



GVSU SUMMER SCHOLARS SHOWCASE

July 29, 2014

Grand River Room, Kirkhof Center

Allendale, MI

4:00 p.m. - 7:00 p.m.

Order of Events

Welcome and Remarks

4:00 P.M. - 4:15 P.M.

Gayle R. Davis, Provost and Vice President for Academic and Student Affairs

Oral Presentations by:

4:15 P.M. - 5:15 P.M.

Delia Chapa • Amaya Guthrie • Ray Jeroso • Kevin Joffre • Chelsea Kendziorski

Poster Presentations by:

5:15 P.M. - 6:15 P.M.

Fatouma Abdoulaye • Kennedy Aldrich • Lindsay Babcock • Lauren Berry • Kelsie Colley • Tina Daniels • Alicia Flores • John Hessler • Veena Janardan • Jessica Janecke • April Kaneshiro • Edwin Klein • Talon Kosak • Angela Kujawa • Lindsey Lusardi • Kathryn McGuire • Natosha Mercado • Samantha Morsches • Benjamin Nicholson • Irma Ramirez • Chelsea Reiber • Cody Robinson • Dallas Rohraff • Christina Sarkissian • Isaac Simon • Scott St. Louis • Katie Uhl • Alison VanDine • Megan Wertheimer • Alayna Zielinski

Oral Presentations by:

6:15 P.M. - 7:00 P.M.

Barrett Kyle • Kirk Luca • Meagan Roche • Stacie Stuet

2014 McNair Scholars

Lauren Berry	Amaya Guthrie
Delia Chapa	Stacie Stuut
Kelsie Colley	Katie Uhl

2014 Student Summer Scholars

Fatouma Abdoulaye	Barrett Kyle (MS3)
Kennedy Aldrich	Kirk Luca (MS3)
Lindsay Babcock	Lindsey Lusardi (Koeze Fellow)
Tina Daniels	Kathryn McGuire
Alicia Flores	Samantha Morches
John Hessler	Benjamin Nicholson (Ott-Stiner Fellow)
Veena Janardan (MS3)	Chelsea Reiber
Jessica Janecke	Meagan Roche
Ray Jeroso	Dallas Rohraff
Kevin Joffre	Christina Sarkissian
April Kaneshiro (Schroeder Fellow)	Isaac Simon
Chelsea Kendziorski	Scott St. Louis
Edwin Klein	Allison VanDine (MS3)
Talon Kosak (MS3 Ott-Stiner Fellow)	Megan Wertheimer
Angela Kujawa	Alayna Zielinski

Welcome to the 2014 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 2014 GVSU Summer Scholars Showcase. Today, we celebrate the scholarship, research, and creative work of undergraduate scholars in the Student Summer Scholars (S3), Modified Student Summer Scholars (MS3), and McNair Scholar Programs.

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.

Susan Mendoza, Director, Office of Undergraduate Research and Scholarship

Fatouma Abdoulaye

Faculty Mentor: Ryan Thum, Annis Water Resource Institute

Do Microbial Communities Determine Herbicide Sensitivity Versus Resistance in the Invasive Aquatic Plant, Eurasian Watermilfoil?

Eurasian watermilfoil is an invasive freshwater plant heavily managed with herbicides to mitigate its ecological and economic impacts. Previous research has proven that while many genotypes are sensitive to herbicides, some exhibit resistance, but the mechanism(s) is unknown. One hypothesis is that resistant genotypes harbor microbial communities that block the uptake and/or metabolize herbicide, leading to reduce its efficacy. To test it, we studied four different genotypes known to exhibit different susceptibilities to the commonly used herbicide 2,4-Dichlorophenoxyacetic acid (2,4-D). We exposed three clones of each genotype to 500 μ g L⁻¹ 2,4-D for 48 hours, and compared them to the control. We are currently extracting microbial DNA from their roots and shoots. We will use 16S DNA barcoding to determine the microbial composition using next-generation sequencing. The data will help determine if sensitive and resistant genotypes have predictably distinct microbial communities.

Kennedy Aldrich

Faculty Mentor: Jennifer Winther, Biology

Characterizing the Symbiotic Relationships between Arbuscular Mycorrhizal Fungi and the Roots of Fruit Trees

Most plant species have a symbiotic relationship between fungi and their roots called an arbuscular mycorrhizal (AM) association. The plant receives mineral nutrients from the fungus while the fungus gets sugars from the plant. AM associations benefit plants by increasing drought tolerance, pest resistance, increasing plant growth, and improving soil structure. This research characterized the AM associations in the roots of ten fruit trees found at GVSU's Sustainable Agriculture Program. Standard molecular techniques were used to sequence fungal DNA from fruit tree root samples. Morphological analyses were carried out on a subset of root sample to characterize the AM associations. Fungal sequences were analyzed to characterize the fungal diversity between and within the trees. Future analyses will incorporate plant and soil nutrient data with the diversity data, which may lead to the development of an AM fungal inoculum designed to benefit plant growth.

Lindsay Babcock

Faculty Mentor: Elizabeth Arnold, Anthropology

Isotopic analysis of archaeological teeth at the Early Bronze Age city of Tell es-Safi, Israel

Stable isotope analyses are utilized within archaeology to determine diet (of both humans and animals) and reconstruct environments. Here, we focus on domestic animals and utilize stable isotope analyses (carbon, oxygen and strontium) to examine herd management and mobility, trade and exchange of animals within the local economic system and the region. This poster will focus on the technique of sampling archaeological teeth from the site of Tell es-Safi, Israel for stable isotope analyses. The focus of analyses was the remains of a young, healthy adult female ass recovered under the floor of an Early Bronze Age (3600-2400 BCE) house at the site. It has been suggested that this urban space may have been the location of merchants who relied upon asses as beasts of burden. These merchants would have been involved in exchange systems across the region during the Early Bronze Age. The importance of this taxon to the religious and economic realms of the EBA of the Near East is discussed.

Lauren Berry

Faculty Mentor: Ernest Park, Psychology

Exploring Unethical Behavior in Group and Individual Contexts

Experimental research studying the behavior of group and individuals in situations where they may elicit disinhibited behavior is important as it provides a framework necessary for understanding social situations.

One potential way people might change from being in a group is to be less inhibited. When people are inhibited they control their immediate urge to act, and reflect on their impulses in a cautious way. They want to avoid negative consequences associated with the behaviors they are contemplating. When people are inhibited, they tend to be more vigilant, and think in a slower, more deliberate way. Since inhibition is effortful, people tend to inhibit only to the degree they feel negative outcomes are likely, or when people don't know how to respond. On the flip side, to the extent people feel certain about how to act or feel safe from harm, they are disinhibited and act with less restraint. This suggests individual and group contexts are inherently different.

Delia Chapa

Faculty Mentor: Glenn Valdez, Psychology

Kappa Opioid regulation of acute and protracted alcohol withdrawal

Alcohol impacts us both personally and economically. Individuals dependent on alcohol continue to consume to avoid the severe withdrawal symptoms. Depression, anxiety and other stress-related symptoms are the primary causes of relapse, and the dynorphin/kappa opioid receptor (DYN/KOR) system is linked to one's ability to manage these symptoms. This research is investigating the role of the DYN/KOR system in regulating alcohol self-administration during acute and protracted withdrawal in alcohol dependent rats. Male Wistar rats were trained to self-administer ethanol. Rats were then fed an ethanol liquid diet to induce physical dependence. The rats were then allowed to self-administer ethanol again and the ability of the KOR antagonist, nor-binaltorphimine (nor-BNI) to reduce the increase in self-administration will be examined. We believe that nor-BNI will reduce ethanol self-administration as a means to manage the stress-related symptoms associated with alcohol withdrawal.

Kelsie Colley

Faculty Mentor: Kristie Dean, Psychology

What motivates you: Feeling good, feeling right, or both?

This study examined whether hedonic experience and regulatory fit have independent or interactive influences on motivation during goal pursuit. We also examined whether regulatory fit – which results from consistency between one’s motivational orientations and means – occurs when self-construals are considered as motivational orientations. This study experimentally manipulated self-construal, motivational means, and hedonic experience and measured perceived performance, actual performance, and task value, difficulty, enjoyment during goal pursuit. The results confirm that fit can be created from consistent self-construals and motivational means, which enhanced both perceived and actual performance. Additionally, the data demonstrate an interactive effect of regulatory fit and hedonic experience. When fit (nonfit) is experienced, hedonic experience is more informative when gauging the value (difficulty) of a task. Discussion will center on implications and future directions.

Tina Daniels

Faculty Mentor: Martin Burg, Biomedical Science

Fly on the Wall: An Observational Study of Courtship Behavior in Histamine-deficient Mutants of *Drosophila melanogaster*

Central nervous system (CNS) histamine is necessary for normal courtship in *Drosophila melanogaster*, but we want to determine whether males and females differ in this requirement. Two mutant fly lines were developed to test in heterotypic courtship experiments with wild-type flies. The Hdc^{JK910} mutant has no detectable histamine while the Hdc^{JK910};pHdc^{Δ32} has histamine in the periphery but not the CNS. Heterotypic mating introduced a male of one genotype to a female of a different genotype to reveal sex-specific differences in courtship. Male wild-type flies were most successful mating with Hdc^{JK910} females, followed by the wild-type and then Hdc^{JK910}; pHdc^{Δ32} females. In contrast, wild-type females mated better with wild-type males than with either the Hdc^{JK910}; pHdc^{Δ32} or Hdc^{JK910} males. This suggests that histamine affects both male and female behaviors leading to courtship, but in different ways. This sexual dimorphism may be due to histamine levels in the CNS and periphery.

Alicia Flores

Faculty Mentor: James Reed, Biomedical Science

Determination of Palatal Bone Density to Aid in Oral Mini-Implant Success

Mini-implants are titanium alloy rods implanted in the bone of the hard palate to help secure dental prostheses like dentures, fixed crowns, and bridge installations. Recent research suggests presurgical determination of bone density quality provides increased mini-implant surgical success rates. In replication of these methods, we evaluated 19 living individual CT scans from Saint Mary's Hospital, using Osirix 8.5 imaging software. Bone density was recorded at 90 separate coordinates using Hounsfield units, measured at three millimeter intervals (mediolaterally and anteroposteriorly starting at the incisive foramen.) The data was then analyzed for age differences and average bone density throughout different regions of the hard palate including intra- and interobserver analysis. Because researchers have indicated that women may have a palatal bone density than men, sex difference were closely investigated in this study.

Amaya Guthrie

Faculty Mentor: John Adamopolous, Psychology

Resource Theory and Interpersonal: An Exploratory Investigation of the Effects of an Economic Crisis on Cultural Values

This study examines how changes in the availability of economic resources over a 5-year period may affect the endorsement of cultural values. Two nations that experienced significantly different levels of an economic crisis, the U.S (low-to-moderate level) and Greece (high level), will be compared with regard to shifts in the values of individualism and collectivism. The participants in our study are approximately 200 university students from Grand Valley State University (USA) and the University of Athens (Greece). Responses to a scale measuring individualism and collectivism from 2009 (pre-crisis) and 2014 (post-crisis) will be analyzed in order to investigate possible changes in both the psychological structure and the relative national endorsement of the two constructs.

John Hessler

Faculty Mentor: Michael Wolfe, Psychology

Belief Change and Memory for Previous Beliefs after Comprehension of Contentious Scientific Information

We explore the relationship between belief change and recollection of previous beliefs. Subjects reported beliefs about TV violence. Later, subjects read a one-sided, belief inconsistent text. We manipulated whether subjects reported beliefs after reading first, or recollected previous beliefs first. A third group was told their previous beliefs before reporting current beliefs. Recollections were not improved when subjects recollected beliefs first. When told previous beliefs, belief change was reduced, suggesting a desire to appear consistent.

Veena Janardan

Faculty Mentor: Suganthi Sridhar, Biomedical Science

Identifying the c-MET phosphorylation site regulated by CD82 in prostate tumor cells

CD82 (KAI), a metastasis tumor suppressor protein is under-expressed in prostate as well as several other types of metastatic cancers. It inhibits cancer metastasis, but the mechanism through which regulation happens remains unclear. Various pathways are being explored in this lab, including regulation of c-MET, a growth factor receptor observed to have increased activation in tumor cells.

CD82 and c-MET do not co-localize, suggesting that CD82 indirectly downregulates c-MET. To be expressed, c-MET first needs to bind to its ligand, HGF. This growth factor encourages phosphorylation of c-MET, consequently activating it. C-Met has four tyrosine phosphorylation sites that include p-Tyr 1003, p-Tyr 1234/1235, p-Tyr 1349 and p-Tyr 1365. Knowing how each phosphorylation site of c-Met affects downstream signaling event, our lab is focused in identifying which site is regulated by CD82. This will provide further insight into how CD82 regulates c-Met and prevents prostate tumor metastasis.

Jessica Janecke

Faculty Mentor: Kyle Barnes, Movement Science

Effects of Weight Support on the Metabolic Demands of

Running

Running velocity and weight support affect the metabolic demands of running. To supplement training or when people may not be able to run safely at their full body weight (BW) due to injury, harness systems and water immersion to support BW during running has been previously used to allow individuals to continue or return to running. Another option is a lower-body positive-pressure weight support system known as the Alter-G anti-gravity treadmill. The Alter-G is more effective than the other training options due to its similarities to normal running. To date, no studies have investigated the effects of changes in BW and running velocity on the metabolic demand of running. Testing for this study includes subjects completing a series of progressive faster run intervals at fixed percentages BW starting at 70% and increasing to 100% while expired gases are continuously collected. Preliminary data indicates a direct relationship between decreased body weight and decreased metabolic demand.

Ray Jeroso

Faculty Mentor: Matthew Daley, History

A Fight So Impassioned: The Struggle Over School Consolidation in Michigan, 1950-1970

This project examines the discussions and changes that occurred in Michigan during the 1960s concerning school consolidation. The issue of merging schools has been a heated topic in the United States since the creation of public schools. The merging of school districts in Michigan completely changed the schools and their communities and how they interacted. However, there has been little discussion in the historical community about the decisions made and the policies implemented as well as their lasting impact on the schools and their communities. Additionally, the project analyzes factors such as urban, rural, suburban settings, and race and their relationship to school consolidation. The research draws upon primary sources such as legislative documents from the Archives of Michigan as well as newspaper articles from various school districts. Examining the existing literature has suggested that various factors feed into the issue of school consolidation.

Kevin Joffre

Faculty Mentor: Amy Masko, English Language & Literature

Identifying the Characteristics of the Ideal Reading Intervention Program for Teen Mothers

Research suggests that teen mothers tend to provide fewer literacy opportunities for their children than older mothers do. This is problematic, since low literacy has been linked to poor academic achievement. As a result, teen mothers and their children tend to be drawn into cycles of poverty. The goal of this project was to interview teen mothers in the Grand Rapids community in order to better understand their perceptions of reading and discover the kinds of books that interest them. Based on their responses, we have recommended a reading intervention program that targets the unique interests and needs of this population. The purpose of such a program is to encourage teen mothers to read more often, as well as make literacy a larger part of their children's lives.

April Kaneshiro, Schroeder Fellow

Faculty Mentor: Amy Russell, Biology

Relatedness of male hoary bats at a migratory stopover site in northwestern California

The hoary bat (*Lasiurus cinereus*) is a species found throughout North America where it undergoes long-distance seasonal migration. Recently, pairs of males were observed flying together during migration. Furthermore, when only one male was caught, the other male would circle around the area and the two bats would call to each other. This suggests a strong social bond between the two males. Since the hoary bat is known to regularly produce twins, it is possible that the co-migrating males are related. To determine whether these males are related, wing tissue samples were collected from the male pairs as well as from the general migrating population and these samples were genotyped at 14-15 microsatellite loci. A genetic analysis of relatedness will be performed later.

Chelsea Kendziorski

Faculty Mentor: Heather Tafel, Political Science

Reconsidering Revolutions: The Democratizing Impact of Breakthrough Elections in Croatia, Serbia, Moldova, and Georgia

Recent research highlights the democratizing impact of breakthrough elections in post-communist Eurasia. Because elections expand opportunities for civil society organization and contentious politics, scholars have noted improvements in democracy in countries where breakthrough elections produced government turnover. Drawing on evidence from Croatia, Serbia, Moldova, and Georgia, this paper investigates the extent to which individual breakthrough elections contributed to democratic development. While these countries have experienced overall democratic progress, improvements in areas such as civil society development, the autonomy of media outlets, and electoral processes have been less robust. Contrary to the conclusions of previous studies that the uneven democratization process in these countries is the result of longer-term structural conditions, this analysis shows how elite decisions can be critical in shaping structural conditions and governance trajectories.

Edwin Klein

Faculty Mentor: Daniel Bergman, Biomedical Science

An Investigation of the Intrinsic and Extrinsic Influences on the Aggressive Behavior of Crayfish

Several influences have been identified as important in determining aggressive (i.e. agonistic) hierarchy formation in crayfish, however the relative significance of these factors has yet to be determined. This study compares several aggressive influences, including previous winning or losing experiences, prior shelter possession, starvation, olfaction obstruction, and control treatments to determine which of these factors affect aggressive interactions to the greatest extent. The analysis will reveal which of these effects is strongest when directly confronted against one another. Each crayfish received one of the above treatments and then interacts with another size-matched crayfish that received a different treatment. All trials were recorded and then analyzed using a blind analysis scheme. Trials of each experimental treatment versus a size-matched naive crayfish have been completed to date, and the cross-comparison trials are currently in progress.

Talon Kosak, Ott-Stiner Fellow

Faculty Mentor: Richard Lord, Chemistry

How Does BBr_3 Cyclize *o*-alkynylanisoles to Form Benzofurans

Nature provides us with a wide array of chemicals that have beneficial uses. Cyclization reactions are important in the man-made creation of these chemicals. Past research by S3 scholar Samantha Ellis in Prof. Korich's lab showed an unexpected cyclization reaction with *o*-alkynylanisoles in the presence of BBr_3 instead of the expected demethylation reaction. We sought to understand this unusual reactivity using computational chemistry by comparing the energies of these competing pathways. However, we discovered that previously considered mechanisms for BBr_3 assisted ether demethylation are incomplete. In this work we present an alternative mechanism for ether demethylation that has implications in a number of different reactions involving boron-containing reagents.

Angela Kujawa

Faculty Mentors: Paul Keenlance, Natural Resources Mgmt and Joseph Jacquot, Biology

Habitat Specific Diet of Kit-rearing Female Martens in Northern Michigan

The American marten (*Martes americana*) is a small, carnivorous mammal found in upper North America and in fragmented populations of Michigan's lower peninsula. A large limiting factor on marten populations is food availability due to their high metabolism and low fat storage. This can be especially important for lactating females that may have up to five kits to sustain. We seek to obtain an understanding of reproducing female marten diets, if differing diets can impact kit production and survival, and how prey availability differs with habitat type. Female martens in the Manistee National Forest were fitted with radio collars and tracked. Cameras were used to confirm den sites and monitor litter size and kit survival. Scat was collected and any identifiable components evaluated to delineate diet. This is novel research that can be used by the Little River Band of Ottawa Indians, the United States Forest Service and Michigan Department of Natural Resources to manage for marten habitat.

Barrett Kyle

Faculty Mentor: Mark Staves, Cell and Molecular Biology

Quantification of light and gravity effects on the giant internodal cells of *Chara*

Light and gravity have profound and interacting effects on plant growth and the goal of this study was to determine the effects of these stimuli on the large internodal cells of the aquatic plant *Chara*. This represents the first report of the interactions of light and gravity in single plant cells. Time-lapse video was used to observe phototropic and gravitropic curvature of *Chara*. Plants in blue light (2.4 μE) showed the greatest response whereas red light at 0.10 μE elicited no phototropic response. This light source was subsequently used to observe the gravity response without the complicating factor of the light response. The gravity response was slower than the light response and was observed over a longer period than the light experiments. In future experiments we will determine the additive and antagonistic effects of light and gravity in these cells. RNA was isolated from single cells as a first step toward determining which genes are expressed in the light and gravity responses.

Kirk Luca

Faculty Mentor: Jennifer Moore, Biology

Growth and movement patterns of neonatal box turtles following egress

Eastern box turtles *Terrapene carolina carolina* (EBT) are uncommon in the Great Lakes region and are protected in Michigan as a species of special concern. Like many reptiles, little is known about hatchlings EBTs, particularly growth and activity of neonates following egress. Neonatal growth was monitored in EBTs in Manistee National Forest via radio telemetry. During the neonates first overwintering they lost approximately 10% of their body weight. Each neonate had overwintering refugia of varying depths; these depths did not correlate with how much mass was lost. The mean weight gain for turtles alive four weeks after egress was 7.9936 g with a 0.142 standard error. The absence of a significant weight gain may be the result of adverse weather conditions during the study. This may have led to a lack of readily available food and difficulty in foraging. It is critical to understand those factors that affect growth rates and promote longevity in EBTs to ensure they reach maturity.

Lindsey Lusardi, Koeze Fellow

Faculty Mentor: David Linn, Biomedical Science

Can A Drug for Alzheimer's Disease Be of Benefit in Glaucoma?

Glaucoma, a neurodegenerative disease, is a leading cause of blindness. It is known that activation of $\alpha 7$ nicotinic ACh receptors (nAChRs) on retinal ganglion cells (RGCs) can provide neuroprotection. Theoretically, if one could increase the amount of ACh released, then more nAChRs should be activated and more neuroprotection observed. DMP 543 was originally developed to treat Alzheimer's disease by increasing the release of ACh in the brain. Previous S³ work has shown that DMP increases the release of ACh from a pig eye-cup preparation. For this S³ project, we wanted to determine if a 'mixed' retinal cell culture (including cholinergic cells and RGCs) could indirectly detect the release of ACh by increased cell survival. Using this 'mixed' culture, we have observed a dose-dependent effect of DMP on cell survival. Currently, we are testing the effects of a selective $\alpha 7$ antagonist and modulator to confirm a direct effect and determine the extent of basal ACh release in our system.

Kathryn McGuire

Faculty Mentor: Merritt Taylor, Biomedical Science

Barx2 and the Regulation of Potential Downstream Genes in the Developing Chick Embryo

Barx2 is a homeobox transcription factor linked to cell adhesion, motility, and tumorigenic potential. In the developing chick embryo, the overexpression of Barx2 is used to determine genes responsible for its function. Literature has indicated that in certain cells, Barx2 induces expression of cadherin-6, collagen type 2, estrogen receptor alpha and matrix metalloproteinase 9(MMP) and these were chosen to be monitored for expression where Barx2 was overexpressed. Electroporation of Barx2 into the developing embryo promotes overexpression and expression of these genes were detected by performing immunofluorescence. Immunofluorescence has not indicated the endogenous expression of cadherin-6 or collagen type 2 alpha, and further experiments are pending. Immunofluorescence for the presence of the estrogen receptor and the MMP's will be done, as these are indicated to be upregulated by Barx2 and are associated with the invasive and metastatic characteristics of certain types of cancer.

Samantha Morsches

Faculty Mentor: Carl Ruetz III, Annis Water Resources Institute

Spatial patterns of fish assemblages in Lake Michigan tributaries

Species similarity of freshwater fish assemblages can be affected by geographic distance between study sites and environmental conditions, although the contribution of each to spatial patterns remains unclear. We sampled 15 coastal lakes connected to Lake Michigan to determine which fish species were present and assess associations between species similarity, distance, and environmental conditions. Our goal was to determine the potential contribution of each factor in shaping spatial patterns of fish assemblages. Fish sampling was conducted at five 10-minute electrofishing transects near the shoreline. Each fish captured was identified to species, measured for length, and released. We characterized environmental conditions by measuring water/organic sediment depths, submerged vegetation, temperature, conductivity, oxidation-reduction potential, dissolved oxygen concentration, and turbidity for each transect. We have completed all fish sampling, and are now beginning data analysis.

Benjamin Nicholson, Ott-Stiner Fellow

Faculty Mentor: Paul Cook, Chemistry

Structural and functional studies of GDP-6-deoxy-talose and GDP-rhamnose biosynthetic enzymes

GDP-6-deoxy-D-talose and its 4-epimer GDP-D-rhamnose are unusual sugars found on the cell surface of certain Gram-negative bacteria. GDP-6-deoxy-talose and GDP-rhamnose are produced by enzymes called GTS and RMD, respectively. We have determined a novel X-ray crystallographic structure of RMD from *Pseudomonas aeruginosa* that contains its cosubstrate NADPH within the active site. Further studies will be performed to determine the structure of GTS and both enzymes will be assessed via steady state kinetics. Characterization of GTS and RMD will allow for an understanding of how bacteria utilize these sugars and may give insight into the pathogenicity of certain Gram-negative bacteria. Furthermore, an understanding of the production of unusual sugars can allow for the derivitization of existing antibiotics in an effort to combat bacterial resistance.

Chelsea Reiber

Faculty Mentor: Osman Patel, Cell and Molecular Biology

Effects of chronic low-dose anti-telomerase and chemotherapeutic drugs on breast cancer cells

Breast cancer is the most common tumor affecting females globally. Among the sub-types, Triple-Negative Breast Cancer (TNBC) remains the most aggressive and has the worst prognosis, decreased overall survival rate and no targeted therapy available. Therefore, this study's objective was to compare and contrast the effects of continuous low-dose of BIBR 1532 (GV1), a novel analogue of BIBR 1532 (GV6) developed at GVSU, and Doxorubicin on TNBC (MDAMB 231) breast cancer cells. MDAMB 231 cells were seeded (5.0×10^5 cells/flask) and supplemented with GV1 or GV6 or Doxorubicin (Dox) or a combination of Dox+GV1 or Dox+GV6 for 21 days ($n=4-8$). The number of viable cells decreased by 55% ($P < 0.05$) and 60% ($P < 0.05$) in the GV6+Dox and GV1+Dox compared to Control by day 21, respectively. Our results indicate that continuous low dose anti-telomerase and chemotherapeutic drugs do inhibit breast cancer cell proliferation and merits further investigation.

Meagan Roche

Faculty Mentor: Deana Weibel, Anthropology

A Guide to Conquest: What Crusades Tourism Reveals about the Construction of French National Identity

This paper examines how contemporary French identity is expressed at tourist sites related to the Crusades at a time when a growing number of Muslim immigrants live in France. ‘Cultural heritage sites’ reproduce and maintain a shared history that shapes collective identity and contemporary social life (DiGiovine and Picard 2014). The study of tourism reveals that it is not a passive representation of a distant history, but instead functions as an active participant in modern identity construction. Historical tourist sites reproduce societal memories and beliefs in describing what happened at these sites and its significance. This ethnographic research focuses on representations found at tourist sites associated with historical conflicts during the Reconquista (718-1492 CE) that pitted Christianity against Islam. Sites in this discussion are analyzed with an emphasis on how touristic information at these locales negotiates, asserts, and reproduces French national and cultural identity.

Dallas Rohraff

Faculty Mentor: Roderick Morgan, Biology

The Evaluation of Essential Oils as Antibiotics

The emergence of antibiotic resistant bacteria is of pressing concern as health care associated infections kill 99,000 people a year in the U.S. alone. Researchers are currently looking for new antibiotics in alternative sources. Essential oils are traditionally known to have medical benefits, and cinnamon, tea tree, and eucalyptus oils have shown antibiotic activity. Initial testing via standard microbiological protocols found minimum inhibitory concentration (MIC) values of 0.019% for cinnamon, 1.25% for tea tree, and 0.313% for eucalyptus. All three oils proved effective against both Gram-positive and Gram-negative bacteria. As cinnamon oil appeared most effective, more thorough microbiological analysis revealed it to be bactericidal and retained antibacterial activity in the presence of human serum protein. The results revealed cinnamon oil may contain a promising novel antibiotic.

Christina Sarkissian

Faculty Mentor: Douglas Graham, Biomedical Science

Prevalence and Population Dynamics of Raccoon Roundworm in West Michigan: Assessing the Potential of an Emerging Zoonosis

Baylisascaris procyonis, a.k.a. raccoon roundworm, is increasingly being recognized as a cause of visceral, ocular, and neural infections in wildlife and humans. Despite its emerging public health importance, very little is known about the population dynamics of this parasite. We analyzed the population genetic structure of this parasite in West Michigan based on DNA extracted from adult worms obtained from euthanized raccoons provided by fur-trappers, animal control operations, and road kills. Over 200 specimens of *B. procyonis* were collected from 84 raccoons over a 12 month period. Prevalence of infection showed a pronounced seasonal variation: close to zero during the winter and over 70% during the late summer and fall. Preliminary results indicate extensive gene flow and weak population structure, as would be expected given the restricted geographic scale of this project and the agility and cosmopolitan nature of raccoons.

Isaac Simon

Faculty Mentor: Todd Williams, Psychology

I can't remember: The effects of lying and Machiavellianism on people's ability to recall past events

Past research has demonstrated that lying about an event interferes with one's later recall of that event (Pickel, 2004; Chrobak & Zaragoza, 2008). This study examined the extent that individual differences in Machiavellianism (Christie & Geis, 1970) moderated the effect of lying on memory bias. Participants were asked to either truthfully recount or lie about the events depicted in a film clip. One week later, participants recalled the actual events of the film clip. Results showed that lying led to a decrease in the number of events and details that participants were able to recall. This effect was moderated by participant's level of Machiavellianism such that low levels of Machiavellianism were associated with less memory bias whereas higher levels of Machiavellianism was related to increased memory bias. These suggest that low Machiavellian individuals are better able to differentiate between self-generated fabrications and actual events than their more manipulative counterparts.

Scott St. Louis

Faculty Mentor: David Eick, French

In Search of Balanced Insight: Macroscopic and Microscopic Reading of Citation Strategies in Diderot's *Encyclopédie*, 1751-1772

My research builds upon the groundbreaking work of scholars Dan Edelstein, Robert Morrissey, and Glenn Roe in the burgeoning field of the digital humanities. By utilizing the search capabilities offered with the digitized ARTFL version of Diderot's *Encyclopédie* (the masterful Enlightenment work totaling 28 volumes published between 1751 and 1772), I find that the carefully designed “macroscopic” methodology of Edelstein and his colleagues must be tempered by ongoing “microscopic” analysis of digitized source material. Thus, digital tools designed for historical research have both remarkable value and noteworthy limitations. The use of sequence alignment programs and massive online databases can yield important new insights in cultural history, but these findings must be balanced by “close” reading of documents relevant to the research question(s) at hand.

Stacie Stuut

Faculty Mentor: Brad Wallar, Chemistry

Structural and Functional Characterization of a Novel Inhibitor for the class C β -lactamase, ADC-7

β -lactams, such as penicillin, are the most frequently prescribed class of antibiotics. Throughout time, as well as in response to their overuse, bacteria have become resistant to most of these drugs. As a result, antibiotic resistance has become a major threat to human health. Many antibiotic-resistant bacteria express the enzyme β -lactamase, the most widespread resistance mechanism to β -lactam antibiotics. One such bacterial species that has rapidly become a health concern is *Acinetobacter baumannii*. A large portion of its resistance is due to the β -lactamase *Acinetobacter*-derived Cephalosporinase-7 (ADC-7). Here, we have characterized an inhibitor molecule that could serve to deactivate ADC-7 and help to restore the efficacy of antibiotics in fighting *Acinetobacter* infections. Specifically, we have determined the X-ray crystal structure ADC-7 bound to the inhibitor (S06017). In addition, we have used competition kinetics to measure the binding affinity of the inhibitor for ADC-7.

Katie Uhl

Faculty Mentors: Sridhar Suganthi, Biomedical Sciences & Robert Smart, Chemistry

Biological Testing of Novel Telomerase Inhibitors

Cancer is often referred to as being “immortal”, because of its ability to divide a seemingly infinite amount of times. This immortality is granted to them by an enzyme called telomerase. Chromosome caps known as telomeres are supposed to become degraded over time, eventually signaling the cell to die when they become too short. Telomerase lengthens the telomeres so that they never reach this critical length. During the summer of 2013, three novel compounds were made based on the parent compound, BIBR 1532 a known telomerase inhibitor. These compounds were then tested on metastatic prostate cancer cell lines for anti-cancer activity, as well as telomerase inhibition. If these compounds prove to be telomerase inhibitors, it would be a breakthrough as to how BIBR 1532 functions, and could potentially lead to a more effective cancer treatment. While tests were done on prostate cancer cells, these potential treatments have applications in both breast and pancreatic cancers as well.

Alison VanDine

Faculty Mentor: Brad Wallar, Chemistry

Characterizing an inhibitory compound to combat antibiotic resistance in *Acinetobacter*

A strain of pathogenic bacteria, *Acinetobacter baumannii*, is developing resistance at an alarming rate to β -lactam antibiotics. Much of this resistance is attributed to the expression of class C β -lactamases, termed *Acinetobacter*-derived Cephalosporinases (ADCs). One of these β -lactamases, ADC-7, can deactivate the β -lactam ring present in a broad spectrum of existing antibiotics. A novel class of inhibitors, boronic acid transition state inhibitors (BATSI), has been synthesized to combat this resistance mechanism. In this study, an inhibitor (CR157) was characterized for its ability to bind and inhibit ADC-7. CR157 was discovered to bind ADC-7 with high affinity and inhibit its ability to deactivate a common antibiotic. Additionally, the X-ray crystal structure of the ADC-7/CR157 complex was determined at 2.03 Å. The ADC-7/CR157 complex provides insight to the inhibitory capabilities of CR157, as well as contributing to the structure-based optimization of future β -lactamase inhibitors.

Brittany Ward

Faculty Mentor: Pat Colgan, Geology

Silurian Rocks and Fossils at Seul Choix Point, Michigan: Sedimentary Environments, Ocean Currents, and Seal Levels

Few recent studies have been conducted of the Cordell and Engadine Formations. Older studies consist mostly of general lithology and fossil classification. This study provides an up to date study of these formations at Seul Choix Point, Michigan. This research had five main objectives: (1) to examine and classify dolostone samples of the outcrops, (2) to identify fossils found, (3) to reconstruct faunal abundance and spatial relationships between organisms, (4) to use the information from data collected to give an accurate illustration of the environment during the deposition, and (5) to reconstruct the ocean currents and sea level present at deposition. We used various methods in the field and lab to reach our results, including: geologic mapping, rock and thin section analysis, transect and map surveys of fossil fauna, and cephalopod orientation. From these methods we were able to determine energy level present at the time of deposition, faunal communities, and proposed water depths.

Megan Wertheimer

Faculty Mentor: Amanda Dillard, Psychology

Reducing the Impact Bias in Colorectal Cancer Screening

Past research has shown that when predicting how a future event will make them feel, people over-estimate the intensity and duration of their emotions, a phenomenon known as the impact bias. When it comes to deciding about colorectal cancer screening, older adults face many psychological barriers related to the anticipated embarrassment, disgust, and pain of screening. Qualitative research suggests these barriers may be characterized by an impact bias. In this study, 17 older adult participants were presented with a message about colon cancer and screening. We tested whether highlighting some participants' adaptive potential would lower their expectations of intensity and duration of these barriers. Findings showed that relative to a control condition, participants who wrote about a time when they emotionally adapted to a past event gave lower maximum pain estimates and marginally lower perceived duration of pain estimates.

Alayna Zielinski

Faculty Mentor: Brandon Youker, Social Work

Who Needs Goals; An Analog Experiment Comparing Goal-Free Evaluation & Goal-Based Evaluation Utility

Systematic research on evaluation can greatly improve a program. But in making decisions about which evaluation model to choose, there needs to be a larger pool of research literature across all evaluation types. One nearly unexamined types of evaluation is goal-free evaluation (GFE). GFE is designed to keep evaluators purposefully ignorant of the program's stated goals and objectives. The idea behind GFE is that the evaluator may uncover unintended side effects which would have gone unnoticed looking solely for specific goals and objectives. In this analog experiment GFE is compared with goal-based evaluation (GBE). GFE and a GBE were simultaneously and independently used to evaluate the same training program. Thirty of the evaluations' users completed an attitude survey and participated in a focus group regarding the utility of each evaluation report.



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