

# **GVSU SUMMER SCHOLARS SHOWCASE**

**September 9, 2021**

**Grand River Room  
Kirkhof Center  
Allendale, MI  
4:00 p.m. - 7:00 p.m.**



**GRAND VALLEY  
STATE UNIVERSITY**

**CENTER FOR  
UNDERGRADUATE  
SCHOLAR ENGAGEMENT**

# Order of Events

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## **Welcome and Remarks** **4:00 P.M.**

Robert Smart, Ph.D.

Vice Provost for Research Administration

Executive Director, Center for Scholarly and Creative Excellence

Chris Plouff, Ph.D.

Interim Provost

Executive Vice President for the Academic and Student Affairs Division

## **Oral Presentations by:** **4:15 P.M.**

Liam Hart • Kelsey Inman-Carter • Landon Klausing • Olivia Maurer • Lindsey Summers

## **Poster Presentations by:** **5:00 P.M.**

Gabriel Alvarado • Amber Anderson • Colin Assenmacher

• Gloria Baker • Keylaiha Brown • Ava Carter • Ian Curtis

• Rylie Dorman • Ashten Duncan • Gabrielle Garlicki •

Xavier Golden • Marissa Gonzales • Olivia Gordon • Ryan

Iacovone • Liv Johanek • Maia Jones • Lily Kedzuch •

Elizabeth Kennard • Madeleine Lang • Collin Louis •

Matthew Martin • Grace McMahon • Stephanie Mendoza

• Grace Miller • Payton Miloser • Lillian Minnebo • Pranav

Nalam • Jennifer Nelson • Seth Ockerman • Madilynn

Olenick • Allison Romanski • Maci Rozich • Georgia Sands

• Lizzy Sielaff • Isabel Soberal • Allison Soffa • Claire Stone

• Derek Tonello

## **Oral Presentations by:** **6:00 P.M.**

Noah Holkeboer • Noemy Parra-Cano • Dionne Pinto

Guerrera • Tumaini Sango • Daisy Soos

## **Closing Remarks** **6:55 P.M.**

Susan Mendoza, Ph.D.

Director, Center for Undergraduate Scholar Engagement

Program Director, OURS Student Scholars Programs

# Welcome to the 2021 GVSU Summer Scholars Showcase!

On behalf of the Office of Undergraduate Research and Scholarship and the Undergraduate Research Council, I welcome each of you to the 2021 GVSU Summer Scholars Showcase. Today, we celebrate the scholarship, research, and creative work of undergraduate scholars in Library Scholars, McNair Scholars, REACH Scholars, Remote Undergraduate Research Assistant, Student Summer Scholars (S3), and Modified Student Summer Scholars (MS3).

Each scholar began the summer with a research question, a methodological roadmap, and the guidance of a faculty mentor. These tools provide scholars with a solid foundation to engage in mentored inquiry. In doing research and scholarship, they begin to direct their own educational paths and familiarize themselves with the requirements and structure of professional research. Successful projects require tenacity, courage, and patience. These attitudes, in concert with a foundation of academic and critical thinking skills, help scholars further their knowledge in a specific area while learning to incorporate academics with professional work.

The research and creative work you will see today is not complete. Rather, the presentations represent scholarship in process. We hope that you take a moment to connect with our scholars, listen to their presentations, and inquire about their work and future plans.

Dr. Susan Mendoza, Founding Director  
Center for Undergraduate Scholar Engagement

# Library Scholars

Xavier Golden

Ryan Iacovone

Grace McMahon

Daisy Soos

# McNair Scholars

Gabriel Alvarado

Amber Anderson

Keylaiha Brown

Ava Carter

Ashten Duncan

Marissa Gonzales

Liv Johaneck

Maia Jones

Collin Louis

Stephanie Mendoza

Grace Miller

Payton Miloser

Noemy Parra-Cano

Dionne Pinto Guerrero

Tumaini Sango

Lizzy Sielaff  
Isabel Soberal  
Claire Stone  
Lindsey Summers

## REACH Scholars

Pranav Nalam

## Remote Undergraduate Research Assistant

Jennifer Nelson

## Student Summer Scholars

Colin Assenmacher  
Gloria Baker, MS3  
Ian Curtis (Stiner Scholar)  
Rylie Dorman  
Gabrielle Garlicki  
Olivia Gordon  
Liam Hart  
Noah Holkeboer

Kelsey Inman-Carter  
Lily Kedzuch (Stiner Scholar)  
Elizabeth Kennard, MS3  
Landon Klausing  
Madeleine Lang, MS3  
Matthew Martin (Ott-Stiner Scholar)  
Olivia Maurer (Ott-Stiner Scholar)  
Lillian Minnebo (Koeze Fellow)  
Seth Ockerman  
Madilynn Olenick, MS3  
Allison Romanski, MS3  
Maci Rozich  
Georgia Sands  
Allison Soffa  
Derek Tonello (Schroeder Fellow)

# 2021 Library Scholars

## Xavier Golden

Faculty Mentor: Amber Dierking, University Libraries

### Developing the Art Educator's Scholarly Resource Guide

Art educators have many responsibilities. Designing and teaching lessons; professional development; managing a classroom; being an advocate for themselves, their students, and the profession; and producing art, for the learners and for their own art-making. The goal of this project was to create a resource guide that would support art teachers in all these roles. Accomplishing this involved speaking to art educators and garnering an idea of what art education looks like as a field, right now, in the summer of 2021. This qualitative research was used to design, format, and write an online database of six distinct categories of art education resources: Foundational works, Explainers, Tutorials, Networks, Soapboxes, and Inspirations.

## Ryan Iacovone

Faculty Mentor: Sheila García, University Library

### A Guide to Performing Historical Contextualization

Some students think history classes are simply about memorizing facts that have to do with dates and dead people. On the contrary, learning about history involves crafting narratives about the past rooted in evidence; then analyzing that narrative to evaluate how human societies have changed over time. That's the story of historical contextualization. Lacking this skill results in students falling into the trap of presentism and consequently missing vital historical information. Therefore, this presentation is designed to acquaint students with the concept of historical contextualization and explain how it can help improve their authority while conducting research.

# Grace McMahon

Faculty Mentor: Anna White, University Libraries

Health and Medicine as Social Sciences: evaluating the impact of relationships, training & education, lived experiences, and community on patient wellness

The goal of this project was to create an interactive resource for students interested in medicine to understand the numerous components that contribute to the field aside from the typically emphasized STEM components. This was accomplished through the creation of the LibGuide, Health & Medicine as Social Sciences. The vast majority of this project was conducted through analysis of journal articles and peer reviewed papers and translated to the LibGuide format through text, links, and summaries. It further evolved to include videos, graphics, and book suggestions to incorporate broad inclusion for various learning formats. The result of this project is a complete LibGuide serving as a live resource to students that includes a home page and highlights the following topics: Patient Care, Interactions in Medicine, Creating Healthy Communities, Minorities and Medicine, and information for Patients and Providers.

# Daisy Soos

Faculty Mentor: Leigh Rupinski, University Library

## Truth in History

As a discipline, History is often questioned for its ability to objectively and accurately report historical information. This project discusses what steps historians take to study history objectively. Mainly, by acknowledging the bias involved in primary sources and comparing and contrasting information, historians are able to make rational inferences about what actually happened. Historians themselves also acknowledge their influence on how information is reported. By adhering to strict academic standards, historians, like any type of scholar, are able to reach objectivity. What truth means in history and how objectivity should manifest is also investigated. Generally, objectivity concerns obtaining more or less factual information from sources and making well-informed, accurate interpretations based on primary and secondary evidence. However, objectivity does not equal neutrality as making judgements and arguments about the past are what compel us to reflect on the present.



# 2021 McNair Scholars

## Gabriel Alvarado

Faculty Mentor: Jennifer Marson-Reed, Criminal Justice  
Rwandan Genocide: Analysis and Investigation of  
Rwandan Media and Propaganda

The goals of this study are to illustrate how radio broadcasts prior to the Rwandan genocide propagated an anti-Tutsi policy, promoting ethnic discrimination. This is accomplished by using a content analysis approach, where the primary sources being analyzed are Radio Télévision Libre des Mille Collines (RTL) radio transcripts. The goal here is to identify recurring themes and connections that exacerbate anti-Tutsi propaganda.. After a close examination of radio transcripts and the current literature on media and social psychology, this study seeks to find recurring themes within mass mediated information that emphasize mass violence and ethnic discrimination.

## Amber Anderson

Faculty Mentor: David Bair, CECEI, Dean's Office

Effects of social capital and social networks on college experiences of GVSU undergraduate students

This study will explore the effects of social capital and social networks on educational attainment in college among Grand Valley State University undergraduate student teacher and teacher assistant candidates. It aims to understand what forms of social and cultural capital are most beneficial to students on their path to a successful education. Upper-level undergraduate education majors were surveyed about their pre-collegiate access to information important for college success, and the sources of this information. Initial findings reveal that these students had access to social networks and tangible information about college practices that positively affected their college success. The most significant sources of social capital for these students was encouragement to attend college from their parents and other family member, along with teachers, counselors and other school administrators.

# Keylaiha Brown

Faculty Mentor: Mihaela Friedlmeier, Psychology

## The Impact of Community Engagement on Marginalized Youth

Community involvement is a predictor of positive adolescent and adult development. Compared to their peers, marginalized youth are at higher risk for experiencing more negative developmental outcomes. The goal of my study is to investigate how a local afterschool center promotes positive youth development (PYD) by intentionally providing marginalized teenagers with paid internships to tutor and teach instruments to the children in the program. We developed a survey consisting of about 100 questions using well established quantitative psychological measures (e.g., the Short PYD questionnaire developed by Lerner and colleagues examining Competence, Connection, Confidence, Caring and Character). We are currently in the process of collecting data from 40 teen interns using Qualtrics. As a next step, we plan to add a control sample using data from 40 teenagers from a nearby urban high school who have not benefited from similar community engagement experiences.

# Ava Carter

Faculty Mentor: Tonisha Jones, Criminal Justice

## Undergraduate Students' Public Opinion of Human Trafficking in West Michigan

The public opinion of students is an ever-changing and important issue. At the same time, controversial and sensationalized human rights issues such as human trafficking are often encompassed in misinformation. This study looked at what those misconceptions are along with how those may impact how undergraduate students would venture to solve the issue of human trafficking. This study asks if any possible misconceptions held by students have any impact on how they would approach solving the issue of human trafficking. This study was conducted in the summer of 2021 via an online questionnaire using a random sample of undergraduate students from Grand Valley State University.

# Ashten Duncan

Faculty Mentors: Kevin Lehnert, SCOB-Marketing & Hollie Blagg, SBDC

## A Design Thinking Response to Disruptions: COVID in the Small Business Social/ Communication Landscape

The gap between small business communication capabilities and customer interactions was further exasperated by the COVID-19 pandemic. Small businesses had to pivot quickly, to begin to build or grow their digital marketing capabilities. These communication tools would be necessary to help small businesses maintain sales and continue to engage with their clients, especially in light of the pandemic's disruption. This research investigates design thinking strategies, as one tool to address the communication breakdown as a result of this disruption. Focusing on leveraging convergence/divergence, customer mapping, and EDIPT design thinking tools, we provide distinct propositions to help firms adapt digital marketing communication strategies to the demands of clients during the pandemic.

# Marissa Gonzales

Faculty Mentor: Beth Macauley, Communication Sciences & Disorders

## Blocking Behavior in Brass Players: Connections Between Fluency in Speech and Music

Typically, brass musicians push air through their instrument and play easily. Other times, the musician's muscles tighten, airflow stops, and the note is blocked. Many professional brass musicians deal with this blocking issue, sometimes called the Valsalva maneuver, musical stuttering, or dystonia. When people speak, they push air through the vocal folds and speak easily. Other times, their muscles tighten and the word is blocked, which is called stuttering. The goal of this study was to describe blocking in brass players and compare and contrast blocking in music and speech. A survey about the physical and emotional symptoms, onset descriptions, and fluent or disfluent environments of blocking was sent to brass musicians via Facebook and email. 33 responses were received and descriptions of brass blocking were compared with known information on speech stuttering. Results suggest that blocking behaviors while playing a brass instrument and speaking are more similar than different.

# Liv Johaneck

Faculty Mentors: Krista Benson, IRIS & Jae Basiliere, WGS

## Reading Into Sleepovers: A Historical Queer Analysis of the Sleepover Environment Through Parenting Magazines

The sleepover environment is an adolescent space that isolates itself from direct societal pressures yet is influenced by external factors intended to maintain expectations of heteronormativity. Parents, who guide their child's development in compliance with social expectations, are a primary influence in shaping their child's self-perception of identity as well as socialization skills. Such influences damage the capacity for queer children to embrace their sexuality, either causing feelings of isolation or identity repression through forced compliance with heterosexual norms. To assess the impact of heteronormative language and social pressures by parents regarding sleepovers, I analyzed articles from parenting websites, magazine archives, and newspapers between 1950 and 2020. I will map the transition towards more modernized expectations of identity and analyze patterns to help understand how queer identities have maneuvered themselves to navigate these spaces as a result.

# Collin Louis

Faculty Mentor: Martin Burg, Biomedical Sciences

## Effects of upstream deletions on spatial expression patterns of the *Hdc* gene in *Drosophila melanogaster*

This study sought to determine whether distinct transcription start sites (TSS) in the histidine decarboxylase (*Hdc*) gene, where *Hdc* gene expression is predicted to initiate, cause *Hdc* expression in different subsets of cells. Previous work demonstrated that the entire *Hdc* gene is contained within a 12.5 kb DNA fragment, through immunodetection of histamine in *Hdc*JK<sup>910</sup> mutant flies bearing this 12.5 kb DNA fragment. Several deletions in this DNA fragment were made and transformed into *Hdc*JK<sup>910</sup> flies, and histamine localization was carried out in larval brains dissected from the transformed flies. When examining histamine distribution in these flies bearing deletions it was found that the area of DNA removed from the end of the *Hdc* gene in  $\Delta 31$ ,  $\Delta 32$  and  $\Delta 108$  had less of an effect on histamine distribution as compared to  $\Delta 67$ , which appears to cause the loss of *Hdc* expression in the larval brain, indicating that the TSS eliminated in  $\Delta 67$  has a wider effect on *Hdc* expression in the CNS.

# Stephanie Mendoza

Faculty Mentor: Ellen Shupe, Psychology

## Student Evaluations: Trump's Presidency

Previous research has found that socialized inequality is common in areas such as educational institutions. In addition to this, other studies have found that student evaluations of professors were influenced by race and gender. This study's objective was to determine any influence Donald Trump's presidency had on student evaluations of their professors. This study completed content analysis on evaluations written by students. The evaluations and ratings were gathered from the website Rate My Professor. This study sampled all tenured professors from a Michigan university. For this study, the race of professors was determined by comparing surnames to the frequently occurring surnames in the 2010 Census. Additionally, publicly accessible photographs were also viewed. The gender of the professors was determined by first names and pronouns used by students in their evaluations. The content analysis of the evaluations included coded wording to determine any bias in the student's writings.

# Grace Miller

Faculty Mentor: Mark Staves, Cell and Molecular Biology

## Using colored light to illuminate plant gravity sensing

Gravitropism is an essential growth response to gravity for the orientation of plant roots and shoots. Two incompatible models for the gravity sensing mechanism are currently in the literature: the statolith model, the most prevalent, and the gravitational pressure model. The statolith model suggests that intracellular particles are the gravisensors, while the gravitational pressure model suggests that the protoplast acts as the gravity sensor. The statolith model is the most widespread, but it cannot explain gravity responses for cells without statoliths or non-sedimenting statoliths. To test between these models, we used rice (*Oryza sativa*) because rice roots grow and respond to both light and gravity stimuli in water and contain statoliths. We found that increasing the external medium density with Optiprep increased the phototropic curvature of rice roots without decreasing the roots growth rate. These results are consistent with the gravitational pressure model of gravity sensing.

# Payton Miloser

Faculty Mentor: Paul Stephenson, Statistics

## Bio-Surveillance of COVID-19 Data using Statistical Process Control

The ability to predict outbreaks of a virus is important for assessing the spread of the virus and handling the impact of the spread on the population. The COVID-19 pandemic has provided data that can be studied at the county level that contributes to the knowledge and research surrounding the eradication of the virus; at the county level, the ability to track the spatial dependence of COVID-19 spread between counties across the United States can be done using the geospatial autocorrelation statistic, Moran's I. Using Moran's I this has been able to track the spatial dependence of the COVID-19 cases throughout the pandemic and visualize spikes in Coronavirus case rates to predict outbreaks. This study will present methods for tracking incident type data using Moran's I and Statistical Process Control to predict outbreaks.

# Noemy Parra-Cano

Faculty Mentor: Rachel Campbell, Sociology

## Mental Health & Therapy: The Perceptions & Experiences of Latinos and Hispanics in West Michigan

The purpose of this study is to gain a better understanding of the views Hispanic and Latinos immigrants have of mental health and therapy. It also examines how these views are impacted by familial relationships and if there are generational shifts in perceptions. Based on one-on-one in-depth interviews with first-generation immigrants living in West Michigan who have been in the United States for at least 10 years and have children or are legal guardians, individual's personal and familial experiences with mental health and therapy are examined. Using thematic analysis of these interviews the relationship between immigrants and their children will be cross-examined with the interaction their children have with mental health and therapy knowledge, and how their exposure may enter the household, and affect the perception immigrants have on mental health and therapy. Implications for mental health provision to Spanish-speaking communities in West Michigan and beyond will be discussed.

# Dionne Pinto Guerrera

Faculty Mentor: Mary Russa, Psychology

## Mental Health Functioning, History of Trauma, and Parent Stress in Maltreating Parents

The present study examines the role of parent history of trauma in shaping parent stress in a sample of maltreating parents. Given that parent stress can increase risk for maltreatment, we proposed that trauma has impacts on parent stress through mental health and non-mental health pathways. We examined archival, clinical records from forensic psychological evaluations from parents (N = 445) undergoing evaluation related to maltreating their children during 2011, 2013 and 2015. Student assistants coded the records for parent mental health status, as well as parent stress level and other characteristics of psychosocial functioning. Analyses indicated that parents reported more parenting stress with older children. When controlling for age of child, parent age, and parent gender, number of mental health diagnoses was not associated with parent stress, but level of exposure to childhood trauma was associated level of parent stress. Implications are discussed.

# Tumaini Sango

Faculty Mentor: Helen Marlais, Music, Theatre and Dance

## Protest Music of the 2010s

Throughout U.S. history, music has served as a soundtrack to transformative social and cultural movements. "Songs like Swing Low, Sweet Chariot," "Lift every Voice and Sing," and "We Shall Overcome" are linked to key events that inspired hope and change. Collectively, these songs are known as protest music. Protest music can act as a type of social commentary, expressing a wide range of emotions, and have a uniting element, calling leaders and groups to action for tangible results. At its core, protest music is a musician's creative response to events happening in the world around them. The 2010s saw the rise of several social movements that initiated national conversations about perpetuated inequalities and injustice. This project will examine the music associated with these movements, the artist(s) who wrote the music, and the reception this music received. The goal of this project is to achieve a greater understanding of how American protest music has evolved in the 21st century.

# Lizzy Sielaff

Faculty Mentor: Shannon Biros, Chemistry

## Synthesis of modified carbazole-containing compounds for use as luminescent probes for cancer

Currently, surgical resection of cancerous tissues relies on excising tumors with wide margins to ensure no malignancies remain. One prospect in advancing cancer therapeutics is the use of bioprobes, molecules designed to detect and visualize specific biological analytes. This project focuses on the development of a luminescent bioprobe which utilizes lanthanide metals' ability to efficiently emit light when coordinated to an organic sensitizer. The ultimate objective is to produce a compound that will illuminate the borders of malignant tissues allowing for their precise excision in the operating room. The targeted synthesis of a carbazole-based ligand was chosen as their terminal di-alkyne "handles" provides an attachment site for pendant groups which can increase the chelated-compound's affinity for cancer cells' surface receptors. This poster describes the synthesis of the target organic molecule and pendant arms as well as plans for coordinating the ligand to a lanthanide metal.

# Isabel Soberal

Faculty Mentor: Huei Lan (Lourdes) Yen, Modern Languages and Literatures

## Analysing and Understanding the Role of Women in the Latin American Boom

The aim of this literature review is to understand the patriarchal influence on lack of female notoriety and success in the Latin American Boom literature movement. Although women authors, editors and managers played a critical role in this movement, they enjoyed and still enjoy a markedly lower level of success than their male counterparts. In this project, the scholar uses a combination of academic journals and periodicals to gather perspectives on this trend and its history.



# Claire Stone

Faculty Mentor: Amanda Dillard, Psychology

## The Effects of Anticipated and Retrospective Regret on Eating Behaviors and Emotions

As the obesity epidemic worsens amongst Americans, the need for eating behavior interventions has become urgent. Research has shown that regret is a particularly important emotion that is associated with eating behaviors (Dillard et al., 2020; Koch, 2014). Specifically, anticipated regret has been shown to have a positive impact on the likelihood that people will make various decisions to benefit their health (Koch, 2014; O Carroll et al., 2011; Richard et al., 1998). However, no research has compared anticipated regret to retrospective regret to determine if one is a stronger predictor of healthy choices. In the present study, a survey was conducted in which participants were randomly assigned to write a brief essay about either anticipated or retrospective regret and an action or inaction behavior. Participants then reported their emotions, including regret, and intentions to adopt more healthier eating behaviors.

# Lindsey Summers

Faculty Mentor: Laura Schneider & Paul Cornish, Political Science

## An Analysis of West Michigan Residents Perception of Intergenerational Justice Pertaining to Climate Change and Mitigation

This study examines the subjects of human rights theory, intergenerational justice in context to climate change and mitigation, and a general summary of the public's perception of climate change and potential policies that would act as mitigation. Though the public perception of climate change has been studied extensively, there has been little study if it would be possible to integrate the popular understanding of human rights into US politics and if framing an issue as a threat to a human right would influence the public's opinion. As an approach to answering this question, a survey was distributed to residents of two west Michigan counties to ask their opinions on the three subjects. Results suggest that it might work to frame that climate change and its effects would be threatening the human right to a safe environment, which could potentially influence how the public thinks the country should approach climate policy and mitigation.

# 2021 REACH Scholars

## Pranav Nalam

Faculty Mentor: Martin Burg, Biomedical Sciences

Identification of Rab protein association with histamine-containing vacuole-like compartment (VLC) in the secondary cells of the accessory glands in *Drosophila melanogaster*

The accessory gland of *Drosophila melanogaster*, which is analogous to the mammalian prostate gland, is composed of two cell types: main cells and secondary cells. The secondary cells contain large vacuole-like compartments (VLCs) that have been shown to contain histamine. This project sought to associate specific rab proteins, which have been shown to be involved in regulation of membrane trafficking, with histamine in the VLCs. The rab proteins used were 16tagged with a fluorescent protein, which allows the protein's visualization within a cell. Histamine was imaged using fluorescent immunolocalization techniques. We attempted to verify the co-localization of a rab protein with histamine in a VLC using laser-scanning confocal microscopy. Results indicate that rab 4 and rab 11 appear to have association with histamine in the VLC, suggesting that histamine may be released by the secondary cell, as rab 4 and rab 11 are known to be involved in endocytic and exocytic processes.

# 2021 Remote Undergraduate Research Assistant

## Jennifer Nelson

Faculty Mentor: Robert Rozema, English

### An Analysis of Self-published Novels by Autistic Authors as a Form of Advocacy

The Autistic Representation Database (ARD) indexes nearly 1,000 works of fiction, auto-biographical non-fiction, film, and television that feature autistic representations. In my development of the ARD, I recognized a key pattern: a higher ratio of autistic authors are self-published in comparison to neurotypical authors. This is not due to the quality of autistic writing, but systematic issues within the publishing industry, which has created barriers for autistic authors through gatekeeping that favors stereotypical autism narratives and excludes stories featuring autistic characters with multiple, intersectional identities. Whereas autistic self-publishing better depicts the diversity of the autistic community and serves as a form of advocacy, a key part of autistic culture. This presentation showcases my work with the ARD by examining four representative self-published novels with autistic authors. These works exemplify how self-publishing can subvert mainstream autism narratives.

# 2021 Student Summer Scholars

## Colin Assenmacher

Faculty Mentor: Eric Snyder, Biology

Collaborating Graduate Assistant: Matthew L Bain

Biological Assessment of Ecosystem Integrity in the Grand River

The Grand River is the longest river in Michigan and has been greatly impacted by human activities, particularly logging in the mid-1800s, which when coupled with 20th-century urbanization and continued agricultural use, led to historically poor river health. Despite this, actions throughout the past 50 years by federal, state, and local citizen involvement, have resulted in increased river health and broader water quality monitoring within the watershed. During the summer of 2021, rapid bioassessments targeting benthic macroinvertebrates (aquatic insects), were conducted along the Grand River, with the primary goal of following up on prior state-led surveys in the past 15 years. Using the Michigan standard P22 and P51 methodology, assessments at seven locations were carried out along with chlorophyll-a quantification. So far, six of our sites have been surveyed with initial results indicating a decline in general water quality as one travels downstream, likely due to riparian impacts.

## Gloria Baker, MS3

Faculty Mentor: Matthew Christians, Cell and Molecular Biology

Impact of Phytohormones on Protein Degradation Through RUBylation in *Arabidopsis thaliana*

Protein degradation is highly regulated in organisms and plays a major role in general cell function. One of the key events in selective protein degradation is the addition of a ubiquitin (Ub) to the target protein which signals the cell to degrade that protein. E3 ligase protein complexes selects those specific protein targets, and adds Ub to them. To become active, an additional protein, Rub, must be covalently ligated to the Cullin protein within the E3 complex. This project seeks to discover the impact of three phytohormones on rates of selective protein degradation in *A. thaliana* by assessing the levels of Rubylated Cullin. We decided to test three common phytohormones: Ethylene, a ripening hormone, Auxin, a growth hormone and Abscisic Acid, a development and stress tolerance hormone. Results from this project will aid our understanding of protein degradation in response to different physiological conditions within all plants.

# Ian Curtis (Stiner Scholar)

Faculty Mentor: David Eick, Modern Languages and Literatures

## Plagiarism of the Plates: The Validity of Accusations

### Against Diderot's *Encyclopédie* (1751-1772)

A literary monument of the eighteenth century, the French *Encyclopédie* (1751-1772) was a massive reference work written by a team of experts that aimed to depict arts and crafts in unprecedented detail. It eventually grew to contain twenty-eight large folio volumes but the journey there was filled with uncertainty due to royal suppressions from seditious and anti-religious ideas and accusations of plagiarism. Since 1951, scholars have studied one of these accusations, made by architect Pierre Patte against the plates, editor Denis Diderot, and the four publishers. This scandal, which is critical in the history of the *Encyclopédie*, has faded from scholarship. While exaggerated, Patte's observations are sound, but is his label of "plagiarism" correct? Differing views of copying, authorship, and property in eighteenth-century France complicate matters. The connotations of plagiarism then are different from today's and must be analyzed from the correct lens to analyze Patte's allegations.

# Rylie Dorman

Faculty Mentor: Amanda Buday, Sociology

## PERCEPTION OF WATER QUALITY POST-REMOVAL FROM THE GREAT LAKES AREA OF CONCERN LIST: A STUDY OF WHITE LAKE

In 2014, White Lake was removed as a Great Lakes Area of Concern (AOC) as defined by the Environmental Protection Agency's U.S.-Canada Great Lakes Water Quality Agreement. Since being delisted, little research has been done on how the AOC process influences place attachment to a historically polluted lake. This study seeks to gain data on the public's overall impression of the remediation efforts, their perception of water quality, and how/if they can be involved in the stewardship of White Lake via a survey sent to a random sample of 1200 residents within the White Lake/White River Watershed. Results of this study will explore how people's perceptions of the lake change post-removal from the AOC list.

# Gabrielle Garlicki

Faculty Mentors: Ian Cleary & Derek Thomas, Biomedical Sciences

## Over-expression and analysis of genes impacted during spaceflight in *Candida albicans*

*Candida albicans* is an opportunistic fungal pathogen that naturally resides in mucosal surfaces and is a part of the human microbiota. This project explores multiple genes, *orf19.3115*, *FRE8* and *MRV2*, that were found to have either been up or down regulated in *C. albicans* found during spaceflight. The main scope of this project is to characterize these genes through differences in morphology and adhesion. which can relate back to the virulence of *C. albicans*. Filamentation, biofilm, and glass adhesion assays were done, and we have observed some changes in adhesion in our overexpression strains. We are constructing overexpression strains to examine the effects of additional genes on these cellular characteristics.

# Olivia Gordon

Faculty Mentor: Andrew Lantz, Chemistry

## Development of a Method for Detection and Quantitation of *Streptococcus mutans* via Capillary Isotachopheresis

*Streptococcus mutans* is a bacterium commonly found in the oral cavity. Chiefly, it is known for its ability to produce acidic biofilms that coat the surface of teeth, leading to a higher incidence of dental caries. Here, we report the development of a method for detection and quantitation of *S. mutans* via capillary electrophoresis (CE). The specific mode of CE chosen was capillary isotachopheresis (cITP). Unlike traditional CE, cITP utilizes a nonuniform electric field in the capillary, taking advantage of a cell's electrophoretic mobility and concentration to focus and separate it from other interferences. Specifically here, a method was designed to focus and separate *S. mutans* from another common salivary species, *Bacillus subtilis*. This cITP method was optimized by varying factors such as buffer concentration, composition, and additives, as well as capillary length and segmental injections. Initial data on the quantitation of *S. mutans* concentration in a sample were also collected.

# Liam Hart

Faculty Mentor: Mike Wolfe, Psychology

## Misinformation about Past Beliefs Influences

### Current Beliefs

This experiment investigated the influence that misinformation concerning past beliefs has on current beliefs. Participants for this experiment were selected on the basis of being strongly in favor or opposed to gun control, according to responses in a pre-screening session. In the study, participants read a text that was consistent or inconsistent with those beliefs, then underwent an experimental manipulation where they were asked to verify their initial beliefs about gun control, which were either accurate or opposite to their initial belief (misinformation), or absent. Participants then reported their beliefs again and wrote approximately 250 words explaining the rationale for their belief. Using a mixed-model, the impact of misinformation versus true information on memory for past and current beliefs will be examined. Results will examine the extent that current beliefs may be influenced by salient information that is available in the recall context.

# Noah Holkeboer

Faculty Mentor: Gary Greer, Biology

Utility of using photographs to study tree architecture:

destructive confirmation and exploratory study of four species.

To our knowledge, all past research on tree architecture and allometry is based on direct measurements that require destruction of limbs or entire trees. In an effort to broaden the scope of inquiry, we tested the utility of using scaled photos. We compared data and estimates of hydraulic efficiency and structural support acquired from photos versus data acquired destructively from a 23-meter *Acer rubrum*. Measurements from close-up node photos corresponded closely to direct measurement. We also used photos to study the architecture of four tree species: *Acer saccharum*, *Quercus rubra*, *Fagus grandifolia*, and *Ginkgo biloba*. Data from these photos were used to estimate task optimization as above. The resulting linear regressions had r-square values above 0.95 that distinguished species-specific and intra-specific optimizations. We conclude that photos are useful for studying tree architecture across large scales of space and time; however, there are inherent limits on its application.

# Kelsey Inman-Carter

Faculty Mentor: Sarah Hamsher, Biology

The epiphytic diatom community of an invasive macroalga, starchy stonewort (Charales: *Nitellopsis obtusa*) and its native relative, *Chara contraria* (Charales) from two drowned river mouth lakes in Michigan

Epiphytic diatoms are essential primary producers in aquatic environments, but the relationship between them and their hosts is not well understood. The purpose of this project is to understand the specificity of a macroalgal host-epiphytic diatom relationship in Pentwater and Muskegon Lakes, and compare the epiphytic diatom communities of the invasive *Nitellopsis obtusa* to its close native relative, *Chara contraria*, using a metabarcoding approach. To these ends, host samples were collected monthly from July to September in 2020 (90 samples) and in June 2021 (55 samples). DNA was extracted from each sample and the plastid RUBISCO (*rbcl*) barcoding region of the diatom DNA was amplified using diatom-specific primers. Amplification success was ~60%. Samples with positive amplification are being prepared for diatom metabarcoding using an Illumina MiSeq platform currently. Ultimately, this study will provide us with better understanding of the macroalgal host-epiphytic diatom relationship.

# Lily Kedzuch (Stiner Scholar)

Faculty Mentor: Todd Williams, Psychology

Examining self-perception, locus of control and coping strategies among Machiavellians

Once thought to be a unidimensional personality trait, recent research has advanced a two-dimensional model of Machiavellianism (Monaghan et al., 2020). The views dimension is associated with a cynical worldview whereas the tactics dimension relates to a willingness to engage in interpersonal exploitation for personal gain. The purpose of this study was to explore how these two dimensions are associated with coping strategies (Carver, 1997) in response to interpersonal stress as well as differences in life satisfaction (Kobau et al., 2010) and happiness (Lyubormirsky & Lepper, 1999). The sample (N = 253) was collected through Prolific, an online paid research panel and included measures of self-consciousness (Scheier & Carver, 2013) and locus of control (Rotter, 1966). Results indicate that Machiavellian tactics and views are associated with more destructive coping strategies like behavioral disengagement, denial and substance use, rather than constructive. Implications are discussed.



# Elizabeth Kennard, MS3

Faculty Mentor: R. Marshall Werner, Chemistry

The production of plasmid expression vectors through Gibson Assembly and the optimization of the enzymatic cleavage reaction between Tobacco etch virus (TEV) and the model fusion protein, Nus-G.

The North American Opossum (*D. virginiana*) produces proteins that inhibit snake venom metalloproteinases (SVMPs) and phospholipase 2As (PLA2s). Eight plasmid expression vectors containing 6-histidine tags and maltose binding proteins (MBP), either DM43 (a SVMPI) or DM64 (a PLA2 inhibitor), and a Tobacco etch virus (TEV) cleavage site were constructed through Gibson Assembly. Four constructs were used to produce either MBP-DM43 or MBP-DM64 in *E. coli*. The optimization of the enzymatic cleavage reaction between TEV and a model fusion protein with a TEV cleavage sites, MBP-NusG, was accomplished using 2 experiments that optimized the duration, temperature, and amount of TEV used to conduct a cleavage reaction. For our purposes, the optimal conditions include the shortest duration and lowest temperature in which the reaction proceeds to completion. Reactions conducted at 4°C with 5.5ug TEV for 1hr gave optimal cleavage of MBP-NusG providing useful conditions for future reactions.

# Landon Klausling

Faculty Mentor: Vijay Gondhalekar, Seidman-Finance

Do Right-to-Work Laws Reduce Financial Constraints of Firms? Evidence from Michigan and Indiana Companies

This study examines financial constraints of Michigan and Indiana firms before and after the two states enacted Right-to-Work laws in 2012 using firms in other states with and without RTW laws as the control groups. Findings based on difference-in-difference regressions indicate that, on average, financial constraints of Michigan and Indiana companies were significantly higher than those in both the control groups before the RTW laws were enacted, but the constraints declined significantly after the laws were enacted not only relative to the pre-enactment levels but also relative to those of companies in both the control groups.

# Madeleine Lang, MS3

Faculty Mentor: Peter Wampler, Meijer Honors College

## 2021 Grand River Water Quality Sampling

Research goals include sampling at different locations and flow conditions, collaboration with wastewater treatment plants, and development of a refined Water Quality Index. In the summer of 2021, seven different reaches were sampled and over 120 samples were collected. Samples were analyzed for nitrate, total phosphate, ammonium, chloride, dissolved oxygen, biological oxygen demand, total suspended solids, E. coli, and total coliform. Field parameters included: temperature, specific conductivity, pH, turbidity, oxidation reduction potential, resistivity, salinity, and total dissolved salts. Water samples were collected from bridges and kayaks, and were analyzed at the Allendale Wastewater Treatment Plant or in the GVSU Lab. Lab methods included: 1) HACH spectrophotometer analysis; 2) Total Suspended Solids Filtration; 3) Biological Oxygen Demand; and 4) IDEXX Colilert 2000 quanti-tray method. Ongoing sample analysis will be compared to water quality data dating back to 1968.

# Matthew Martin (Ott-Stiner Scholar)

Faculty Mentor: Mary Karpen, Chemistry

## Computational Analysis of BshC, an Enzyme Responsible for Antibiotic Resistance in Firmicute Bacteria

Bacillithiol is a compound synthesized by certain gram positive bacteria called firmicutes. This compound is used to establish antibiotic resistance. There are three enzymes in the synthesis pathway of bacillithiol: BshA, BshB, and BshC. BshC has a potentially novel mechanism that is not yet well understood. This enzyme is a putative cysteine ligase, however the ligand that donates the cysteine is unknown. The structure of BshC has been previously solved and has a unique dumbbell shape suggesting a hinging motion. Previous Small Angle X-ray Scattering (SAXS) results suggest the structure in solution may adopt a different conformation than the crystal structure. Using computational biochemistry methods, a conformer that better fits the SAXS data was identified. Structural homology searches allowed us to explore potential ligands of the BshC active site. Results of this project will be used to formulate hypotheses about ligand interactions and possible enzyme mechanisms.

# Olivia Maurer (Ott-Stiner Scholar)

Faculty Mentor: Brad Wallar, Chemistry

Structural and functional characterization of *Acinetobacter*-Derived Cephalosporinase variants and their ability to bind and inactivate  $\beta$ -lactam antibiotics

Antibiotic resistance in the pathogenic bacterial strain *Acinetobacter baumannii* has greatly increased, partially due to their production of specific  $\beta$ -lactamases: *Acinetobacter*-derived cephalosporinases (ADCs). Small mutations in the amino acid sequences of ADCs have resulted in the development of new variants. Such variants include ADC-219 and ADC-33, with the only difference being a change from a glycine (ADC-33) to an aspartate (ADC-219). Though its significance was unknown, the change is in a specific location of the enzyme known to facilitate binding of the antibiotic molecule. In our work, kinetic analyses showed that ADC-219 had much lower ability to bind and inactivate larger cephalosporin antibiotics than ADC-33. Using X-ray crystallography, we are determining the molecular structure of ADC-219 bound to an inhibitory molecule. This combination of structural and functional studies of ADC-219 offers critical insights into how specific variants may affect antibiotic resistance.

# Lillian Minnebo (Koeze Fellow)

Faculty Mentor: Ian Winkelstern, Geology

Last Interglacial Climate from *Dendostrea frons* Oysters, Verrill Island, Bermuda

The Bermuda Islands preserve carbonates from several warm and cool geologic intervals. Specifically, Verrill Island exposes a shell rich deposit from the Last Interglacial (~125,000 years ago), a time broadly similar to climate today that can potentially serve as an analog for future conditions. Here, we use  $\delta^{18}\text{O}$  analyses of oyster fossils to estimate past temperatures and seasonality and compare our data with those from other species.

Eight *Dendostrea frons* oysters were sampled along their growth axes to reconstruct seasonal temperature curves. We report a mean  $\delta^{18}\text{O}$  value of  $-0.51 \pm 0.17\text{‰}$ , corresponding to a temperature of  $\sim 23^\circ\text{C}$ . These temperatures are similar to modern Bermuda ( $\sim 20$  to  $\sim 28^\circ\text{C}$ ) and will be refined further via ongoing clumped isotope analyses to define local water  $\delta^{18}\text{O}$ . These data enable interspecies comparisons with other Bermuda records and will contribute to a broader understanding of climate and North Atlantic circulation during the Last Interglacial.

# Seth Ockerman

Faculty Mentor: Erin Carrier, Computing

## Detecting Face Mask Usage Trends in Social Media Using Machine Learning

The use of face masks to prevent disease spread has become widespread with the COVID-19 pandemic. Accurately detecting and monitoring face mask usage trends is crucial to understanding and predicting hotspot areas for pandemics. We investigate the detection of face masks in social media images using deep learning, specifically convolutional neural networks (CNNs). While current datasets exist, they are typically too small, limited in diversity, artificially created, or contain only straight-on images of people's faces. This project creates a social-media-based face mask image dataset by gathering approximately 120k images containing people tweeted from different cities. Mechanical Turk is then used to label the images based on the presence of a face mask. We train a CNN model to detect the presence of face masks in social media images and compare the results to existing approaches. The model is currently being deployed to detect trends in face mask usage in a city over time.

# Madilynn Olenick, MS3

Faculty Mentor: Ruijie Liu, Biomedical Sciences

## Diabetic Cardiomyopathy in Mice

The purpose of this ongoing research is to examine the role of the extracellular signal-regulated kinase 1 and 2, also known as ERK 1/2, in diabetic cardiomyopathy. A mouse model with enhanced ERK 1/2 phosphorylation is used. Diabetes is induced chemically in mice through a drug called streptozocin (STZ). This drug attacks pancreatic beta cells, which produce insulin. The mice are given a week to allow the STZ injection to produce an effect, at which point we compare heart disease markers to determine whether activation of ERK 1/2 lessens the effect that is diabetic cardiomyopathy.

# Allison Romanski, MS3

Faculty Mentors: Peter Wampler, Meijer Honors College

## 2021 Grand River Water Quality Sampling

Research goals include sampling at different locations and flow conditions, collaboration with wastewater treatment plants, and development of a refined Water Quality Index. In the summer of 2021, seven different reaches were sampled and over 120 samples were collected. Samples were analyzed for nitrate, total phosphate, ammonia, chloride, dissolved oxygen, biological oxygen demand, total suspended solids, E. coli, and total coliform. Field parameters included: temperature, specific conductivity, pH, turbidity, oxidation reduction potential, resistivity, salinity, and total dissolved salts. Water samples were collected from bridges and kayaks, and were analyzed at the Allendale Wastewater Treatment Plant or in the GVSU Lab. Lab methods included: 1) HACH spectrophotometer analysis; 2) Total Suspended Solids Filtration; 3) Biological Oxygen Demand; and 4) IDEXX Colilert 2000 quanti-tray method. Ongoing sample analysis will be compared to water quality data dating back to 1968.

## Maci Rozich

Faculty Mentor: Kristin Renkema, Biomedical Sciences

### Comparing the Immune Systems Between Clean and Dirty Mice

Recently, many studies have grown in the immunology field regarding the hygiene hypothesis. Diverse and equipped immune systems have shown to better fight off infections and pathogens. Whereas lesser exposed immune systems tend to be compromised when faced with foreign invaders. The immune system of a mouse is comparable to the human when focusing specifically on the immune cells themselves. T cells make up a huge part of the body's secondary defense system. By programming a specific attack and building memory for the future, T cells are one of the most diverse and complex immune cells. A well-equipped immune system and plenty exposure to pathogens supports the hygiene hypothesis in that diverse immune systems are better able to fight off infection and disease than those immune systems with not as much memory and pathogen recognition.

# Georgia Sands

Faculty Mentor: Shannon Biros, Chemistry

The synthesis and characterization of four phosphine oxide ligands as sensitizers for lanthanide luminescence and the influence of the aryl and phosphine oxide carbonyls. One of the unique properties of lanthanide metals is that they luminesce in sharp emission bands in the visible IR and near IR regions. This luminescence property has allowed them to be used in materials applications such as microLEDs and hybrid car batteries. For the lanthanide metals to emit light efficiently, they can be coordinated to organic molecules that can transfer energy to the metal via the antenna effect. Previous research has demonstrated that aryl carbonyl groups are effective antennas for this process, however the influence of aryl phosphine oxide groups has been less studied. With this S<sup>3</sup> project, four  $\beta$ -carbonylphosphine oxide compounds have been synthesized with systematic changes to the number and placement of the aromatic rings. One ligand and its complexes with the lanthanide metals,  $\text{Eu}^{3+}$ ,  $\text{Sm}^{3+}$ ,  $\text{Dy}^{3+}$  and  $\text{Tb}^{3+}$ , have been characterized in detail. The ongoing goal of this work is to determine the influence of both the aryl carbonyl and phosphine oxide carbonyl groups.

# Allison Soffa

Faculty Mentor: Marshall Werner, Chemistry

Art and Biochemistry Applied to Snakebite Treatment: Medical Illustration and Biochemical Investigations of the bacterial production of metalloproteinase inhibitors from the North American opossum *D. virginiana*.

Two virtually identical antihemorrhagic proteins isolated from either the North American opossum (*D. virginiana*) or the South American big-eared opossum (*D. aurita*), termed oprin or DM43 respectively, inhibit specific snake venom metalloproteinases (SVMs). Snake-bite envenomation is a global health concern, and a better understanding of these proteins may provide useful insight to determine their mechanism of action and for the development of therapeutics. The aim of this work is to produce a recombinant snake venom metalloproteinase inhibitor (SVMPI) similar to the above opossum proteins. Eight constructs including the genes for the production of the proteins DM43 and maltose binding protein (MBP) were created in *Escherichia coli* vectors. These new constructs replace a Factor Xa cleavage site with a TEV cleavage site. Scientific illustrations were made to portray this history and methods used in this project.

# Derek Tonello (Schroeder Fellow)

Faculty Mentor: Zeni Shabani, Biomedical Sciences

## Trace-amine associated receptor 1 and vulnerability to methamphetamine use disorders

Vulnerability to methamphetamine (MA) use is related to the genetics that mediate the aversive and rewarding effects of MA. According to the most recent research, a gene known as the trace-amine associated receptor 1 (TAAR1) seems to play protective role, meaning animals that have a functional version of the gene have very low voluntary MA intake. Our research worked with mice that have a non-functional version of the TAAR1 gene and mice that have the functional version of the gene TAAR1<sup>+/+</sup> knocked in via the CRISPR-Cas9 method. We pharmacologically manipulated the gene and were able to show that TAAR1 receptor is necessary for the aversive effects of MA and other hypothermic effects.





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