterica</i>
Rylie Gramann	Chemistry & Biochemistry	Sujat Sen	Synthesis of Nitrogen-Containing Organic Catalysts for the Conversion of Carbon Dioxide to Valuable Products

Name	Department	Mentor	Title
Kelly Griffa	Psychology	Daniel Hyson	Effect of Mental Health Labels on Teacher Behavior and Attitudes
Colin Griffin	Chemistry & Biochemistry	Daniel Grilley	An Alternative DNA Structure Formed by A-tracts Influences the Dynamic Properties of Nucleosomes
Jenna Hayes	Chemistry & Biochemistry	Kelly Gorres	Effect of Curcumin and Curcumin Derivatives on the Lytic Cycle of Epstein-Barr Virus
Allison Henderson	Biology	Eric Strauss	Stable Isotope Correlation between Muscle and Adipose Tissue on Brook Trout ( <i>Salvelinus fontinalis</i> ) and Brown Trout ( <i>Salmo trutta</i> ) in the Driftless Region of Southwest Wisconsin
Rebecca Hinz	Physics	Seth King	$\gamma$ -Radiation “Aging” of Gallium Oxide
Kory Holder	Microbiology, Chemistry & Biochemistry	Xinhui Li, Valeria Stepanova	Combination of Curcumin Derivatives and Ultraviolet-A Light for the Inactivation of Tulane Virus, a Human Norovirus Surrogate
David Holmes	Geography & Earth Science	Niti Mishra	Quantifying Changes in Mass Balance and Surface Velocity of a Himalayan Glacier Using Repeat Unmanned Aerial System (UAS) Survey
Mallory Keating	Biology	Barrett Klein	Using Thermography to Identify Sleep in an Herbivorous Pest Species and its Parasitoid
Emily Kinney	Archaeology & Anthropology	Amy Nicodemus	Inequality in Tiwanaku: A Zooarchaeological Examination
Andrew Klabon & Sawyer Massie	Biology	David Schumann	Effects of Noise Pollution on Swimming Behaviors of Fathead Minnow ( <i>Pimephales promelas</i> ): A Model Fish Species for Biological Inquiry
Macy Klabunde	Chemistry & Biochemistry	Daniel Grilley	Determining the N-Terminus of the Hemolytic Region of Hemolysin A in <i>Proteus mirabilis</i>

Name	Department	Mentor	Title
Heidi Koehnke	Biology	Ross Vander Vorste	Increasing Water Temperatures within Hexagenia Habitat to See Overall Survival and Growth Response
Joseph Koenecke & Trenton Adams	Health Education & Health Promotion	Karen Skemp	The Effects of Acute vs. Chronic Caffeine Consumption on Athletic Performance Markers
Nico Lang	Chemistry & Biochemistry	Valeria Stepanova	The Study of the Effect of pH on Product Isolation in the Microwave-Assisted Synthesis of Natural and Unnatural Curcumin
Avery Lettenberger	Biology	David Schumann	Effect of Sedimentation and a Changing Benthic Environment on Slimy Sculpin ( <i>Cottus coganatus</i> ) Swimming Endurance
Jason Machacek	Economics	Nabamitta Dutta; Lisa Giddings	Employment Status: Do Trust and Individualism Matter?
Ryan Maki	Chemistry & Biochemistry	John May	Structural and Functional Characterization of Fumarase C from <i>Salmonella enterica</i>
Kaylan Marshall	Microbiology	Bonnie Bratina	Optimization of Bacteriocin Production in <i>Carnobacterium</i> LV66
Jason Martin	Chemistry & Biochemistry	Sujat Sen	Electrodeposition and Surface Modification of Gas-Diffusion layers for the Conversion of Carbon Dioxide to Valuable Product
Connor Martin	Biology	Jaclyn Wisinski	Understanding the Role of Rap1b in Cell Proliferation
Conrad McPherson	Chemistry & Biochemistry	Kelly Gorres	Studies of Selected Ligands Interacting with Hen Egg White Lysozyme
Danielle Mori	Geography & Earth Science	Joan Bunbury	Particle Size Analysis of a Lake Sediment Core to Understand Flooding and Periods of Drought in the Upper Midwest Since the Last Glacial Period
Samuel Munk	Biology	Eric Strauss	Microplastic Abundance in Upper Mississippi Shorthead Redhorse
Malcolm Nelson	Archaeology & Anthropology	Christine Hippert	Sustainable Development as a Result of Reflexive Modernization

Name	Department	Mentor	Title
Ashton Osterhaus & Dylan Tousey	Biology	Alder Yu	Effect of Gut Microbes on Circadian Rhythms in Locomotor Activity
Annie Panico	Biology	Tony Sanderfoot	The Effects of Nitrate Exposure on <i>Chlamydomonas reinhardtii</i>
Brianna Pearson	Biology	Jennifer Klein	Development of a Regulatory T cell Biomarker for Food Allergen Tolerance during Oral Immunotherapy
Grace Quinn	Educational Studies	Charlotte Roberts	People Seeing People
Frederick Ragan & Caleb Summers	Biology	David Schumann	Condition-Dependent Competition of Brook Trout and Brown Trout: Implications for Harvestable Brook Trout Populations
Alyssa Ragon	Chemistry & Biochemistry	Daniel Grilley	Identifying Necessary Interactions for Folding/Activation of Hemolytic Protein HpMA
Rosa Salas	Biology	Anne Galbraith	Effects of Antioxidants on Yeast Growth after Treatment with the Antimicrobial SK-03-92
Jordan Schuler	Exercise & Sport Science	Joel Luedke	Metabolic Effects of Blood Flow Restriction
Cullen Schull	Chemistry & Biochemistry	Valeria Stepanova	Synthesis and Computational Study of a New Class of Enhanced Asymmetric Curcuminoids
Cullen Schull	Chemistry & Biochemistry	Valeria Stepanova	Synthesis of New Class of Enhanced Asymmetric Curcuminoids
Erick Sells	Exercise & Sports Science	Naoko Giblin	Can Shifting Focus of Attention Change the Way You Run?
Jacqueline Sporie	Physics	Seth King	Characterization of Zinc Oxide Concentration Manipulation Effects on Graphene Zinc Oxide Thin Films
McKenna Theine	Chemistry & Biochemistry	Kelly Gorres	The Use of Environmental DNA as a Tool for Detecting the Presence of Invasive Lionfish
Isaac Trocinski	Chemistry & Biochemistry	John May	Functional and Structural Analysis of DcrB Mutations in Bacterial Copper Resistance

Name	Department	Mentor	Title
Claire Trudeau	Chemistry & Biochemistry	Valeria Stepanova	Synthesis of New Curcuminoids with Improved Stability and Water Solubility
Claire Trudeau	Chemistry & Biochemistry	Valeria Stepanova	Improvement of Water Solubility of Curcuminoids
Damon Trump	Biology	David Schumann	Density-dependent Growth of Age-0 Brown Trout ( <i>Salmo trutta</i> ): Searching for Evidence in the Hyperdense Streams of the Driftless Area, Wisconsin
Melissa Vanoskey & Paige von Mende	Psychology	Tesia Marshik	Childhood Adversity and its Overall Effects on Quality of Life
Sydney Vian	Psychology	Grace Deason	The Impostor Phenomenon and the Theory of Intelligence
Ella Wall	Exercise & Sport Science	Joel Luedke	Establishing Best Time Parameters for Electrostimulation Trigger Point Dry Needling
Joe Wallner & Zach Hanson	Biology	David Schumann	Muskie Breakout! Feasibility of Using Acoustic Telemetry to Analyze Muskellunge Entrainment Rates and Habitat Usage
Chris Weier	Chemistry & Biochemistry	Daniel Grilley	Understanding the Hemolytic Function of HpmA using Aspartate Mutants
Annika Wille	Computer Science	Samantha Foley	Visualization Tool for SLEUTH
Leah Williams	Psychology	Suthakaran Veerasamy	A Powerful Force: Does the Method of Presentation of Information about Human Trafficking Influence Advocacy Behaviors?
Seth Wisowaty	Microbiology	Bonnie Bratina	Extraction of DNA from Wood and Biofilm Found on Submerged Logs in Different Flow Regions
Laura Zinnell	Mathematics & Statistics	Nathan Warnberg	Anti-Schur Numbers to $x+y=z$ in $[m] \times [n]$
Matia Zins	Chemistry & Biochemistry	Daniel Grilley	The Impact of DNA Structure on Nucleosome Exclusion

**2020 RECIPIENTS OF THE GRADUATE RESEARCH,  
SERVICE, AND EDUCATIONAL LEADERSHIP AWARDS**

<b>Name</b>	<b>Program or Department</b>	<b>Faculty Sponsor</b>	<b>Title</b>
Courtney Baker	Biology-M.S. Aquatic Science	Eric Strauss	Microplastic Abundance and Patterns in Fishes and Habitat Strata of the Upper Mississippi River System
Dylan Baldassari	Biology	Tom Volk	Fungal Diversity of the Whitebark Pine Microbiome: Examining Links Between Fungal Communities, Disease Resistance and Biogeography in a Threatened Keystone Tree Species
Ali Chalberg	Biology	Eric Strauss	High-Resolution Satellite Image reassessment of Coldwater Stream Designations in Northeast Iowa
Andrew LeSage	Clinical Microbiology	Bernadette Taylor	Development of a Serum-antibody Test Specific for a bacterium Associated with Rheumatoid Arthritis Patients
Brad Morris	Biology	Ross Vander Vorste	Temporal and Spatial Variability of Aquatic Insect Emergence in Pool 8 of the Upper Mississippi River
Judd Prasnicky	Clinical Microbiology	Anne Galbraith	The Effects of SK-03-92 Treatment on the Expression of Genes Involved in Malate Production and Cell Cycle Progression in <i>Saccharomyces cerevisiae</i>
Thomas Roehl	Biology	Todd Osmundson	Examining the Genetics of Mushroom Development in the Cultivated Edible Mushroom <i>Flammulina velutipes</i>
Noah Splinter	M.S. Cell and Molecular Biology	Scott Cooper	The <i>in vitro</i> Effects of Cold-Storage on Platelet Apoptosis and the Signaling Cascade Involved
Shianne Stacy	Microbiology	Paul Schweiger	Identifying Microbiota Change and Pathogen Susceptibility of <i>Drosophila melanogaster</i> After Disruption in Circadian Rhythm

<b>Name</b>	<b>Program or Department</b>	<b>Faculty Sponsor</b>	<b>Title</b>
Alex Ruechel	Clinical Exercise Physiology	Ward Dobbs	The Influence of Conditioning Activity on Sprint Performance when Equating Volume Load
Alexa Christenson	Exercise and Sports Science	John Porcari	The Effects of the Calm App on Heart Rate, Blood Pressure, and Mood States
Andrew Wells	Microbiology	Bonnie Bratina	How the Addition of Oil and a Surfactant to the La Crosse River Marsh Influences Bacterial Community Composition and Function
Austin Kosmal	Clinical Exercise Physiology	Ward Dobbs	Cross-validation of Muscle Oxygenation, Heart Rate Variability, and Blood Lactate Thresholds
Tanner Lange	Clinical Exercise Physiology	John Porcari	The Effects of Mindful Meditation Using the Calm App on Sleep Patterns
Kristina Joy Pechacek	Biology: Aquatic Science-MS	Eric Strauss	Habitat Use, Thermal Distribution, and Diets of Brook Trout as affected by Interspecific Competition with Non-Native Brown Trout in the Driftless Region of Southwest Wisconsin
Alexandra Kriefski	Exercise and Sport Science	Cordial Gillette	The Effects on Dynamic Postural Stability Following Cryotherapy in Athletes
Kaitlin Baumann	Exercise and Sport Science	Salvador Jaime	The Effects of Acute Beet Root Juice Supplementation on Anaerobic Power in Females

## Presenter Index

A, B, C, D are the poster sessions

A=Asynchronous; S=Synchronous

P= Poster; O=Oral Presentations; E=Exhibits

F=Faculty & Staff; G=Graduate Students; U=Undergraduate Students

NAME	ABSTRACT(s)	NAME	ABSTRACT(s)
Adams, Trenton	CAP.U.21	Cording, Alexandria	DAP.G.21
Ahrenhoerster, Cara	ASO.G.39	Coursin, Eric	CAP.U.4
Ahrens, Jessica	DAP.G.23	Courtney, Josh	BAP.U.3
Alberts , Allison	CAP.U.1	Crocker, Ethan	DAP.G.21
Ariano, Ky	CAP.U.2	Damro, Joshua	AAP.G.28
Arsana, Arini	DAP.U.1	DeKeyser, Nic	AAP.G.29
Atchison, Cait	AAP.G.23	Demers, Tia	DAP.G.20
			AAP.U.4, BAP.U.4
Atkins, Micah	DSO.U.16	Dobson, Cody	
Bakken, Alex	DAP.G.28	Dockendorf, Andy	DAP.G.22
Baldassari, Dylan	CAP.G.25	Dols, Dayna	DAP.G.22
Banta, Reece	AAP.U.1	Dominguez Mendea, Liz	CAP.G.25
Bartig, Emily	BAP.G.28	Dorshorst, Jacob	DAP.G.22
Baumann, Kaitlin	BSO.G.30	Doughty, Alyssa	AAP.G.30
Bechtel, Hannah	DAO.U.15	Draxler, Evan	AAP.U.5
Beckett, Samantha	AAP.G.24	Driessen, Malcolm	AAP.G.36
Bednarz, Nicole	DAP.G.20	Duddeck, Mai Chao	BSO.N.24
Beisecker, Danielle	CSO.U.18	Duggan , Marissa	CAP.U.5
Bergerson, Lydia	DAP.U.6	Ertman, Bryce	DAP.G.28
Bertucci, Monica	CAP.U.3	Evans, Alex	DAP.G.21
Blackman, Taylor	DAP.G.23	Faivre, Kyle	AAP.U.6
Blaser, Allison	DAP.G.28	Feehan, Kayla	BSO.U.20
Bolduc, Joe	AAP.U.7	Floersch, Sean	BAP.U.5
Bomkamp, Korl	DAP.G.22	Freiberg, Dawson	DAP.U.3
BonoAnno, Emily	BAP.G.28	Furger, Sierra	AAP.U.7
Bower, Anna	BAP.U.1	Gamoke, Kyle	DAP.G.27
		Gaugert, Grace	BAP.G.25
Boyer, Jarod	ASO.U.22	Gesch, Taylor	BAP.G.25
Brown, William	AAO.U.14	Goethel, Zach	DSO.U.17
Burton, Alex	BAP.G.25	Golisch, Bailee	DAP.U.4
Buss, Anna	AAP.U.2	Gonske, Sara	BAP.U.6
Butrum, John	AAP.U.3	Griffa, Kelly	CSO.U.20
Byington, Cydney	AAP.G.25	Griffin, Colin	BAP.U.7
Caine, Sierra	AAP.G.26	Halvensleben, Taylor	AAP.U.8
Carlstrom, Cody	AAP.G.36	Hanson, Mia	AAO.U.14
Casey, Shannon	CSO.U.19	Hayes, Jenna	CAP.U.6
Charles, Hunter	BAP.U.2	Heathcote, Leigh	DAP.G.23
Cheekati, Tanmaya	AAO.U.13	Hendrickson, Lauren	AAP.G.31
Cobus, Christopher	AAP.G.27	Holder, Kory	CAO.U.15
Conley, Lauren	BAP.U.13	Holvick, Alyxandra	AAP.U.8

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Jelacic, Madeline	DAP.G.24	Neubauer, Jon	CAP.U.12
Jossie, Jordan	BAP.U.9	Nisius, McKenzie	AAP.U.7
Keane, Bill	DAP.G.23	Nitz, James	BAP.G.28
Keating, Mallory	CAP.U.7		
Kil, Namyun	AAP.G.30	Osterhaus, Ashton	BAP.U.17
Kinney, Emily	BAP.U.10	Packard, Abraham	DAO.G.29
Klabunde, Ivy	CAP.U.5	Panico, Annie	BSO.U.22
Klabunde, Macy	BAP.U.11	Peckumn , Dominique	CAP.G.29
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Klein, Jennifer	AAP.U.2	Pekdemir, Recep	ASO.F.42
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Koenecke, Joseph	CAP.U.21	Priest, Kali	DAP.G.28
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Kopke, Paige	DAP.U.5	Radewan, Haley	AAV.U.21
Kosmal, Austin	CAP.G.27	Ragon, Alyssa	DAP.U.7
Kryshak, Roman	CAO.U.16	Reber, Scott	BSO.F.31
Kucksdorf, Jordan	CAP.U.9	Rehauer, Allison	AAV.U.21
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Lettenberger, Avery	AAP.U.9	Rozek, Ellen	AAP.U.8, CAP.F.33
Liang, Lu	ASO.G.40	Ruechel, Alex	CAP.G.30
Litwin , Kayla	DAP.G.24	Rutherford, Drew	DAP.G.23
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Maki, Ryan	CAP.U.10		
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Miller, Joe	CSO.U.23	Sporie, Jacqueline	BAO.U.19
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Mitchell, Kris	DAP.G.20		
Monson, Erika	AAP.U.7	Stepanova, Valeria	DSO.F.30
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		Weier, Christopher	BAP.U.18
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Thompson, Ethan	DSO.U.18	Wells, Andrew	CAO.G.32
Thornton, Benjamin	AAP.G.36	Weyenberg, Hailey	CAP.G.31
Torgerson, Mackenzie	BAP.G.25	Widenski, David	AAV.U.21
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	AAP.U.15, BSO.U.23		
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Trudeau, Claire	AAP.U.16	Wille, Annika	DAO.U.14
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Vanselow, Matthew	CAP.U.9	Wilson, Jamin	AAP.U.19
Verrall, Steven	ASO.F.43	Winkelman, Gregory	AAP.G.38
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Voie, Lucas	DAP.G.28	Witter, Sam	CAO.U.16
von Mende, Paige	AAP.U.17	Yang, Paj Nra	DAP.G.27
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### **COMMENTS OR SUGGESTIONS?**

We welcome your comments and suggestions about the Symposium.  
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