

ignoring differences in conspicuousness (e.g., self-consciousness about social attention). Participants (N=170) were randomly assigned to write about a past acceptance, ignoring, or rejection experience. Then, they responded to two scenarios involving potentially dangerous situations in familiar environments, reporting their feelings of safety and self-protective actions. Data analysis is ongoing. However, we predict that reliving a social rejection (vs. ignoring or acceptance) will heighten feelings of conspicuousness, which will lead to greater perceptions of danger in familiar environments and more self-protective behaviors. Discussion will center on interpreting results and their implications for how people cope with feelings of disconnection and ensure their physical safety in lived environments.

HENRY HALL ATRIUM 103

### **Transfer of Cellulolytic Gene Cel7a into *E. Coli***

Participants attending 2:00 PM – 3:00 PM

Presenter: Cayden Steinebach

Mentor: Doug Graham

Cellulose, a polysaccharide commonly found in plant cell walls, is composed of glucose monomers that could provide significant energy. However, humans cannot digest cellulose. Certain species, such as cows, termites, and various microbes, can break down the beta 1–4 linkages between cellulose monomers. This research aims to develop a method for human cellulose digestion using genes from other species. Specifically, we are utilizing the cellulolytic fungus *Trichoderma reesei* to extract its cellulase-producing gene, cel7a. This gene is then incorporated into a plasmid with antibiotic resistance and introduced into a strain of *E. coli* that can also be found in the human digestive tract. The success of this gene transfer will be measured using quantitative Benedict's solution to detect reducing sugars in the transformed *E. coli* population. These sugars will indicate successful gene transfer and protein production. If the cel7a gene can be successfully transferred to *E. coli* and these bacteria can be introduced into the human digestive tract, it may enable humans to digest cellulose, provided the *E. coli* continues to produce the cellobiohydrolase enzyme in vivo. Results are still pending.

KIRKHOF CENTER GRR 001

### **Neurodivergence: The Divergence of a Term**

Participants attending 12:00 PM – 1:00 PM

Presenter: Emily Seburn

Mentor: Coeli Fitzpatrick

Mental differences have manifested throughout history though categorizations have varied. Through intensive literature review, we sought to determine how Western European Medieval (500–1500 CE) society viewed what, in modern times, we call “neurodivergence.” Developmental and intellectual disabilities were grouped with mental illnesses and the terms “mad, idiot, frenzy, not of sound mind, and out of his mind” were typically used to describe them, while “insane” was typically used in more recent years. The mentally and intellectually disabled were rarely viewed as possessed or influenced by the devil, but rather seen as worthy of pity and care. People were supported by their communities while those with legal or religious responsibilities would be assigned a guardian who watched over them. Diagnoses were not made based on objective criteria, but instead a comparison of ability versus responsibilities. If one’s responsibilities were greater than their mental ability, they were considered “mad.” The subjective and context-dependent diagnoses makes it likely that modern day “high-functioning” diagnoses may not be present or identifiable in historical records. However, people who required support often received care from their communities, and were safeguarded by laws of protection. While present, there is less evidence of cruelty towards the intellectually disabled than often assumed.

KIRKHOF CENTER GRR 002

### **Dogs 'n' Roses**

Participants attending 3:00 PM – 4:00 PM

Presenter: Summer Selles

Mentor: Dawn De Vries

This presentation addresses research and evidence of the potential benefits of animal assisted interventions and horticulture therapy programs for adults in correctional facilities and programs. These benefits can include improved mental, physical, and social health, reduced aggression, infractions, drug use, and recidivism, along with education, nutrition, community involvement, and more.

KIRKHOF CENTER GRR 003

### **Healing Through Creativity**

Participants attending 9:00 AM – 10:00 AM, 1:00 PM – 2:00 PM

Presenter: Essence Williams

Mentor: Dawn De Vries

The research paper contains information on the benefits of expressive arts for adolescents who are healing from trauma of abuse and how therapeutic recreation plays a big role by providing nonverbal arts as a healing source.

KIRKHOF CENTER GRR 004

### **Synthesis, Spectroscopy, and Computational Investigations of 2-Cyano Phosphorine**

Participants attending 3:00 PM – 4:00 PM

Presenter: Rachel Duford

Mentors: John Bender, Richard Lord

The 2-cyano maleimide was synthesized after the results of the P-Adams 499–491 projects due to the discovery of ways to create stable maleimides. After the synthesis unique confirmations were found in the NMR data which suggest a certain confirmation. Geometry optimizations and NMR simulations were conducted with the PBEPBE functional and the 6–31G(d) basis set. Out of 9 initial configurations, 5 different structures remained.

KIRKHOF CENTER GRR 005

### **The Role of Medical Laboratory Scientists: Staffing Challenges, Turnaround Times, and Impacts on Patient Care**

Participants attending 11:00 AM – 12:00 PM

Presenters: Kevin Le, Devan Powers, Maddison Ratliff, Michael VanSulichem

Mentor: Lilianne Nelson

This literature review synthesizes primary research articles from *Pubmed* and *Proquest Medical Database* to examine the effects of medical laboratory staffing on turnaround times and patient care. Qualitative studies, which have included interviews of MLS staff, have revealed that a lack of staffing is a major issue affecting medical laboratory scientists (MLS), leading to burnout and corner-cutting in an attempt to keep up with the heavy workload. Supporting this is a UK study which tracked laboratory incidents and found a vast majority were due to inadequate following of procedures which have a direct impact on both turnaround times and patient care. If caught, mistakes must be corrected, taking time away from other patients and their results. If not discovered, these errors can result in improper medical treatment for the patient and can be fatal in serious cases. For example, an incorrect bag of blood given for transfusion may cause a hemolytic reaction that could kill a patient in minutes. In this literature review and presentation, we will explore the reasons for staffing shortages, their effects on employees, and the subsequent impact on crucial turnaround times and patient care.

KIRKHOF CENTER GRR 006

### **Determining the Identity of Histamine Metabolites in the CNS of *Drosophila melanogaster* Using Mutations that Disrupt Histamine Metabolism**

Participants attending 9:00 AM – 10:00 AM, 2:00 PM – 3:00 PM, 3:00 PM – 4:00 PM, 4:00 PM – 5:00 PM

Presenter: Lola Piper

Mentor: Martin Burg

Histamine immunostaining of male *Drosophila* accessory glands has revealed an immunosignal initially thought to be histamine, as mutations that disrupt histamine synthesis show an absence of this signal. This 'histamine' antibody was also shown to detect two other histamine metabolites, carcinine and N-acetylhistamine (NAH), through antibody blocking experiments. Carcinine synthesis is blocked through mutation of the *ebony* gene, while NAH synthesis is blocked through mutation of the *AANATL-7* gene. Accessory gland immunostaining shows that *AANATL-7* mutants, and not *ebony* mutants, block the histamine immunostaining in the accessory gland, indicating that accessory gland immunostaining indicates presence of NAH, not carcinine or histamine. It is unknown whether *AANATL-7* or *ebony* mutants exhibit altered histamine immunostaining in the central nervous system (CNS) where histamine immunostaining has been reported. We examined CNS tissues from wild-type, *AANATL-7* mutant, and *AANATL7; ebony* double mutant flies using the histamine antibody. Preliminary evidence indicates a difference in immunofluorescence intensity in CNS tissues between the mutant and control flies, as mutant flies demonstrate a brighter immunostaining signal in the CNS. Quantitative analysis of images collected using confocal microscopy is being conducted to measure the differences in histamine immunostaining levels observed between these samples in the CNS of *D. melanogaster*.

KIRKHOF CENTER GRR 007

### **Analysis of Druggability of Potential Tuberculosis Antibiotics Using Lipinski's Rule of Five**

Participants attending 1:00 PM – 2:00 PM

Presenter: Nicolette Owen

Mentor: Matthew Hart

Tuberculosis (TB) is an infectious respiratory illness affecting a quarter of the world's population. Previous work in this group has focused on the design and organic synthesis of antibiotics to treat TB. This project evaluates the druggability of the potential antibiotic molecules previously designed and tested computationally. These ligands were analyzed using Lipinski's rule of five (Ro5), an existing set of guidelines to judge how "drug-like" a compound is. Applying Lipinski's Ro5, the ligands were redesigned and tested computationally in AutoDock Vina software to determine if they maintained their effectiveness against a known TB protein target, InhA. The results of this work will inform the group's design of TB antibiotics in the future.

KIRKHOF CENTER GRR 008

### **Understanding Bicuspid Aortic Valve: Global Prevalence, Genetic Factors, Long-Term Outcomes, Treatment Approaches and Knowledge Gaps**

Participants attending 1:00 PM – 2:00 PM

Presenter: Ashley Sligh

Mentor: Ruijie Liu

Bicuspid aortic valve (BAV) disease is the most common congenital heart condition in the world, with a prevalence of 0.5 to 2.0 %, with the highest predominance in Caucasian men. This disease causes two leaflets to form instead of the typical three leaflet and can lead to many complications. This paper explores the global prevalence of BAV, highlighting observed variations between ethnicities and geographical background. It also examines the genetic factors contributing to the condition, including known hereditary patterns and emerging genetic insights. This review also addresses risk factors associated with BAV, such as environmental and developmental influences, as well as other complications that can arise. Treatment strategies, from surgical interventions to preventative measures, are discussed, along with the impact of BAV on life expectancy and quality of life. Current knowledge gaps in care management and relevant clinical trials. By integrating data on prevalence, genetics, treatment options, and outcomes, this analysis provides a comprehensive overview of BAV, aiming to enhance understanding and advocate for future research and more clinical trials.

KIRKHOF CENTER GRR 009

**Mercury Analysis of *Chironomidae* Larva and Sediment Within Two Western Michigan Lakes.**

Participants attending 1:00 PM – 2:00 PM

Presenter: Mitchell Fedewa

Mentor: Ryan Otter

Mercury is a toxic and persistent environmental pollutant that bioaccumulates and biomagnifies through food webs. While mercury contamination is monitored in fish and marine life the ecological implications throughout food webs are less understood. *Chironomidae* are a family of non-biting midge flies from the order *Diptera* (colloquially known as bloodworms) that are primary consumers in temperate lake food chains. This project analyzed the ecological mercury dynamics between *Chironomidae* larva and surficial sediment within two west Michigan lakes. *Chironomidae* larva and sediment samples were collected using a Ponar sampler and total mercury levels were determined using the MA-3000 Direct Mercury Analyzer in accordance with US EPA method 7473. Mean Muskegon Lake concentrations were 150 ppb and 145 ppb for sediment and bloodworms, respectively. Mean Spring Lake concentrations were 96 ppb and 35 ppb for sediment and bloodworms, respectively. Muskegon Lake had significantly higher mercury contamination than Spring Lake for both bloodworms and sediment ( $p \leq 0.05$ ). Additionally, mercury concentrations between each matrix were significantly different between our two lakes. Elevated mercury levels in Muskegon Lake may be due to historical industry. Differences in bloodworm sediment dynamics between lakes may be a result of variations in feeding patterns.

KIRKHOF CENTER GRR 010

**Design and Synthesis of Amides to Treat Tuberculosis**

Participants attending 12:00 PM – 1:00 PM

Presenter: Nicolette Owen

Mentor: Matthew Hart

Tuberculosis (TB) is an infectious respiratory bacterial illness that can be treated with antibiotic drugs. However, the prevalence of drug-resistant strains of TB has increased the need for new therapeutics. The goal of our project is to design novel targets and evaluate their effectiveness to treating mycobacterium. AutoDock Vina software was used to determine potential candidates for organic antibiotic synthesis. Using AutoDock, various targets were evaluated containing either a urea, amide, or triazole core with aryl substituents. The targets were screened *in silico* against a known tuberculosis protein target, InhA. The strongest binding affinity of  $-9.0$  kJ/mol came from an amide with a biphenyl substituent and a 4-(N,N-dimethylaminoethyl)benzyl substituent. Derivatives of this N-benzyl benzamide were synthesized. A summary of these derivatives and their biological assessment is reported herein. Based on these results we hope to continue the development of novel drugs to treat TB.

KIRKHOF CENTER GRR 011

**Insights into Molybdenum Toxicity in an Invertebrate Model for Applications in Atherosclerotic Cardiovascular Disease**

Participants attending 10:00 AM – 11:00 AM, 1:00 PM – 2:00 PM, 2:00 PM – 3:00 PM

Presenter: Brianna Hofman

Mentors: Babasola Fateye, Maria Kwesiga

Atherosclerotic cardiovascular disease (ACD) causes narrowing of blood vessels and is treated through the insertion of a permanent stent implant, but permanent implants often lead to complications. In contrast, biodegradable stents could promote more physiological vascular healing. Molybdenum (Mo), a potential biodegradable stent material, has excellent mechanical and degradation properties, but there are toxicity concerns. *Galleria mellonella* has emerged as a toxicity model due to their innate immune system and malpighian tubules, which are homologous to mammalian kidneys. *Galleria mellonella* were injected with 0.1 mg/kg to 1g/kg body weight of sodium molybdate and observed over a 24–72h period. Survival data showed a nontoxic effect of Mo treatment. Two-photon microscopic imaging performed on isolated malpighian tubules indicated changes in auto fluorescent intensity of the metabolic species (NAD(P)H) and histological analysis of cross sections from treated larvae showed dose-dependent changes within the malpighian tubules. Colorimetric assays were also performed to assess redox balance across the

treatment groups and the results showed marginal significance compared to the control. In summary, *Mo* seems to have relatively minimal toxic or metabolic impact on *Galleria mellonella*.

KIRKHOF CENTER GRR 012

### **All Behavior is Communication: Trauma-Informed Classroom Strategies**

Participants attending 10:00 AM – 11:00 AM

Presenters: Mary Doucette, Daphnie Uhrich

Mentor: Jamie Langlois

In schools, one out of every four children has been exposed to a traumatic event at some point in their childhood. The exposure to a traumatic event can create barriers to success in the classroom as trauma can negatively influence academic performance, behavior, overall well-being, and one's ability to engage with peers. With the prevalence of trauma in the classroom setting and the impact trauma has on behavior, it is essential that teachers and staff engage in classroom management skills that are trauma-informed and strengths-based. With our project: All Behavior is Communication, we are looking to educate on the importance of recognizing trauma and provide concrete resources to school staff on how to support the unique needs of students. From research and collaboration, we compile materials that teachers and staff can utilize in the classroom to better engage students with their learning. This includes behavior interventions or classroom lessons that staff can reference, which help students feel more successful in the classroom. It's time to recognize all student behavior as communication and provide staff resources to promote equity within the classroom.

KIRKHOF CENTER GRR 013

### **Using Chalcones to Explore Carbonyl Chemistry**

Participants attending 1:00 PM – 2:00 PM

Presenters: Matthew Bays, Richard Villegas

Mentor: John Bender

This project involves an exploration of carbonyl chemistry as well as functional group transformations at alkenes. An initial condensation reaction between a methoxy-substituted Benzaldehyde and halogen-substituted Acetophenone will form an alpha-beta unsaturated ketone, otherwise known as a Chalcone. Subsequently, H NMR analysis of the Chalcone will be conducted to understand the impact of the ring substituents on chemical shifts observed in the spectra. The alkene functional group will be the site of additional transformations, including a series of two epoxidation reactions, with one intended to form a racemic mixture and the other an optically pure compound. Optical rotation measurements will be collected using a polarimeter and NMR data will be obtained. Next, an epoxide-episulfide exchange will take place to investigate whether the configuration of the optically pure epoxide will be carried over to the episulfide. Lastly, thermal distillation will be performed to isolate Cyclopentadiene, which will react with the Chalcone through a Diels-Alder reaction and form several new stereocenters. This series of reactions will serve to emphasize the importance and variety of alkene reactions.

KIRKHOF CENTER GRR 014

### **Fresh Start: Expungement For Homeless Communities**

Participants attending 4:00 PM – 5:00 PM

Presenters: Aubrey Brearley, Hannah DeVries, Madison Post, McKare Stoffers, LaTonia Vernon

Mentor: Jamie Langlois

Criminal records can be a significant barrier to securing stable housing, employment, and social services. This project, in collaboration with Family Promise of Kent County, aims to provide homeless individuals with criminal records the necessary resources for expungement, enabling them to reintegrate into society successfully. Our study focuses on a sample of homeless individuals in Kent County, specifically those with prior criminal convictions seeking housing stability. Through research of programs and legal aid organizations, we provide informational pamphlets detailing the expungement process, eligibility requirements, and available legal support. From our research and collaboration with Family Promise we

are encouraging an increased awareness of the expungement and clean slate resources available to those experiencing homelessness. Preliminary findings indicate that access to legal resources significantly improves expungement application rates, leading to increased housing stability among participants. The study concludes that targeted legal education and outreach efforts can mitigate barriers to housing for formerly incarcerated individuals experiencing homelessness. Continued support and expanded access to expungement services are recommended to enhance long-term reintegration outcomes.

KIRKHOF CENTER GRR 015

### **Impact of Nitration of Various Phosphines for Use in Lewis Acid/Base Reactions with Various Heavy Metals**

Participants attending 2:00 PM – 3:00 PM, 3:00 PM – 4:00 PM

Presenters: Michelle Brown, Rachel Duford, Owen Smythe

Mentor: John Bender

In this experiment we will prepare triphenylphosphine oxide compounds with varying nitro group substitutions to see the effects electron withdrawing has on the Lewis acid strength of the compound. Samples will be tested against various lanthanide triflates such as, lanthanum, yttrium, and lutetium with each acting as the Lewis base in competitive reactions. The results of these tests will be confirmed using NMR focusing primarily on  $^{31}\text{P}$  and the relative change in chemical shifts.  $^{13}\text{C}$ ,  $^1\text{H}$ , and TLC will be used to confirm successful synthesis of the various triphenylphosphine oxide compounds. Once the phosphine oxides are synthesised additional metals may be substituted for future tests.

KIRKHOF CENTER GRR 016

### **Pick Me Up: A Chapbook of Poetry and Resources**

Participants attending 10:00 AM – 11:00 AM

Presenter: Nathan Boyt

Mentor: Jamie Langlois

In the Atlantic article *The Anti-Social Century*, Derek Thompson observes, "Americans are now spending more time alone than ever. It's changing our personalities, our politics, and even our relationship to reality." Grand Valley State University has mental health resources for students, but what happens when these students do not hop on the University Counseling Center's website or know where to find these resources? Working with the University Counseling Center and with support from student poets, *Pick Me Up* is a chapbook of poetry and curated mental health resources that seeks to address the pervasive issue of social isolation. The title serves as a double meaning. It is both an instruction, daring the reader to pick up the book and see what lies inside, as well as an informal noun meaning something that stimulates or restores. In a time when political divisiveness and economic pressures are contributing to heightened stress among students, the chapbook offers a creative message of hope. By centering on connection, self-expression, and accessible resources, the project aims to uphold and advocate for human rights, specifically as related to the grand challenge of eradicating social isolation.

KIRKHOF CENTER GRR 017

### **Painting A Brighter Future: The Power of Creative Arts in Overcoming Childhood Trauma**

Participants attending 10:00 AM – 11:00 AM

Presenter: Rachael Ells

Mentor: Dawn De Vries

This poster presentation focuses on the benefits of utilizing therapeutic use of the arts to help children who have faced trauma during their formative years. The poster will cover different forms of creative arts and how they help heal school-age children who have dealt with different types of trauma.

KIRKHOF CENTER GRR 018

## **Understanding Support: Experiences of African International Students in U.S. Universities**

Participants attending 2:00 PM – 3:00 PM

Presenter: Ophelia Zornu

Mentor: Jamie Langlois

**PURPOSE:** International students contribute significantly to the cultural diversity and economic growth of higher education institutions, yet they face unique challenges in adapting to their new learning environments. Despite initial orientations and other support services offered by host institutions, navigating services like accommodation, transportation, and healthcare remain daunting.

**SUBJECT:** There was limited scientific evidence on how African international students accessed support services and what resources they relied on for their well-being. This research explored the perceptions of African international students from West Michigan regarding the resources they relied on for support and characterized the unmet needs they faced in pursuing their education.

**METHODS:** Data was collected through in-depth interviews with a purposive sample of 20 students using semi-structured questionnaires. Data was analyzed using the grounded theory approach, assigning codes based on themes that emerged from the interviews.

**RESULTS:** The findings suggest that African students face significant challenges navigating unfamiliar systems, workforce preparation, and cultural adjustment. Support services like university counseling and academic advising aid well-being, while student organizations and cultural events enhance a sense of belonging.

**CONCLUSION:** This research highlighted the importance of inclusive and accessible support services in enhancing African international students' sense of belonging and academic success.

KIRKHOF CENTER GRR 019

## **Nature's Truth Supplement Including Red Beetroot Induce Vasodilation in Porcine Coronary Arteries**

Participants attending 12:00 PM – 1:00 PM

Presenters: Carter Bechtel, Jarrett Budde, Thu Le, Daniel Nichols, Drew Smith, Luis Vidal

Mentor: Francis Sylvester

Cardiovascular disease (CVD) remains the leading cause of mortality in the United States, with coronary artery disease being a major contributor. The left anterior descending (LAD) coronary artery is critical for myocardial perfusion, and its dysfunction can lead to severe cardiac events. Dietary nitrates found in *Beta vulgaris* (red beetroot) have been shown to enhance vascular function by increasing the presence of nitric oxide, an important mediator of vasodilation. This study examines the vasodilatory effects of Nature's Truth Beetroot Powder on the LAD coronary artery. Porcine hearts were obtained, then dissected to produce arterial rings with some vessels denuded to assess endothelium-dependent responses. The arteries were mounted in an organ bath, equilibrated, and exposed to sequential treatments, including potassium chloride, acetylcholine, sodium nitroprusside, and U46619. Increasing concentrations of Nature's Truth Beetroot Powder were then introduced, and changes in vascular tone were measured. Results demonstrated significant vasodilation in both intact and denuded arteries following beetroot extract exposure, suggesting an endothelium-independent mechanism. Findings indicate that Nature's Truth Beetroot Powder may improve coronary artery function and contribute to cardiovascular health. Future research will explore its mechanism of action and compare its effects with other sources of beetroot powder.

KIRKHOF CENTER GRR 020

## **Storage Optimization for Kidney Transplantation**

Participants attending 11:00 AM – 12:00 PM

Presenter: Jaylyn Kelley

Mentor: Francis Sylvester

End-stage renal disease (ESRD) remains a significant global health burden, with kidney transplantation serving as the gold standard treatment. However, organ shortages and ischemia-reperfusion injury (IRI) present major challenges to transplantation success. This study investigates the effects of different kidney storage conditions—buffer composition, temperature, and oxygenation—on renal vasculature to optimize graft viability. We hypothesize that currently used commercial storage buffers will maintain vascular reactivity in isolated arteries, while storing kidneys at cooler temperatures with oxygen supplementation will further improve vascular function by decreasing apoptosis and free radical production. Preliminary observations suggest that cold storage may negatively impact vascular function, but further investigation is needed to confirm these findings. This research assesses vascular reactivity, oxidative stress, and apoptosis in renal arteries under varied storage conditions. Findings are expected to inform strategies for minimizing IRI, improving graft survival, and expanding the pool of viable donor kidneys. Enhancing preservation techniques could lead to improved transplant outcomes and address the growing demand for donor organs.

KIRKHOF CENTER GRR 021

### **Environmental Connectivity's Effect on Evolutionary Dynamics**

Participants attending 1:00 PM – 2:00 PM

Presenter: Grant Gordon

Mentor: Alexander Lalejini

Evolutionary graph theory is a field that explores the relationship between an environment's topology and evolutionary processes occurring within it. However, much of this field focuses on small graphs for short durations of time leaving a gap in the literature. Our study applies evolutionary graph theory in a digital evolution context to investigate how the environment's topology influences long-term evolutionary outcomes. We used the Avida Digital Evolution platform to evolve populations of self-replicating computer programs on different spatial topologies. We found that spatial structure has an effect on a populations ability to evolve complex traits. We also observed that the magnitude of fitness benefits for adaptive traits alters the effects a spatial structure has on evolutionary outcomes. Finally, certain spatial structures contain regions where the evolution of new traits occurs more frequently than random chance. Future research will investigate whether we can craft specific topologies to yield faster evolution of adaptive traits, which has applications for improving our ability to steer evolution in the laboratory when applied to microbial populations.

KIRKHOF CENTER GRR 022

### **Establishing Rater Reliability in a Clinical Trial of Power Wheelchair Skills Training for Children with Cerebral Palsy**

Participants attending 3:00 PM – 4:00 PM, 4:00 PM – 5:00 PM

Presenter: Micah Gordon

Mentor: Lisa Kenyon

The purpose of this poster is to outline our methods for establishing and maintaining intra- and inter-rater reliability. We are conducting a 2-arm, parallel group, single-blinded, pre-test-post-test randomized controlled trial involving power wheelchair (PWC) skills training for children with cerebral palsy. Outcomes are assessed using the Assessment of Learning Powered mobility use (ALP) and the Wheelchair Skills Checklist (WSC) at 3 timepoints: T0 (Week 0), T1 (Week 8), and T2 (Week 16). Assessment sessions are video recorded for subsequent scoring by 4 blinded student researchers. To establish rater reliability, these student researchers first undergo training in scoring the ALP and the WSC. They then independently score the ALP and the WSC from 10 videos of various non child participants driving a PWC. Seven days later, they independently rescore the ALP and the WSC from 5 of the original 10 videos. Once our benchmark intra-class correlation coefficient (ICC) value of .80 is achieved for both intra- and inter-rater reliability, these students start scoring videos from the clinical trial. We then monitor both their intra- and inter-rater reliability at pre-determined intervals. Should any ICC values be <.80, additional training will occur, and reliability will be re-evaluated until the desired ICC values are achieved.



## KIRKHOF CENTER GRR 023

**An Investigation of Reactivity and Stereoselectivity on the Epoxidation and Diels–Alder Reaction of Unique Chalcones**

Participants attending 10:00 AM – 11:00 AM, 11:00 AM – 12:00 PM

Presenters: Elijah Kincaid, Ethan Smith, Ava Thomson

Mentor: John Bender

Through a series of reactions, a Chalcone will be made using an aldol condensation, utilizing a unique methoxy-substituted benzaldehyde, and a unique Acetophenone. This Chalcone will then undergo a series of reactions, first of which being an epoxidation of the Chalcone, followed by a epoxide–episulfide exchange, and ending with a diels–alder reaction with cyclopentadiene to achieve the final product. The use of unique benzaldehydes and unique acetophenones will allow for an examination in the change of reactivity based on the electronegativity of the group attached to the chosen acetophenone, and the change of reactivity based on the whether the methoxy group is ortho, meta, or para to the carbonyl on the benzaldehyde. Through the use of H–NMR, IR, and measuring optical activity, the progress of the reaction will be closely followed, and the product will be fully analyzed. In the end, the presumed Scalar relationships of the Hammett Hypothesis will be confirmed, through the use of NMR data.

## KIRKHOF CENTER GRR 024

**Mammalian Teeth from the Great Divide Basin**

Participants attending 4:00 PM – 5:00 PM

Presenter: Rose Pulte

Mentor: Natalie Laudicina

The Great Divide Basin Research Project (GDBRP) has collected over 13,000 mammalian fossils from more than 150 localities in the Great Divide Basin (GDB) of Wyoming. Although the GDBRP has amassed one of the largest fossil collections from this area and period, many questions remain regarding the taxonomic designation of the species present. To better understand the taxa found, it is essential to establish criteria to differentiate and diagnose the species present in the area. Mammalian teeth were collected from the site and utilized to understand the organisms' dietary sources during this period. To assist with taxa identification, this project created an open access field guide which highlights the most numerous taxa found in the GDB. Illustrations of the teeth were created using Procreate and compiled via Adobe InDesign and Photoshop into a usable field manual for onsite teeth identification in the GDB. The final manual will be distributed to other field sites with similar faunal material and will be available for open, online access.

## KIRKHOF CENTER GRR 025

**The Impact of the Mediterranean Diet on Inflammation in Adults with Systemic Lupus Erythematosus (SLE)**

Participants attending 10:00 AM – 11:00 AM

Presenter: Emily Brom

Mentor: Nicole Harpold

Objectives: The purpose of this rapid literature review was to answer the questions: Does the Mediterranean diet reduce inflammation, defined by a decrease in C–reactive protein (CRP) levels, in adults with systemic lupus erythematosus (SLE)? Does inflammation reduction result in decreased disease activity, measured by various lupus disease activity indices? Methods: A search within PubMed, ProQuest Medical, and CINAHL was completed, findings were synthesized into a rapid literature review. Mediterranean diet elements including fatty acids, antioxidants, protein, fiber, and monounsaturated fats guided the organization of the review. Only articles that were published within the past five years were included. Geographical location of research was not limited. Results: Recent evidence demonstrates that Mediterranean diets can decrease inflammation, displayed by reduced CRP levels, in adults with SLE. Disease activity index scores, including the SLEDIA, have indicated a correlated decrease in SLE activity, suggesting positive health outcomes. Conclusion: The Mediterranean diet is linked to reduced inflammation, promoting general health for adults with SLE. However, further research is required to determine long–term effects that this diet has on SLE management and symptoms impacted. This

research raises awareness about SLE and suggests that diet is an effective management tool for inflammation.

KIRKHOF CENTER GRR 026

### **Synthesis and Microbiological Testing of Potential Tuberculosis Antibiotics**

Participants attending 11:00 AM – 12:00 PM, 4:00 PM – 5:00 PM

Presenters: Nicole Denz, Thien Anh Hoang

Mentor: Matthew Hart

Tuberculosis (TB) remains a significant global threat to human health. The bacteria responsible for TB, *Mycobacterium tuberculosis*, has proven difficult to combat, as drug resistance continues to arise within the bacterial species. Multidrug-resistant tuberculosis has led to the declaration of a public health crisis, and those affected are less likely to receive successful treatment. This research builds upon previous work to synthesize and analyze possible molecular structures for tuberculosis antibiotics, in the form of diphenyl ureas (DPUs). The focus of this project was to take the previously synthesized DPUs and run them all through Mycobacterium screening. The tests include antimicrobial susceptibility tests and minimum inhibitory concentration tests. The results allowed for the classification of all current molecules based on bacterial efficacy, which helps to direct future development. Structural trends identified from this screening guided the rational design and synthesis of new DPU derivatives. By expanding the molecular library and optimizing active compounds, this research aims to contribute to the discovery of more effective TB antibiotics.

KIRKHOF CENTER GRR 027

### **Physical activity on depression in nurses**

Participants attending 10:00 AM – 11:00 AM

Presenters: Logan Klinge, Matthew Smith, Charles Walters

Mentor: Afokoghene Odhu

Depression among nurses is a growing concern, exacerbated by workplace stressors and global health crises. This study explores the relationship between physical activity and depression in nurses, aiming to understand how exercise influences mental well-being. Drawing from three research articles, we analyze the role of physical activity in mitigating depressive symptoms, enhancing emotional resilience, and improving overall psychological health among nurses. The findings indicate that nurses who engage in regular physical activity report lower levels of depression, improved emotional regulation, and greater psychological resilience. Additionally, physical activity positively influences emotional intelligence and self-efficacy, further supporting its role in mental health management. Despite the demanding nature of nursing, many nurses do not engage in sufficient physical activity, highlighting the need for institutional support in promoting exercise within the profession. Our study underscores the importance of integrating physical activity into nurses' routines as a preventive and therapeutic strategy for reducing depression and improving overall well-being.

KIRKHOF CENTER GRR 028

### **Social Justice Begins with ME!**

Participants attending 1:00 PM – 2:00 PM, 2:00 PM – 3:00 PM

Presenters: Della Chia, Mackenzie Donohue, Cassandra Lekas

Mentors: Jamie Langlois, Emily Nichols

One in four children experiences discrimination or bias in their daily lives, impacting their self-esteem and sense of belonging. Teaching social justice concepts at an early age is an effective approach according to scholars. In collaboration with *Social Justice Begins with ME!* we are analyzing past programs and resources to expand the program's reach by making recommendations for new materials and tools that enhance learning and engagement. The project aims to promote awareness of and education about social justice issues for children in Grand Rapids, Michigan, and beyond. Through carefully selected books and guided discussions, we encourage families, educators, and children to engage in meaningful

conversations about topics such as racial equality, gender equity, and disability rights. Exposure to these critical themes through literature fosters empathy and understanding, helping children develop a groundwork for advocacy and inclusion. By incorporating the most impactful books, reading sessions, interactive activities, and guided discussions, we aim to create a ripple effect, empowering young minds to challenge injustice. It is time to promote a world where all voices are heard and valued—*Social Justice Begins with ME!*

KIRKHOF CENTER GRR 029

### **Alternative Splicing and MicroRNA Regulation in Thymoma**

Participants attending 10:00 AM – 11:00 AM

Presenter: Bushra Rashrash

Mentors: Charitha Subrahmanya Kodumagulla, Suhila Sawesi

Thymoma is a rare but significant tumor of the thymic epithelium, often associated with myasthenia gravis (MG). Understanding its molecular mechanisms is crucial for advancing diagnostic and therapeutic strategies. This study investigates the differential expression of microRNAs (miRNAs) and their impact on tumorigenesis through the PI3K/AKT/mTOR signaling pathway using the publicly available GSE79978 dataset. Additionally, we explore the potential role of alternative splicing in thymoma progression. Analyses reveal distinct miRNA profiles and splicing variants among thymoma subtypes, shedding light on potential biomarkers and therapeutic targets.

KIRKHOF CENTER GRR 030

### **Dancing Away Burnout: Evaluating the Impact of Dance Movement Therapy on Healthcare Workers' Well-being and Compassion Satisfaction**

Participants attending 10:00 AM – 11:00 AM, 11:00 AM – 12:00 PM, 12:00 PM – 1:00 PM, 1:00 PM – 2:00 PM, 2:00 PM – 3:00 PM

Presenter: Moira Yaney

Mentor: Afokoghene Odhu

Burnout and stress among healthcare workers, particularly nurses, have become pressing issues that affect both individual well-being and patient care. Dance Movement Therapy (DMT) has shown promise as a therapeutic intervention to improve mental health, well-being, and work ethic. This study evaluates the impact of DMT on healthcare staff, specifically examining its effects on compassion satisfaction, burnout, compassion fatigue, and motivation. Using a mixed-methods approach, including pre- and post-intervention surveys, focus groups, and semi-structured interviews, the study assesses the effectiveness of DMT programs within healthcare settings. The intervention included a series of leisure activities, focusing on dancing, for nurses in both the NHS and a Chinese tertiary hospital. The results reveal that DMT significantly reduced stress, anxiety, and depression while improving compassion satisfaction, motivation, and overall emotional well-being. Participants reported enhanced self-efficacy and greater autonomy, meaning, and affiliation. These findings suggest that DMT, through its positive impact on stress reduction and emotional health, can be an effective strategy for preventing burnout, improving staff retention, and fostering a sustainable healthcare workforce. The study underscores the importance of incorporating DMT and similar interventions into hospital settings to enhance nurses' psychosocial health and improve patient care outcomes.

KIRKHOF CENTER GRR 031

### **Targeting the Human Histamine H3 Receptor for Myelin Repair in Multiple Sclerosis: Computational Identification of Potential Small Molecule Inhibitors**

Participants attending 11:00 AM – 12:00 PM, 12:00 PM – 1:00 PM

Presenter: Sophie Stevens

Mentor: Agnieszka Szarecka

Multiple sclerosis (MS) is a chronic autoimmune disease that progressively degenerates myelin in the central nervous system. The human histamine H3 receptor (H3R) is a GPCR that functions to inhibit the

maturation of oligodendrocyte precursor cells (OPC's), interfering with the brain's natural ability to repair damaged myelin—a key feature of MS pathology. While conserved–ligand binding mechanisms have been described by previous structural and functional studies, the discovery of small molecule inhibitors are still desperately needed to promote myelin repair. In this study, we aimed to design and test novel inhibitor candidates targeting the human H3R. We used computational techniques such as protein structure visualization, pocket analysis and discovery, protein–ligand docking simulations, ADME prediction, and QSAR. We specifically focused on a shallow pocket near the extracellular part of the receptor, which has been predicted as druggable. Our ongoing work is to design a number of new ligands—using various scaffolds—and dock them to this receptor. Going forward, our focus will be on the optimization of potential drug molecules.

KIRKHOF CENTER GRR 032

### **Urban–Rural Disparities in Trust for Medication Information: Physicians vs. Pharmacists**

Participants attending 12:00 PM – 1:00 PM

Presenter: Kyle Kane

Mentor: Suhila Sawesi

This project examines how socio–demographic factors, mainly whether respondents live in urban vs rural areas, influence perceptions of reliance on physicians regarding medical advice and information. Data from 1,522 respondents were analyzed using Chi–square tests and Binary logistic regression. For physician reliance regarding medication advice, rural residents are more likely to agree that physicians are better than pharmacists, with urban respondents 31% less likely to agree. Regarding physician reliance on medical information, rural residents are more likely to agree that physicians provide all necessary information, while urban respondents are 35% less likely to agree. Older and middle–aged individuals and females are also less likely to agree based on the binary logistic regression. Both logistic regression and chi–squared test data indicate that people from urban areas are less likely to agree that physicians provide better medicine advice than pharmacists and that physicians provide all information about medicines. These findings highlight the influence of urban vs rural living on healthcare perceptions and suggest implications for improving healthcare delivery in rural areas.

KIRKHOF CENTER GRR 033

### **A Student's Perspective on Nursing Scholarship: Exploring the Value and Impact of the DNP–prepared Nurse**

Participants attending 9:00 AM – 10:00 AM

Presenter: Akiko Flanders

Mentor: Katherine Moran

The Doctor of Nursing Practice (DNP) was the first doctoral–level practice degree designed intentionally for nurses, marking a pivotal advancement in nursing focused on developing clinical expertise, leadership, and application of evidence–based practice to enhance patient care. This study explores the value and impact of the DNP–prepared nurse from the perspectives of employers and colleagues of DNPs across diverse healthcare settings in the United States. Engaging in collaborative research enhances student understanding of nursing scholarship and the evolving identity of the DNP–prepared nurses.

The student's contributions in qualitative analysis, data coding, and organizational support provided hands–on experience in scholarly inquiry, while uncovering key findings: DNP–prepared nurses are essential in translating research into practice, influencing healthcare policy, and fostering interdisciplinary collaboration. Challenges identified include the diversity of DNP programs and a lack of standardized evaluation methods, which complicate the assessment of the DNP's impact on health outcomes.

This research experience increased the student's confidence in research skills and underscored the importance of nursing scholarship. The student aspires to apply these insights in clinical practice, advocate for evidence–based changes, and continue contributing to the advancement of nursing as a future DNP. Acknowledgments were extended to mentors and collaborators for their support.

## KIRKHOF CENTER GRR 034

**Exercise as a Remedy: Combating Nursing Student Burnout Through Physical Activity**

Participants attending 2:00 PM – 3:00 PM

Presenters: Sabina Anti, Brianna Bredeweg, Paul Warutumo

Mentor: Madison Goodyke

Student life in nursing school tends to be stressful because students face multiple academic, clinical, financial and personal difficulties. This paper examines scientific research about exercise and physical activity as stress reduction interventions for nursing students who experience burnout. An integrative search was conducted utilizing CINAHL, PubMed, Google Scholar, and Medline research databases. Researchers screened the studies according to the following eligibility criteria: (a) published between 2017–2021, (b) published in a peer review journal, (c) full-text accessibility, (d) focus on nursing students, (e) exercise or physical activity implementation as part of the research design, and (f) measurement of stress or burnout outcomes. A total of four articles that met the eligibility criteria were included. A thorough analysis of the effects of physical exercise against traditional care approaches was evaluated by the chosen research publications. The research confirms exercise participation as a key activity for nursing students to reduce their stress, enhance mental health, and minimize their risk for burnout. This poster examines obstacles to adherence alongside recommendations for nursing programs to implement structured physical activity and discusses barriers that might prevent its success. The results support the conclusion that exercise promotion is beneficial for building student nursing resilience and wellness.

## KIRKHOF CENTER GRR 035

**Erector and Paraspinal Muscle Activation During Backward Torso Rotation Using Fiberglass Resistance Poles**

Participants attending 12:00 PM – 1:00 PM, 1:00 PM – 2:00 PM, 2:00 PM – 3:00 PM, 3:00 PM – 4:00 PM

Presenters: Lillian Curtis, Ella Gaylord, Noah Hadley, Jacob Mertes, Morgan Righter, Bryanna Tromp, Meghan VanDalen

Mentor: Stephen Glass

Back muscles such as the erector spinae (ES) and paraspinal muscles (PS) are used to maintain posture and stability of the torso. Weak ES and PS muscles contribute to low back pain (LBP) and low back injuries which are common among many individuals. Treatment for improving LBP can involve strengthening exercises for these muscles. Often these exercises are done in a uniplanar motion, which can be beneficial for improving strength, but neglect the functional aspects of movement. The Core-Stix resistance poles are a tool that can be used to train both strength and functionality of ES and PS muscles by doing multiplanar movements. The goal of this design project is to determine the methodology needed to examine the activation of ES and PS muscles during backward torso rotation using Core-Stix resistance poles. Variables to consider include: tests for maximal voluntary contraction, measurements of force and flex angles and electrode placement for robust data acquisition. Final design will be used as part of an IRB submission.

## KIRKHOF CENTER GRR 036

**Excavating Compliance: Repatriation and Museum Ethics**

Participants attending 1:00 PM – 2:00 PM, 2:00 PM – 3:00 PM

Presenter: Emma Elliott

Mentor: Steven Dorland

The intersection of museum collections, archaeology, and cultural heritage stewardship is a focal point in contemporary discussions on Indigenous repatriation and ethical compliance. This project explores the historical and ongoing repatriation efforts within the Lakeshore Museum in Muskegon, Michigan. Specifically, this study examines a repatriation session that took place in the 1990s and early 2000s under the Native American Graves Protection and Repatriation Act (NAGPRA) and considers the complexities surrounding the leftover materials and updated compliance efforts. Through archival research, museum collections analysis, and interviews with museum staff involved in past repatriation

efforts. This study aims to highlight the evolving role of museums as institutions of ethical stewardship, addressing both historical injustices and contemporary efforts to uphold Indigenous sovereignty over cultural heritage. This project will engage with broader theoretical frameworks such as decolonization, relational ethics, and the role of museums in Indigenous archaeology. By analyzing case studies of repatriation and its challenges, this project contributes to discussions on how museums can more effectively navigate compliance with NAGPRA while fostering collaborative relationships with Indigenous communities.

KIRKHOF CENTER GRR 037

### **Kinetic Characterization of ADC-73, a prevalent class C $\beta$ -lactamase expressed in *A. baumannii***

Participants attending 11:00 AM – 12:00 PM

Presenter: Luz Sanchez

Mentor: Rachel Powers

$\beta$ -lactams are one of the most prescribed types of antibiotics. However, many bacteria are now resistant to these antibiotics due to overuse and over-prescription. The most common way bacteria become resistant is by producing  $\beta$ -lactamases that destroy the four-membered lactam ring. *Acinetobacter baumannii* are multi-drug resistant pathogens, and they express all four classes of  $\beta$ -lactamases. The class C enzymes are known as *Acinetobacter*-derived cephalosporinases (ADCs). One of the most prevalent ADC variants is ADC-73, which differs from ADC-30 by a single amino acid change: Gly221Ser. To better understand the function of ADC-73, kinetic analysis was performed against a panel of  $\beta$ -lactam substrates. Based on its activity, ADC-73 has a narrow-spectrum kinetic profile with the cephalosporins. Hydrolysis of cephalothin (CEF;  $k_{cat}$  771.5  $s^{-1}$ ), was significantly faster when compared with cefotaxime (CTX;  $k_{cat}$  0.225  $s^{-1}$ ). However, ADC-73 bound CTX with the higher affinity ( $K_m$  3.34  $\mu M$ ), nearly 100x better than CEF ( $K_m$  274.9  $\mu M$ ). Cefepime (FEP), the largest of the antibiotics tested, displayed a catalytic efficiency ( $k_{cat}/K_m$  0.0036  $\mu M^{-1}s^{-1}$ ) with ADC-73, indicating FEP is a poor substrate. Further characterization of the activity of ADC-73 will provide a better understanding of one of the most prevalent variants in carbapenem-resistant *A. baumannii*.

KIRKHOF CENTER GRR 038

### **Understanding the Relationship Between Different Dimensions of Social Exclusion and Perceived Physical Safety**

Participants attending 11:00 AM – 12:00 PM

Presenters: Lauren Andrews, Lyric Hein

Mentor: Kristy Dean

Past research has uncovered a link between one's experiences of social exclusion and perceptions of physical vulnerability. Specifically, studies show that social exclusion heightens feelings of physical vulnerability, which increases sensitivity to environmental threats. The goal of the current study is to examine the nuances of this effect by dividing exclusion into two subcategories: direct rejection and indirect ignoring. These types of exclusion differ in their degree of conspicuousness, defined as the degree to which individuals receive social attention from others. Participants will be randomly assigned to relive past rejection, ignoring, or acceptance experiences, report their feelings of conspicuousness and threat to basic needs, and report their feelings of physical vulnerability across different scenarios. We hypothesize that those in the direct rejection condition will experience higher physical vulnerability and greater feelings of conspicuousness (vs. ignored). Discussion will center around the validity of our research process as well as implications of this research on how people perceive safety and more effective methods of achieving it.

KIRKHOF CENTER GRR 039

### **Caffeine, Resistance Exercise, and the Cardiovascular Effects: A Review of the Literature**

Participants attending 9:00 AM – 10:00 AM, 10:00 AM – 11:00 AM

Presenter: Leah Converse  
Mentor: Sarah Kearney

Caffeine is the most consumed drug in the world and is commonly thought to alter measures of the cardiovascular system; namely sympathetic activity, heart rate (HR), and blood pressure (BP). This could be concerning, as caffeine is often utilized as an ergogenic aid during resistance exercise (RE), which has independently been reported to alter measures of heart rate variability (HRV) and hemodynamics. With this, it is probable that caffeine in combination with acute RE could further alter these cardiovascular variables, beyond their independent effects. Therefore, the purpose of this literature review is to assess if caffeine consumption in conjunction with acute RE alters measures of HRV and hemodynamics. Of the few studies conducted, it is suggested that caffeine (independent of exercise) does not alter measures of HRV and hemodynamics, specifically following doses ranging from 3–6 mg/kg. With this, results indicate that caffeine (3–9 mg/kg) in conjunction with acute RE does not further alter measures of HRV and hemodynamics. While these results are preferred, the literature largely varies in methodologies, specifically regarding the type of caffeine, dose, and exercise protocol. Therefore, further research is needed to fully understand caffeine's ergogenic use and how it may impact the heart.

KIRKHOF CENTER GRR 040

### **Incidence of De Novo Arteriovenous Malformations After Mild or Severe Brain Injury: A Case Discussion and Analysis of Similar Reports**

Participants attending 11:00 AM – 12:00 PM, 12:00 PM – 1:00 PM, 1:00 PM – 2:00 PM

Presenter: Connor Veen  
Mentor: John Capodilupo

Arteriovenous malformations (AVMs) are abnormally formed sets of blood vessels that form inappropriate direct connections between arterioles and venules. These abnormally formed tangles of blood vessels are prone to rupture due to high-pressure arterial blood flow into low-pressure capacity venules. If a rupture occurs, it can cause severe neurological injury without prompt intervention. These malformations are typically thought to occur from a congenital etiology: the patient is born with the abnormality. However, etiology has also been expanded to cases of trauma, where the formation of an AVM is the result of the reforming of blood vessels after some sort of stress. In recent years, this type of AVM formation has been called a “de novo” AVM, essentially describing a malformation occurring as a direct result of cerebral trauma. This new classification opens new doors as to what can be done to prevent and detect AVMs early. Using a case discussion and the published data of other case reports of a similar nature, we can begin to understand what types of trauma are most likely to cause AVM formation and what potential steps can be taken to minimize their risk of rupture.

KIRKHOF CENTER GRR 041

### **Identifying Bat Species Through Fecal Samples**

Participants attending 9:00 AM – 10:00 AM

Presenter: Daniela De Andrade  
Mentor: Amy Russell

The goal of this project was to analyze fecal samples of bats to identify their species through mitochondrial DNA and conclude the study initiated by a previous GVSU graduate student, Randi Lesagonicz. Her research involved surveying up to eight southern Michigan orchards in 2019–2020 to increase our understanding of the valuable ecosystem service of bats as a biological control for pest insects. Collecting samples in 2020 was disrupted due to COVID 2020 restrictions, resulting in anonymous samples. The arthropod prey items in the bats' diet from 2019 and 2020 have been identified (Lesagonicz 2021), but the bat species that produced all of the fecal samples from 2020 and a few from 2019 are unknown. We completed a molecular assay to selectively sequence mammal DNA fecal samples and identify the bat species responsible for them.

KIRKHOF CENTER GRR 042

## Observing the Causes and Effects of Scoliosis in an 80 Year-Old Female Cadaver

Participants attending 9:00 AM – 10:00 AM

Presenter: Levi Vanast

Mentors: Natalie Laudicina, Chris Reed, Dawn Richiert, Laura Stroik

During the dissection of an 80 year-old cadaver it was discovered that she has scoliosis of her spine. Scoliosis is a deformity of the spine, commonly understood as a lateral curvature that may be combined with vertebral rotation. Scoliosis may be categorized a variety of different ways: early or late onset idiopathic, neuromuscular, congenital, and syndromic. To determine the cause of scoliosis in this cadaver, nervous tissue is examined to determine whether central nervous system dysfunction or nervous lesions led to the appearance of scoliosis. Bone density is examined to determine if bone degeneration might be a contributor to her deformity. To determine a timeframe for the onset of scoliosis, bone structure and skeletal muscle accommodation are measured. To determine effect of scoliosis on the cadaver, she is examined for comorbidities. These include tumors that may have resulted from a large amount of x-ray imaging, signs of pelvic obliquity, or impingement of nerves and pulmonary tissues. Investigation into the presence of orthopedic implants or evidence of invasive procedures that correlate to common treatments also gives insight into the potential severity of scoliosis during the cadaver's life.

KIRKHOF CENTER GRR 043

## Acute Toxicity of Cadmium in Larvae of the Greater Wax Moth

Participants attending 9:00 AM – 10:00 AM

Presenter: Sarah Atang

Mentor: Babasola Fateye

Background: Greater wax moth (*Galleria mellonella*) larvae are a very useful model for determining acute toxicity of chemicals. We assessed the acute and organ toxicity of cadmium chloride in malpighian tubules (MT; the insect excretory organ, similar to mammalian nephrons). Methods: CdCl<sub>2</sub> was administered via oral and intrahaemocoel injections. After 24hrs, MT's were dissected and imaged with confocal microscopy. Results: CdCl<sub>2</sub> was acutely toxic: LD50 for oral & haemocoel injections were ~50mg/kg and 1mg/kg, respectively. Microscopy showed clear disruption of conformation and histology of the tissue. Conclusion: While the exact effect it has on MT's is not fully understood, damage at a cellular level has been observed along with disruption in the integrity of the tubule.

KIRKHOF CENTER GRR 044

## The Essential Role of the Pkn Gene in *Drosophila melanogaster*: Insights into Developmental Defects and Wing Morphology

Participants attending 11:00 AM – 12:00 PM

Presenter: Lia Quatro

Mentor: Georgette Sass

The function of Protein Kinase N (Pkn) in *Drosophila melanogaster* is required during embryonic development as a regulatory component of the actin cytoskeleton. The *delorean* mutant expresses reduced levels of *Pkn*, serving as our focal point to understand how a deficiency of maternal *Pkn* impacts development. To examine defects associated with a maternal deficiency of *Pkn*, we used homozygous *delorean* females crossed with wild-type males. Analysis via cuticle preparations, protein markers, and confocal microscopy revealed severe developmental defects in embryos from *delorean* mothers. Examinations of unexpected wing phenotypes associated with the presence of moesin actin-binding domain demonstrated an enhancement of *delorean* severity, also seen with human utrophin actin-binding domain. Wing characteristics including stouts and twin sensilla were utilized to determine the level of severity. To further understand the cause of the wing phenotype, a knockdown of a GFP-tagged Pkn was performed with a wing GAL4 driver and deGradFP, in an attempt to recapitulate the *delorean* wing phenotype. These findings highlight the critical role that Pkn plays in proper development, demonstrating severe defects when *Pkn* functions are disrupted.



KIRKHOF CENTER GRR 045

**The Olive Tree Collection**

Participants attending 3:00 PM – 4:00 PM

Presenter: Ian McGuckin

Mentor: David Alvarez

One of the most contentious international conflicts over the past two years, the Israeli bombardment of the besieged enclave of the Gaza strip, has defied international law and eroded humanitarian norms that enshrine the rights of ordinary civilians. The percolation of this violence through social media platforms has stunned the world, especially the younger generations. This presentation explores and exhibits the efforts of several GVSU students to engage with this issue through the creative mediums of art and writing, culminating in the publication of a collection representing dozens of Palestinian artists, including several from Gaza, a Pulitzer Prize winning illustrator, and one of Italy's top political cartoonists. This presentation will display some of the premier artwork and poetry laid out in the collection. Furthermore, it will detail the importance of such acts of solidarity towards raising awareness and education of a situation that is frequently distilled to thought-terminating slogans to avoid in-depth analysis.

KIRKHOF CENTER GRR 046

**Exploring the Correlation Between Emotional Well-being and Academic Success in College Students Using AgileBrain**

Participants attending 11:00 AM – 12:00 PM

Presenter: Caroline De Roo

Mentor: Babasola Fateye

Academic performance and well-being are closely linked, yet the relationship between cognitive-emotional states and student success remains underexplored. AgileBrain is a neuroscience-based screening tool that was recently validated to assess emotional well-being in college students. This study aims to explore how academic variables such as GPA and extracurricular involvement correlate with AgileBrain survey outcomes. Statistical analysis will identify correlations between academic habits and cognitive-emotional well-being. Preliminary findings "suggest that AgileBrain can sensitively detect changes in student well-being following interventions, such as counseling sessions or participation in stress-reduction programs" (Pincus, VanWagoner, & Colon, 2024). Understanding these correlations can help improve student success while promoting mental health, offering insights into how academic pressures impact well-being.

KIRKHOF CENTER GRR 047

**Biochemical Characterization of ADC-172, a Class C Beta Lactamase from *Acinetobacter baumannii***

Participants attending 1:00 PM – 2:00 PM

Presenter: Sierra Papa

Mentor: Rachel Powers

$\beta$ -lactams are the most widely prescribed class of antibiotics. However, resistance to them poses significant healthcare challenges. Of concern is emergence of multidrug resistant bacteria. In particular, the gram negative bacteria *Acinetobacter baumannii* is considered a "critical priority" pathogen by the WHO. Much of its resistance to  $\beta$ -lactams derives from expression of  $\beta$ -lactamases that hydrolyze the defining lactam ring. *A. baumannii* resistance to a wider range of antibiotics continues to expand through acquisition of mutations in these enzymes. One  $\beta$ -lactamase variant found in *A. baumannii* is the class C  $\beta$ -lactamase ADC-172. This variant differs from its parent enzyme, ADC-33, by a single amino acid change, Asn296Lys. Both ADC-33 and ADC-172 also contain an alanine duplication in the omega loop, contributing to resistance. ADC-33 was shown to turnover two large  $\beta$ -lactams, cefiderocol and ceftazidime. To better understand the functional impact of the Asn296Lys mutation in ADC-172, we kinetically characterized ADC-172 with a panel of  $\beta$ -lactams. The kinetic characterization of  $\beta$ -lactamase variant ADC-172 provides useful information on how the acquisition of various mutations impact its

functional hydrolytic activity and contribute to the growing resistance in *A. baumannii*. These results may aid in the development of new antibiotics that are resistant to  $\beta$ -lactamases.

KIRKHOF CENTER GRR 048

### **Testing a Mindful Intervention to Reduce Cell Phone Use in College Students**

Participants attending 1:00 PM – 2:00 PM, 2:00 PM – 3:00 PM, 3:00 PM – 4:00 PM, 4:00 PM – 5:00 PM

Presenters: Grace Nieboer, Emily Shane

Mentor: Amanda Dillard

Mindfulness refers to an awareness and acceptance of the present moment (Brown et al., 2007). Trait mindfulness is a variation in individual mindfulness for diverse situations and times (Sala et al., 2020). Both forms of mindfulness have been associated with enhanced physical health and better health behaviors, and one explanation for this is that mindfulness may increase receptivity to health messages. In this study, we investigated whether college students who experienced a mindfulness intervention were more accepting of threatening health information. Participants came to the laboratory and were randomly assigned to listen to either a mindful or relaxation (control) task. Following this manipulation, all participants read a message about the health problems associated with excessive cell phone screen time (e.g., depressive symptoms, neck and back problems), which was defined as more than 2 hours per day. Following the message, participants answered various questions about the acceptance (e.g., agreement, trust, importance) of the information in the message. They also reported their beliefs about their personal risks of experiencing health problems and their behavior intentions to reduce their screen time. Analyses will test if people in the mindful condition (versus the relax condition) are more accepting and motivated to change their behavior.

KIRKHOF CENTER GRR 049

### **Isotachophoresis Spacer Ion Optimization for *Escherichia coli* and *Lactobacillus casei* Separation**

Participants attending 11:00 AM – 12:00 PM

Presenter: Colton Dysart

Mentor: Andrew Lantz

*Escherichia coli* (*E. coli*) is a bacterium that is known for its gastrointestinal tract infections. Probiotics are often used to treat GI tract infections by introducing competing bacteria such as *Lactobacillus* and *Bifidobacterium* species. In this research, we develop a method using isotachophoresis (ITP) mode of capillary electrophoresis to separate and potentially quantify *E. coli* and *Lactobacillus casei* (*L. casei*) in mixed cell samples. ITP uses an applied electric field to separate ions and cells within a capillary based in the order of their electrophoretic mobilities. In this work we screen a series of ions whose mobility bracket those of the cells, allowing the species to be separated into distinct peaks on the electropherogram. This ITP method will be used in the future to quantify the competitive growth of *L. casei* and *E. coli*.

KIRKHOF CENTER GRR 050

### **A Comparative Machine Learning Framework for Predicting Pharmacy Type Selection in the United States**

Participants attending 10:00 AM – 11:00 AM

Presenter: Michael Irungu

Mentor: Suhila Sawesi

Background: Traditional analyses of pharmacy type selection often rely on logistic regression within the Anderson Behavioral Model, potentially overlooking non-linear relationships in consumer decision-making. Objective: This study applies machine learning techniques to the 2021 National Consumer Survey data to uncover non-linear patterns in pharmacy type selection and compare these approaches with logistic regression. Methods: Data from 1,521 respondents were first analyzed using a baseline logistic regression model. Random Forest and XGBoost models were then developed to predict five pharmacy types (independent, chain, supermarket/mass merchandise, mail-order, and prescription-only). Results:

Machine learning models outperformed logistic regression, achieving high accuracy for mail-order (92.7%) and prescription-only pharmacies (93.7%). Key predictors across models included income, the number of chronic diseases, and geographic division. Notably, prior mail prescription experience emerged as a strong predictor for mail-order selection, and complex interactions between income and geographic region were identified that traditional methods did not reveal. Conclusion: Machine learning approaches uncovered previously undetected non-linear relationships in pharmacy type selection. These findings provide deeper insights into healthcare consumer behavior, offering valuable guidance for healthcare providers and policymakers in tailoring services to diverse patient needs.

KIRKHOF CENTER GRR 051

### **Understanding Partner Social Dance: Motion Analysis of Salsa Dance**

Participants attending 9:00 AM – 10:00 AM, 11:00 AM – 12:00 PM, 2:00 PM – 3:00 PM, 3:00 PM – 4:00 PM

Presenters: Jackson Farrell, Hannah Hertstein, Magdalen Kyi, Benjamin Maletta, Kelly Peregrine, Lauren Space

Mentors: Stephen Glass, Yunju Lee

Research has shown that partner dancing (waltz, salsa, samba etc.) is movement useful for the improvement of balance, coordination, cognitive function and even socialization within communities of older adults and adults with neuromuscular dysfunction. Dance consists of patterns of movements that can be learned and repeated, and movement is performed rhythmically with music particular to a given dance. The partner aspect of dance allows for tactile contact for the leader and follower, also improving one's sense of body position and pressure/contact points for movement inputs (i.e., the lead). Conventional research examining the effects of dance on balance or coordination involved pre-post general tests of balance, with minimal assessment of the actual changes in movement of individuals. The purpose of our study is to examine the biomechanical movement variables (i.e., kinematics) of three different skill levels of salsa dance followers. Wireless 3D motion capture technology is being utilized to capture 12 salsa dance movement patterns. Four of the patterns are executed by the dancer individually, and the remaining eight movements are performed with a standardized lead partner. Since data collection is ongoing, we are presenting some examples of individualized results to demonstrate the nature of our data and analysis process.

KIRKHOF CENTER GRR 052

### **Utilizing High-Temperature Melting for Lanthanide Trichloride Complex Synthesis with $\text{dppmO}_2$**

Participants attending 12:00 PM – 1:00 PM

Presenter: Joseph Paganelli

Mentors: John Bender, Shannon Biros

The isolation and purification of lanthanide (Ln) ions continue to attract much attention due to the increased use of these metals in everyday devices. Our research group has prepared complexes with (bis)diphenylphosphinomethane dioxide ( $\text{dppmO}_2$ ) and a series of  $\text{Ln}(\text{Cl})_3$  salts using solvent-free, high-temperature melt conditions. In these complexation reactions, the stoichiometry between the ligand and the metal was varied. The complexes were then studied by FT-IR, NMR, mass spectrometry, and X-ray crystallography.

KIRKHOF CENTER GRR 053

### **A Replication and Comparison of 'Predisposing, Enabling, and Need Factors Driving Pharmacy Type Choice in The US' Using 2021 NCSME-PR Data**

Participants attending 10:00 AM – 11:00 AM

Presenter: Pranitha Presingu

Mentor: Suhila Sawesi

**Background:** Understanding pharmacy choice is essential for optimizing healthcare delivery, improving medication adherence, and tailoring services to diverse needs. **Objective:** This study replicates and extends the 2015 analysis by Rashrash *et al.* (2016) of factors influencing pharmacy type selection using 2021 data. **Methods:** Statistical analyses were conducted using R. Logistic regression identified key predictors, including demographics (age, gender, education), financial enablers (insurance), and healthcare needs (prescription use, health status). **Results:** Convenience factors gained importance, clinical services had a growing impact, and mail prescriptions showed increasing influence. Traditional demographic factors showed mixed effects, with stronger age preferences and more complex gender associations. **Conclusion:** Pharmacy selection is shaped by diverse factors, highlighting the need for tailored services and informed policies. Future research should examine attitudinal factors and longitudinal trends.

KIRKHOF CENTER GRR 054

### **Core Muscle Activation During Lateral Trunk Rotation Using Core-Stix Resistance Poles**

Participants attending 9:00 AM – 10:00 AM, 10:00 AM – 11:00 AM

Presenters: Seth DeCaire, Benjamin Maletta

Mentor: Stephen Glass

Abdominal oblique muscles help to rotate to torso and move through multiple planes and stabilize functional movements. Training core muscles such as the obliques is often done using single planes of movement, like weightlifting, planks, and pushups. Core-Stix is a system of fiberglass resistance poles that create unique opportunities to utilize strength training through multiple planes of movement. The purpose of this design project is to create a potential research study that examines muscle activation patterns of the obliques using a multiplanar movement and compare the activation across different resistance intensities. We are designing an exercise movement for the external oblique muscles and comparing activation across different resistance intensities. Methods for measuring activation, force applied on the poles and other design control variables will be developed. We are presenting our final study design, prior to moving forward for IRB submission.

KIRKHOF CENTER GRR 055

### **Characterizing the Aggregation Process of the Functional Amyloid Kassinin**

Participants attending 10:00 AM – 11:00 AM

Presenter: Lillie Waldron

Mentor: Laura Hawk

Aggregation of proteins to form amyloids is implicated in several diseases such as Alzheimer's Disease and Parkinson's Disease. This aggregation has several stages, progressing from isolated protein molecules (monomers) to small aggregates (oligomers), which are toxic to cells, and finally to large, string-like mature aggregates. Despite this association with disease, functional amyloids, which have normal biological functions, also result from protein aggregation. Kassinin, an amphibian peptide involved in nerve signal transmission, is a model system for functional amyloid study. To compare the aggregation of functional and disease-causing amyloids, we monitored the aggregation process of fluorine-labeled kassinin. We synthesized the fluorine-labeled kassinin through solid-phase peptide synthesis and purified the peptide by HPLC. The aggregation was monitored by  $^{19}\text{F}$  NMR in the presence of various additive molecules to further characterize the role these additive molecules may have in the aggregation process of kassinin. Examining the aggregation process of functional amyloids and contrasting with disease-associated amyloids will contribute to a clearer understanding of the disease process of protein aggregation-associated diseases.

KIRKHOF CENTER GRR 056

### **A Data-Driven Analysis of Health Informatics Graduate Education in the United States**

Participants attending 9:00 AM – 10:00 AM

Presenters: Michael Irungu, Pranitha Presingu

Mentors: Suhila Sawesi, Guenter Tusch

**Abstract:** The rapid evolution of healthcare technology coupled with the vast collection of clinical and administrative data has driven a surge in demand for professionals in health informatics. Universities across the United States have developed a range of master's programs designed to meet the demand. However, there is limited systematic analysis of such programs and their effectiveness in addressing the market needs. **Aims:** This study aims to analyze and compare Health Informatics master's programs across the United States, focusing on curriculum content, program delivery formats. **Methods:** We collected data from 108 Health Informatics graduate programs, analyzing program characteristics including tuition structure, delivery format, accreditation status, and detailed curriculum content. **Results:** (1) CAHIIM-accredited programs (57.4%) tend to have more standardized curricula and lower tuition rates; (2) 98.1% of programs cover healthcare concepts, while technical skills like programming appear in only 64.8% of programs; (3) Most programs (69.4%) offer fixed duration paths with 24 months being the most common timeline; (4) Significant tuition variation exists between resident (\$654 mean) and non-resident (\$1,235 mean) rates. **Conclusion:** While programs share common core elements in healthcare and informatics, there's considerable variation in technical skill coverage, program structure, and cost.

KIRKHOF CENTER GRR 057

### **Synthesis of Tuberculosis Antibiotics with Various Halogen Substitution**

Participants attending 12:00 PM – 1:00 PM

Presenters: Julianna Cornwell, Catey Engel, Sophia McComb, Anh Lan Nguyen, Brianna Rhodea

Mentor: Matthew Hart

Tuberculosis (TB) is a bacterial infection affecting millions of people globally, estimated to have infected 8.2 million diagnosed in 2023 alone. This makes it the most prevalent infectious disease killer, surpassing the pandemic-causing coronavirus. Some antibiotics have been made in an attempt to decrease the spread and deadliness of TB, but an increasing amount of resistant strains have rendered those drugs unusable. Thus, it is necessary to synthesize new drugs in response to *Mycobacterium tuberculosis*' growing resistance to drugs already created. In our experiment, we will examine the impact of various halogens on drug efficacy. Specifically, derivatives of the diphenyl amide core will be prepared with substitutions of ortho, meta, and para halide groups, including fluorine, chlorine, and bromine. Organic synthetic chemistry techniques and computational analysis will be used to predict the effectiveness of these antibiotics. Additionally, confirmation of each final antibiotic will be completed using IR, NMR, and mass spectroscopy. We hope our findings provide new insights for the treatment of TB.

KIRKHOF CENTER GRR 058

### **Voices in the Void**

Participants attending 3:00 PM – 4:00 PM

Presenter: Breezy Rusher

Mentor: David Zwart

The experiences of Black educators in Michigan as they navigated the evolving educational landscape from the 1970s to the 1990s is a topic that has often been overlooked in historical scholarship. Historically, Black educators have been marginalized and frequently spoken for by non-educators, despite their deep commitment to their work and communities. Including Black educator voices and examining the direct impact of historical events on them is paramount. Their experiences are crucial to understanding the broader context of educational history and the systemic challenges they faced. This paper draws on the voices of Black educators and secondary literature, revealing teachers' experiences, observations, and insights, alongside geographical and quantitative data. It aims to provide a richer and more informed understanding of the role and impact of Black educators in history, addressing gaps in historical scholarship and emphasizing the significance of their lived experiences to the field of education

KIRKHOF CENTER GRR 059

### **Designing Tuberculosis Drugs with Increasing Ester Chains**

Participants attending 12:00 PM – 1:00 PM, 1:00 PM – 2:00 PM, 3:00 PM – 4:00 PM

Presenters: Corine Elian, Diana Marroquin, Evelyn Schab

Mentor: Matthew Hart

Mycobacterium tuberculosis (TB) is an infectious disease that primarily affects your lungs, but also impacts other parts of your body. TB is one of the leading causes of death from infectious diseases worldwide, making the need for novel antibiotics critical. There has been a rise in antibiotic resistance against TB treatments, further complicating this issue. This project studies the synthesis of novel drugs to treat infections caused by TB. We will focus on exploring the structure–activity relationship (SAR) of a lead structure that contains an amide core. By utilizing synthesis, we will alter our lead structure by modifying the ester group with varying chain lengths of 2, 4, and 8 carbons. We will use NMR and IR to confirm the results of our structure. Additionally, computational docking will be used to predict each compound's effectiveness. It is hoped that these findings will help contribute to the development of powerful and effective drugs to treat resistant strains of TB.

KIRKHOF CENTER GRR 060

### **Communication Strategies and Health Literacy for Patients Diagnosed with Age-Related Macular Degeneration (AMD): A Scoping Review**

Participants attending 12:00 PM – 1:00 PM, 3:00 PM – 4:00 PM

Presenters: Niam Aboalsaman, Ethan Fulton, Sydnie Greene, Jack Miller

Mentor: Julia VanderMolen

**Purpose:** This scoping review aims to analyze health literacy resources for individuals diagnosed with Age-related macular degeneration (AMD) and address communication strategies with primary care physicians (PCPs) **Methods:** Five researchers used the Preferred Reporting Items for Systematic Reviews and Meta-Analyses (PRISMA) Group as a guideline for developing, reporting, and replicability of systematic review methodology. Three databases were used for the review PubMed, (2) CINAHL, (3) ProQuest Med. **Results:** The search strategy retrieved 201,331 records regarding AMD and health literacy. Thirteen studies met eligibility criteria and were included in the review. **Discussion:** Based on the limited research findings, the main conclusion from the review revealed a lack of health literacy education for individuals diagnosed with AMD and the communication resources provided by their PCP.

KIRKHOF CENTER GRR 061

### **Cooler Coastal Environments of the Oligocene US East Coast**

Participants attending 9:00 AM – 10:00 AM

Presenter: Ella Puffer

Mentor: Ian Winkelstern

This study examines an eastern US coastal environment of Oligocene age, a warm epoch thought to be globally cooler than the preceding “hothouse” Eocene climate. We use oxygen and carbon isotope data as proxies to study the paleoenvironment of the Ashely and Chandler Bridge formations of South Carolina, USA. Isotopic subsamples were collected from calcite and aragonite bivalve shells by drilling approximately the same area on each shell hinge and measured for  $\delta^{18}\text{O}$  and  $\delta^{13}\text{C}$ . The shells were collected from two different locations, one more inland (Ashley Fm.) and one closer to the coast (Chandler Bridge Fm.). The Ashley Fm. shells had more negative  $\delta^{18}\text{O}$  values (–2 to –4 ‰ VPDB) and very negative  $\delta^{13}\text{C}$  values (–9 to –11 ‰ VPDB), relative to the Chandler Bridge shells (0 to –2 ‰  $\delta^{18}\text{O}$  and –1.5 to –3 ‰  $\delta^{13}\text{C}$ ). A likely cause of the more extreme values for the inland shells is that they were growing in an estuarine environment, where fresh water meets salt water. Coastal shells likely grew in primarily saltwater as their values are not as negative. We suggest that all shells grew in warmer water compared to today's temperatures, implying sustained Oligocene warmth across the modern US East Coast.

KIRKHOF CENTER GRR 062

### **Comparison of Clumped Isotope, Raman Spectroscopy, and Calcite Microstructural Constraints on Burial and Exhumation of the Laventille Formation, Northern Range, Trinidad**

Participants attending 11:00 AM – 12:00 PM

Presenter: Hugo Rainey

Mentor: Ian Winkelstern

The Laventille is an understudied meta-limestone exposed along the Caribbean–South American plate boundary in the Northern Range of Trinidad. We seek to constrain the burial and exhumation history of this unit to better understand the tectonics in the region. Previous study by Genarro et al. (2022), Arkle et al. (2021), and Weber et al. (2001) has identified maximum burial temperatures across the range, with temperatures increasing to the northwest. New constraints from the Laventille, south of the Arima Fault Zone, will provide a more comprehensive picture and a direct comparison between clumped isotope and more established geothermometry methods. Petrographic analysis reveals spatial variability in degree of alteration, with highly recrystallized, marble-like textures exclusive to our northernmost samples. Calcite twins indicate peak burial temperatures of at least 150–200°C, with thicker, higher temperature twins appearing exclusively in moderately to highly altered samples. Clumped isotope analyses agree with the tectonic history described in Genarro et al. (2022), placing burial to 315°C around 12 Ma, exhumation to 150°C by 7 Ma, and near-surface temperatures 5 Ma, verifying that clumped isotope-based exhumation models can agree with other techniques.

KIRKHOF CENTER GRR 063

### **Assessing Geohydrological Challenges in Constructing Wetlands Using Monitoring Wells and Sedimentary Profiles at a Field Site in South Central Michigan**

Participants attending 12:00 PM – 1:00 PM

Presenter: Delaney Novach

Mentor: Peter Riemersma

Regulations permit the destruction of natural wetlands if they are replaced by constructed wetlands, often sold as a commodity through mitigation banks. Wetland design plans often focus on measuring vegetation and wildlife activity, with little emphasis on geologic or hydrologic factors. This research investigates gaps in the current methodology of constructing wetlands to identify certain geohydrological challenges in wetland construction. A review of the literature establishes hydrology as a primary factor allowing natural wetlands to exist in specific geomorphic settings. Comparing surface-groundwater interactions of a constructed wetland with those of a natural wetland highlights the important role that hydrology plays. Existing management plans, precipitation data, and historic water elevation data were obtained at a field site which is a part of Kalamazoo Watershed Wetland Mitigation Bank in Eaton County, Michigan to analyze the constructed wetland. Nested well installation, precipitation event analysis, sedimentary profile observations, and hydraulic gradient studies are used to better characterize the role of surface-groundwater interactions in mitigated wetlands. Given that these interactions are crucial to the health and functionality of wetlands, the results suggest that additional emphasis on the flow of water should be employed in wetland mitigation bank site planning.

KIRKHOF CENTER GRR 064

### **Synthesis of TB Antibiotics with Naphthylene Substituted Amides**

Participants attending 12:00 PM – 1:00 PM, 1:00 PM – 2:00 PM, 2:00 PM – 3:00 PM

Presenters: Devin Chung, Tyler Cooper, Beck Shores, Gracie Willett, Elizabeth Yamine

Mentor: Matthew Hart

In 2023, WHO estimated that 1.25 million people died from Mycobacterium Tuberculosis (TB). Over the years, TB has evolved resistance to current treatment strategies. Scientists have worked to identify drug-resistant TB strands and develop novel antibiotics. In this project, organic synthesis and computational analysis will be used to determine the Structure Activity Relationship of new amide derivatives. The addition of a naphthalene ring and its attachment position will be analyzed in combination with meta and para esters attached to an amide core. These changes will alter the binding affinity of the drug to the target in TB. Autodock will be used to determine the change in binding affinity, in hopes of finding a new structure with increased antibiotic interactions. The structures of these derivatives will be confirmed through <sup>1</sup>H NMR, <sup>13</sup>C NMR, IR, and mass spectrometry.

KIRKHOF CENTER GRR 065

## **Algal Responses to Nitrogen and Phosphorus Inputs in Wetlands of a Large River Mouth Ecosystem**

Participants attending 9:00 AM – 10:00 AM

Presenters: Alexandra Ferguson, Lauren Tabor

Mentors: Matthew Cooper, Sarah Hamsher

Nitrogen (N) and phosphorus (P) loading to freshwater wetlands is a problem in many agricultural and urban settings. To determine the effects of N and P additions on wetland algal growth, we conducted a nutrient amendment study in 21 coastal wetlands throughout the Grand River Estuary (GRE). We used nutrient diffusing substrata (NDS) consisting of N, P, combined N+P amendments, and control substrates to determine nutrient limitation. We also collected algal biofilm samples for taxonomic evaluation. We found that N availability limited benthic algal growth in many wetlands while N+P co-limitation occurred in some cases. P limitation alone was not observed. Wetland sites near the mouth of the Grand River had more algal growth, which suggests a greater amount of available nutrients further downstream. In some areas where nitrogen limitation was recorded, a higher abundance of nitrogen-fixing taxa was found. Coastal wetland food webs rely on algae as a primary energy source and our results suggest that anthropogenic nitrogen loading may alter algal communities and stimulate excessive algal growth in wetlands of the GRE. Watershed management strategies should consider mitigating both N and P loading in tributaries draining to freshwater wetlands to prevent excess algal growth.

KIRKHOF CENTER GRR 066

## **Effects of Oral Contraceptive Use and Cervical Cancer in Women**

Participants attending 10:00 AM – 11:00 AM, 11:00 AM – 12:00 PM

Presenters: Mila Tasma, Emma Walker, Dylan Wigfield

Mentor: Chad Sutcliffe

The objective of this research is to determine the correlation between oral contraceptive (OC) usage and the development of cervical cancer. Oral contraceptives are the most commonly prescribed form of birth control in the United States and are widely used by women due to the accessibility and effectiveness of OC. This systematic review included 20 peer-reviewed articles focusing on women above the age of 19 to assess the relationship between OC and cervical cancer risk. Findings from the review revealed that there is a positive correlation between prolonged use of oral contraceptives and an increased risk of developing cervical cancer. While there is a positive correlation, it is important to note the influence of other factors, such as the presence of human papillomavirus (HPV) infection. Additional variables, including smoking, age, duration of OC use, and immune status also contribute to cervical cancer development. These findings highlight the importance of regular cervical cancer screenings and awareness of potential risk factors.

KIRKHOF CENTER GRR 067

## **The Burden of Disease: Impacts on the Occupied Palestinian Territory**

Participants attending 1:00 PM – 2:00 PM

Presenter: Aner Schuyler

Mentor: John Gabrosek

The Global Burden of Disease (GBD) Study in 2010 estimated the burden of diseases, injuries, and risk factors globally and for 21 regions for 1990 to 2010. The dataset chosen provides the number of deaths and mortality rates for 187 countries, 21 regions, and globally by age group and sex for 1970, 1980, 1990, 2000, and 2010. This project looks at the “burden of disease” on Palestine and Israel. The study explores any statistically significant disparities between the health and mortality of the Occupied Palestinian Territories and the Israeli nation. This research looks at the GBD in the nations under study in explanatory variables like age group, sex, year, number of deaths, and death rate per 100,000. Using SAS graphing and comparison techniques this study will quantify the differences in mortalities and their origins. The goal is to present the findings with an unbiased opinion and use news coverage, government statements, historical data, and health data to highlight potential causes, effects, and action plans.



KIRKHOF CENTER GRR 068

**Effects of ATG13 on *Schmidtea mediterranea* Regeneration**

Participants attending 9:00 AM – 10:00 AM

Presenter: Brandalyn Morris

Mentor: Matthew Christians

Planaria are flatworms capable of remarkable tissue regeneration, owing to their abundant and highly proliferative pluripotent stem cells. Understanding these stem cells may reveal opportunities for novel regeneration/stem cell therapies in humans. Currently, ATG13 was found to be a bridging protein involved in initiating autophagy. However, ATG13's contributions to regeneration have yet to be assessed. Utilizing RNAi, we attempted to assess brain regeneration in planarians after the knockdown of ATG13. After knocking down ATG13, and amputating the heads of planaria, we found little compelling difference between our knockdown versus the control in the area of regeneration. However, we did notice subtle changes in the eyespots that may be due to changes in regeneration. This research suggests that ATG13 does not play a major role in planaria regeneration, however more research is needed to understand how autophagy may control the regeneration process in planaria.

KIRKHOF CENTER GRR 069

**Quebec Wildfires 2023**

Participants attending 10:00 AM – 11:00 AM

Presenter: Bryan Heiss

Mentor: Kin Ma

Canada has been devastated by a record-breaking series of wildfires in 2023, and wildfires have raged in all 13 provinces and territories burning 15 million hectares. The 2023 fire was the most destructive ever recorded – exceeding the fire years of 1989 (7.6 million hectares), 1994 (7 million hectares), and 2014 (4.5 million hectares). A record 4.5 million hectares burned in Quebec Province between 3/2023–9/2023, due to extremely warm and dry conditions. With the acquired geospatial data and maps we can learn about Quebec forest destruction patterns and the impacts of 2023 fires. The types of vegetation destroyed were grassland, needle forest, shrubland, and mixed forest. Wildfires in Canada can significantly impact the landscape and their distribution. GIS and Remote Sensing Clip, and Buffer methods were extracted specific regions of interest and created buffer zones around fire-affected areas. Spatial interpolation method estimated the distribution and density of tree types. Utilized ERDAS Imagine was used to remove atmospheric interference and display the extent of the fiery smoke. The 3D Analyst tool visualizes and processes terrain/ elevation data, enhancing understanding of topography, vegetation cover, and fire behavior. These methods provide an assessment of the extent of Canada wildfire destruction.

KIRKHOF CENTER GRR 070

**Prospective Associations Between Trait Mindfulness, Health Behaviors, and Behavioral Intentions in College Students**

Participants attending 9:00 AM – 10:00 AM, 2:00 PM – 3:00 PM

Presenter: Mya Hanna

Mentor: Amanda Dillard

State mindfulness is described as being accepting of the present moment (Brown et al., 2007). State mindfulness is obtained through practicing various breathing exercises, and paying attention to one's passing thoughts without judgment. In contrast, trait mindfulness refers to a general level of mindfulness that a person engages in across everyday situations (Sala et al., 2020). Previous research has shown that individuals who are higher in trait mindfulness experience lower levels of psychological distress (Tomlinson et al., 2017). Although studies using cross-sectional designs have found positive associations between trait mindfulness, general health, and pain (Bodenlos et al., 2015, Greeson & Chin 2019), researchers know less about the relationship between trait mindfulness and physical health symptoms, particularly over time. Well-known correlates of physical health are health behaviors (exercise, smoking, sleep quality, etc.). The present study examines prospective associations between trait mindfulness,

physical health, health behaviors, and behavioral intentions in a sample of college students. Participants responded to an online survey every 3 weeks for four months. The survey included the Mindful Awareness and Attention Scale (MAAS), and the Checklist for Symptoms in Daily Life (CDS) scale, and assessed participants' health behaviors including physical activity and dietary and sleep practices.

KIRKHOF CENTER GRR 071

### **Summer at the Smithsonian: A Conservation Internship**

Participants attending 12:00 PM – 1:00 PM

Presenter: Zachary Glover

Mentor: Sigrid Danielson

Art and artifacts are at constant odds with time. Light, moisture, and temperature all work to damage material culture. The duty of taking care of objects falls to art conservationists. Over the course of a three-month internship at the National Museum of American History I learned about and assisted with treatments on paper and textiles in the museum's collection. I repaired over 5,000 documents, rehoused memorial ribbons, and repaired currency for the numatics collection. This experience introduced me to essential methods of conservation practice including recognition of personal bias, respecting the integrity of the original object, and employing reversible techniques. Combining the sciences and humanities I was able to participate in the care of the museum's large collection and preserve material culture for future generations.

KIRKHOF CENTER GRR 072

### **Identifying Evolvability-Enhancing Mutations via Computational Models**

Participants attending 9:00 AM – 10:00 AM, 10:00 AM – 11:00 AM, 11:00 AM – 12:00 PM

Presenter: Marcos Sanson

Mentor: Austin Ferguson

The last few decades have seen a surge in experimental evolution, where researchers empirically test evolutionary theory using laboratory experiments. Evolution occurs over a span of generations, so even with fast-replicating organisms, such as bacteria, these experiments can take months, years, or even decades to perform. Computational experimental evolution systems, however, can experience thousands of generations per minute, allowing us to conduct experiments that are currently intractable in natural organisms. Here, we use these computational systems to empirically study evolvability-enhancing mutations: mutations that increase the long-term fitness of the population. Evolvability is a long-debated idea in evolutionary biology, partially because it has been difficult to study through direct experimentation. While several methods have been proposed to study evolvability-enhancing mutations, the speed of our model allows us to measure actual differences in long-term fitness between populations with and without a mutation, giving a true measure of change in evolvability. We use this new method to identify patterns in evolvability-enhancing mutations across fitness landscapes. We also compare our results to other methods of identifying these mutations to determine which approach offers the truest glimpse into evolvability in natural organisms.

KIRKHOF CENTER GRR 073

### **Improving Efficiency of Underlying Solvers for Quantum Scattering**

Participants attending 12:00 PM – 1:00 PM, 1:00 PM – 2:00 PM

Presenter: Hannah Shaw

Mentor: Erin Carrier

Quantum scatterings caused by molecular collisions can be virtually simulated by a package called molscat developed to facilitate chemistry research. However, the efficiency of the package has been outgrown by the complexity of problems many current chemists are looking to tackle, due to extensive matrix operations performed by the simulation. In the standard approach, the dominant operation which limits scaling is the use of explicit matrix inversion throughout the simulation. Alternative approaches utilize sparse matrix operations. This project analyzes the computational performance through the use of

profiling to verify the time-consuming aspects. The ultimate goal is to develop enhancements which improve runtimes and scalability with respect to problem size, while maintaining stability and accuracy of the solution.

KIRKHOF CENTER GRR 074

### **Exploration of Vulnerabilities and Threat Mitigation of Service Function Chaining in Fog Computing**

Participants attending 1:00 PM – 2:00 PM

Presenters: Fahim Morshed, Trevor Ouma

Mentor: Sara Sutton

Service Function Chaining (SFC) in Network Function Virtualization (NFV) enables the dynamic deployment of Virtual Network Functions (VNFs) such as Firewalls and Deep Packet Inspectors. This research investigates inherent vulnerabilities in Service Function Chains (SFCs) that can be exploited by attackers, with a focus on the mapping consistency of Virtualized Network Functions (VNFs), which represents a critical aspect of network security. The consistency of VNF mapping is essential for ensuring the proper execution of network functions, yet inconsistencies can be manipulated by attackers to compromise security. We explore various attack vectors targeting VNF mapping and emphasize how attackers can exploit these vulnerabilities to undermine the integrity of network services. The study proposes proactive defense strategies, including threat modeling and resource utilization monitoring, to detect anomalies and enhance the security of VNF mappings in fog computing environments.

Preliminary experiments show that our algorithm efficiently maps VNFs. Ongoing work focuses on conducting targeted attacks to divert packets bypassing critical VNFs and determine any resultant anomalies in resource metrics. Future work will focus on quantifying the impact on system resources and developing robust mitigation strategies, thereby enhancing the security and resilience of SFC deployments.

KIRKHOF CENTER GRR 075

### **Assessing the Impact of Timber Harvesting on Soil Erosion and Sediment Transport in the Au Sable Watershed**

Participants attending 12:00 PM – 1:00 PM, 2:00 PM – 3:00 PM, 3:00 PM – 4:00 PM, 4:00 PM – 5:00 PM

Presenter: Alexander Baetz

Mentor: Sean Woznicki

The timber industry is a key economic driver in Michigan, but its impact on soil erosion and water quality requires investigation. This study uses Geographic Information Systems (GIS) to evaluate how logging activities influence both soil erosion and sediment dynamics within the Au Sable watershed. By integrating the Revised Universal Soil Loss Equation (RUSLE) and a Sediment Delivery Ratio (SDR) model, the project quantifies erosion risk and sediment transport to water bodies. The analysis will incorporate key factors such as land cover, precipitation, soil erodibility, topography, management practices, and hydrologic connectivity to assess their roles in identifying high-risk erosion zones. Additionally, locations with evidence of timber harvests will be included to link logging activities with soil erosion and sediment delivery. The findings will provide actionable insights for sustainable forestry practices, highlighting areas where logging may accelerate soil loss and adversely affect aquatic ecosystems. Ultimately, this research seeks to balance Michigan's economic interests in timber production with the long-term health of its forests and waterways, promoting effective environmental stewardship.

KIRKHOF CENTER GRR 076

### **Coral Image Classification Using Underwater Image Enhancement**

Participants attending 11:00 AM – 12:00 PM, 12:00 PM – 1:00 PM, 1:00 PM – 2:00 PM, 2:00 PM – 3:00 PM

Presenters: Dat Nguyen, Minh Tran

Mentors: Denton Bobeldyk, Jonathan Leidig

Coral image classification can be negatively affected by underwater image quality as well as the size of the dataset used to train the machine learning models. Underwater image quality can be significantly degraded by factors such as turbidity, depth, lighting conditions, backscatter, resolution, camera calibration, blur, and distance. In addition to challenges in underwater image quality, the classification accuracy of a machine learning model may suffer from an inadequate amount of data to properly update the weights. Pretrained vision transformers (ViTs) have demonstrated exceptional effectiveness in image analysis, especially in cases where limited training data constrains the ability to train models from scratch. By adopting a hybrid approach that combines features from both a pre-trained CNN and a pre-trained ViT, our model has significantly outperformed the state-of-the-art accuracy of 41.75% on 10 species, achieving an impressive 94.89% classification accuracy. Furthermore, we have expanded our study to encompass 27 species, achieving an overall classification accuracy of 82.06%. To our knowledge, no other existing models demonstrate this level of performance across such a diverse range of coral species.

KIRKHOF CENTER GRR 077

### **Can Photos Depict the Mental Health of Grand Valley State University Students?**

Participants attending 10:00 AM – 11:00 AM, 11:00 AM – 12:00 PM

Presenter: Edwin Lopez Maldonado

Mentor: Babasola Fateye

How accurate are image surveys purporting to tell us the overall mental state of college students? This study seeks to find the most common mental health areas (spiritual, social, material, self) of struggle on a college campus and how they relate to coping skills. AgileBrain is a survey in which respondents view a series of images for approximately 1 second each to assess emotional needs without cognitive bias. Image-based surveys keep participants' attention span longer than other kinds of surveys. Participants: Students at a large 4-year college in Midwestern USA. Methods: PHQ-9, GAD-7, and UCLA-3 are short, validated questionnaires that will administered before an AgileBrain survey. Coping skills will be assessed by an image survey developed on Grand Valley State University grounds. Results will be analyzed compared to demographic information (gender, race, extracurriculars). Results: Preliminary findings suggest that those in student leadership organizations have better coping skills.

KIRKHOF CENTER GRR 078

### **Habitat Suitability of Eastern Massasauga Rattlesnakes in the Lower Peninsula of Michigan**

Participants attending 10:00 AM – 11:00 AM

Presenters: Emma Adams, Gabrielle Blunt, Carly Hedley

Mentor: Kin Ma

This project is meant to raise awareness of an endangered snake that is native to the Lower Peninsula of Michigan. The Eastern Massasauga Rattlesnake was placed as a threatened species in 2016 under the Endangered Species Act (ESA). This rattlesnake was listed as threatened under the ESA due to habitat loss. The goal of this project is to visualize habitat suitability of the remaining habitats for this species in Michigan's Lower Peninsula. Eastern Massasauga rattlesnakes need access to both lowland and upland locations, access to wetlands, and open, sunny areas with shaded spots, and access to open water. The data projected will be from credible sources, such as EGLE (Environment, Great Lakes, and Energy) and Michigan's Open Source Data. We will be investigating and analyzing wetland locations, lake and river locations, as well as land use/cover types. All data will be projected on a map created using Geographic Information Systems. Our hypothesis for this project is that the habitats for these snakes will be more concentrated in the southern part of the Lower Peninsula of Michigan, though we are expecting to find a portion of ideal habitats in the Northern Lower Peninsula.

KIRKHOF CENTER GRR 079

### **Cannabinoid Influence on Eating Motivation in Rodents**

Participants attending 10:00 AM – 11:00 AM

Presenter: Courtney Earl

Mentor: Natasha Swale

Cannabis has two main cannabinoids:  $\Delta^9$ -tetrahydrocannabinol (THC) and cannabidiol (CBD). Little is known about the effects of CBD on eating motivation and even less about its combination with THC. We used a substance similar to THC (WIN55,212-2), CBD, and a combination of the two to analyze the effects of cannabinoids on eating motivation. Rats initially went through four days of training, then were put on a fixed ratio schedule until they reached criteria (20+ lever presses/day for seven days). They were then injected with either WIN55,212-2 (1.2 mg/kg), CBD (10 mg/kg), a combination of both, or saline. Rats were put on a progressive ratio schedule until they had no reinforcers per day; this schedule increases the number of lever presses required for one reward which helps us see how hard they are willing to work in order to receive a single reward. Results showed that alone, WIN and CBD did not affect eating motivation when compared to the saline group, however, the combination of the two seemed to increase eating motivation. These results can help us translate the information to humans and potentially provide additional resources for future medical treatment for disorders such as obesity or other eating related disorders.

KIRKHOF CENTER GRR 080

### **The Cat Gene and its affect on *D. melanogaster***

Participants attending 9:00 AM – 10:00 AM

Presenter: Leonel Estudillo-Vazquez

Mentor: Georgette Sass

Parkinson's Disease affects 50,000–60,000 new people annually in the U.S. alone. It has multiple causes, most notably oxidative stress on neural cells and mitochondrial functionality. A key protein,  $\alpha$ -Synuclein, which is normally harmless, causes dysfunction when it aggregates in large amounts in neural cells. The Cat gene produces catalase, an enzyme that breaks down hydrogen peroxide into water and oxygen, preventing cellular damage from oxygen species. In my study, I am examining the effects that the presence of the Cat gene and  $\alpha$ -Synuclein have on fruit flies (*D. melanogaster*). I will use RNAi knockdown to reduce Cat gene expression and observe the resulting impact in the fruit flies. By analyzing the guts of adult and adolescent fruit flies, I aim to understand how the Cat gene influences fruit fly morphology and mitochondrial function. This research highlights the importance of the Cat gene, and the roles of oxidative stress and mitochondrial functionality in relation to Parkinson's Disease.

KIRKHOF CENTER GRR 081

### **Analysis of the Overexpression of Alpha-Synuclein on the Stathmin Gene and its Results on the Phenotype of the Ovary in *Drosophila melanogaster***

Participants attending 11:00 AM – 12:00 PM

Presenter: Daniela De Andrade

Mentor: Georgette Sass

The stathmin protein coding gene encodes a tubulin-binding protein involved in axo-dendritic transport, gamete generation, and synaptic growth at the neuromuscular junction of *Drosophila melanogaster*. Stathmin is involved in the development of ovaries, and the research will involve overexpressing alpha-synuclein using the GAL4/UAS system and analyzing the ovary of the *D. melanogaster* via a genetic knockdown scheme.

KIRKHOF CENTER GRR 082

### **Mutational Analysis of Aminoglycoside Nucleotidyltransferase(6)-Ia from *Bacillus subtilis***

Participants attending 1:00 PM – 2:00 PM

Presenter: Angela Tran

Mentor: Brian Smith

Antibiotics have revolutionized the treatment of bacterial infections, yet their widespread use has also led to antibiotic resistance. Such resistance threatens the efficacy of these medications as the frontline therapy for bacterial infections. Aminoglycoside nucleotidyltransferases (ANTs) are bacterial enzymes that specifically confer resistance to a class of antibiotics known as aminoglycosides. These drugs bind to the

30S subunit of the bacterial ribosome, causing translational miscoding. ANT<sub>s</sub> inactivate these drugs by catalyzing the transfer of an adenosine monophosphate (AMP) from ATP to a hydroxyl group on the antibiotic. With the addition of AMP, the modified antibiotic cannot bind to its target, causing bacteria to become resistant to these drugs. ANT(6)-Ia specifically modifies streptomycin by transferring AMP to the hydroxyl group at position 6. Despite the clinical significance of this activity, ANT(6)-Ia remains relatively uncharacterized. Gaining a greater understanding of this enzyme is imperative for surmounting the public health crisis that is antibiotic resistance. Here, using the structure of ANT(6)-Ib as a guide, several amino acid residues were selected for mutational analysis. The kinetic characterization of these variants suggests that E75 and E158 function primarily in streptomycin binding, whereas R172 is likely involved in ATP binding.

KIRKHOF CENTER GRR 083

### **Unlocking Memories: The Power of Mnemonics for Dementia Care**

Participants attending 10:00 AM – 11:00 AM

Presenter: Savannah Cano

Mentor: Dawn De Vries

I focus on the use of mnemonic strategies in improving memory recall with older adults with dementia. Mnemonics, such as songs, rhymes, acronyms, imagery and association can serve as a non-pharmacological approach to support memory retention.

KIRKHOF CENTER GRR 085

### **Single Entity Electrochemical Collisions of *S. saprophyticus* in Iodide Solutions at Au Ultramicroelectrodes**

Participants attending 1:00 PM – 2:00 PM, 2:00 PM – 3:00 PM

Presenter: Grace Connelly

Mentor: Scott Thorgaard

In a single bacteria electrochemical collision experiment, the interactions between individual bacteria and an ultramicroelectrode (UME) are tracked in time. There are two possible collision-types that were observed in this work: blocking collisions, where bacteria interacting with the UME obstructed transport of a redox species and produced decreasing current transients, and catalytic collisions, where a chemical reaction at the bacteria produced increasing current transients. Here, bacteria collision experiments using *S. saprophyticus* were ran at an Au disk UME in potassium iodide solutions. The electrochemistry of iodide in solutions of low ionic strength was characterized using cyclic voltammetry. Iodide exhibits two voltametric waves due to iodide and triiodide oxidation, respectively. The second wave is distorted due to coupled chemistry with Au. Collision experiments were run with the UME biased at the potentials of both waves. Blocking events were present at both waves, and catalytic events were also observed at the second wave. To assist in deducing the mechanism for catalytic collisions in the iodide/Au system, CV experiments were also performed in potassium bromide solutions. This work provides the first demonstration of single bacteria redox measurements in the iodide/Au system and could lead to the development of new bacteria sensing technologies.

KIRKHOF CENTER GRR 086

### **Recreational Therapy in Schools: Avenue to Holistic Learning**

Participants attending 10:00 AM – 11:00 AM

Presenter: Samantha Jordan

Mentor: Dawn De Vries

This presentation is about how Recreational Therapy in a school setting can help to support students with disabilities through interventions that will engage them in their learning and in their relationships with their fellow classmates. Recreational Therapy is a great asset for K-12 learning.

KIRKHOF CENTER GRR 089

**Structural and Functional Studies of Bacilliredoxins: Enzymes Involved in Redox Homeostasis in Gram-Positive Bacteria**

Participants attending 12:00 PM – 1:00 PM

Presenters: Annika Hawley, Lily Sorensen

Mentor: Paul Cook

During oxidative stress, gram positive Firmicutes utilize the low-molecular weight thiol known as bacillithiol (BSH) to protect vulnerable cysteine residues and modulate enzymatic activity. The glycolytic enzyme GAPDH, has been shown to be bacillithiolated during oxidative stress. This results in downregulation of glycolytic flux that shuttles metabolites into the pentose phosphate pathway, producing NADPH to combat the oxidative stress. Bacilliredoxins BrxA, BrxB, and BrxC, are responsible for the removal and processing of BSH after an oxidative stress event completes. Structures of BrxB, BrxC, and of GAPDH bound with bacillithiol have not been determined. Moreover, the exact mechanism by which these bacilliredoxins remove and process bacillithiol from GAPDH and other enzymes is not fully understood. In this study, a series of assays were conducted that explored the ability of BrxA, BrxB, and BrxC to debacillithiolate GAPDH. X-ray crystallographic structures were determined of bacillithiol-bound *Staphylococcus aureus* GAPDH and BrxC at resolutions of 2.3 Å and 2.1 Å, respectively. These results demonstrate that BSH forms a mixed disulfide with the active site cysteine residues of both GAPDH and BrxC. These studies provide a deeper understanding of the protective and regulatory mechanisms gram-positive Firmicutes utilize, and may suggest avenues to treat antibiotic resistant infections.

KIRKHOF CENTER GRR 091

**Guided Nature Forest Therapy**

Participants attending 9:00 AM – 10:00 AM

Presenter: Caleb Franke

Mentor: Afokoghene Odhu

In today's fast-paced world, many individuals, particularly healthcare students, experience fatigue, anxiety, and burnout. Common coping strategies include caffeine consumption, exercise, and creative outlets, yet the effectiveness of these methods varies. One promising approach is guided nature forest therapy, or "nature bathing," which has been shown to enhance mental well-being and reduce stress. Research supports its benefits for nursing students, who often struggle with burnout. Marthe et al. (2024) found that outdoor learning environments improved academic performance while reducing stress levels. Similarly, Morrison et al. (2024) demonstrated that nature bathing techniques positively impacted medical students' mental states. Additionally, Korkut et al. (2020) explored the effects of progressive muscle relaxation with nature sounds, noting improvements in nursing students' anxiety levels and physiological responses. These findings suggest that integrating nature therapy into healthcare education could be an effective strategy for stress management.

KIRKHOF CENTER GRR 092

**Volunteer Manager Perceptions and Sentiments About Court-Ordered Volunteers**

Participants attending 9:00 AM – 10:00 AM

Presenter: Bex Takacs-Britz

Mentor: Salvatore Alaimo

Every year 600,000 people return to their communities after incarceration, and there are 3.7 million individuals who are living in the community under community supervision arrangements. These 4.3 million individuals with recent criminal records represent 2.7% of the American workforce. And with over 65% of courts in the US assigning community service hours as part of a sentence, it is estimated that 36 million hours of community service is ordered annually. With an estimated value of \$31.80 an hour for volunteer time, the nonprofit sector stands to realize \$1.14 billion in compelled labor savings annually from court ordered community service; however, the current experience for court-ordered volunteers is transactional in nature. This study explores the perceptions and experiences of volunteer managers regarding court-ordered volunteer programs. This qualitative analysis includes interviews with Michigan-

based volunteer management professionals to examine their sentiments, challenges and strategies in overseeing court-mandated volunteers. The study seeks to understand how these programs are structured, the barriers managers face in implementation, and the broader impact on nonprofit organizations. Through interviews, this research aims to identify best practices and management strategies that can enhance the effectiveness of court-ordered volunteer initiatives, benefiting both the volunteers and the organizations involved.

KIRKHOF CENTER GRR 093

### **Rheumatic Heart Disease in Sub-Saharan Africa: What Is It and What Can We Do?**

Participants attending 3:00 PM – 4:00 PM, 4:00 PM – 5:00 PM

Presenter: Esther Bard

Mentor: Ruijie Liu

Rheumatic heart disease (RHD) is the final stage of an unrecognized and misunderstood disease. Beginning with a simple sore throat, caused by Group A Streptococcus (GAS) bacterium, the disease manifests into an autoimmune illness. The body attacks itself, marking the beginning of acute rheumatic fever (ARF). Mitral and aortic valve calcification is the first sign of RHD if all symptoms go unnoticed or untreated. Sub-Saharan Africa (SSA), a group of developing countries, is a primary hotspot of RHD because of a multitude of socioeconomic and demographic factors. Prevention in higher income countries like the United States, may look different than in Africa because of lack of economic aid and healthcare access. Treatment for this disease can be straight forward if caught early, but because of this fundamental lack of resources in this area, it rarely is treated before it progresses into the fatal stage. This literature review will summarize RHD pathology, global prevalence, sub-Saharan prevalence, prevention and treatment.

KIRKHOF CENTER GRR 094

### **Glitches in the System: Are EHRs Putting Patients at Risk?**

Participants attending 10:00 AM – 11:00 AM

Presenter: Phaedra Melinn

Mentor: Chad Sutcliffe

This systematic review analyzes the impact of electronic health records (EHRs) on patient safety, examining whether EHRs increase, decrease, or have no effect on patient safety outcomes. A total of 20 studies were well-researched, with most of them supporting the hypothesis that EHRs pose risks to patient safety. Common concerns included challenges with usability, system design flaws and workflow disruptions that contributed to documentation errors, miscommunication and delays in patient care and provider response. However, some studies also highlighted EHRs benefits, but only under certain conditions. These include things such as improved provider communication and improved clinical intelligence, or the use of data and technology to improve decision-making in healthcare. While EHRs have the potential to enhance healthcare efficiency, their impact on patient safety depends largely on their implementation and design. These findings shed light on the need for ongoing evaluation and improvement of EHRs to minimize their risk and maximize their benefits. As we move forward, future research should focus on pin-pointing specific weaknesses in EHRs, and finding useful methods to ensure that EHRs strengthen, rather than compromise patient safety.

KIRKHOF CENTER GRR 095

### **Effects of Dry Needling, Craniosacral Therapy, and Sound Vibration on Brain Waves, Autonomic Regulation and Muscle Tension**

Participants attending 9:00 AM – 10:00 AM, 10:00 AM – 11:00 AM, 11:00 AM – 12:00 PM, 12:00 PM – 1:00 PM

Presenter: Savannah Tormala

Mentor: Eric Ramsson



Dry needling, craniosacral therapy and sound vibration are medical techniques that allow participants to feel more relaxed. These three techniques trigger the human autonomic system, which decreases the sympathetic system (fight or flight) and increases the parasympathetic system (rest and digest). This study aims to investigate the effects of dry needling, craniosacral therapy and sound vibration on brain waves, autonomic regulation and muscle tension. Twenty healthy individuals participated in a session involving dry needling, sound vibration and two rounds of craniosacral therapy. At an individual session, ten needles were placed with two in each foot, lower leg, upper leg, forearm and cheek. Upon needle insertion, a round of craniosacral was performed followed by a round of sound vibration using tuning forks with the frequencies 9.63Hz, 8.52Hz, 7.41Hz, 6.39Hz, 5.28Hz, 4.17Hz, 3.96Hz, 2.86Hz, 1.74Hz, and then finally another round of craniosacral. Assessment of outcomes was recorded by electrocardiogram (ECG or EKG), electroencephalogram (EEG), and electromyography (EMG). We expect the results to have a decrease in heart rate triggered by a reduction in the sympathetic nervous system and an increase in the parasympathetic nervous system.

KIRKHOF CENTER GRR 096

### **Developing an Intervention Fidelity Measurement Plan: The Em-Power Study**

Participants attending 11:00 AM – 12:00 PM, 12:00 PM – 1:00 PM

Presenter: Jordyn Hopgood

Mentor: Lisa Kenyon

The intent of a given intervention in research can be controlled through intervention fidelity, which outlines and measures the key components of an intervention. The following presentation outlines the importance of fidelity within an intervention, and how it will be implemented in our Em-Power study involving the application of the Facilitating Strategies from the Assessment of Learning Powered Mobility Use (ALP). High fidelity will ultimately lead to more confidence in the research findings and greater reproducibility in the future. We will measure four dimensions of fidelity within the Em-Power study: adherence, dosage, quality of intervention delivery, and participant responsiveness. Measurement strategies for these four dimensions were created through iterative processes and evaluation of the study's goals and protocols. Some examples of methods that were devised to measure these four dimensions are dichotomous scales (indicating a key component was "observed" or "not observed"), and a four-point Likert scale (ranging from zero to three), to indicate how well the intervention was executed. Our devised measurement strategies for these four dimensions will help to prevent Type I, Type II, and Type III research errors, and ensure the Em-Power study's intervention is of top quality.

*Keywords:* Fidelity, Assessment of Learning Powered Mobility Use (ALP)

KIRKHOF CENTER GRR 097

### **Number Sequences Generated by the Edge Covers of Fan Graphs**

Participants attending 2:00 PM – 3:00 PM

Presenter: Marshall Nicholson

Mentor: Feryal Alayont

In an effort to discover new integer sequences, we examined the number of edge covers of fan graphs. An edge cover of a graph is a subset of the edges such that every vertex is the endpoint of at least one edge. A fan graph is obtained from a path graph by adding new vertices adjacent to each vertex of the path graph. In this poster, we will present our research on the edge cover sequences and edge cover polynomials of fan graphs, beginning with the cases obtained from a path graph of length two and extrapolating to larger fan graph cases.

KIRKHOF CENTER GRR 098

### **"We must Cultivate Our Garden": Interpreting Voltaire's *Candide* (1759)**

Participants attending 12:00 PM – 1:00 PM

Presenter: Aner Schuyler

Mentor: David Eick

Voltaire wrote *Candide* in 1759. This philosophical tale tells the story of a naïve and optimistic youth who travels the Old and New Worlds, encounters cruelty and atrocities everywhere, wonders how they fit into a world created and overseen by a benevolent God, and gradually becomes disabused. At the time his book was considered heretical by the Monarchy and Catholic Church for speaking plainly and critically about world tragedies and injustices. In *Candide* Voltaire critiques the abuse of power, injustice, intolerance, oppression, and autocracies through satire and tragedy. This essay interprets the last line of Voltaire's *Candide* (1759). It contends that the ideas of trauma on bonding, self-discovery, tolerance, and community are key takeaways from the phrase "We must cultivate our garden." This essay creates a literary commentary utilizing historical context from Voltaire's life experience, the Enlightenment, and the text itself to discuss interpretations of *Candide*.

KIRKHOF CENTER GRR 099

### **Edge Covers of Joined Tadpole Graphs**

Participants attending 11:00 AM – 12:00 PM

Presenter: Jarrett Gadziemski

Mentor: Brian Drake

We investigate number sequences that arise from counting edge covers. An edge cover is a subgraph that includes all of the original vertices, such that every vertex has degree of at least one. A tadpole graph is a cycle and a path joined at an end vertex. The number of edge covers of paths, cycles, and tadpoles have known formulas involving Fibonacci and Lucas numbers. In this project we study sequences of tadpoles joined head to tail or tail to tail. We use the Carlitz–Scoville–Vaughan theorem to find the recurrence relation for the number of edge covers.

KIRKHOF CENTER GRR 100

### **Relationship Between Mood and Cytokines in Treatment–Seeking Veterans.**

Participants attending 1:00 PM – 2:00 PM

Presenters: Karis Gillen, Natasha Vaughn, Breanna Wallace

Mentor: Elizabeth Flandreau

Previous data support a potential role for inflammation (overactivity of the innate immune system) in the etiology of stress-sensitive psychiatric disorders such as post-traumatic stress disorder (PTSD), major depressive disorder (MDD), and other anxiety disorders. However, the data are confounded by heterogeneity within diagnoses (two people with PTSD may have very different symptoms) as well as overlap across diagnostic categories (someone with MDD may have symptoms that present similar to someone with a PTSD diagnosis). Here we examined the relationship between seven different mood factors, which are relevant across diagnoses, on inflammatory markers in treatment-seeking veterans with or without psychiatric diagnoses. We identified a potential relationship between inflammatory markers and several mood factors including anxiety, affect, suicidality, and anhedonia. In some cases, this relationship was gender- or age-specific. These results should encourage ongoing research focusing on mood symptoms rather than diagnostic categories to better understand the role of inflammation in psychiatric disorders.

KIRKHOF CENTER GRR 101

### **Does the Way *Candida auris* Differs from *Candida albicans* in One Protein Family Relate to its Drug Resistance or Emergence as an Urgent Threat to Human Health?**

Participants attending 9:00 AM – 10:00 AM

Presenter: Carson Noyes

Mentors: Ian Cleary, Derek Thomas

*Candida auris* is an opportunistic pathogen that is inherently drug resistant. There are increasing cases of *C. auris* infections across the United States that are causing deaths in immunodeficient patients. *C. auris* is a fungus that is closely related to a more studied microbe, *Candida albicans*. We have found that overexpressing the gene *PHO15* in *C. albicans* can impair the organism's ability to filament or create

biofilms in certain growth conditions. This study aims to clone the *C. auris* ortholog of gene *PHO15* and over-express it in *C. albicans*. Then, analyze the change in degree of filamentation, biofilm formation, macroscopic colony morphology, and antifungal resistance of the overexpression strain. If the *C. auris* ortholog overexpression strain has a similar effect on the virulence factors examined as the corresponding *C. albicans* strain had, then it is likely that the *C. auris* ortholog gene behaves similarly in *C. auris*, furthering the understanding of the microbe. Preliminary results indicate that the *PHO15* ortholog gene conserves some function between *C. auris* and *C. albicans* because overexpression of both versions reduces hypha formation in YPD medium and increases tolerance to caspofungin.

KIRKHOF CENTER GRR 110

### **Sugarloaf Key, Revisited: New Mineralogical and Stable Isotope Data from a Modern Dolomite-Forming Environment**

Participants attending 2:00 PM – 3:00 PM

Presenter: Noah Valentine

Mentor: Ian Winkelstern

Dolomite, a carbonate mineral like calcite, is seen abundantly in the geologic record, but in recent millennia, the abundance of the mineral has decreased significantly. Dolomite formation is relatively scarce in the Holocene; one of the few locations where Holocene dolomitization has been described is Sugarloaf Key, Florida. We sought to revisit work describing this dolomite and investigate changes in its spatial distribution and mineralogy after ~50 years of environmental and sea level change. We collected ~50 rock and sediment samples across the island and then analyzed them with X-ray diffraction to quantify the content of calcite and aragonite ( $\text{CaCO}_3$ ) vs. the content of dolomite ( $\text{CaMg}(\text{CO}_3)_2$ ), which will determine each sample's position on the dolomite to calcite spectrum. These range from 100% calcite to VHMC, or very high magnesium calcite, followed by poorly ordered dolomite, and finally stoichiometric dolomite, or perfectly ordered dolomite. We will present these data along with water stable isotope measurements of waters from the site, which allow us to characterize the geochemistry of the environment. In the future we also intend to measure dolomite stable isotopes to estimate the temperature of the ocean at the time that the dolomite was formed.