UW Oshkosh
Student Scholarship
2015 Book of Abstracts

UNIVERSITY OF WISCONSIN
OSHKOSH

osscap
OSHKOSH STUDENT SCHOLARLY & CREATIVE ACTIVITIES PROGRAM

UW Oshkosh Student Scholarship 2015 Book of Abstracts

"Tell me and I forget, teach me and I may remember, involve me and I learn."
—Benjamin Franklin

I am pleased to present the *UW Oshkosh Student Scholarship 2015 Book of Abstracts*, which showcases undergraduate and graduate research, scholarship and creative activities at UW Oshkosh. The book includes abstracts from scholarly presentations and publications, fine and performing arts endeavors and 2014–2015 collaborative research projects.

Consistent with UW Oshkosh's mission to "prepare our graduates to meet the challenges of an increasingly global society," the activities showcased in this book positively affect students' intellectual, professional and personal development by enhancing capabilities including self-directed inquiry, information literacy, communication and collaboration. These skills directly benefit students by leading to employment opportunities or graduate school acceptance, while the community at large benefits as students and faculty together conduct applied research to solve real-world problems.

The activities highlighted within these pages demonstrate the exemplary research being conducted at UW Oshkosh. Congratulations to the students and faculty mentors featured here. Their engagement with research and creativity advances UW Oshkosh's vision and enriches our community and world.

I hope you enjoy our *Book of Abstracts*.

Lane R. Earns
Provost and Vice Chancellor

UNIVERSITY OF WISCONSIN OSHKOSH

University of Wisconsin Oshkosh
Oshkosh Student Scholarly and Creative Activities Program

The Oshkosh Student Scholarly and Creative Activities Program (OSSCAP) supports a wide range of collaborative, hands-on scholarly and creative activities, and provides students with an outlet to demonstrate their talents to the public at large.

Oshkosh Student Scholarly and Creative Activities Board (as of May 2015):

Benjamin Artz – Economics
Jeffrey Behm – Anthropology
Chris Christopherson (Oshkosh Student Association appointee) – Undergraduate Student
Karina Cutler-Lake – Art
Jonathan Gutow (at-large member/chair) – Chemistry
Joan Heller (Graduate Council representative) – Social Work
Jaya Jambunathan – Nursing
Stephen Kercher – History
Alfred Kisubi – Human Services Leadership
Michelle Kuhl (*Oshkosh Scholar* adviser) – History
Andrew Redington (*Spectrum* adviser) – Art
Mary Seaman – Biology
Susan Surendonk (ex officio) – Oshkosh Student Scholarly and Creative Activities Program

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Key:
▲ = Activity that OSSCAP does not directly support
♦ = Graduate student
* = McNair Scholar

Fine and Performing Arts Endeavors▲

UW Oshkosh is dedicated to supporting the creative endeavors of students in the fine and performing arts.

The Seafarer, by Conor McPherson

Students: Michael Stimac (Actor—James "Sharky" Harkin), Matthew Nielsen (Actor—Richard Harkin), Benjamin Mackey (Actor—Ivan Curry—and Scenery Construction), Jared Schultz (Actor—Nicky Giblin), David Kurtz (Actor—Mr. Lockhart), Amanda O'Donnell (Sound Design, Sound Engineer and Sound Board Operator), Joseph King (Stage Manager), Andrea Ewald (Production ASM), Shelby Coats (Production ASM), Keynen Butler (Sound Engineer), Connor Dziedzic (Light Board Operator), Brad Skonecki (Deck & Prop Crew), Amy Baumgardner (Wardrobe & Makeup Crew and Costume Shop Assistant), Mallory Radney (Wardrobe & Makeup Crew), Nick Buzzanca (Scene Shop Assistant), Jacob Harn (Scene Shop Assistant), Krystal Kasuboski (Scene Shop Assistant), Xinyuan Li (Scene Shop Assistant), Nathan Ochocinski (Scene Shop Assistant), Robert Schwalen (Scene Shop Assistant), Alexandria Wolff (Scenery Construction and Costume Shop Assistant), Eve Funnell (Scenic Artist), Carlie Erdman (Props), Brian Felten (Costume Shop Assistant), Paige Boyden (Costume Shop Assistant), Tania Boyden (Costume Shop Assistant and Assistant to the Costume Designer), Gabriela Peterson (Costume Shop Assistant and Assistant to the Costume Designer), Jacob Schaubs (Costume Shop Assistant), Lacey Van Stappen (Costume Shop Assistant), Mary Chancellor (Costume Shop Assistant) and Thomas Offer-Westort (Public Relations Assistant)

Collaborators: Merlaine Angwall (Director), Kathleen Donnelly (Costume Design), Roy Hoglund (Set Design), Mick Alderson (Lighting Design and Technical Director) and Jane Purse-Wiedenhoeft (Dialect Coach), Theatre

Performed at: Kennedy Center American College Theater Festival (KCACTF), Region III Festival, Pabst Theatre, Milwaukee, WI, January 2015

The Kennedy Center American College Theater Festival (KCACTF) is a national theater program that enables university theater departments to showcase their work and promotes high-quality college-level theater production. A year-round program, the KCACTF is divided into eight regions, with each region holding annual festivals in January and February. UW Oshkosh's region, Region III, includes Illinois, Indiana, Michigan and Wisconsin. *The Seafarer* was one of only seven productions chosen to perform at the Region III KCACTF. Inspired by an Irish myth, *The Seafarer* portrays a Christmas Eve card game in which Sharky finds himself playing a mysterious stranger for his soul.

Scholarly Presentations

CUR Posters on the Hill

Sixty competitively selected undergraduates from across the United States present their research at the U.S. Capitol in spring.

Observing Nebulosities: The Cygnus Superbubble

Student: Christopher Christopherson
Co-Authors: Dr. Valeri Golev, University of Sofia; Dr. Nadejda Kaltcheva, Physics and Astronomy
Mentor: Dr. Nadejda Kaltcheva, Physics and Astronomy

"Observing Nebulosities" is a student-led project at the University of Wisconsin Oshkosh, undertaken to study star-forming complexes with the aim of gaining more understanding of their large-scale structure and star-forming history. The computer-guided modified Canon DSLR camera used for this project allows observations of extended areas of the night sky, much larger than the fields covered by professional telescopes. The Cygnus superbubble is the project's first target. Current X-ray, radio and optical observations reveal the Cygnus superbubble to be a giant ring of hot gas more than 1,000 light years in diameter, filled with regions of star formation. It is surrounded by a complex network of gaseous filaments and dust structures. We are imaging a field covering 22 x 17 degrees of the sky in the Hydrogen-alpha, Hydrogen-beta and Oxygen-III

emission lines. These are particular wavelengths of light emitted from the gaseous component of star-forming regions. Our project complements existing archive data and provides additional details on the interaction between the massive stars and the surrounding interstellar medium in this giant star-forming field. The valuable hands-on experience in the collection and reduction of astronomical observations yields insights on the entire research process, from obtaining data to final results.

National Conference on Undergraduate Research (NCUR)

Undergraduate students from all disciplines present at this annual national conference held each spring.

Observing Nebulosities — The Cygnus Superbubble

Student: Christopher Christopherson
Co-Authors: Dr. Valeri Golev, University of Sofia; Dr. Nadejda Kaltcheva, Physics and Astronomy
Mentor: Dr. Nadejda Kaltcheva, Physics and Astronomy

Current X-ray, radio and optical observations reveal the Cygnus superbubble to be a giant ring of hot gas more than 1,000 light years in diameter and filled with regions of star formation. It is surrounded by a shell of cooler hydrogen gas and a complex network of gaseous filaments and dust structures. "Observing Nebulosities" is a student-led project at the University of Wisconsin Oshkosh, undertaken to study star-forming complexes with the aim of gaining more understanding of their large-scale structure. The Cygnus superbubble is the project's first target. We are imaging a field covering 22 x 17 degrees of the sky in the Hydrogen-alpha, Hydrogen-beta and Oxygen-III emission lines. Emission lines are particular wavelengths of light which are emitted from the gaseous component of star-forming regions. The computer-guided modified Canon DSLR camera used for this project allows us to observe large areas of the night sky, much larger than the fields covered by professional telescopes. Our project complements existing archive data and provides additional details on the interaction between the massive stars and the surrounding interstellar medium in this giant star-forming field. A comparison between the Hydrogen-alpha and Oxygen-III emission allows us to trace regions where physical conditions change rapidly due to supernova shock fronts and strong stellar winds. Comparing the Hydrogen-alpha and Hydrogen-beta emission allows us to trace the distribution of interstellar dust across the entire field. The valuable hands-on experience in the collection and reduction of astronomical observations yields insights on the entire research process from obtaining data to final results.

Precision-Photometry Study of the Cyg OB1 Star-Forming Field

Student: Steven Lund
Co-Authors: Dr. Nadejda Kaltcheva, Physics and Astronomy; Dr. Valeri Golev, University of Sofia; Dr. Michael Briley, Appalachian State University; Dr. John Beaver, UW–Fox Valley
Mentor: Dr. Nadejda Kaltcheva, Physics and Astronomy

Cyg OB1 is one of the several OB associations located within the spectacular Cygnus superbubble. Several open clusters are identified as nuclei of Cyg OB1 and the adjacent Cyg OB3. The associations contain also numerous WR and O-type stars. Observations of ionized and neutral hydrogen indicate that the region around Cyg OB1 is characterized by two-component kinematics: an extended slowly expanding shell, and high-velocity motions of gas within the shell. This morphology suggests two major star-forming events – the formation of an extended shell crafted by the stellar winds of the massive main-sequence stars, followed by possible supernova explosions. In order to address the star-formation hierarchy and multiple stellar generations across the field of Cyg OB1, a reliable correlation between the young stars and the surrounding interstellar matter should be established. The purpose of this project is to provide new insights on the structure of Cyg OB1 star-forming field. Since it is located toward the Great Cygnus Rift, separating young stellar groups along the line of sight is a difficult experiment. Despite extensive studies, the distances to the clusters

and the association's members are still not well known. We use uvbyß and UBVß photometries, which are sophisticated astronomical techniques that allow the derivation of stellar physical parameters, such as brightness and temperature, with high precision. Existing catalog data are combined with new uvbyß photometry of nearly 150 stars in NGC 6913. The stellar physical parameters we derived allowed us to establish homogeneous scales for distances, extinction of light due to the interstellar material, and ages for the major clusters and layers of foreground and background stars in the studied field. We provide new distance estimates for the young open clusters NGC 6913, IC 4669 and NGC6871 and discuss these results in the context of the Cyg OB1 association characteristics. Since the existing estimates for the distance to NGC 6913 are differing by a factor of two at least, the new uvbyß photometry we present is especially useful to refine the parameters of this cluster.

A War for Manhood

Student: Andrew Mannenbach
Mentor: Dr. Michelle Kuhl, History

The last twenty years of the 19th century was a time of reckoning in the United States, particularly in the Northeast and the South. These regions had undergone rapid transformations as a result of the Civil War and were now grappling with the changes wrought by the aftermath of war. In particular, the identity of middle- and upper-class men in these regions was in flux. The problems confronting masculine identity needed a solution and in both regions men turned to football as a way to help remedy their masculine ills. The question then is how did men in each region use football as a means to help fulfill their identities as men? Did football help build a new definition of masculinity or preserve an older sense of manhood? In what ways do the two regions compare to each other in their use of football as a tool for masculine identity formation? Which region used football more effectively to resolve its issues? These questions will be resolved by examining secondary sources to understand what authors have said about manhood/masculinity in each region as well as the political and social impacts of the Civil War on each region. Primary documents will then be used to establish the social conditions of the Northeast and the South from 1880 to 1910, as well as to compare masculinity's presence in football in each region. Thus far I have found that in both regions football acted as a bridge between the male's desired ideal and the reality of his life, this being true for both regions. It is in this way that football was both a preserving and reconstructing agent. Each region had different masculinity issues to resolve and did so in very different ways. However, I believe that the North was able to make better use of football as a way to resolve and form masculine identities, as it was more compatible with the realities of that region.

UW Oshkosh Celebration of Scholarship

UW Oshkosh students share their scholarly and creative works at this annual event, now in its 22nd year.

Lateral and Vertical Homogeneity in a Single Lava Flow, Southern Cascades

Student: Samantha J. Anderson
Mentor: Dr. Jennifer M. Wenner, Geology

The Poison Lake Chain (PLC), in the southern Cascades, is a series of 38 small-volume basaltic volcanoes and associated lava flows subdivided into 8 groups by geochemistry and mineralogy. Although dominated by primitive basalts, the major and trace element compositions suggest that the Bogard Buttes group in the PLC are more magmatically evolved than surrounding neighbors. In an effort to understand the processes that modify primitive basalts in the shallow crust, we examined the longest contiguous flow erupted in the PLC, unit 5 of the basalts of Bogard Buttes (bb5). This flow measures 5km from vent to toe, and the cone and associated flow have been described as a single homogenous unit. However, little has been done to understand any changes through time during the eruption. We present new petrographic and major and trace element data from a vertical sequence of 10 lava flows and compare them to 10 samples taken at regular intervals both laterally across and longitudinally along the flow.

Our major and trace element analyses from the overflows reveal no systematic variation, vertically or laterally, suggesting that bb5 is homogenous throughout the eruption. Our new geochemical data support the interpretation of bb5 as a single unit, erupting a homogeneous composition from a shallow magma chamber. Geochemical homogeneity supports the conclusion that bb5 may have spent too little time in the shallow crust to experience significant modification.

Inactivation of Sucrose Synthesis in the Cyanobacterium for Increased Production of Isoprenoid Hydrocarbons

Student: Sara Arafeh
Mentor: Dr. Toivo Kallas, Biology

Our group has engineered *Synechococcus* sp. PCC 7002 cyanobacteria to produce isoprene, which is a precursor for synthetic rubber as well as biofuels for transportation. However, the production of isoprene is not yet sufficient for commercial purposes and thus our goal is to increase isoprene synthesis in these bacteria. One way to do this is by shutting down competing pathways that utilize carbon, such as the pathway for sucrose synthesis. Toward this goal, we are working to inactivate a sucrose synthase gene, spsA, for an essential enzyme in the sucrose synthesis pathway and determine whether this will increase isoprene production in cyanobacteria. To date, Polymerase chain reaction (PCR) has been used to generate the DNA fragments needed to inactivate the spsA gene. A procedure called "Gibson Assembly" will be used to assemble these pieces into a genetic construct for inactivating the spsA gene, and gas chromatography—mass spectrometry—will be used to measure isoprene production in the engineered cyanobacteria. This was important as a starting point to inactivate a sucrose synthase gene, spsA, for an essential enzyme in the sucrose synthesis pathway.

Clinical Microsystem Readmission Project

Student: Linda Backus♦
Mentor: Diane Park, Nursing

The Centers for Medicare and Medicaid Services (CMS) readmission initiatives started in 2010 when CMS started publicly reporting readmission ratios for acute myocardial infarction (AMI), heart failure (HF), and pneumonia on Hospital Compare. Aurora Medical Center Oshkosh (AMCO) was a top performing hospital for core measure readmission rates, but the interdisciplinary team felt more could be done for the all-cause readmission population. Hospital readmission rates were reviewed. The highest readmission rates occurred on 2W, a medical/surgical/telemetry unit. Thirty-day readmission data was aggregated from 11-01-13 to 09-30-14 to identify the 2W top readmission diagnoses groups. Alcoholic-induced liver or pancreatic diagnoses comprised 13 percent of the 2W readmission population. A subgroup of the All-Cause Readmission Team was developed to study the alcohol-related readmission population. The alcohol abuse subgroup used the Iowa Model of Evidence Based Practice for their process improvement framework. A global aim statement was developed: We aim to improve the 30-day readmission rate for alcohol-related diagnoses on 2W. A literature search was done, the evidence was graded, gaps in care were noted and a best practice initiative was identified and implemented. The plan-do-study-act was used for testing change.

Biogeochemical Marine Minerals Formed Below the Seafloor Off the Coast of Peru, South America: Implications for Phosphate Deposits and Ancient Analogs

Student: Lauren Bane
Mentors: Dr. Eric Hiatt, Geology; Dr. Peir Pufahl, Acadia University

Phosphorites are phosphate-rich sedimentary rocks and are major sources of phosphate for fertilizer. These major phosphorus reservoirs are linked to evolution of life and feedback mechanisms for global climate. Phosphate minerals are associated with modern oceanic upwelling environments, which are marked by high accumulation rates of organic matter, low oxygen levels and biochemical minerals. In these environments, chemosynthetic marine

bacteria exploit chemical gradients and drive mineralization of phosphate, dolomite and pyrite. To determine how and when biochemical minerals form, I am analyzing samples collected by the International Ocean Drilling Program off the coast of Peru and drilled in 300 m water depth to more than 200 m below the seafloor. Biological activity and sediment burial are recorded in the abundance of phosphate, dolomite and pyrite, which represent a series of biochemical processes as oxygen was consumed and chemosynthetic bacteria metabolized sulfur. Phosphate is released into the pore-water as organic matter breaks down, and by activity of sulfur-oxidizing bacteria it bonds with calcium and precipitates. Sulfate-reducing bacteria release sulfide, and this leads to iron sulfide (pyrite) precipitation. Finally, when the pore-water becomes alkaline, dolomite precipitates. The simple burial history of these phosphorites has allowed me to determine the nature of these processes and show that the system evolved chemically and mineralogically.

Evolution of Porosity in Dolostones Due to Recrystalization and Cementation: An Example From the Oneota Formation, Ripon, Wisconsin

Student: Scott Bender
Mentor: Dr. Eric Hiatt, Geology

Sedimentary rocks are important groundwater aquifers in Wisconsin. With burial, minerals can precipitate and recrystallize reducing porosity and permeability, and this is especially true in carbonate rocks, such as limestone and dolostone. I have analyzed samples including microscope slides (thin sections) of dolostone from the Saint Marie Quarry, Ripon, Wisconsin. In this quarry Jordan Formation quartz sandstones are overlain by dolostones of the Oneota Formation. The Jordan Formation is a major deep-water aquifer and is used for hydraulic fracturing sand in Wisconsin. The overlying Oneota dolostones are made up of dolomitic sandstones, sandy dolostones and ooid-rich dolostones. These rocks are relatively impermeable due to replacement and recrystallization of dolomite. I used a petrographic microscope to examine microscope slides of the rock and identify dolomite phases. I could not, however, always identify cement from recrystallized original material. To address this problem, I used cathodoluminence (CL) microscopy. Under CL, carbonates glow based on their trace element content. CL showed that there are multiple dolomitization events, including two cement phases—one that is darker red/brown in color and one lighter red to orange in color. Manganese causes bright colors, and dark colors are due to higher iron concentrations. The objective of this research is to determine the processes that led to dolomite crystal growth and decreased this rock's porosity.

Living in the Dorms: The Quality of Life in College

Student: Elizabeth Cable
Mentor: Dr. Paul Van Auken, Sociology

Social capital is noteworthy because in a community with higher amounts of social capital, life becomes easier and simpler. The network one gains from social capital helps create more organization and better communication and also helps ensure good self-esteem. This study will examine students living in the dorms at the University of Wisconsin Oshkosh. Through the process of interviews and surveys the study will help emphasize the benefits of living on campus and determine if students who have lived in the dorms will produce higher amounts of social capital. The questions in the interviews and surveys will reveal the educational benefits as well as the social benefits. In another study, the findings are that those who live on campus also have significantly higher GPAs than comparable students at the same institution who live off campus with family (Turley, Ruth N López 2010; Turley 2010). This study will contribute to the previous literature since most of the research examining the importance of living in the dorms was studied at large-scale universities. The University of Wisconsin Oshkosh is a smaller, liberal arts school, so there may be a difference in the results depending on the size of the school.

Targeting Synthetic Genes to *Synechococcus* sp. PCC 7002 for Production of Pinene as a Biofuel Feedstock

Student: Rhiannon Carr♦
Mentors: Dr. Toivo Kallas and Matthew Nelson, Biology

Global consumption of petroleum products, from plastics to cosmetics to fuels, has far exceeded the pace at which petroleum and similar fossil fuels are formed. International interest has therefore turned to finding sustainable sources for equivalent feedstocks, including photosynthetic organisms like cyanobacteria. Cyanobacteria, from a commercial perspective, are a space- and resource-efficient route to a number of biologically produced alternative feedstocks for diverse products. In particular, their methyl erythritol phosphate (MEP) pathway can be supplemented with enzymes to manufacture useful terpenoids (e.g., isoprene and pinene). Isoprene, which has previously been produced in the marine cyanobacterium *Synechococcus* sp. PCC 7002, is an important precursor for synthetic rubber; pinene, a larger hydrocarbon, has potential as a jet fuel feedstock. This project attempts to insert two synthetic genes—GPPS and bPinS—into the PCC 7002 genome, and thereby induce pinene production. While constructs including these genes have been targeted to two different sites—the first localized to an extra-chromosomal plasmid and the second to the chromosome—zero transformants have been observed, and consequently pinene production is unconfirmed. This lack of transformants may indicate that the synthetic gene products (namely the geranyl diphosphate synthase and ß-pinene synthase proteins) are somehow toxic to the cells.

Connecting Isolated Female Faculty in the UW System

Students: Maame Esi Coleman and Travis Brace
Mentors: Dr. Erin Winterrowd, Psychology; Dr. Jennifer Mihalick, Chemistry

Across the United States, women with Ph.D.s are less likely to hold academic positions than men with doctoral degrees. Women in academia are less likely than their male counterparts to hold tenured or full professor positions. This phenomenon is pronounced in the science, technology, engineering and mathematics fields and is apparent in most universities in the UW System. The current study examines a mentoring program which aims to connect isolated female senior faculty in the participating UW universities. The program is designed to provide mentoring services and support to participants by pairing them with other senior faculty from the UW schools. Eight female senior faculty members were interviewed by the primary investigator. Using the interpretative phenomenological approach, themes were developed from these interviews. Some of the themes include experience with misogynistic advisers, lack of support from colleagues, and satisfaction from mentoring others. It is expected that the mentoring program will give women an avenue to share experiences with peers and help to alleviate the feelings of isolation and frustration that many of these women experience.

Fraudulent Billing and Improper Medicare and Medicaid Payments: New Solutions to Old Problems

Student: Nana Adjoa Coleman♦
Mentor: Dr. Anna Filipova, Public Administration

In 2013 the federal government made $62.2 billion in improper Medicare and Medicaid payments, accounting for most of the estimated $105 billion in inappropriate payments to federal agencies (GAO, 2013). According to the Department of Health and Human Services' (HHS) 2013 annual report, between the fiscal years 2009 and 2012, Medicare fee-for-service administrative error rates consistently improved, falling from 10.8% to 8.5% but then rising to 10.1%, an increase of more than $6 billion. The HHS attributed this to factors such as outright fraud, overbilling schemes, improper "upcoding," new policies, and others. In Medicaid, the national improper payment rate declined to 5.8% ($14.4 billion) in 2013. Medicaid's fiscal year 2011 administrative error rate of 8.1% ($21 billion) was the "second-highest estimated improper payments of any federal program" (GAO, 2013).

Through systematic analysis of government reports and empirical research, the purpose of this research is to discuss fraudulent billing and improper Medicare and Medicaid payment practices with regard to false claims, upcoding and unbundling to identify innovative solutions and strategies for fraud and abuse detection and prevention. This information would serve as a guide to auditors, health care providers and their top management in ensuring an honest, ethical and responsible corporate conduct.

Author Numbers and Genders Over Forty Years in *Teaching of Psychology*

Students: Alexandria Ebert and Rebecca Timmins
Mentor: Dr. Lee McCann, Psychology

The numbers and genders of all authors and first authors of articles published over 40 years (1974-2013) in *Teaching of Psychology* were studied. Both numbers of authors per article and percentage of female authors showed significant increases over time. Female authors made up 16.6% of the earliest five-year block, increasing to 57.8% in the most recent five years. Female first authors followed a similar trend, beginning with 15.6% in the first five years and rising to 43% in the most recent five years. The average number of authors per article also increased significantly over time, starting with an average of 1.53 per article and rising to 2.45 in the most recent five years.

The Impact of State Mindfulness on Affective Forecasting

Students: Alexandria Ebert, Emily Vogels♦, Elizabeth Bogenschutz, Shelby Kelso♦ and Ashley Neuhaus
Mentor: Dr. Phan Hong, Psychology

The present research examined whether mindfulness increased accuracy in affective forecasting of emotions. Using randomized blocks, 228 college student participants were randomized into either a mindfulness task, control-task or baseline condition and then forecasted their emotions upon completion of an exam and upon receiving an exam grade. Results indicated that those in the mindfulness condition were more accurate in predicting negative, but not positive, emotions after receiving their exam grade. Moreover, this effect was not mediated by objective accuracy in predicting exam performance. Unlike the mindfulness manipulation, scores on a popular measure of trait mindfulness (the FMMQ) predicted more accuracy in forecasting positive and negative emotion in response to completing the exam, but not in response to receiving the exam grade. The findings highlight the potential role of mindfulness on increasing affective forecasting accuracy of negative emotion, but suggest this influence may be a function of the concreteness and importance of the imagined emotional event.

The Metamorphoses of Ingmar Bergman's *The Virgin Spring* in Wes Craven's *The Last House on the Left* and Dennis Iliadis's *The Last House on the Left*

Student: Julia Elkins
Mentor: Dr. Paul Klemp, English

Dating back to a medieval Swedish ballad for his source, Ingmar Bergman shows the story of rape, revenge and atonement to cinema in his film *The Virgin Spring* (1960). Wes Craven's *The Last House on the Left* (1972) transforms the story into a depiction of the counterculture that portrays the increased violence brought on by the Vietnam War where the importance of Christian morality is traded for a sadistic world of sex and violence. Following the trend of horror-film remakes, Dennis Iliadis recreates *The Last House on the Left* (2009) in which he portrays a new theme of family bonds and binary depictions of good and evil, unlike Bergman and Craven's deconstruction of sympathy for the victim's family and murders. This essay examines the shifting role of parents in these three adaptations of the story. Themes of jealousy, competition, paganism and Christianity, and revenge and atonement are the focus of Bergman's film; passive, animalistic parents, mockery and the decline of family values, class, and morality are addressed in Craven's film; and finally, Iliadis presents an optimistic approach on parental bonds and the act of protection and survival instead of the earlier themes of fragmentation and revenge.

The Role of CCL25 and CCR9 in Intestinal Immune Cell Changes During Hibernation

Students: Jeffrey Allen Farvour and Elizabeth Weir♦
Mentor: Dr. Courtney C. Kurtz, Biology

As mammals hibernate, the number of immune cells in their small intestines greatly increases. One potential cause of this change is an increase in the expression of the immune cell recruitment protein, CCL25, or its receptor, CCR9. My project analyzed whether expression of CCL25 and CCR9 changes in the intestine of hibernating versus non-hibernating 13-lined ground squirrels (*Ictidomys tridecemlineatus*). qPCR was used to determine the relative levels of CCL25 in frozen intestinal tissues. Flow cytometry was used to quantify the number of CCR9-positive cells in the intestine. There was a trend toward higher CCL25 expression in the intestine of hibernating ground squirrels versus non-hibernators, but the difference was not significant. Interestingly, the number of CCR9+ cells tended to be higher in non-hibernators, but this difference was also not significant. These findings suggest that CCL25 and CCR9 are not the main cause of the increase in immune cells seen in small intestines of hibernating ground squirrels, although the examination of more samples is necessary to elucidate whether these proteins play some role. This project was funded by an Undergraduate Small Grant.

RR Lyrae Stars in the Sagittarius Dwarf Galaxy Globular Cluster Arp 2

Student: Thomas Charles Gehrman Junior
Mentor: Dr. Barton Pritzl, Physics and Astronomy

The Sagittarius Dwarf Galaxy is one of a few satellite galaxies of the Milky Way galaxy. Due to the large gravitational field of the Milky Way, the Sagittarius Dwarf Galaxy is being ripped apart and absorbed into the Milky Way galaxy. We are analyzing the globular cluster Arp 2, which once belonged to the Sagittarius Dwarf Galaxy. The DAOPHOT suite of programs was used to analyze the observations. The data were searched for RR Lyrae stars, which are pulsating variable stars, by looking for variations in the magnitudes of these stars. We were able to find several RR Lyrae stars in Arp 2. The light curves of the variable stars will be used to find the distance modulus, chemical composition, and the classification of the cluster Arp 2. Using the information found from the RR Lyrae stars, we will compare Arp 2 to other globular clusters found in the Milky Way galaxy. By comparing the properties of a globular cluster that once belonged to an external galaxy with those in the Milky Way, we can examine in what way mergers with other galaxies helped to build up the Milky Way galaxy.

Evidence-Based Strategies to Enhance New Faculty Orientation

Students: Maria Graf♦, Heather Hollander♦ and Kristin Gabriel♦
Mentor: Dr. Jaya Jambunathan, Nursing

In an effort to determine the evidence-based characteristics that would best assist new nursing faculty members when transitioning into a teaching role, an integrative systematic review of literature (SROL) was conducted. A total of 37 articles were reviewed and included quantitative, qualitative, and mixed methods studies, SROLs, and expert opinions. Anecdotal evidence within the CON indicated that faculty believed orientation could have been more beneficial for them if they had a formal relationship with their mentors, received more education regarding Desire2Learn, and had better communication with other faculty and administrative personnel. Themes that emerged from the SROL included the importance of and need for: mentorship, clear explanations of faculty roles and expectations, information regarding technology, and accessible resources regarding contact information, campus information, and policies and procedures. The results were used to create a CON faculty orientation website within Desire2Learn. Additional research is needed to further explore strategies that support role transition and to determine the appropriate duration of orientation programs, gender-specific considerations, and appropriate orientation to clinical sites.

Mating Behaviors of Captive Thirteen-Lined Ground Squirrels

Student: Tristan Greening*
Mentor: Dr. Dana K. Merriman, Biology

UW Oshkosh has maintained a captive breeding colony of thirteen-lined ground squirrels since 2002. Production is not maximal because only ~50% of females paired with a male produce an observed litter, and then a varying percent of observed litters are cannibalized by the dam. In a continuing effort to maximize success, this project aimed to document mating behaviors, conduct a feasibility study of group mating to better approximate the natural state, and assess any resulting improvement in breeding success. An arena was constructed for group mating where, over 20 days of the 2014 breeding season, 7 experienced mothers were grouped for 1 hour daily with 5 males. An observer watched and videotaped interactions. Alongside, 65 females were pair- or trio-housed with a male, as is standard procedure. Six behaviors were recorded that were categorized as "greeting or courtship," and lordosis (female receptivity) and copulation were documented. One male, a yearling in his first breeding season, was observed to perform most copulations. A heretofore undocumented behavior, termed piling, was observed: multiple females were seen to pile on top of one another in a corner of the arena and appeared to be resting. Mouth-to-mouth contacts were consistent with the notion of pheromone transfer, which will be further examined in 2015. Compared to pair mating, group mating registered a lower rate of observed litters (29% vs. 46%) but also a lower rate of maternal cannibalism (0% vs. 17%).

The Spatial Distribution of Benthic Invertebrates in Lake Winnebago, Wisconsin

Student: Courtney Heling♦
Mentors: Drs. Robert S. Stelzer and H. Gene Drecktrah, Biology; Dr. Mamadou Coulibaly, Geography and Urban Planning; Ryan Koenigs, Wisconsin Department of Natural Resources

Benthic invertebrates play important roles in aquatic ecosystems. Chironomids, for example, comprise approximately half of the carbon assimilated by lake sturgeon (*Acipenser fulvescens*) in Lake Winnebago, the largest inland lake in Wisconsin. However, little is known about the spatial distribution of chironomids and other benthic invertebrates throughout the lake. Our objectives were to observe where invertebrates were most densely clustered and to determine which physical characteristics were correlated with their distribution. We collected invertebrates and measured sediment characteristics at 45-60 locations at various depths and substrates throughout the lake in August 2013 and 2014. We will use GIS and spatial statistics to identify spatial variation in invertebrate abundance within and between years and to determine associations between taxonomic diversity and physical factors. Preliminary results indicate areas of increased chironomid and total invertebrate abundance in the northeastern portion of the lake. Additionally, the littoral and profundal sites differ in the dominant invertebrate taxa present. A better understanding of the spatial distribution of benthic invertebrates in lakes may be useful for predicting impacts of primary consumers on higher trophic levels.

Dog Personality Matching and Its Effects on Successful Adoptions and the Commodification of Dogs

Student: Anna Kinderman
Mentor: Dr. Paul Van Auken, Sociology

Overpopulation leading to euthanasia of 1.2 million dogs a year is a major issue shelters have had in recent years (ASPCA 2014). This is something that as humans is our responsibility to try to reduce for the sake of these animals' welfare because it is something that we as a society created. I would like to see if dogs being better matched would help to overcome this problem. If ways to make dogs permanent parts of people's lives and not a commodity fetish are found then there would be a reason for more shelters to implement those procedures. The problem of animals being seen as a commodity fetish would mean the dogs are just being seen as another thing to own and throw away when owners are done with their dogs or cannot take care of them anymore. People who have this view

of their dogs likely do not realize what happens if they get rid of them or think it has no effect on the dog. Dogs have become a big part of American culture and therefore have also become victims of capitalization. I would like to investigate if commodification of dogs is a main reason for the problem of overpopulation and if matching dogs with humans affects owners' views of their dogs.

Hymenobacter Species Dominate Freshwater Biofilms

Students: Patrick Klepp and Tammy Nesbit
Mentor: Dr. Sabrina Mueller-Spitz, Biology

We are trying to understand mature biofilm composition occupying man-made structures in eutrophic freshwater. Common man-made substrates in the Fox River watershed include metal, wood, and concrete piers and docks. All three habitats shared *Hymenobacter* as the most dominant genera. The objective of this research was to determine if subpopulations of *Hymenobacter* favor different substrates. *Hymenobacter* sequences ranged from 4.2 to 23.3% of total bacterial community with over 80 operational taxonomic units (OTU) detected across the three substrates. Twelve OTUs inhabited all three environments, showing that various subpopulations are substrate generalists. The concrete substrate had the greatest total diversity and most unique OTUs. The wood and concrete substrates shared 22 OTUs whereas there was less overlap with metal. By comparison, three populations dominated the metal habitat, comprising 89% of all *Hymenobacter* sequences detected. This reduction in OTU richness on metal substrates leads us to consider potential adaptations that have led to this substrate being less favorable, potentially related to more competitive microorganisms that are better suited to this microenvironment. The *Hymenobacter* dominance in freshwater biofilms allows us to hypothesize that this group makes a significant contribution to ecological processes.

Is There an Association Between Tattoos and Social Class?

Student: Allison Knoch
Mentor: Dr. Paul Van Auken, Sociology

In April 2000, *National Geographic* news stated that 15% of Americans, or 40 million people, were tattooed. In today's society tattoos could be considered an everyday expression that is accepted as normal, but there are a great number of individuals who see tattoos negatively. Society has continued to instill a negative perception of tattoos because of the unfavorable associations from the past, which leads to discrimination of individuals with tattoos. Through my future research, I will be conducting interviews with legal adults in the state of Wisconsin of all races, sexes, and levels of income. In conducting interviews with participants, I hope to attain a better comprehension of the background and reasoning of people getting tattoos. I plan to relate my findings to my hypothesis that tattoos are becoming more accepted in society and are not restricted to lower income citizens. In time, I hope to find that other research studies on the same subject will influence individuals and institutions to reconsider their negative views on inked individuals and decrease the negative stereotypes associated with tattoos.

Novel Method for the Identification of *Deinococcus* and *Hymenobacter* Using High Performance Liquid Chromatography

Students: Thomas Kuborn and Patrick Klepp
Mentors: Dr. Sabrina Mueller-Spitz, Biology; Dr. Kevin Crawford, Chemistry

It has been estimated that less than 1% of all bacteria have been cultured in the laboratory environment. To understand the intricacies of microbial ecology, we need isolates that can be easily characterized and cataloged. Traditional methods for characterization utilize biochemical methods and molecular techniques, allowing for identification down to the species level. However, most of these methods are either too costly or not rapid enough for analysis of large groups of isolates. This work sought to develop a reverse phase high performance liquid chromatography

(HPLC) method for identification of pink bacterial carotenoids unique to the genera *Deinococcus* and *Hymenobacter*. *Deinococcus* strains are the only known producers of deinoxanthin, supporting the notion that the presence of deinoxanthin suggests that the strain must be *Deinococcus*. *Hymenobacter* strains are known to produce many derivatives of the carotenoid flexixanthin, with 2'-hydroxyflexixanthin being the common carotenoid observed. Bacterial cultures were isolated from submerged freshwater substrates. Pink colonies were then isolated for testing and analysis. To verify the identity of putative *Deinococcus* and *Hymenobacter* species, 16S-rRNA analysis was used. A total of 122 isolates were analyzed using our method, resulting in positive identification of 7 deinoxanthin and 72 2'-hydroxyflexixanthin producing bacteria, with 43 isolates exhibiting unidentified carotenoids.

UW Oshkosh Academic Success Project

Student: Ryan Kussow
Mentor: Dr. Paul Van Auken, Sociology

This analysis of research observes the relationship social class has on educational development and the secondary effects with academic achievement in college. Bourdieu foresaw that social reproduction of social class was maintained through the education system. He understood that an individual's cultural capital signifies the value of information and the quality of education a student has access to. Upper-class parents typically maintain higher degrees, allowing their children to have availability to classes in the community, attend better school districts, and gain access to better technology, as well as relaying their cultural capital at home. This provides an easier transition into college, as opposed to students of lower-class backgrounds. At the same time the structure of education, in terms of four-year universities, is built around students of middle-and upper-class backgrounds. The student habitus may be affected by the differences within the college atmosphere as well as the general student population. This may cause a sense of alienation influencing a student's self-efficacy and self-concept, which may potentially cause problems in academic achievement or possible retention. This research tries to uncover the latent barriers of lower SES students caused by the exploitation of the structure of education.

Natural Gas Halogenation Using Metal Halide Photocatalysts and Renewable Energy

Student: Amanda Leichtfuss
Mentor: Dr. Jennifer Schuttlefield Christus, Chemistry

Hydrocarbon fuels are the major source of energy on the market today. These fuels power everything, from the cars that people rely on to take them places to the warming of houses. In past years, there were many concerns about limited hydrocarbon resources. Now that abundant quantities of shale gas have been found in a variety of places, the focus has shifted to natural gas. Natural gas is projected to be the major hydrocarbon source of the future. Transportation of natural gas is expensive, especially in remote places where natural gas is produced as a byproduct of oil extraction, such as off-shore drilling sites. One way to lower transportation costs is to convert natural gas from the gaseous state it is extracted in to a liquid state at the remote extraction sites. However, traditional liquefaction processes use extreme conditions, such as high temperature and pressure, which are cost intensive. A potential solution for this technique is to utilize solar energy and a solid metal halide as a photocatalyst. These catalysts will aid in the halogenation of the natural gas, which can then be used for liquefaction. Proof-of-concept Gas Chromatography-Mass Spectrometry (GC-MS) experiments were performed on "dirty" natural gas. These experiments showed that the halogenation of various natural gas components can be accomplished, which is a critical first step in creating a sustainable system for natural gas liquefaction.

Multi-Wavelength Study of the Star-Forming Field in the Constellation Cygnus, the Swan

Students: Steven Lund, Erik Robinson, Henri LeMieux, Nick Grosskopf and Christopher Christopherson
Mentor: Dr. Nadejda Kaltcheva, Physics and Astronomy

The star-forming complex in the constellation Cygnus, the Swan, is the largest isolated feature of interstellar gas, dust and massive young stars recognized in our galaxy. Current X-ray, radio and optical observations reveal a giant ring of hot gas, known as the Cygnus superbubble, filled with regions of star formation. It is surrounded by a shell of cooler hydrogen gas and a complex network of gaseous filaments and dust structures. We have observed the Cygnus field in the Hydrogen-alpha, Hydrogen-beta and the doubly ionized oxygen emission lines. These particular wavelengths are emitted from the gaseous component of star-forming regions. The two hydrogen lines are recombination lines, which provide information about the overall distribution of ionized gaseous material and the interstellar dust. The doubly ionized oxygen line at 500.7 nm is driven by collisional excitation and its intensity increases with the temperature of the interstellar gas. This allows us to trace regions where the physical conditions change rapidly due to supernova shock fronts and strong stellar winds. We then combine these data with professional all-sky surveys and intermediate-band stellar photometry with the aim to investigate the morphology of the field and the interaction between the stars and interstellar material. This research seeks to reach specific conclusions on still-controversial issues on the origin and energy source of this vast star-forming structure of expanding interstellar matter.

A War for Manhood: An Interregional Comparison of 19th-Century Masculinity and Football

Student: Andrew Mannenbach
Mentor: Dr. Michelle Kuhl, History

The last twenty years of the 19th century were a time of reckoning in the United States, particularly in the Northeast and the South. These regions had undergone rapid transformations as a result of the Civil War and were now grappling with the changes wrought by the aftermath of war. In particular, the identity of middle- and upper-class men in these regions was in flux. The problems confronting masculine identity needed a solution, and in both regions men turned to football as a way to help remedy their masculine ills. The question then is how did men in each region use football as a means to help fulfill their identities as men? Did football help build a new definition of masculinity or preserve an older sense of manhood? In what ways do the two regions compare to each other in their use of football as a tool for masculine identity formation? Which region used football more effectively to resolve its issues? These questions will be resolved by examining secondary sources to understand what authors have said about manhood/masculinity in each region and the political and social impacts of the Civil War on each region. Primary documents will then be used to establish the social conditions of the Northeast and the South from 1880 to 1910, as well as to compare masculinity's presence in football in each region.

Extracurricular Involvement at UW Oshkosh: The Impact on Academic Achievement

Student: Addela Marzofka
Mentor: Dr. Paul Van Auken, Sociology

Involvement in extracurricular activities, which would include any outside of the classroom experience, is an easy way that students can get involved to help them gain social capital. Beyond that, it can also affect students' academic performance. Existing literature on this topic reports on studies done in regard to athletic extracurricular participation. Although those studies do point out an increase in academic success, the literature found has hardly touched on other activities, such as clubs, organizations or volunteer commitments at the college level. Through this research the goal is to find out if extracurricular involvement truly does increase academic achievement and, if so, whether the type of involvement matters. A survey will be emailed to a sample of the student population

at UW Oshkosh, asking questions about any activities students may be involved in and what their GPA has been throughout that involvement. The survey will also collect demographic information to try to control for any underlying details that could account for any increase in GPA that is found. The hope is to shed light on something beyond athletic participation and social capital to make a more direct correlation between extracurricular activities and academic achievement.

Inactivation of the *CpcB* Light-Harvesting Protein in *Synechococcus* sp. PCC 7002 Cyanobacteria for Increased Cell Density and Bioproduct Yields

Student: Franki Mayer*
Mentor: Dr. Toivo Kallas, Biology

Petroleum products are limited resources and their continued use creates the problem of finding sustainable and renewable replacements. One alternative is isoprene, a precursor for products such as synthetic rubber, plastics and biofuels. One method to produce bioproducts is to use cyanobacteria, microalgae that derive energy from sunlight. Our group genetically modified the cyanobacterium *Synechococcus* sp. PCC 7002 to produce isoprene. To make isoprene a marketable option for replacing petroleum products, many more modifications are needed. One of these involves the gene *cpcB* that codes for a protein called phycocyanin, which is a major component of the phycobilisome light-harvesting complex. Phycobilisomes effectively capture solar energy, but also stop cultures from growing to high densities since the cells closest to the surface absorb most of the sunlight and prevent the cells below from receiving light. High bioproduct yields cannot be obtained unless cultures grow to high densities. My goal is to inactivate the *cpcB* gene by inserting an antibiotic resistance gene into it to prevent phycocyanin from being made. This should prevent the overshadowing effect and result in higher isoprene yields. I used genetic engineering methods to assemble a DNA construct that carries the inactivated *cpcB* gene. The inactivated gene will be inserted into *Synechococcus* to create cyanobacteria that can be grown to higher densities with higher isoprene yields.

Broken Spanish

Student: Irineo Medina
Mentors: Gail Panske and Jeff Lipschutz, Art

Through this project I researched and confronted issues dealing with stereotype and racism around Mexican American culture. I am a third-generation Mexican American, so many of these issues stem from personal experiences and feelings. To reach the final goal, an art show focused on this problem, I implemented various methods in printmaking, painting and photography. My goal with the "Broken Spanish" show was to open a discussion around how this problem is affecting people such as myself every day. All too often this problem is not addressed, and more often than not it is socially accepted as jokes and humor. However, as we know from current events, unaddressed issues dealing with racism and stereotypes have a tendency to boil over and create situations that are bad for everyone involved. After applying for the Undergraduate Student/Faculty Collaborative Research program grant, receiving it, doing the artwork to address the problems and finally putting together the "Broken Spanish" show, which was in the Annex Gallery here on campus, I feel that my goal was reached. I feel that I have shown just how real the effects can be on someone of a different culture who was born right here in America.

Kinship and Judgments of Helping Behavior

Students: Samantha Miller♦, Jimmy Willing♦ and Xiaoyi Gu♦
Mentor: Dr. David Lishner, Psychology

In line with kin selection theory, research suggests that when presented with a life-or-death need situation, humans judge themselves as more likely to help those of closer kinship. Moreover, research has found that judgments of helping are highest in such situations when kin are of an age when they are most capable of reproduction. The purpose of the present study was to examine a reciprocity alternative explanation for this finding. Participants will be asked to indicate

the likelihood they would help a person in two non-life-threatening situations (person needs a ride, person needs help moving) and in two life-threatening situations (person needs rescuing from a burning building, person needs food and care under famine and sickness conditions). Participants will be randomly assigned to (a) imagine the person is either a stranger, an infant half-sister, a 10-year-old half-sister, an 18-year-old half-sister, or a 45-year-old aunt, and (b) either imagine the person is unable to return help in the future or told nothing about the potential for future help. Kin selection theory predicts the highest judgments of helping for the the 10-year-old and 18-year-old half-sister in the famine and sickness situation regardless of the ability of the person to return help in the future. In contrast, the reciprocity alternative explanation predicts this age-specific pattern only when the person would be able to return help in the future.

Titanium Dioxide Nanoparticles Alter Mucosal Associated Bacteria

Student: Kaitlyn Nielsen
Mentor: Dr. Sabrina Mueller-Spitz, Biology

Nanoparticles (NP) are increasingly being used in consumer goods due to their unique chemical and physical properties. However, usage of NP has outpaced the toxicological assessment of human exposure. Our research examined effects of NP ingestion on gastrointestinal (GI) tract health. We hypothesized that titanium dioxide (TiO2) NP will have the ability to interact with bacteria in the GI tract by becoming trapped in tissues, modifying the environment. Our research focused on the response of segmented filamentous bacteria (SFBs) and *Lactobacillus*, which are known to be important to proper function of the immune system. GI tissues were collected post-exposure from mice treated with 1mg/kg TiO2 NP. Quantitative polymerase chain reaction (PCR) was used to track changes in population levels. Both bacterial populations decreased in the ileum at 24hr. This decrease was reversed by 14d, suggesting the harm caused to both populations was not permanent. In the cecum, *Lactobacillus* and SFBs increased after exposure. TiO2 NP may have antibacterial properties, which led to the decrease of both populations in the ileum. This decrease allowed more nutrients to reach the cecum, which may have contributed to the population increase. These changes have the potential to lead to inflammation in the intestine, increasing the risk for development of inflammatory bowel diseases.

Women in Law Enforcement: An Examination of Female Interest in Policing

Student: Michaela Otto
Mentor: Dr. Victoria Beck, Criminal Justice

Police departments are actively recruiting more and more females to law enforcement positions. Despite this, recent statistics show that less than twenty percent of all police officers were female (Hoffman and Hickey 2005). Much of the research on the subject of women in law enforcement points to reasons such as male oppression and family obligations for the lack of female police officers. This research aims to examine if the reason there are not more female police officers is that women are simply uninterested in law enforcement. The criminal justice program at the University of Wisconsin Oshkosh has a more proportional ratio of male and female students, but not every student in the program desires a career in law enforcement. The research will examine female criminal justice students' career aspirations in order to determine if a possible reason the ratio of females in policing is low is because of a lack of interest from potential female applicants.

Textural Alteration of Late Permian Brachiopods: Implications for Understanding Replacement Reactions in Biomineralized Skeletal Material

Student: Piper Lee Poe
Mentor: Dr. Eric Hiatt, Geology

Environmental conditions, such as temperature and nutrient levels of ancient oceans, can be determined from limestones. Alteration, however, can obscure the chemical signatures requiring careful analysis. Because they build their shells out of low-Mg calcite with a dense microstructure, the shells of brachiopods

are considered the most chemically stable components in ancient limestones that record environmental characteristics. I am studying brachiopod-rich limestone samples from the Phosphoria Formation (260 million years B.P.), Wyoming, to explore how alteration is expressed. The Phosphoria Formation has experienced a long history of chemical and mineral alteration and is part of a major petroleum system. I chose 40 samples with various degrees of alteration and replacement by silica (chert) to examine using petrographic and cathodoluminescent (CL) microscopy. Silicification occurs in unpredictable patterns, sometimes following growth lines in the microstructure and sometimes crosscutting all microstructure. I examined the silica replacement front on chert using a scanning electron microscope. I discovered that silicification preserves some physical microstructure details, but wipes out chemical characteristics. Recrystallized calcite luminescences brightly in CL and exploits weaknesses in the microstructure, but does not cross shell boundaries as chert does. These results shed light on the alteration mechanisms of marine biomineralized skeletal elements.

The Influence of Player Character Role, Game Choice, and Fantasy Tendency on Aggression Following Violent Video Game Play

Student: Sharayah Preman♦
Mentor: Dr. David Lishner, Psychology

The present research examined potential factors that may influence the degree of aggression following violent video game play. Participants played a violent video game and were then given an opportunity to behave aggressively toward another ostensible participant. Participants were randomly assigned to play the violent video game while adopting either a heroic or deviant character role and were either given the option to choose the role they played or assigned the role directly. Finally, participants were asked to report on the extent to which they tended to engage in fantasy. Results indicated that adopting the deviant character role produced higher aggression than did adopting the heroic character role. However, among low-fantasy individuals, the character role effect on aggression was greater when they were assigned the character role directly. But among high-fantasy individuals, the character role effect on aggression was greater when they were given the opportunity to choose the character role. The results suggest that the effect of violent video game play on aggression may be jointly influenced by the interaction between video game characteristics and individual differences in game players.

Bedding Dip Patterns in the Southern McMurdo Sound Drill Core (AND-2A), Victoria Land Basin, Antarctica

Student: Tulio Ribeiro
Mentor: Dr. Timothy Paulsen, Geology

In 2006-2007, the ANDRILL McMurdo Ice Shelf Project recovered over 1200 m of Neogene sedimentary rocks from the southern Terror Rift in the McMurdo Sound region of Antarctica. Previous sedimentological analyses suggest the drilled sequence can be divided in three facies indicative of hemipelagic sedimentation, proglacial current and turbid plume deposition, and ice proximal or iceberg-dominated conditions (Passchier et al., 2011). Seismic surveys in the vicinity of the AND2A borehole show a sequence of reflectors that dip at shallow angles away from the Transantarctic Mountains. In an effort to better understand three-dimensional geometry of the cored sequence, we conducted WELLCAD orientation analyses on oriented whole-core scan imagery of 22 intact core intervals from 398 to 1,117 meters below sea floor. The analyses (n=714) yielded bedding dip angles that are generally shallow; they range from 0° to 70° with dip directions that are highly variable, consistent with second-order influences such as soft-sedimentary deformation and paleoflow. Kamb contour density analysis of the cumulative data set yields a notable concentration of poles that indicate a 5-degree dip towards S82E, which is consistent with the geometry of the seismic reflectors and could reflect the overall first-order dip of the sequence.

Algorithm Visualizations for the λ-Calculus

Student: Taylor Rydahl
Mentor: Dr. Thomas Naps, Computer Science

Algorithm visualization is a subset of computer science in which educators build visual representations of various abstract concepts and algorithms that are seen in the field. Lambda calculus is an abstract programming language used in programming theory to teach the functional programming paradigm. My project was to create visualizations for the lambda calculus in order to help new computing students better understand the fundamental concepts of the language. I designed these visualizations as part of the OpenDSA Project, a collaboration of computer scientists working to form an electronic book that can be used to teach students all of the core concepts that would be covered in a computer science data structures and algorithms course. To meet their specifications, I worked primarily with the JavaScript programming language, utilizing both the Khan Academy Framework and the JavaScript Algorithm Visualization (JSAV) libraries. In the end I was able to create a series of animations and accompanying exercises to both teach the core concepts of lambda calculus and test for student comprehension. These visualizations are currently being used at the University of Wisconsin Oshkosh in two sections of the Programming Languages course this spring. I am hoping to use the information gathered from this to gain a better understanding of how visualizations can help students learn and effective methods for teaching through this medium.

Atmos

Student: Valeria Sacco
Mentor: Jeff Lipschutz, Art

Through the artistic practice of painting and printmaking, my work emphasizes the importance of knowing, understanding, and appreciating how things are constructed, as a means of achieving greater awareness of self and reality. My series "Atmos" seeks to find an ancient connection to the natural environment, both humble and aware. Whether natural or man-made, to comprehend the details of our reality allows humanity to discover truth and achieve a greater sense of awareness and better state of existence. I design imagery to instigate contemplation and critical thinking and promote positive ideals. Being inspired by virtue, truth and history, my work focuses on the complexity of reality as we know it. With timeless symbols, such as circles, obelisks and the compass, my work acknowledges perpetual truth.

African American Males in College: Following Their Educational Journey at the University of Wisconsin Oshkosh

Student: Shariah Salahaladyn*
Mentor: Dr. Sylvia Carey-Butler, Academic Support of Inclusive Excellence

This research study seeks to highlight factors that affect African American males' persistence in and graduation from UW Oshkosh. The purpose for this qualitative study is to examine factors of five African American males ranging from sophomore to graduate level. These factors include, but are not limited to, elementary- and secondary-education preparation (K–12), relationships with professors, campus resources implemented to support African American males, and the campus environment. This study found four themes: (a) college preparedness, (b) social connections/ relations with administrators or faculty, (c) college resources and amenities, and (d) growth for African American males in the future. The findings indicate the need for male initiatives and African American faculty for African American males.

Pilot Study of Microbial Gut Diversity of Meadow Voles (*Microtus pennsylvanicus*) Born in Captivity as Compared to Those Caught in the Wild

Student: Lucas Schulz
Mentor: Dr. M. Elsbeth McPhee, Biology

There are many animal conservation programs that use captive breeding to help supplement wild populations of animals whose natural populations are becoming depleted due to human activity. These programs have seen varied success. Bringing wild animals into

captivity can sometimes have a very dramatic and diverse effect on an animal's external and internal morphology. Intestinal microbiota play an important role in human and animal health. They allow our guts to digest and function more efficiently and play a role in our immune health. A change in environment, diet, and exposure to certain drugs can highly affect these ecosystems. This effect may reduce the survival of animals born in captivity, potentially causing unneeded losses for breeding programs. To test this, we used meadow voles (*Microtus pennsylvanicus*) as an animal model. Through genetic assays, we took a look at the difference in microbial diversity of meadow voles born in captivity to those in the wild. We predicted that due to vaccinations and very little exposure to diversified food sources, voles born in captivity will not have as diverse a microbial community as wild-captured individuals. From this study we hoped to gain a better understanding of the effects of generations of captivity on microbial gut communities. Data is still forthcoming at this time.

Target Absent vs. Target Present Police Lineups and the Issue of False Positives

Student: Ryne Scopp
Mentor: Dr. Victoria Beck, Criminal Justice

False positive identifications in police lineups are a problem in today's society and can often lead to the conviction of an innocent person. Police agencies are constantly trying to find ways to make eyewitness identification more accurate. One way to do this would be to determine whether or not culprit absent lineups lead to an increase in false positive identifications. To test this hypothesis, the theft of a researcher's briefcase was staged during a criminal justice class, and a week later the participants were apportioned into one of four possible experimental conditions. A chi-square test found that culprit absent lineups lead to an increase in false positive identifications: 29% of participants under the culprit absent condition correctly said the culprit was not in the lineup, while 34.7% of participants under the culprit present condition chose the correct suspect. Police agencies can use results from this experiment and others like it to improve the current eyewitness identification methods.

Quaternary Metal Oxide Investigation for Water Splitting

Student: Yuqi She
Mentor: Dr. Jennifer Schuttlefield Christus, Chemistry

The quaternary metal oxide semiconductors were investigated as potential catalysts for water splitting. Specifically, the efficiency of a known three metal oxide combination composed of aluminum, nickel and iron was examined as a catalyst for water oxidation when a fourth metal was added to the combination. To detect the oxygen evolution of the various combinations, the Heterogeneous Anodes Rapidly Perused for Oxygen (O2) Overpotential Neutralization (HARPOON) kit was used. The HARPOON kit uses a stainless steel mesh coated with paint that contains two fluorophores, one of which is sensitive to O2 and the other insensitive to O2. The ratio of response to the two fluorophores is plotted on a false color map, where the brightest spots correspond to the high concentration of oxygen evolved. Spots that correlate to the catalysts where the highest concentration of oxygen evolved are of the most interest. To date, the addition of the metals molybdenum and cobalt enriched oxygen generation in the aluminum, nickel, iron combination. Further tests are underway to determine the long-term response of the materials to simulated solar irradiation.

The Effects of Technology on Academic Libraries

Student: Zoe Smith
Mentor: Dr. Paul Van Auken, Sociology

Technology is shaping the function of academic libraries. Libraries provide an important public good through services including computers with internet access, reference resources and books. With the services provided by libraries, we are able to reduce the gap of inequality in access to information. Literature on this subject has discussed three possible outcomes for libraries:

technology and libraries will complement one another; libraries will change in order to serve the needs of the community; or obsolescence of libraries altogether (Jorgensen et. al 2001). If students do not use the resources of the library, they are likely to be eliminated. An analysis will be conducted from 10 interviews of staff and librarians from Polk Library on personal perspectives of the history of the library and 500 online surveys of a simple random sample of University of Wisconsin Oshkosh students on their individual use and knowledge of the campus library. This project aims to understand the impact of technology on the use of academic libraries as well as what changes have occurred in academic libraries and how their resources may be utilized in the future.

Emotional Callousness and Emotional Responses to Those in Need: A Direct Replication Study

Students: Steven Steinert♦, Timothy Pionk♦, Taylor Miller♦, Matthew Hanson♦ and Shelby Kelso♦
Mentor: Dr. David Lishner, Psychology

A number of studies have found that when presented with a person in need whose situation is unlikely to improve, psychopathic emotional callousness is negatively related to feeling empathic concern and positively related to feeling positive emotion (Agnello and Lishner, 2012; Frankowski and Lishner, 2011). Moreover, a recent study by Lishner et al. (2012) suggested that when the person's situation is likely to improve, emotional callousness becomes negatively related to feeling positive emotion. The present study seeks to replicate Lishner et al.'s findings to determine if the effect of need outcome on the association between emotional callousness and positive emotion is dependable. Participants will read an ostensible pilot newspaper article about a fellow student who suffers from a vision impairment. Participants will be randomly assigned to read either a version of the article in which the need is unlikely to be resolved in the near future or a version of the article in which the need is likely to be resolved in the near future. Participants' emotional reactions to the article and willingness to help the student (when the need is unlikely to be resolved) will be measured, as will various psychopathic traits, including emotional callousness.

The Impact of Personal Relevance on the Continued Influence Effect

Students: Steven Steinert♦ and Caitlin Weihing♦
Mentor: Dr. Quin Chrobak, Psychology

Research suggests that people have trouble disregarding information that has subsequently been retracted and discredited (i.e., the continued influence effect). The present study examined the extent to which someone's personal investment in the events experienced influence this tendency.

Project Success and Education

Student: Nicolette Stemo
Mentor: Dr. Paul Van Auken, Sociology

There is unequal educational access between students with learning disabilities and students without learning disabilities. In recent years the number of students with learning disabilities has increased within post-secondary schools. It is shown that students with learning disabilities have a difficult time with school. Not all post-secondary schools accommodate for students to have this equal access. It is important for all students to have equal access to success. This study focuses on UW Oshkosh students with learning disabilities. The study shows a comparison between students with learning disabilities who are part of a program called Project Success and students who are not in the program. This program gives students with learning disabilities accommodations that are needed to have an equal opportunity to have success. The survey that will be conducted shows the academic comparison of students with learning disabilities within Project Success to those students who are not in the program who are attending UW Oshkosh. Interviews will be conducted with some students within the general population who have a learning disability and some students within the Project Success program. These interviews will have questions based on if/if not accommodations help and what accommodations, if any, help students succeed in post-secondary school.

This is a *Thriller*!

Student: Kelley Teague
Mentor: Dr. Stephen Kercher, History

The object of my research was to produce a paper about an aspect of American culture. I chose a little-known television show from the 1960s titled *Thriller*, hosted by famed actor Boris Karloff, to study an aspect of popular culture during the height of the Cold War. *Thriller*, a show intended to rival popular science fiction shows, like *The Twilight Zone*, was not suited to a mainstream audience. This unusual show, a blend of horror and crime stories, was the only weekly exposure that many Americans had to "creepy" television programming. In fact, there was nothing quite like it at the time. For my research, I used the papers of screenwriter Donald S. Sanford, housed in the Wisconsin Historical Society Archives. The bulk of my research came from secondary sources, like film and television historians, including audio commentary from historians provided in the *Thriller* DVD box set. Ultimately, I found that *Thriller*, although largely unknown, is an important piece in the repertoire of 1960s television and its sudden cancellation was emblematic of censorship and cultural homogeneity of America in the sixties.

Unraveling the Antiviral Properties of Hmong Green Medicine, *Tshuaj Ntsuab*

Student: Sitha Thor
Mentors: Drs. Teri Shors, Neil Harriman, Thomas Lammers and Lisa Dorn, Biology

Bioprospecting is the process of discovering new products based on biological resource, which has been going on since the dawn of civilization when prehistoric people from different cultures noticed that plants could be used as medicines. Like other ethnic groups, the Hmong developed health practices that utilize plants to treat and cure maladies. Few studies exist about Hmong cultural practices, beliefs, and plants primarily used for women's health, and there are no documented studies that investigate the biological activity of green medicine (e.g., *tshuaj ntsuab* used in Hmong practices) to treat viral infections. In recent years, the threat of a viral epidemic has increased, and yet there are very few antiviral drugs available. Thus, there is an urgent need for the development of more antiviral drugs. During a previous screen of 75 plants for bioactive compounds against vaccinia virus, about one-third of the plant extracts inhibited viral replication. Therefore, I proposed screening a total of 30 plant extracts at 4 different concentrations for activity against poliovirus serotype 1 using 50% Tissue Culture Infective Dose (TCID50) assays in BS-C-1 (monkey kidney) cells. Of the 30 different plant extracts, 23 caused 50% or more viral inhibition. Findings from this study may lead to the development of novel drugs to treat poliovirus serotype 1, and suggest that medicinal plants may hold a broader potential to provide antiviral compounds against a range of viruses.

Photogrammetric Reconstruction of the Late Jurassic Cleveland-Lloyd Dinosaur Quarry of Central Utah

Students: Chelsea Vosters and Steven Clawson
Mentor: Dr. Joseph Peterson, Geology

Photogrammetry has long been utilized to digitize archaeological artifacts and, relatively recently, paleontological remains and trackways. This study uses photogrammetric techniques to digitize the Late Jurassic Cleveland-Lloyd Dinosaur Quarry in the Morrison Formation of Emery County, Utah, in three dimensions. In May 2013, a photogrammetric test model was produced using over 700 photos. Due to a considerable lack of photo quality and the absence of a systematic approach to capturing photographic data, the model lacked detail, voiding visibility to most exposed fossils. Furthermore, portions of the quarry were distorted as a result of uneven lighting and mobile objects obstructing visibility. Because of these errors, a field manual was constructed using a systematic approach to maintain control and offer suggestions for supplies, lighting, placement of capture reference markers, and other such drawbacks encountered during previous photography. In June 2014, the prepared methodical approach was applied to CLDQ's north Butler building. The resulting model utilized over 1,000 photos taken from systematically determined distances at 0o, 45o,

and 90o, accounting for 125 vertebrate fossil elements. The updated 3D model provides considerably fine detail, accounting for in-situ fossil orientation along with burial depth. This information may be useful in reconstructing the order of depositional events that led to the genesis of this famous Jurassic death assemblage.

The Connection Between the Presence of Woodland Voles and Recovering Bur Oak Openings

Student: Keaton Wigg
Mentor: Donna Charley-Johnson, Biology

The hypothesis tested was that woodland voles (*Microtus pinetorum*) are found in higher abundance in bur oak openings that are fully reestablished (recovered from a disturbance and closely resemble its pristine condition) in comparison to a more degraded bur oak opening. This particular species of vole had not been identified as present in these areas. This study collected data over the course of three weeks at two separate locations in Southern Kettle Moraine State Forest. Visual appraisal was used to determine the level of degradation in each location. Fifty-two Sherman live traps were set and baited along transect lines spaced 10 meters apart. The first day of trapping was used to identify the optimal time to trap. The data collected (GPS, sex, weight, ID data) from the survey supported the hypothesis that woodland voles are more abundant in established bur oak openings. Specifically, at the less degraded location, 20 of the trapped animals were determined to be the target species. In the more degraded location, under the same conditions, no voles were trapped. There was an absence of all trapped animals in general, which offered strong support that biodiversity was drastically reduced following the degradation of the bur oak opening.

The Synthesis and Characterization of a Novel Catalyst to Recycle Carbon Dioxide

Student: Andrew Wildish
Mentor: Dr. Sheri Lense, Chemistry

This research project sought to synthesize and characterize a novel catalyst to recycle carbon dioxide (CO_2) into sustainable fuels. In sustainable fuels, energy from sustainable resources, such as the sun and wind, is stored in chemical bonds. One type of sustainable fuel can be produced by using CO_2 as a starting material. However, the process of recycling CO_2 is energetically intensive and inefficient. By introducing a catalyst, the process can be made much less energy intensive and more efficient. The catalyst studied differed from previously investigated catalysts because it contained acidic groups that could theoretically interact with CO_2 and stabilize CO_2 coordination to the catalyst, possibly leading to a faster and more efficient catalyst. By adapting published procedures for similar complexes, I synthesized this catalyst. I used different techniques, such as mass spectrometry, infrared spectroscopy, UV-visible spectroscopy, and X-ray crystallography to characterize the catalyst and the precursor for the catalyst. I also used electrochemical techniques to test the ability of the catalyst to recycle CO_2.

Rhoda: A Realistic Depiction of a 1970s Woman

Student: Nathan Wolff
Mentor: Dr. Stephen Kercher, History

As conventional gender roles were questioned and challenged in the 1960s, the portrayal of women in entertainment evolved from the traditional housewife or male-dependent characters and began to reflect the new, "modern" or independent woman. Literature focused on the emergence of the "New Woman" of 1970s television has primarily explored shows focused on the career woman, such as *The Mary Tyler Moore Show*. *Rhoda*, on the surface, is viewed as the lighthearted spin-off. Upon scratching the surface, however, it is quite apparent that Rhoda is significant in American culture not because she was a pillar of feminist perfection, but because she provides a realistic, relatable depiction of an independent woman's experience in the 1970s. Piecing together notes from the original scripts, transcripts of interviews with Valerie Harper and individuals from the production company, and magazine articles written to reflect the audience response, the importance of Rhoda is clear. Rhoda began as

a neighbor and a friend, but fans came to know her as a sister, a daughter, a wife, and even an ex-wife. Ultimately, she was a product of the many perspectives brought by a diverse group of writers, making her more relatable to the television audience. The situations Rhoda faced were real, and her reaction to them was authentic, rather than an attempt to portray an ideal feminist. Rhoda's power was the writers' ability to create a true depiction of a woman making her way in the world, while giving viewers the opportunity to laugh along the way.

Peace, Justice, and Understanding in Northern Ireland

Student: Brooke L. Wollner*
Mentor: Dr. Marguerite Helmers, English

This study examines the relationship between oral history interviews with terrorists and the efforts of a society to maintain peace, justice, and understanding. I examine the Northern Ireland Troubles, the conflict between the Irish Republican Army (IRA) and Ulster Volunteer Force (UVF), as well as the ethics of data collection and distribution.

Internet Religion: Exploring Community Formation on Wiccan Websites

Student: Pearl Wright*
Mentor: Dr. Michael Baltutis, Religious Studies

A common element of religion is the act of gathering for worship, study and community, but research has shown that an increasing number of people are turning to the Internet for their religious and spiritual experiences. A steady increase in Internet usage has occurred, which shows no sign of slowing. At the beginning of the twenty-first century, a survey of American teenagers showed that one in six teens had indicated they expected to use the Internet as a substitute for their current religious practices. As members of this group mature, they will take their religious practices with them and pass them on to the next generation, indicating a shift in how religion will be practiced in the future. The religious studies scholar is on the edge of a new frontier in research that strives to understand this new religious behavior and how it is changing the way individuals practice their religions. By examining participatory websites, specifically those of the Wiccan following, this research will attempt to analyze the activities that draw participants to the sites and the emotional responses that are causing people to form and maintain participatory communities on these sites.

UW System Posters in the Rotunda

Each spring undergraduate UW System students display research posters at the Wisconsin State Capitol.

Biogeochemical Mineral Formation in Phosphorites From the West Coast of Peru, South America: Implications for Understanding Ancient Analogs and Economic Deposits

Student: Lauren Bane
Mentor: Dr. Eric Hiatt, Geology

Sedimentary phosphorites are major sources of phosphate for fertilizer and industry. Phosphorites form in oceanic upwelling environments that are marked by low oxygen levels, which are exploited by chemosynthetic marine bacteria that drive phosphate mineralization. Based on our research, minerals in this recent phosphorite represent depth-related bacterial biochemical processes.

Observing Nebulosities: The Spectacular Cygnus Superbubble

Students: Nicholas Grosskopf, Christopher Christopherson, Henri LeMieux, Steven Lund and Erik Robinson
Co-Author: Dr. Nadejda Kaltcheva, Physics and Astronomy
Mentor: Dr. Nadejda Kaltcheva, Physics and Astronomy

"Observing Nebulosities" is a student-led project at UW Oshkosh, imaging large-scale Galactic star-forming fields in the Hydrogen-alpha, Hydrogen-beta and Oxygen-III emission lines. The aim is to trace the spatial distribution of interstellar dust, supernova shock fronts and strong stellar winds as well as gain more understanding of star formation processes.

Optimization of Catalyst for Direct Methanol Fuel Cells

Student: Nicholas Horswill
Mentor: Dr. Yijun Tang, Chemistry

This interdisciplinary project is to optimize the construction conditions for the catalyst, which is used in direct methanol fuel cells. Combining the knowledge of chemistry, engineering and statistics, the platinum and gold nanoparticle catalyst is constructed by immersing an electrode in various solutions for precisely controlled durations.

Novel Method for Identification of *Deinococcus* and *Hymenobacter* Species Using High Performance Liquid Chromatography

Student: Thomas Kuborn
Mentor: Dr. Kevin Crawford, Chemistry

Carotenoids are naturally occurring organic pigmentation molecules found in various biological systems for coloration, UV protection, and other uses. This work sought to develop a reverse phase high performance liquid chromatography (HPLC) method for identification of pink bacterial carotenoids unique to the genera *Deinococcus* and *Hymenobacter* isolated from local freshwater systems.

The Effects of Fatigue on Balance and Cognitive Ability

Students: Matt Wilfuer and Joe Hanel
Mentor: Dr. Robert Sipes, Kinesiology

One component of concussion evaluation is to measure balance and cognitive ability, which often occurs when the athlete is fatigued. This study aims to investigate the effects of fatigue on balance and cognitive ability. Subjects completed pretests and posttests with Lumosity and SWAY applications, with either rest or fatigue between.

Peace, Justice, and Understanding in Northern Ireland

Student: Brooke L. Wollner*
Mentor: Dr. Marguerite Helmers, English

This study examines the relationship between oral history interviews with terrorists and the efforts of a society to maintain peace, justice, and understanding. I examine the Northern Ireland Troubles, the conflict between the Irish Republican Army (IRA) and Ulster Volunteer Force (UVF), as well as the ethics of data collection and distribution.

UW System Symposium for Undergraduate Research and Creative Activity

UW System undergraduates showcase scholarly and creative works at this springtime event held on a UW System campus.

Inactivation of Sucrose Synthesis in the Cyanobacterium *Synechococcus* PCC 7002 for Increased Production of Isoprenoid Hydrocarbons

Student: Sara Arafeh
Mentor: Dr. Toivo Kallas, Biology

Cyanobacteria are a group of bacteria that obtain energy from sunlight, produce large amounts of oxygen, and consume atmospheric carbon dioxide for photosynthesis. Our group has engineered *Synechococcus* sp. PCC 7002 cyanobacteria to produce isoprene, which is a precursor for synthetic rubber as well as biofuels for transportation. However, the production of isoprene is not yet sufficient for commercial purposes and thus our goal is to increase isoprene synthesis in these bacteria. One way to do this is by shutting down competing pathways that utilize carbon, such as the pathway for sucrose synthesis. Toward this goal, we are working to inactivate a sucrose synthase gene, spsA, for an essential enzyme in the sucrose synthesis pathway and determine whether this will increase isoprene production in cyanobacteria. To date, Polymerase chain reaction (PCR) has been used to generate the DNA fragments needed to inactivate the spsA gene. A procedure called "Gibson Assembly" will be used to assemble these pieces into a genetic construct for inactivating the spsA gene, and gas chromatography, mass spectrometry will be used to measure isoprene production in the engineered cyanobacteria. This was important as

a starting point to inactivate a sucrose synthase gene, spsA, for an essential enzyme in the sucrose synthesis pathway. If successful, the project will be important for developing cyanobacterial strains that can use sunlight energy to capture CO_2 and convert this into high-value isoprenoid, hydrocarbon chemicals.

RR Lyrae Stars in the Sagittarius Dwarf Galaxy Globular Cluster Arp 2

Student: Thomas Charles Gehrman Junior
Mentor: Dr. Barton Pritzl, Physics and Astronomy

The Sagittarius Dwarf Galaxy is one of a few satellite galaxies of the Milky Way galaxy. Due to the large gravitational field of the Milky Way, the Sagittarius Dwarf Galaxy is being ripped apart and absorbed into the Milky Way galaxy. We are analyzing the globular cluster Arp 2, which once belonged to the Sagittarius Dwarf Galaxy. The DAOPHOT suite of programs was used to analyze the observations. The data were searched for RR Lyrae stars, which are pulsating variable stars, by looking for variations in the magnitudes of these stars. We were able to find several RR Lyrae stars in Arp 2. The light curves of the variable stars will be used to find the distance modulus, chemical composition, and the classification of the cluster Arp 2. Using the information found from the RR Lyrae stars, we will compare Arp 2 to other globular clusters found in the Milky Way galaxy. By comparing the properties of a globular cluster that once belonged to an external galaxy with those in the Milky Way, we can examine in what way mergers with other galaxies helped to build up the Milky Way galaxy.

Hymenobacter Species Dominate Freshwater Biofilms

Student: Patrick Klepp
Mentor: Dr. Sabrina Mueller-Spitz, Biology

Freshwater biofilm formation is influenced by numerous factors, such as nutrient availability, flow dynamics, and substrate type. These factors affect community succession, structure, and species diversity between nascent and mature biofilms. We are trying to understand mature biofilm composition occupying man-made structures in eutrophic freshwater. Common man-made substrates in the Fox River watershed include metal, wood, and concrete piers and docks. All three habitats shared *Hymenobacter* as the most dominant genera. The objective of this research was to determine if subpopulations of *Hymenobacter* favor different substrates. *Hymenobacter* sequences ranged from 4.2 to 23.3% of total bacterial community with over 80 operational taxonomic units (OTU) detected across the three substrates. Twelve OTUs inhabited all three environments, showing various subpopulations are substrate generalists. The concrete substrate had the greatest total diversity and most unique OTUs. The wood and concrete substrates shared 22 OTUs, whereas there was less overlap with metal. By comparison, three populations dominated the metal habitat comprising 89% of all *Hymenobacter* sequences detected. This reduction in OTU richness on metal substrates leads us to consider potential adaptations that have led to this substrate being less favorable, potentially related to more competitive microorganisms that are better suited to this microenvironment. The *Hymenobacter* dominance in freshwater biofilms allows us to hypothesize that this group has significant contribution to ecological processes. While *Hymenobacter* was present on all sampled substrates, the concrete environment provides the most suitable substrate favoring diversity. The large variance in OTUs present on other substrates points to taxa divergence to niche substrates, possibly based on attachment strategies or physiological adaptations.

Natural Gas Halogenation Using Metal Halide Photocatalysts and Renewable Energy

Student: Amanda Leichtfuss
Mentor: Dr. Jennifer Schuttlefield Christus, Chemistry

Hydrocarbon fuels are the major source of energy on the market today. These fuels power everything, from the cars that people rely on to take them places to the warming of houses. In past years, there were many concerns about limited hydrocarbon resources. Now that abundant quantities of shale gas have been found

in many places, the focus has shifted to natural gas. Natural gas is projected to be the major hydrocarbon source of the future. Transportation of natural gas is expensive, especially in the remote places where natural gas is produced as a byproduct of oil extraction, such as off-shore drilling sites. One way to lower transportation cost is to convert natural gas from the gaseous state it is extracted in to a liquid state at the remote extraction sites. However, traditional liquefaction processes use extreme conditions, such as high temperature and pressure, which are cost intensive. A potential solution for this technique is to utilize solar energy and a solid metal halide as a photocatalyst. These catalysts will aid in the halogenation of the natural gas, which can then be used for liquefaction. Proof-of-concept Gas Chromatography-Mass Spectrometry (GC-MS) experiments were performed on "dirty" natural gas. Samples were irritated for 3 hours under broadband light above a metal halogen salt solution, such as potassium chloride, in a sealed quartz chamber. A platinum catalyst was used as an initial test case to prove halogenation was possible. A bias of 1.5 V was applied to the working electrode during the 3 hours of irradiation. These experiments showed that the halogenation of various natural gas components can be accomplished, including methane, ethane and propane. This is a critical first step in creating a sustainable system for natural gas liquefaction and understanding the halogenation of the natural gas components using a metal salt solution.

Massive Stellar Content of the Cygnus Superbubble

Student: Henri LeMieux
Mentor: Dr. Nadejda Kaltcheva, Physics and Astronomy

The Cygnus superbubble is one of the largest bubbles known in the Milky Way galaxy so far. It has been identified by its strong X-ray emission, and its angular size is approximately 18 by 13 degrees in Galactic longitude and latitude, respectively. It is still unclear whether the Cygnus superbubble is a physical unity of interstellar matter, or a projection along the line of sight of unrelated features at different distances. The superbubble has seven OB associations containing numerous young massive OB stars. Since in this direction the line of sight is along the local Orion spiral arm, the discrimination of individual stellar and interstellar structures is difficult. Thus, the available distance determinations to the OB-star groups within the boundaries of the Cygnus superbubble are uncertain, as are their spatial correlation to the features of interstellar matter in this complex field. This makes the study of the topology and energetics of the Cygnus superbubble difficult. This study is focused on the massive stellar content of Cygnus star-forming field with purpose to provide new insights on its structure. We have gathered from the literature all available photometric uvbyβ data for the massive stars in Cygnus. The intermediate-band uvbyβ photometry, which is our main method of investigation, allows the derivation of stellar physical parameters, such as brightness and temperature, with high precision. Knowing these parameters allows us to estimate stellar distance for all stars in our sample, map the structure of the Cygnus field, and provide homogeneous distance and age estimates to the OB-associations.

Algorithm Visualizations for the Lambda Calculus

Student: Taylor Rydahl
Mentor: Dr. Thomas Naps, Computer Science

Algorithm visualization is a subset of computer science in which educators build visual representations of various abstract concepts and algorithms that are seen in the field. Lambda calculus is an abstract programming language used in programming theory to teach the functional programming paradigm. As such, my project was to create visualizations for the lambda calculus in order to help new computing students better understand the fundamental concepts of the language. I designed these visualizations as part of the OpenDSA Project, a collaboration of computer scientists working to form an electronic book that can be used to teach students all of the core concepts that

would be covered in a computer science data structures and algorithms course. To meet their specifications, I worked primarily with the JavaScript programming language, utilizing both the Khan Academy Framework and the JavaScript Algorithm Visualization (JSAV) libraries. In the end I was able to create a series of animations and accompanying exercises to both teach the core concepts of lambda calculus as well as to test for student comprehension. These visualizations are currently being used at the University of Wisconsin Oshkosh in two sections of the Programming Languages course this spring. This will hopefully give me insight into their effectiveness and provide me with information needed to work on and improve what I have done thus far. I am hoping to use the information gathered from this to gain a better understanding of how visualizations can help students learn and what are effective methods for teaching through this medium. If proven to be effective, these visualizations can one day become commonplace in education, both inside and outside the field of computer science.

Quaternary Metal Oxide Investigation for Water Splitting

Student: Yuqi She
Mentor: Dr. Jennifer Schuttlefield Christus, Chemistry

The quaternary metal oxide semiconductors were investigated as potential catalysts for water splitting. Specifically, the efficiency of a known three metal oxide combination composed of aluminum, nickel, and iron was examined as a catalyst for water oxidation when a fourth metal was added to the combination. To detect the oxygen evolution of the various combinations, the Heterogeneous Anodes Rapidly Perused for Oxygen (O2) Overpotential Neutralization (HARPOON) kit was used. The HARPOON kit uses a stainless steel mesh coated with paint that contains two fluorophores, one of which is sensitive to O2 and the other insensitive to O2. The ratio of response to the two fluorophores is plotted on a false color map, where the brightest spots correspond to the high concentration of oxygen evolved. Spots that correlate to the catalysts where the highest concentration of oxygen evolved are of the most interest. To date, the addition of the metals molybdenum and cobalt enriched oxygen generation in the aluminum, nickel, iron combination. Further tests are underway to determine the long-term response of the materials to simulated solar irradiation.

Financing the American Dream: The Struggles and Possibility of Hispanic Immigrants Starting a Business in the US

Student: Katelyn Stienen
Mentor: Wendy Potratz, Accounting

The American Dream is a notion that US citizens and foreigners alike have opportunity at achieving success and living prominent lives while living in the USA. This impression brings in many immigrants each year to attain these opportunities. They come with the perception that they are able to start with nothing and secure financial prosperity. This analysis will define the American Dream as the idea that those that come to the USA with hopes of starting a successful business. Further, the analysis will compare personal income and business data of varying ethnicities to see the potential for equal prosperity in the USA. Personal income will portray financial position before starting a business. To determine success of a business, an analysis compares startup capital and average income in different industries that vary by ethnicity of business ownership. The data comes from surveys completed by the US Census Bureau. Overall, this analysis focuses on the likelihood of Hispanic immigrants attaining their interpretation of the American Dream as it relates to creating a successful business.

The Connection Between the Presence of Woodland Voles and Recovering Oak Openings

Student: Keaton Wigg
Mentors: Donna Charley-Johnson and Dr. Gregory Adler, Biology

The hypothesis to be tested was that woodland voles (*Microtus pinetorum*) are found in higher abundance in bur oak openings that are fully

reestablished (recovered from a disturbance and closely resembles its pristine condition). When Wisconsin was first settled, there were millions of acres of bur oak openings. By the 1980s, 99.98% were gone. A strong association is known between the woodland voles and bur oak openings. The survey was done over the course of three weeks. Two separate locations were chosen, both in Southern Kettle Moraine State Forest. One of these locations was determined by visual appraisal to be degraded where the other location was less degraded. Fifty-two Sherman live traps were set along transect lines spaced 10 meters apart and baited. The first day of trapping was used to identify the optimal time to trap. Both the GPS coordinates and photo evidence (when an animal was trapped) were recorded. The data collected from the survey supported the hypothesis that woodland voles are more abundant in established bur oak openings. In surveying the less degraded location, 20 of the trapped animals were determined to be the target species with a high likelihood. Weight and appearance were used to determine the target species of vole. In the more degraded location, under the same conditions, no voles were trapped. There was an absence of all trapped animals in general, which offered strong support that biodiversity was drastically reduced following the degradation of the bur oak opening. These findings have larger implications for the degradation of our landscape. The absence of woodland voles is just one species missing from a complicated ecological system. Biodiversity loss is a critical issue in restoring ecosystems. As ecosystems become less diverse they become less resilient to degradation. A positive feedback loop is established where the loss of species causes the ecosystem to become more damaged, thereby creating a less fit habitat. This loop continues on and on. This conclusion further supports the connection between animals and plants in their ecosystem.

Internet Religion: Community Formation on Wiccan Websites

Student: Pearl Wright*
Mentor: Dr. Michael Baltutis, Religious Studies

A common element of religion is the act of gathering for worship and study as a community. Sociologists have long considered close human interaction to be fundamental to community, and Durkheim wrote that the presence of collective effervescence was fundamental to religion. However, research has shown that an increasing number of people are turning to the Internet for their religious and spiritual experiences. Could cyberspace become a new sacred space not unlike that which churches and temples have provided for thousands of years? This freedom from the brick-and-mortar locations has also sparked an increase in new religions. One such religion is Wicca, an Earth-based Neo-Pagan practice that has experienced explosive growth on the Internet. With relatively few offline groups, the majority of Wiccans experience most of their contact with each other online. This paper explored how people might experience collective effervescence when they only know each other as an avatar and words exchanged on the computer screen and factors such as active discussion threads and chat room rituals are replacing the face-to-face experiences of offline communities. By examining interactive Wiccan websites, this research identified the factors that members consider important to an online religious community.

Other Scholarly Conference Presentations▲

(presented between May 2014 and April 2015)
These scholarly presentations were not directly supported by OSSCAP but are included because OSSCAP encourages all scholarly/ creative activities.

The Importance and Interest of Introductory Psychology Textbook Topics: Student Opinions at Technical College, Two-, and Four-Year Institutions

Student: Sarah K. Adelson♦
Co-Presenters: Dr. Lee I. McCann, Psychology; Dr. Kathleen Immel, UW–Fox Valley; Tammy L. Kadah-Ammeter, Fox Valley Technical College
Mentor: Dr. Lee I. McCann, Psychology
Presented at: National Institute on the Teaching of Psychology, St. Petersburg, FL, January 2015

Introductory psychology students at a technical college, two-year community college, and regional university rated the current importance of each textbook chapter or topic, how important it would be to them in the future, and how interesting it was. Most topics ranked between important and quite important, and university students typically rated topics highest.

The Timing and Spatial Extent of Late-Holocene Fire-Inferred Drought Conditions in the Western Great Lakes Region

Student: Vanessa Bailey
Co-Author: Dr. Colin Long, Geography and Urban Planning
Mentor: Dr. Colin Long, Geography and Urban Planning
Presented at: Association of American Geographers Annual Meeting, Chicago, IL, April 2015

Long-term fire histories, used in this study as a proxy for drought conditions, from a transect of six lakes in eastern Wisconsin and the Upper Peninsula of Michigan were compared to determine the spatial extent of drought periods over the last 2,000 years. The sites represent a north/south transect that spans the "tension zone," a climate boundary that divides the Upper Great Lakes area into cool/dry and warm/wet regions. Synchronous fire events at several sites centered on 1100 cal yr BP and 600 cal yr BP indicate regional drought conditions. Regional atmospheric conditions that produced these drought conditions likely consisted of a persistent upper-level ridge that deflected storm systems away from the region. This project adds to our understanding of the resilience of the tension zone climate boundary, and provides new information on the extent and timing of drought conditions in the past.

Evidenced-Based Strategies for Closing the Racial Gap in High School Drop-Out Rates

Student: Patricia Dempsey♦
Mentor: Dr. Kelli Saginak, Professional Counseling
Presented at: National Evidence-Based School Counseling Conference, Erlanger, KY, March 2015, and the Wisconsin School Counseling Association Conference, Madison, WI, February 2015

This project focuses on compiling research that provides evidence for the general risk factors that contribute to students dropping out of high school and highlights the unique factors that may contribute to the racial gap. The project also compiles research for evidence-based practices that schools, and school counselors in particular, can implement to help reduce drop-out rates and close the racial gap. Goals of the project are to: raise awareness of the racial gap that exists in high school graduation rates across the country and, in particular, in Wisconsin; increase understanding of the risk factors that potentially lead to high school students dropping out and potentially contribute to the racial gap; and increase knowledge of evidence-based strategies that are available to schools, and school counselors in particular, to incorporate into the comprehensive school counseling program to help reduce the risk of dropping out and close the racial graduation gap.

Author Numbers and Genders Over Forty Years in *Teaching of Psychology*

Students: Alexandria R. Ebert and Rebecca R. Timmins
Co-Presenter: Dr. Lee I. McCann, Psychology
Mentor: Dr. Lee I. McCann, Psychology
Presented at: National Institute on the Teaching of Psychology, St. Petersburg, FL, January 2015

Changes in the numbers and genders of all authors and first authors of articles published over 40 years (1974-2013) in *Teaching of Psychology* were studied. The number of authors per article and percentage of female authors and first authors all increased significantly over time.

Collecting and Processing NTFPs in Oshkosh and the Surrounding Areas

Student: Karmen Fiedler
Co-Presenter: Dr. Elizabeth S. Barron, Geography and Urban Planning
Mentor: Dr. Elizabeth S. Barron, Geography and Urban Planning
Presented at: Association of American

Geographers Annual Meeting, Chicago, IL, April 2015

Collecting nontimber forest products is important for cultural and environmental reasons. We document collecting by residents of Oshkosh, WI, through surveys and spatial analysis to find out what they collect, where and why. We aim to understand the social importance of collecting and make recommendations for how to support collecting through resource management.

S.A.G.E. (Self-Harm Awareness, Guidance and Education)

Students: Erica Harbath♦, Ashley Miller♦, Megan Schultz♦, Sarah Stanzek♦ and Maci Wallace♦
Mentor: Dr. Kelli Saginak, Professional Counseling
Presented at: Wisconsin School Counseling Conference, Madison, WI, February 2015

S.A.G.E. (Self-Harm Awareness, Guidance and Education) is a program that was developed for middle school students to help prevent self-harm. This program was created because the number of adolescents who self-injure has been increasing over the last few years. In Wisconsin, self-harm was the number one cause of hospitalization in young adults aged 10-17. S.A.G.E. is a four-week program designed to create a "safety net" of trusted adults, teach students healthy coping strategies, connect students to the community and help the students create goals for their future.

Play: The School Counselor Way

Students: Erica Harbath♦ and Jessica Pagel♦
Mentor: Dr. Kelli Saginak, Professional Counseling
Presented at: Wisconsin School Counseling Conference, Madison, WI, February 2015

Play: The School Counselor Way was an overview of using play therapy in schools with background information on Piaget's cognitive development. Theraplay basics were discussed as well as how to incorporate Theraplay into individual, small group and classroom guidance lessons in schools. Examples were given on using play in elementary, middle and high school settings. There was an interactive portion where students were able to practice using play therapy with Playdoh.

Lifestyle and Response to Stressors in a Freshwater *Vogesella* Species

Students: Shannon Johnson, Amber All, Leanne Bowen, Amanda Buehring, Mitchell Christensen, Garrett Heiman, Jorge Hernandez♦, Theodore Krenke, Adam Laden, Zachary Mertens, Mary Murphy, Tyler Neuman♦, Seth Pollentier, Morgan Prust♦, Meghan Raebel♦, You Yang and Rilee Zeinert
Co-Presenter: Dr. Sabrina Mueller-Spitz, Biology
Mentor: Dr. Sabrina Mueller-Spitz, Biology
Presented at: American Society for Microbiology General Meeting, Boston, MA, May 2014

Freshwater bacterial communities are dominated by Betaproteobacteria. Yet, much of the diversity has only been identified through molecular techniques, leaving numerous questions unanswered about their basic physiology. Members of the genera *Vogesella* represent one of these under-characterized freshwater groups. A non-pigmented *Vogesella* species was recently isolated from the Fox River in Oshkosh, Wisconsin, providing an opportunity to study the general lifestyle of this bacterium and how it responds to various natural and artificial stressors. Basic lifestyle data was generated from genomic data, motility experiments, and optimal growth conditions for various abiotic factors. Exposure to ozone and increased gravity allowed for an examination of extreme conditions for survival. The results from our various experiments demonstrate that this Betaproteobacteria would be classified as generalist that easily adapts to changes in environmental conditions, indicating a habitat flexibility in freshwater environments.

Investigation of Ni-Fe Ternary Oxides for Water Splitting

Student: Amanda Leichtfuss
Co-Presenter: Dr. Jennifer Schuttlefield Christus, Chemistry
Mentor: Dr. Jennifer Schuttlefield Christus, Chemistry
Presented at: Center for Chemical Innovation: Solar Fuels Annual Meeting, Newport Beach, CA, January 2015

The Heterogeneous Anodes Rapidly Perused for Oxygen Overpotential Neutralization (HARPOON) kit was successful in detecting the oxygen evolution of the standard Ni-Fe-Co solution. Other Ni-Fe combinations were evaluated but the results here specifically focus on the Ni-Fe-Mg results versus the standard. Additionally, a fourth metal, Cu or Mg, was incorporated into the Ni-Fe-Mg combination and analyzed. The results produced similar to standard activity. Lastly, deposition methods were analyzed and mixing precursor solutions was found to evolve more oxygen than spotting the precursors one metal at a time.

Olivine-Hosted Spinels Reveal Small-Scale Mantle Heterogeneities Beneath the Lassen Segment of the Southern Cascades

Student: Quin A. Lenz
Co-Presenters: Dr. Jennifer M. Wenner, Geology; Dr. Rachel Teasdale, California State University, Chico
Mentor: Dr. Jennifer M. Wenner, Geology
Presented at: Annual Meeting of the Geological Society of America, Vancouver, BC, Canada, October 2014

Chromian spinel compositions from a geochemically diverse suite of calc-alkaline primitive basalts, erupted in the Poison Lake chain (PLC), reveal the presence of small-scale heterogeneities in the mantle beneath the Lassen region of the Southern Cascades....The small spatial scale, similar ages and wide range of geochemical compositions make the PLC an ideal laboratory to describe geochemical variations in the sub-arc mantle. We present electron microprobe analyses of olivine-hosted spinel to characterize the source of these primitive basalts. Focused on spinel inclusions in olivines that have Fo contents that indicate equilibrium with their host rocks' Mg#s, we examine spinel compositions to determine early crystallizing phases (spinels with TiO_2 <1.5 and Mg# > 0.5) and use the most primitive compositions to differentiate mantle source compositions. Mg# and Cr# in spinel and Fo content in olivine for PLC basalts define geochemical trends that describe phases that crystallized from mantle melts. Spinel chromium compositions of inferred melts are consistent with three distinct mantle sources: (1) depleted/higher partial melt with Cr# = 0.44-0.52; (2) intermediate with Cr# = 0.4; and (3) enriched/lower partial melt with Cr# = 0.2-0.3....Mineral chemistry of olivine-spinel pairs and the small area of the PLC suggest that the mantle beneath the Southern Cascades is heterogeneous on a much smaller scale than previously recognized.

Algorithm Visualizations for the Lambda Calculus

Student: Taylor Rydahl
Mentor: Dr. Thomas Naps, Computer Science
Presented at: CCSC Midwest, Olivet Nazarene University, Bourbonnais, IL, September 2014

Algorithm visualization is a subset of computer science in which educators build visual representations of various abstract concepts and algorithms that are seen in the field. Lambda calculus is an abstract programming language used in programming theory to teach the functional programming paradigm. As such, my project was to create visualizations for the lambda calculus in order to help new computing students better understand the fundamental concepts of the language. I designed these visualizations as part of the OpenDSA Project, a collaboration of computer scientists working to form an electronic book that can be used to teach students all of the core concepts that would be covered in a computer science data structures and algorithms course. To meet their specifications, I worked primarily with the JavaScript programming language, utilizing both the Khan Academy Framework and the JavaScript Algorithm Visualization (JSAV) libraries. In the end I was able to create a series of animations and accompanying exercises to both teach the core concepts of lambda calculus as well as to test for student comprehension. These visualizations are currently being used at the University of Wisconsin Oshkosh in two sections of the Programming Languages course this spring. I am hoping to use the information gathered from this to gain a better understanding of how visualizations can help students learn and what

are effective methods for teaching through this medium.

Quaternary Metal Oxide Investigation for Water Splitting

Student: Yuqi She
Co-Presenter: Dr. Jennifer Schuttlefield Christus, Chemistry
Mentor: Dr. Jennifer Schuttlefield Christus, Chemistry
Presented at: Center for Chemical Innovation: Solar Fuels Annual Meeting, Newport Beach, CA, January 2015

The quaternary metal oxide semiconductors were investigated as potential catalysts for water splitting. Specifically, the efficiency of a known three metal oxide combination composed of aluminum, nickel, and iron was examined as a catalyst for water oxidation when a fourth metal was added to the combination. To detect the oxygen evolution of the various combinations, the Heterogeneous Anodes Rapidly Perused for Oxygen (O2) Overpotential Neutralization (HARPOON) kit was used. The HARPOON kit uses a stainless steel mesh coated with paint that contains two fluorophores, one of which is sensitive to O2 and the other insensitive to O2. The ratio of response to the two fluorophores is plotted on a false color map, where the brightest spots correspond to the high concentration of oxygen evolved. Spots that correlate to the catalysts where the highest concentration of oxygen evolved are of the most interest. To date, the addition of the metals molybdenum and cobalt enriched oxygen generation in the aluminum, nickel, iron combination. Further tests are underway to determine the long-term response of the materials to simulated solar irradiation.

Eating Disorders and School and Work Productivity and Activity Impairment Among University Students: Policy and Practical Implications

Student: Cheri Stoffel♦
Mentor: Dr. Anna Filipova, Public Administration
Presented at: 2014 NEDA Conference, San Antonio, TX, October 2014

Eating disorders represent a public health concern because of the increased risk for medical or psychological problems, greater use of health services, and reduced productivity. College is especially a high-risk period for the onset of eating disorders. Yet, little university student-data exist on the prevalence or correlates of eating disorders. This study examined the prevalence of eating disorders among all undergraduate and graduate students at a public university in one of the Midwestern states in the United States. It also explored reasons for not seeking help when students experience binge eating in particular. Finally, it tested several hypotheses on correlates of binge eating. An anonymous online survey was implemented. The usable response rate was 9.77% (1165 of the 11923 surveys sent). Descriptive statistics, chi-square tests, independent t tests, and linear regression analyses were performed. Binge eating was reported by 7.7% of the sample, while obesity was reported by 17%. Gender, age, and college status were significantly related with obesity severity levels. Binge eating was significantly more common among obese students than nonobese students. Moderate binge eating, extreme obesity, physical inactivity, and inadequate sleep may contribute to impaired class productivity, daily activity and social activity in students. Practical and policy implications were shared to build awareness about student eating disorders and to spur communities into action.

Parents and Pamphlets: Unraveling the Mysteries of Parent Responses to Pediatric Handouts

Student: Karen Thompson
Mentor: Dr. Jennifer Considine, Communication
Presented at: National Communication Associate Annual Conference, Chicago, IL, November 2014

Twenty parent participants were interviewed to learn about their personal experiences with pediatric well-child care and their use of handouts distributed during well-child checks. Results of this study suggest that the four responses to health promotion materials were revelation, reminder, reassurance, and rejection.

An Examination of Community Formation on Wiccan Websites

Student: Pearl Wright*
Mentor: Dr. Michael Baltutis, Religious Studies
Presented at: American Academy of Religion, St. Paul, MN, April 2015

A common element of religion is the act of gathering for worship and study as a community. Sociologists have long considered close human interaction to be fundamental to community, and Durkheim wrote that the presence of collective effervescence was fundamental to religion. However, research has shown that an increasing number of people are turning to the Internet for their religious and spiritual experiences. Could cyberspace become a new sacred space not unlike that which churches and temples have provided for thousands of years? This freedom from the brick-and-mortar locations has also sparked an increase in new religions. One such religion is Wicca, an Earth-based Neo-Pagan practice that has experienced explosive growth on the Internet. With relatively few offline groups, the majority of Wiccans experience most of their contact with each other online. This paper will explore how people might experience collective effervescence when they only know each other as avatars and words exchanged on the computer screen and as active discussion threads and chat room rituals replace the face-to-face experiences of offline communities. By examining interactive Wiccan websites, this research will identify the factors that members consider important to an online religious community.

Scholarly Publications

Oshkosh Scholar, Volume IX

The UW Oshkosh undergraduate research journal is published annually.

Against the Slang Use of the Word *Rape*: A Langtonian-Birdian Reproach

Student: Maria Bady
Mentor: Dr. Larry Herzberg, Philosophy

A disturbing trend that has surfaced recently in slang language is to use the word *rape* in a joking or hyperbolic manner. An example of this is, "I raped that exam!" In this paper, I argue that such use of the term *rape* is immoral. I begin by modeling my case after British philosopher Rae Langton's argument that pornography "silences" the speech of women in a particular way. I then discuss Alexander Bird's objection to Langton's notion of "silencing." In the end, I develop a hybrid theory that respects the cogency of Bird's objection while retaining the spirit of Langton's view. By analyzing communication in a novel way, I argue that the slang use of the word *rape* immorally silences rape victims/survivors, although not in the way Langton's argument would suggest.

More Congruences for the *k*-regular Partition Function

Student: Eric Boll
Mentor: Dr. David Penniston, Mathematics

A partition of a number n is a list of positive integers whose sum is n. For example, 4 + 2 + 1 and 4 + 1 + 1 + 1 are both partitions of 7. It can be shown that 4 has 5 partitions, 9 has 30 partitions, 14 has 135 partitions, and Srinivasa Ramanujan proved the following beautiful result: the number of partitions of $5n + 4$ is divisible by 5 for any nonnegative integer n. The k-regular partition function counts the number of partitions of n whose parts are not divisible by k. In 2012, for particular values of k, David Furcy and David Penniston found many families of numbers whose number of k-regular partitions is divisible by 3. In this paper, I extend their results to larger values of k and provide an overview of the methodology used to arrive at the result. In the interest of brevity, only a sketch of the proof is given.

Do Existing Screening Tools Accurately Reflect Experiences of LGBTQ-Identified Victims of Intimate Partner Violence?

Student: Ashley T. Leonardelli
Mentor: Dr. Erin Winterrowd, Psychology

The purpose of this study was to assess how relevant existing screening tools are to lesbian, gay, bisexual, transgender, and queer (LGBTQ) victims of intimate partner violence (IPV). Screening tools are surveys medical and mental

health professionals give to their beneficiaries to determine if the person is experiencing some form of abuse (e.g., emotional or physical). Expert participants decided the relevance of each screening tool by rating all items on the three most commonly used: Hurt, Insult, Threaten, Scream; Partner Violence Screen; and Abuse Assessment Screen. Participants were also asked to evaluate the relevance of new questions, designed by the principal researcher based on extensive literature reviews. All three tools and researcher-generated items were rated as "somewhat relevant" to LGBTQ victims with participants reporting that wording changes and additional questions could improve the tools' relevance. These results help inform best practices for identifying LGBTQ survivors of IPV.

Fifteenth-Century Florentine Exceptionalism: Civic Humanism, the Medici, and Savonarola

Student: Patrick D. McCorkle
Mentor: Dr. Franca Barricelli, History

The Italian city-state of Florence had a long-standing tradition of exceptionalist rhetoric during the Renaissance, though the focus of the city's distinction altered over time. This tradition, also referred to as the "Myth of Florence," is similar to the idea of "American exceptionalism." This paper aims to investigate the distinct change in Florentine exceptionalism over the course of the fifteenth century. The civic humanists of the early 1400s viewed Florence as a New Rome, spreader of political liberty, and, with its republican form of government, heir to the ancient Roman Republic. In the 1490s, Dominican Friar Girolamo Savonarola argued that Florence was a New Jerusalem, destined to become the new model of Christendom on earth. Medici hegemony explains the rhetorical shift from Rome to Jerusalem. Before 1434, Florence was a functioning republic. After that date, and until 1494, Florence was increasingly under the rule of one family. The transition to a quasi-principality made civic humanist rhetoric impossible and paved the way for Savonarola to craft his message of Florentine religious exceptionalism.

Circuit Court Experience and Consistency on the Supreme Court (1953–2013)

Student: Alex Phillips
Mentor: Dr. Jerry Thomas, Political Science

The modern trend of appointing judges from the U.S. Circuit Court of Appeals to the U.S. Supreme Court is undeniable. As a near prerequisite to attaining a seat on the bench, Justices from appellate courts have been appointed because of, among other factors, perceived ideological consistency. Presidents seek to extend their legacies far beyond their terms, and Senators seek to approve nominees with ideologies consistent with their parties' political interests. In either case, the expectation is ideological consistency. Ideological drift is a phenomenon well observed since the shift of Justice Blackmun, but studies have not attempted to measure circuit court experience and evaluate its relation to drift. The model here reasons that circuit court experience does relate to less ideological drift, but finds that Justices with circuit court experience actually drift more than Justices without this experience. These findings hold important implications for the judicial selection process.

Parents and Pamphlets: Unraveling the Mysteries of Parent Responses to Pediatric Handouts

Student: Karen Thompson
Mentor: Dr. Jennifer R. Considine, Communication

Written handouts are usually provided to parents at routine pediatric visits, but little is known about how parents use this written medical information. To explore this topic, handouts provided by the American Academy of Pediatrics (AAP) Bright Futures Initiative were analyzed and 20 parent participants were interviewed to learn about their personal experiences with pediatric well-child care (WCC) and their use of handouts distributed during WCC visits. Results of this study determined that the four responses to health promotion materials are revelation, reminder, reassurance, and rejection. First-time parents are most likely to use handouts. Handout

use may increase when they are provided at the beginning of visits, when they are personalized to each family, or when providers discuss them directly with parents. Further, results suggested that handouts are largely used by parents to reinforce existing beliefs rather than challenge or change them.

Other Scholarly Publications▲

(published between May 2014 and April 2015)
These scholarly publications were not directly supported by OSSCAP but are included because OSSCAP encourages all scholarly/ creative activities.

Hibernation Induces Immune Changes in the Lung of 13-Lined Ground Squirrels (*Ictidomys tridecemlineatus*)

Students: Matthew Bohr and Abigail R. Brooks
Co-Author: Dr. Courtney C. Kurtz, Biology
Mentor: Dr. Courtney C. Kurtz, Biology
Published in: *Developmental and Comparative Immunology*, December 2014

During hibernation, significant changes occur in the systemic and intestinal immune populations. We found that the lungs of hibernating 13-lined ground squirrels (*Ictidomys tridecemlineatus*) also undergo shifts in immune phenotype. Within the population of mononuclear cells, the percentage of T cells increases and the percentage of CD11b/c(+) cells decreases in hibernators. E-selectin, which promotes endothelial attachment, increases during arousal from torpor. Levels of the anti-inflammatory cytokine interleukin (IL)-10 in the lung are lower during hibernation while levels of the pro-inflammatory cytokine, tumor necrosis factor (TNF)-α remain constant. Expression of suppressor of cytokine signaling (SOCS) proteins is also decreased in torpid hibernators. Our data point to a unique immune phenotype in the lung of hibernating ground squirrels in which certain immunosuppressive proteins are downregulated while some potentially inflammatory proteins are maintained or amplified. This indicates that the lung houses an immune population that can potentially respond to antigenic challenge during hibernation.

An Online Course Checklist

Student: Katie M. Heidke♦
Mentor: Dr. Judith Westphal, Nursing
Published in: *Nurse Education Today*, February 2015

Online education has been one of the biggest changes in education over the past decade and has grown greatly in popularity among all types of higher education students. This paper was written to better understand what students desire in online classes, and from that develop a checklist. This checklist can be used to better develop online classes when starting from the beginning or to evaluate existing classes. The checklist is separated into sections for ease of use. Instructions on how to use the checklist are included.

Validation of Otolith Ages for Walleye (*Sander vitreus*) in the Winnebago System

Student: Ryan P. Koenigs♦
Co-Authors: Dr. Robert S. Stelzer, Biology; Ronald M. Bruch and Kendall K. Kamke, Wisconsin Department of Natural Resources
Mentor: Dr. Robert S. Stelzer, Biology
Published in: *Fisheries Research*, February 2015

Although accurate age data are essential when estimating somatic growth and mortality rates required to effectively manage exploited walleye (*Sander vitreus*) populations, aging structures have not been validated for age ranges present in most walleye populations. Otoliths and dorsal spines were collected from 302 walleye considered known age in the Winnebago System, Wisconsin, USA. Paired aging structures were also collected from over 2,000 additional walleye sampled during spawning assessments, tournament monitoring, and other surveys to better understand the relationship between spine and otolith age estimates and to compare catch curve residuals from structure and sex-specific catch curves to standard walleye recruitment indices. We found otoliths were accurate for walleye ages 0–10, while dorsal spines yielded relatively accurate age estimates for walleye ages 1–5, but underestimated age of walleye ages 6 and older. Our results from fish considered

known age validate the accuracy of otolith age estimates for walleye up to age 10, with corroborating evidence from catch curves and accurate recruitment indices strongly suggesting that otoliths are valid for all ages of Winnebago System walleye.

Communication Quality Improvement in Student Nursing Clinicals

Student: Mike Mason*
Co-Authors: Dr. Suzanne Marnocha, Nursing; Dr. Mark R. Marnocha, UW–Madison
Mentor: Dr. Suzanne Marnocha, Nursing
Published in: *Nursing Education in Practice*, July 2014

Background: Little previous research has examined attempts to improve the quality of communication among nursing clinical students, unit-based educators, and academic educators. The current study utilized focus groups and needs assessments to identify communication concerns of both academic and unit-based clinical educators in several inpatient settings. Methods: Quality improvement interventions were developed based on concerns and needs identified by staff. The interventions included zone phones, concise student placement summaries, and unit communication boards. Comparisons of pre- and post-intervention surveys of unit staff and of academic faculty were conducted by t-tests. Results: Statistical analyses indicated areas of significant communication improvements between academic faculty and both students and unit staff. Interventions did not show significant benefits for communication between unit staff and students. Conclusions: Application of quality improvement techniques resulted in successful improvement of communications among nursing students, clinical site educators, and academic educators. The results underscore the need to further tailor and evaluate quality improvement efforts at the level of day-to-day patient care, and to address the inevitable diversity among hospital units via timely staff input on the most effective unit-level interventions.

Unprofessional Content Posted Online Among Nursing Students

Student: Tiffany Pilliow*
Co-Authors: Dr. Suzanne Marnocha, Nursing; Dr. Mark R. Marnocha, UW–Madison
Mentor: Dr. Suzanne Marnocha, Nursing
Published in: *Nurse Educator*, January 2015

This study investigated the posting of unprofessional content online among nursing students. Surveys of 293 schools of nursing revealed that 77% had encountered at least 1 incident of students posting such content. Respondents reported greatest concerns about content pertaining to educational and professional affiliations and to patient confidentiality. Most schools are developing responses to online unprofessionalism. Nursing education must stay current with social networking technologies and students' educational needs.

Hibernation Alters the Diversity and Composition of Mucosa-Associated Bacteria While Enhancing Antimicrobial Defence in the Gut of 13-Lined Ground Squirrels

Student: Ryan J. Sprenger
Co-Authors: Dr. Courtney C. Kurtz, Biology; Kimberly A. Dill-McFarland, UW–Madison; Katie L. Neil, UW–Madison; Austin Zeng, UW–Madison; Dr. Garrett Suen, UW–Madison; Dr. Hannah V. Carey, UW–Madison
Mentor: Dr. Courtney C. Kurtz, Biology
Published in: *Molecular Ecology*, September 2014

The gut microbiota plays important roles in animal nutrition and health. This relationship is particularly dynamic in hibernating mammals where fasting drives the gut community to rely on host-derived nutrients instead of exogenous substrates. We used 16S rRNA pyrosequencing and caecal tissue protein analysis to investigate the effects of hibernation on the mucosa-associated bacterial microbiota and host responses in 13-lined ground squirrels. The mucosal microbiota was less diverse in winter hibernators than in actively feeding spring and summer squirrels. Communities in all seasons were dominated by Firmicutes and Bacteroidetes,

with lesser contributions from Proteobacteria, Verrucomicrobia, Tenericutes and Actinobacteria. Hibernators had lower relative abundances of Firmicutes, which include genera that prefer plant polysaccharides, and higher abundances of Bacteroidetes and Verrucomicrobia, some of which can survive solely on host-derived mucins. This core community indicates that the mucosal microbiota remains relatively stable over the annual cycle yet responds to substrate changes while potentially serving as a pool for "seeding" the microbiota once exogenous substrates return in spring. Relative to summer, hibernation reduced caecal crypt length and increased MUC2 expression in early winter and spring. Hibernation also decreased caecal TLR4 and increased TLR5 expression, suggesting a protective response that minimizes inflammation.

2014–2015 Student/Faculty Collaborative Research Programs

Graduate Student/Faculty Collaborative Research Program

Awards $3,000 stipends and up to $500 to full-time graduate students for research-related expenses for scholarly projects done in collaboration with a faculty mentor.

Targeting Synthetic Genes to a Cyanobacterial Genome for Production of Pinene as a Biofuel Feedstock

Student: Rhiannon Carr♦
Mentor: Dr. Toivo Kallas, Biology

Global consumption of petroleum products, from plastics to cosmetics to fuels, has far exceeded the pace at which petroleum and similar fossil fuels are formed. International interest has therefore turned to more sustainable sources for equivalent feedstocks, including photosynthetic organisms like cyanobacteria. Cyanobacteria, from a commercial perspective, are a space- and resource-efficient route to a number of biologically produced alternative feedstocks for diverse products. In particular, their methyl erythritol phosphate (MEP) pathway can be supplemented with enzymes to manufacture useful terpenoids, like isoprene and pinene. This project will mirror a previous experiment – focused on the synthetic rubber precursor isoprene – but attempting pinene synthesis (a possible jet fuel feedstock) by adding the genes *GPPS* and *bPinS* to a neutral site on a plasmid (extra-chromosomal DNA element) carried by *Synechococcus* sp. PCC 7002. If, as expected, these genes are not fatal to the cyanobacteria, pinene production should be observable in liquid culture. Results permitting, a further step is to re-target the pinene synthesis genes to a chromosomal site, where they are less likely to be lost over time. A possible path for this step includes exploration of an alternative-marker strategy, which employs selection pressure other than the typical antibiotic resistance method. If successful, this will produce a more stable strain that does not rely on antibiotics to maintain pinene production. This is a commercially desirable outcome, as it would provide consistent production levels and eliminate the environmental and fiscal concerns inherent to antibiotic use.

Spatial Distribution of Benthic Invertebrates in Lake Winnebago

Student: Courtney Lee Heling
Mentor: Dr. Robert S. Stelzer, Biology

Aquatic invertebrates are an essential component of most freshwater food webs. Benthic (i.e., bottom-dwelling) invertebrates are particularly important as food resources for a variety of fish species. The spatial distribution of invertebrates can be a significant determinant in the dispersal of predator populations and is dependent upon a number of factors, including temperature and sediment type. In Lake Winnebago, aquatic invertebrates, especially *Chironomus* species (locally known as lakeflies), are an important part of the diet of lake sturgeon (*Acipenser fulvescens*) and other fish species. *Chironomus* and related species have been studied in Lake Winnebago periodically for over fifty years. These studies have been largely based on samples collected at four offshore locations, which are likely not representative of the lake's varied habitats, particularly because of its large area. Currently, little is known about the spatial distribution of benthic invertebrates in the lake beyond

the information obtained at the four offshore locations. The main objective of this study is to conduct a comprehensive survey of benthic invertebrates in Lake Winnebago to assess their spatial variation and assess correlations between invertebrate distribution and physical variables (e.g., sediment type, water depth). The study will be conducted for two consecutive years to assess year-to-year variation in invertebrate spatial variation. The project will be the most comprehensive investigation of Lake Winnebago benthic invertebrate communities (i.e., group of species) ever completed and will contribute significantly to the student author's professional development.

Unraveling the Antiviral Properties of Hmong Green Medicine, *Tshuaj Ntsuab*

Student: Sitha Thor
Mentor: Dr. Teri Shors, Biology

Bioprospecting has been going on since the dawn of civilization when prehistoric people from different cultures noticed that plants could be used as medicines. Like other ethnic groups, the Hmong developed a health practice that utilizes plants to treat and cure maladies. A few studies exist about cultural practices, beliefs, and plants primarily used for women's health. There are no documented studies that investigate the biological activity of green medicine, *tshuaj ntsuab*, used in Hmong practices to treat viral infections. In recent years, the threat of a viral epidemic or even a pandemic has become more of a reality than ever before, yet so few antiviral drugs and vaccines exist to combat viruses. There is an urgent need for more effective antiviral drugs or neutraceuticals. Bioprospecting medicinal plants may lead to the discovery of a new class of antiviral compounds. Toward this end, the proposed research is aimed to screen 30 Hmong medicinal plants for bioactive/antiviral compounds against human parainfluenza type 3 and poliovirus serotype 1 using plaque reduction assays. Results will be combined with prior studies against vaccinia virus and contribute toward the preparation of a manuscript for a peer-reviewed scientific journal and the completion of an M.S. thesis project. The proposer plans to go to medical school after completion of an M.S. degree at UW Oshkosh. The student hopes to one day combine the knowledge of alternative medicine and Western medicine when treating patients, similar to a complementary and alternative medicine program at the Mayo Clinic.

Undergraduate Student/Faculty Collaborative Research Program

Awards $3,000 stipends and up to $550 to undergraduate full-time students for research-related expenses for scholarly projects done in collaboration with a faculty mentor.

Inactivation of a Gene for Sucrose Synthesis for Increased Production of Isoprenoid Biofuels in Cyanobacteria

Student: Sara Arafeh
Mentor: Dr. Toivo Kallas, Biology

Cyanobacteria are a group of bacteria that obtain energy from sunlight. They are important to life on earth because of the high volume of oxygen they produce and the atmospheric carbon dioxide (CO_2) that they consume during the process of photosynthesis. Our group has engineered cyanobacteria to produce isoprene, an organic compound that is also produced by plants, and can be used as biofuel for transportation. However, cyanobacterial production of isoprene is not yet sufficient for use in everyday transportation. Thus, to increase the production of isoprene in cyanobacteria, carbon flow must be increased to the isoprene synthesis pathway. To accomplish this, other carbon utilization pathways in the cyanobacteria must be inactivated or slowed down, so that carbon molecules are forced into the isoprene synthesis pathway. The proposed study focuses on shutting down the sucrose synthesis pathway in the cyanobacterium *Synechococcus* PCC 7002. The goal of this study is to inactivate a sucrose synthase gene, *spsA*, for an essential enzyme in the sucrose synthesis pathway and determine whether this will increase isoprene production in *Synechococcus* PCC 7002 cyanobacteria as we propose. Polymerase chain reaction (PCR), and an enzymatic procedure called "Gibson Assembly" will be used to assemble the genetic construct for inactivating the *spsA* gene,

and gas chromatography – mass spectrometry – will be used to measure isoprene production in the modified cyanobacteria. If successful, the project will be important for developing cyanobacterial strains that can use sunlight energy to capture CO_2 and convert this into high-value isoprenoid, hydrocarbon chemicals.

The Timing and Spatial Extent of Fire-Inferred Drought Conditions in the Western Great Lakes Region

Student: Vanessa J. Bailey
Mentor: Dr. Colin Long, Geography and Urban Planning

Long-term fire histories, used in this study as a proxy for drought conditions, from six lakes in eastern Wisconsin and the Upper Peninsula of Michigan will be compared to determine the spatial extent of drought periods over the last 3,000 years. The sites represent a north/south transect that spans the "tension zone," a climate boundary that divides the Upper Great Lakes area into cool/dry and warm/wet regions. Synchronous fire events at most sites would indicate more regional drought conditions. Five of the fire history records are available. The activities in this project include reconstructing the sixth fire history through the collection and analysis of lake sediment, and determining synchronous fire events among the six sites. This project will produce a new fire history from the region, add to our understanding of the resilience of the tension zone climate boundary, and provide new information on the extent and timing of drought conditions in the past.

Microbial Destruction of Calcium Carbonate Gastropod Shells During the Pleistocene: Implications for Global Carbon Cycling

Student: Amanda Doherty
Mentor: Dr. Eric Hiatt, Geology

The subject of my research is the role of bio-erosive endolithic micro-organisms in the destruction of biomineralized shells of gastropods, and how this process has changed over time. Bio-erosion involves utilization of proteins and other organic molecules inside the microstructure of shells as a food source, and use of the shell for protection. This process is well understood in marine environments, but not in terrestrial settings; yet, it plays an important role in cycling carbon from the solid calcium carbonate reservoir back to the atmosphere. Using a single terrestrial genus of gastropod, *Poecilozonites*, indigenous to the islands of Bermuda, we will document changes over time in the nature of endolithic organisms that inhabit this micro-environment. I completed a pilot study using petrographic analysis and scanning electron microscope (SEM) imaging of modern samples and one ancient sample of *Poecilozonites* that showed an incredible array of well-preserved microboring networks. For this study I will collect a more representative set of samples from more ancient soil horizons that will allow me to document changes in the endolithic behavior over the Pleistocene. Drastic changes in climate during the Pleistocene coupled with intense sea-level fluctuations, on the order of 120 m, created a punctuated environmental system shown by the stratigraphic record of Bermuda. This record provides excellent age control in relation to these major climate changes, and will allow potential variation observed in micro-boring textures to be placed in the context of large swings in climate during the Pleistocene.

Analysis of the Metamorphoses of Ingmar Bergman's *The Virgin Spring*

Student: Julia Elkins
Mentor: Dr. Paul Klemp, English

As an English major, I have largely been interested in film theory and criticism, particularly in art and exploitation horror. Ingmar Bergman and Wes Craven are two directors who had a significant impact on the art and exploitation genre. Dating back to a medieval Swedish ballad for his source, Bergman brought the story of rape, revenge, and atonement to the screen in his *The Virgin Spring* (1960). In *The Last House on the Left* (1972), Craven transformed the story into a depiction of the counterculture and increase of violence brought on by the Vietnam War, where Judeo-Christian morality was traded for a sadistic, animalistic world of sex and violence.

Following the trend of horror remakes, Dennis Iliadis recreated *The Last House on the Left* (2009), in which he portrayed a new theme of family bonds and binary depiction of good vs. evil, rather than Bergman's and Craven's blend of sympathy for both the victim's family and the murderers. Although Bergman and Craven have been extensively studied, there has been little scholarship on these films, even as the story continues to be adapted for mainstream theaters. The limited scholarship of these films has focused on the victimized daughter and her rapists/murderers, while ignoring the evolution of the portrayal of her parents' role in the story. I intend to examine the role of the parents in these three versions of the story. Shifting themes of jealousy, competition, religion, revenge, and forgiveness make up Bergman's film; absent, passive, animalistic parents, and mockery and decline of family values, class, and morality are addressed in Craven's version; and finally, Iliadis gives a positive outlook on the parental bond and act of protection and survival, rather than fragmentation and revenge during the family's tragedy.

Identification of Carotenoids in Five Species of *Hymenobacter* and *Flectobacillus* Bacteria

Student: Thomas Kuborn
Mentor: Dr. Kevin Crawford, Chemistry

Hymenobacter and *Flectobacillus* are two genera of bacteria located under the family *Cytophagaceae*. This research seeks to analyze a total of five specific species of bacteria under these two genera, two species under *Hymenobacter* and three under *Flectobacillus*, due to their production of both red and pink pigmentation molecules known as carotenoids. Not all of these species in question are exactly the same color. This, combined with preliminary ultraviolet-visible light spectroscopy (UV-vis) data, shows there may be some additional color exhibiting molecules. Previous published works in the field have already discovered many different carotenoids found within relatives of these species. The identity of the carotenoids present in the five species being studied remains unknown, leaving open the possibility that these carotenoids could be unique to the strains being studied. Additionally, these strains produce the carotenoids en masse, allowing for future work in both carotenoid-producing gene analysis, as well as carotenoid stability analysis. The methodology behind this project seeks to firstly isolate the carotenoids and other pigmented molecules through a combination of UV-vis and high pressure liquid chromatography (HPLC). Following this, a mass for the pigment molecule will be determined using liquid-chromatography mass spectrometry (LC-MS) for comparison against other known molecules. Concluding the identification process, an exact chemical structure for each molecule will be determined using nuclear magnetic resonance (NMR) spectrometry to determine a definitive molecular identity.

A War for Manhood

Student: Andrew Mannenbach
Mentor: Dr. Michelle Kuhl, History

During the 1890s, men in the United States began to question whether or not they were still men. However, the roots of this identity crisis varied by region. For men in the increasingly industrial Northeast, the identity crisis stemmed from an increasingly sedentary lifestyle and women's activism. White southern masculinity issues arose as a result of defeat in the Civil War and the perceived infringement of Reconstruction. Despite the differences in the origins of these masculinity crises, they were both solved using the same tool: football. Some scholars have addressed the ways football was used to preserve masculine virtues during the 1890s and into the 1900s. But there is little scholarship on the way football was used to preserve southern white masculinity, and there is even less scholarship comparing these two distinct regions. By carrying out research that compares masculine virtues ascribed to football in the Northeast and in the South, a more complete portrait of United States social history can be painted.

Broken Spanish

Student: Irineo Medina
Mentors: Gail Panske and Jeff Lipschutz, Art

Being a third-generation Mexican American, I experience and struggle with the effect of culture loss and disorientation within our society. This missing feeling of belonging can be defined as an identity crisis, which is common to all cultures. What I aim to do is artistically explore and confront stereotypes and racism, and how they weave together in the challenge, or crisis, of Mexican-American identity.

Utilizing three different disciplines—painting, printmaking, and photography—will allow me to follow in the footsteps of artists like Enrique Chagoya, Kara Walker and Glenn Ligon, who all have different artistic approaches in dealing with culture and identity. The research process will also allow me to confront the feelings I have about my identity, good and bad, and externalize them into an expressive, perhaps provocative, educational form.

In creating my artwork, I will blend traditional iconography with my personal imagery using images from a traditional Mexican bingo game, Loteria, along with those of a contemporary setting, for example street art and urban photography. Critiques along the way from my professor Gail Panske will be extremely helpful in addressing technical issues that may arise throughout the process. The artworks created will be a lasting collection of work that will allow me to take my experiences and frustrations with these issues and reveal them to a large and diverse audience.

Effect of Titanium Dioxide Exposure on Populations of SFB and *Lactobacillus* in Gastrointestinal Tract of Mice

Student: Kaitlyn Nielsen
Mentor: Dr. Sabrina Mueller-Spitz, Biology

The use of nanoparticles in numerous consumer products is steadily increasing. Ingestion is the most common route of entrance for these particles and increased consumption could be detrimental to one's health. It is hypothesized that titanium dioxide nanoparticles have the ability to interact with beneficial bacteria found in the gut, altering the response of the immune system. This interaction could negatively impact these populations and lead to various diseases relating to the gut. The purpose of this research is to determine how two groups of bacteria known to stimulate the immune system, segmented filamentous bacteria (SFB) and *Lactobacillus* species, change in intestinal tissue of mice following exposure to titanium dioxide nanoparticles. The primary method to be utilized is quantitative polymerase chain reaction to track changes in population dominance. It is predicted that, following exposure, the numbers of SFB will significantly decrease. As a result, the numbers of *Lactobacillus* species will increase. Once titanium dioxide has had time to exit the digestive system, it is predicted that the organismal populations will return to a fairly normal state, but the overall number will be reduced from those found in the control mice. The outcomes from this experiment will help to elucidate the human health threat from nanoparticle exposure.

Balanced Tree Visualizations in OpenDSA

Student: Taylor Rydahl
Mentor: Dr. Thomas Naps, Computer Science

The goal of this project is to create a computer visualization designed to teach data structures concepts to computer science students. Specifically, this project will deal with visualizations for various "tree" data structures. This project is to be presented at the upcoming Consortium for Computing Sciences in College (CCSC) Midwest Conference at Olivet Nazarene University. In addition, it will also be added to the OpenDSA project, an open-source collaboration started to create an electronic book filled with visualizations and accompanying exercises designed to act as an educational aid to computer science students learning data structures and algorithms. My personal interest in the subject material as well as previous programming experience and knowledge will make this project one that can be reasonably completed in an eight-week period.

Pilot Study of Microbial Gut Diversity of Meadow Voles (*Microtus pennsylvanicus*) Born in Captivity as Compared to Those Caught in the Wild

Student: Lucas Schulz
Mentor: Dr. M. Elsbeth McPhee, Biology

There are many animal conservation programs that use captive breeding to help supplement wild populations of animals whose natural populations are becoming depleted due to human activity. These programs have seen varied success. Bringing wild animals into captivity can sometimes have a very dramatic and diverse effect on an animal's external and internal morphology. Intestinal microbiota play an important role in human and animal health. They allow our guts to digest and function more efficiently and play a role in our immune health. A change in environment, diet, and exposure to certain drugs can highly affect these ecosystems. This effect may reduce the survival of animals born in captivity, potentially causing unneeded losses for breeding programs. To test this, we will use meadow voles (*Microtus pennsylvanicus*) as an animal model. Through genetic data we plan to look at the difference in microbial diversity of meadow voles born in captivity to those in the wild. We predict that due to vaccinations and very little exposure to diversified food sources, voles born in captivity will not have as diverse of a microbial community as wild-captured individuals. From this study we hope to gain a better understanding of the effects of generations of captivity on microbial gut communities.

Is There a Connection Between the Presence of the Woodland Vole (*Microtus pinetorum*) and the Recovery of Oak Openings in Wisconsin's Kettle Moraine State Park?

Student: Keaton Wigg
Mentor: Donna Charley-Johnson, Biology

I will test the hypothesis that a higher relative abundance of woodland voles (*Microtus pinetorum*) can be found in sections of oak openings that are well established. The primary objective of this project is to use data collected from the trapping of the target species to show the difference in relative abundance between areas that are in the process of recovery and areas that have been fully reestablished. These areas of interest occur in the southeast glacial plains ecological landscape of Wisconsin. This project will be focused on state-owned public lands where bur oak openings reside in the Kettle Moraine State Forest (Kettle Moraine Oak Opening No. 229 and Eagle Oak Opening No. 66). From the data I gather, I will compare the relative abundance of the woodland vole (*Microtus pinetorum*) between two sites and create a map of its distribution in the areas surveyed. Current data is limited to studies outside of Wisconsin; a significant amount of data was collected in Indiana and Minnesota. Studies from other states that apply to my proposal have been used throughout and have been placed in the bibliography section. This proposal will make available to me a unique opportunity to gain first-hand research experience in my field of study while addressing a topic of my own choosing. The results from this study will be submitted for publication in *Oshkosh Scholar*.

The Synthesis and Characterization of Novel Catalysts to Recycle Carbon Dioxide

Student: Andrew Wildish
Mentor: Dr. Sheri Lense, Chemistry

The proposed research seeks to investigate novel catalysts to recycle carbon dioxide (CO_2) into sustainable fuels. In sustainable fuels, energy from sustainable resources, such as the sun and wind, is stored in chemical bonds. One type of sustainable fuel can be produced using CO_2 as a starting material. However, the process of recycling CO_2 is energetically intensive and inefficient. By introducing a catalyst, the process can be made much less energy intensive and more efficient. The catalysts in this proposal will differ from previously investigated catalysts because they will contain acidic groups that can interact with CO_2 and stabilize CO_2 coordination to the catalysts, potentially leading to faster and more efficient catalysts. I will adapt published procedures for similar complexes to synthesize these catalysts, and use many techniques that I learned in my general and organic chemistry

classes. I plan to use different techniques, such as mass spectrometry, infrared spectroscopy, UV-visible spectroscopy, and X-ray crystallography to characterize the catalysts and the catalyst precursors. I will also use electrochemical techniques to test the ability of the catalysts to recycle CO_2. For this project, I plan to work with Dr. Sheri Lense during summer and spring 2014 to learn any techniques that I will need for the experiment that I have not yet learned. Upon completing my project, I plan to present at a regional or national conference as well as the UW Oshkosh Celebration of Scholarship.

Undergraduate Small Grants Program

(awarded February–October 2014)

Awards up to $550 to full-time undergraduate students for research-related expenses for scholarly projects done in collaboration with a faculty mentor.

Comparison of Molecular Dynamics and Quantum Computations on a Protein

Student: Miguel Paolo Baldomero
Mentor: Dr. Jonathan Gutow, Chemistry

The Glutathione Reductase (GR) enzyme is a complex protein that is found in human cells. Its job is to increase the rate of the chemical reaction of Glutathione Disulfide (GSSG) into Glutathione (GSH). GSH is the primary antioxidant, a molecule that prevents cellular damage and cellular death in human cells. However, high levels of GR and GSH are also found in malarial parasites. These molecules render the parasite less susceptible to anti-malarial drugs. Hence, the GR enzyme has become an attractive target for anti-malarial drug development. By inhibiting the GR enzyme, production of GSH within the parasitic cell will decrease, making the parasite vulnerable to oxidative stress, which facilitates the death of the parasite. One such inhibitor is GCSG, which is an analogue of GSSG. A GCSG inhibited GR enzyme will cease to catalyze production of GSH, thereby exposing the parasitic cell to oxidative stress.

Due to the nature of GCSG, it can dock within the GR enzyme in two ways. In this study, theoretical methods will be used to determine how exactly GCSG docks within GR. Previously, GAMESS, a quantum mechanical computation program, was used to determine the energetics of the two possible configurations. By calculating the energy of the complex, the most common way of GCSG binding can be determined. In the proposed project, AMBER, a molecular dynamics program that utilizes classical physics theory, will be used to calculate the energetics of the complex. Then, the results of the two theoretical methods will be compared.

Microbial Destruction of Terrestrial Gastropod Shells During the Pleistocene Ice Ages in Bermuda: Implications for Climate Change

Student: Amanda Doherty
Mentor: Dr. Eric Hiatt, Geology

Microbes attack the shells of marine and terrestrial organisms that make their skeletal elements from calcium carbonate. This bio-erosion begins while animals are still living when bacteria, fungi, and algae colonize the surface of shells, such as those of snails. The microorganisms bore into the shell for protection and mine organic molecules for food. The network of micro-borings created leads to destruction of the shell, dissolution of solid calcium carbonate and release of carbon dioxide; this process is fairly well understood in marine environments, but is poorly understood in terrestrial settings.

The island of Bermuda records a detailed and complex stratigraphic history of marine environments punctuated by soils produced during extreme climate changes of the Pleistocene. We have conducted a preliminary study of Bermuda land snails collected previously to determine the extent and nature of micro-borings, and found an amazing array. The samples we have analyzed were collected from several locations around the island; however, they only represent modern conditions and one ancient soil horizon. We need to collect additional samples from older soils to examine the history of this process and determine if climate affects this process over time.

Recently an amino acid dating process, using the same genus of land snails we are proposing to study, has allowed age relationships to be calculated accurately. This development has significantly improved the accuracy of stratigraphic mapping in Bermuda. The availability of these maps will allow us to readily identify locations of older soils and collect samples within those age ranges.

The Role of CCL25 in Intestinal Immune Cell Changes During Hibernation

Student: Jeffrey Allen Farvour
Mentor: Dr. Courtney C. Kurtz, Biology

Mammalian hibernation is an important adaptation used to survive the long winter. As mammals hibernate, the number of immune cells in their small intestine greatly increases. To date, it is unclear what exactly is initiating the movement of these immune cells to the intestine during hibernation. Most likely, several factors are involved in this seasonal change. One of these factors could be CCL25, a protein that helps recruit immune cells to the small intestine. My goal during this project is to examine whether CCL25 plays a role in the immune changes seen in the intestine of hibernators. This will be the first time that CCL25 has been examined in any hibernating animal. I will compare the relative levels of CCL25 in the frozen intestinal tissues of 10 hibernating and 10 non-hibernating 13-lined ground squirrels. I will determine the relative expression of CCL25 in these samples using qPCR. qPCR measures the amount of RNA (the genetic material used to make protein) in a sample. This technique can be designed to specifically detect and quantify only the RNA that will be used to make CCL25. My hypothesis is that the amount of CCL25-specific RNA will be higher in the intestine of hibernating compared to non-hibernating ground squirrels.

Textural Alteration of Ancient Brachiopods

Student: Piper Lee Poe
Mentor: Dr. Eric Hiatt, Geology

Environmental conditions in ancient oceans, such as temperature and nutrient levels, can be determined from ancient limestones. Alteration, however, can obscure these, requiring careful analysis. Certain ancient marine organisms, such as brachiopods, are used because they are composed of stable low-Mg calcite and contain a dense microstructure, making them more resistant to alteration. We are interested in testing whether ancient limestones, including brachiopods, preserve oceanic conditions in the Phosphoria Formation of Idaho and Wyoming because these rocks were deposited in an ancient oceanic upwelling system in the Permian (280-250 million years ago) where organic productivity was very high, but the nature of the system is still debated. Understanding upwelling systems is important partially because these also create petroleum, and are often part of an overall petroleum system. My advisor has collected approximately 200 samples from the Phosphoria. I will analyze 50 samples using cathodoluminescent petrography (CL) and scanning electron microscopy (SEM), which will provide means to evaluate potential alteration. CL in biogenic calcite is controlled by the addition of trace elements (Mn and Fe) during recrystallization; Mn causes luminescence and Fe decreases it, ultimately allowing us to see if the brachiopod has recrystallized. Evaluation will allow us to completely assess how much cementation by calcite or dolomite the brachiopods have undergone. Our ultimate problem is to decipher what is original (from the Permian) and what is new (recrystallized) so that we can eventually expand this project to perform more geochemical analyses to determine ambient oceanic conditions.

Ronald E. McNair Postbaccalaureate Achievement Program▲

Prepares 25 first-generation, low-income or underrepresented UW Oshkosh undergraduates annually for doctoral study through faculty mentorship.

The Social, Economic, and Environmental Recession of Agriculture

Student: Alia Carroll*
Mentor: Dr. Steve Dunn, Finance and Business Law

Presented at: McNair Showcase, Oshkosh, WI, September 2014

In recent years, concerns for the environment, health, and future global sustainability have been rising as more and more individuals are becoming educated on the controversial methods used by industrial farmers. Consumers are realizing that the consequences behind monocropping and factory farming far outweigh the benefits. In turn, the demand for local, organic produce has grown significantly, creating a competitive, up-and-coming spot in the food market. As a result, morally motivated individuals are taking initiative by serving as leaders in the urban food movement by creating local organic farms themselves. Food distributors are quickly adapting to the recent shift in demand as well. Large superstores, such as Wal-Mart and Target, are strategically positioning themselves in the organic food market by incorporating large sections designated for natural and organic foods. As the urban food movement continues to thrive, skeptics unceasingly question the differences between industrial and local organic agriculture. Local organic farms, farmer market supervisors, and supermarket employees around the Fox Valley area in Wisconsin will be interviewed in order to gain insight on this recent food shift. These results will increase the understanding of the effectiveness, efficiency, and sustainability of organic and industrial farming, as well as explain what type of impact this shift indicates on a local and global scale. This study is set out to gauge the overall sustainability of local, organic farming, including economic, environmental and social factors, in addition to the effects on the food supply chain. In short, this research helps determine which farming method is the most sustainable and beneficial to the overall well-being of both the consumers and the planet. In addition, the effects of the urban food movement are analyzed. More specifically, the potential changes within the food supply chain become a significant factor when considering consumer well-being. Ultimately, this research provides insight and closure to the average consumer, and will help them make the best food sourcing decisions.

Barriers to Civil Justice: A Sociological Approach

Student: Laureine George-Pratt*
Mentor: Dr. Juyeon Son, Sociology
Presented at: McNair Showcase, Oshkosh, WI, September 2014, and the National McNair Conference, Delavan, WI, October 2014

This study focuses on the issue of access to civil justice for low-income people in the United States. Existing studies have pointed to the significant inequities of legal representation in terms of the legal outcomes, access, and the consequences thereof. While the low-income groups are more likely to lack access to civil representation due to a lack of financial resources, the discussions of this issue in the existing literature tend to be sporadic and are often covered within different social contexts. Sociological perspectives inform us of the importance of the patterns that occur in many facets of human lives in a systematic manner. The objective of this study is to gain a better understanding of the pathways in which the unequal access to legal representation impacts the poor. Using a systematic review of literature and government reports, this study examines what barriers people with low socioeconomic status have to access civic justice and what the consequences are of not having proper legal representation. A total of twenty-five journal articles were analyzed. The barriers to legal representation and the consequences of lacking it are discussed through a conceptual map constructed from the analysis.

Mating Behaviors and the Effects of Mate Choice on Maternal Infanticide Rates in Captive Thirteen-Lined Ground Squirrels

Student: Tristan Greening*
Mentor: Dr. Dana K. Merriman, Biology
Presented at: McNair Showcase, Oshkosh, WI, September 2014, and the National McNair Conference, Delavan, WI, October 2014

The University of Wisconsin Oshkosh has maintained a captive breeding colony of thirteen-lined ground squirrels since 2002. Production is not maximal because only ~50% of females

paired with a male produce an observed litter, and then a varying percent of observed litters are cannibalized by the dam. In a continuing effort to maximize success, this project aimed to document mating behaviors, conduct a feasibility study of group mating to better approximate the natural state, and assess any resulting improvement in breeding success. An arena was constructed for group mating where, over 20 days of the 2014 breeding season, 7 experienced mothers were grouped for 1 hour daily with 5 males. An observer watched and videotaped interactions. Alongside, 65 females were pair- or trio-housed with a male as is standard procedure. Six behaviors were recorded that were categorized as "greeting or courtship," and lordosis (female receptivity) and copulation were documented. One male, a yearling in his first breeding season, was observed to perform the most copulations. A heretofore undocumented behavior, termed piling, was observed; multiple females were seen to pile on top of one another in a corner of the arena and appeared to be resting. Mouth-to-mouth contacts were consistent with the notion of pheromone transfer, which will be further examined in 2015. Compared to pair mating, group mating registered a lower rate of observed litters (29% vs. 46%) but also a lower rate of maternal cannibalism (0% vs. 17%).

The Mamāceqtaw and the Education System: A Qualitative Case Study on the Educational Experiences of Menominee Indian Students

Student: Thomas Kenote*
Mentor: Dr. Paul Van Auken, Sociology
Presented at: McNair Showcase, Oshkosh, WI, September 2014, and the National Collegiate Research Conference, Harvard University, Cambridge, MA, January 2015

American Indian students have a difficult time learning in the standard education system presented in US public schools. A study done by the Indian Nations At Risk Task Force and the National Advisory Council on Indian Education (1990) stated that schools needed restructuring because they "no longer meet the needs of our kids, either socially or academically." Research on the difficulties experienced by American Indian students in the education system has been done in Montana, South Dakota, and Arizona, but to date has not been done in Wisconsin. The aim of this study is to identify the difficulties facing American Indian students in the educational system in Wisconsin to support the data already collected regionally and nationally through interviews conducted with members of the Menominee Nation of Wisconsin. Analysis of interviews compares current results and themes of such interviews in the lens of the Menominee Nation and identifies possible solutions to help improve the educational system as whole, while creating conversation about strategies to improve the system to benefit American Indian students and all other students.

Inactivation of Light-Harvesting Proteins in *Synechococcus* sp. PCC 7002 Cyanobacteria for Increased Cell Density and Bioproduct Yields

Student: Franki Mayer*
Mentor: Dr. Toivo Kallas, Biology
Presented at: McNair Showcase, Oshkosh, WI, September 2014, and the National McNair Conference, Delavan, WI, October 2014

A growing concern worldwide is the continued use of products and fuels derived from petroleum. These resources are limited, which presents the problem of finding suitable replacements that need to be sustainable, renewable, and cost effective. One such alternative to petroleum products currently being explored is isoprene (C_5H_8), a precursor for numerous terpene products, including synthetic rubber, pharmaceuticals, plastics, and biofuels. One approach to the production of bioproducts is to use cyanobacteria, which are microalgae that derive energy from sunlight and carbon from CO_2. Our group had genetically modified the cyanobacterium *Synechococcus* sp. PCC 7002 to produce isoprene. However, for cyanobacterial "photo-isoprene" to become a marketable option for replacing petroleum products, there are many more modifications to be made. One of these involves the gene *cpcB* that codes for a protein called phycocyanin, which captures light energy in the photosynthetic process. Phycocyanin very efficiently captures solar energy, but also prevents

cyanobacterial cultures from growing to high densities because the cells closest to the light source absorb most of the sunlight and prevent the cells beneath from receiving sufficient light. This is known as "overshadowing." As a result, cultures are not able to grow to high densities with high bioproduct yields. My goal was to inactivate the *cpcB* gene by inserting an antibiotic resistance gene into the middle of the *cpcB* gene. This will prevent phycocyanin from being made, which in turn should prevent the overshadowing effect and result in higher isoprene yields. I have used genetic engineering methods to assemble a DNA construct that carries the inactivated *cpcB* gene and replicates as a plasmid (extra-chromosomal element) in a bacterial host. This inactivated gene will be introduced into *Synechococcus* to generate cyanobacteria that can be grown to higher densities with increased isoprene yields. Producing higher amounts of isoprene is one of the first steps to creating a marketable replacement for petroleum products.

African American Males in College: Following Their Educational Journey at the University of Wisconsin Oshkosh

Student: Shariah Salahaladyn*
Mentor: Dr. Sylvia Carey-Butler, Academic Support of Inclusive Excellence
Presented at: McNair Showcase, Oshkosh, WI, September 2014, and the Black Doctoral Network Social, Philadelphia, PA, October 2014

This research study seeks to highlight factors that affect African American males' persistence in and graduation from UW Oshkosh. The purpose for this qualitative study is to examine factors of five African American males ranging from sophomore to graduate level. These factors include, but are not limited to, elementary and secondary education preparation (K-12), relationships with professors, and campus resources implemented to support African American males and the campus environment. Jameel Scott, Kenneth Taylor, and Robert Palmer (2013) have found four critical factors that contribute to Black males' departure from high school: lack of skilled and culturally competent teachers; low educational expectations; lack of mentorship; and lack of family and community support (p. 295). All these factors relate to students who have not completed high school. This study found four themes: (a) college preparedness, (b) social connections/ relations with administrators or faculty, (c) college resources and amenities, and (d) growth for African American males in the future. The findings indicate the need for male initiatives and African American faculty for African American males.

Parametric Solution to Stochastic Ants

Student: Alvaro Sosa*
Mentor: Dr. Christopher Edwards, Mathematics
Presented at: McNair Showcase, Oshkosh, WI, September 2014, and the National McNair Conference, Delavan, WI, October 2014

For nondeterministic systems with a probability distribution that can be contained by a finite support (i.e., not a random walk process) and with convergence occurring at some later time, it is believed that there exists a stochastic differential equation such that explains how the support changes as time lapses. In order to explain why the support changes, a time dependent vector parametric equation was formulated. A common difficulty for analyzing nondeterministic systems is the insufficiency of data. Therefore, in order to learn more about stochastic processes, this project focuses on finding an explanation for the stochastic nature of ant trajectories as a colony identifies a food source. Within this research, an algorithm has been created which formulates how ants find food sources. Also, as time lapses, ants create the shortest distance between their nests to the food.

Anti-Viral Properties of Common Over-the-Counter Products

Student: Megan Wilson*
Mentor: Dr. Teri Shors, Biology
Presented at: McNair Showcase, Oshkosh, WI, September 2014

Bioprospecting is a method utilized by both commercial and scientific entities to identify valuable bioactive compounds. A demand for better treatment options for human diseases that are safe, effective and affordable has spurred

commercial businesses and drug manufacturers to offer alternative medicines. As pathogenic viruses emerge for which there are no identified vaccines, cures or treatments, over-the-counter herbal and home remedies continue to rise in popularity. Is there something behind the hype of these consumable products? The objective of this research was to screen zinc, cinnamon, L-Lysine and bee propolis for antiviral properties. Healthy BS-C-1 cell cultures were maintained and served as host cells for viral infections used in screening experiments. Cinnamon and bee propolis reduced the number of herpes simplex-1 virus and vaccinia virus plaque forming units (PFUs) by 40% or more at a concentration of 1 mg/ml and more than 90% PFU reduction at 10 mg/ml. L-Lysine caused a modest effect, with no PFU reduction at 1mg/ml and only a 9% PFU reduction of vaccinia virus; the effect on herpes simplex-1 virus was much more promising, reducing PFUs as much as 38%. Zinc was too toxic to host cells at both concentrations, in multiple trials.

Peace, Justice, and Understanding in Northern Ireland

Student: Brooke L. Wollner*
Mentor: Dr. Marguerite Helmers, English
Presented at: McNair Showcase, Oshkosh, WI, September 2014, and the National McNair Conference, Delavan, WI, October 2014

This study examines how conducting oral history accounts with terrorists can contribute to a society's ability to maintain peace, justice, and understanding within that society, all of which are core values that contribute to a society's success and inner workings. On a larger scale, the world itself is made up of different regions that have the ability to maintain peace, justice, and understanding, thus contributing to the ideas behind the ever-evolving nature of collaborative work and innovation. Through mutual respect and understanding, the role of ethics is born. With this said, I am examining the nature of interviewing terrorists as it pertains to peace, justice, and understanding, by exploring the context of "The Troubles" in regards to the Northern Ireland Conflict that has occurred for decades between the Irish Republican Army (IRA) and Ulster Volunteer Force Veterans (UVF). I will further examine contradictory evidence through a synthesis of sources leading to a judgment about the ethics of data collection and distribution – for example, oral history interviews being used to prosecute criminal cases – as well as the responsibilities of the researchers who decide to conduct oral history research projects like the Boston College oral history archives, formerly known as the "Belfast Tapes." Getting "both sides of the story" is highly valuable in that it allows academics to understand the true nature of conflict. However, if not done just right, exploring the nature of conflict can do significant harm, thus violating ethics codes in place to protect participants as well as researchers. I used three main variables to distinguish the effects of interviewing, defined specifically in regards to the context of conflict discussed between the late 1960s through present day in Northern Ireland: *peace, justice,* and *understanding*. After an extensive literature review process, I used a coding scheme to represent attitudes and outcomes pertaining to the variables listed. The coding scheme used within this research allowed me to distinguish ethical practices within this time period, as well as gather inferences pertaining to ethical practices while conducting oral history interviews. Being sensitive to ethical practices and examining past examples is what allows researchers to engage in useful and valuable research that does not stir up conflict or harm others. Although interviewing terrorists can be helpful in regards to the variables at hand, the present study found disproportionate relationships between interviewing and ethics. Interviewing, as a means to collect data, can sometimes lead to neglect of certain ethical principles, such as beneficence.

Internet Religion: Community Formation on Wiccan Websites

Student: Pearl Wright*
Mentor: Dr. Michael Baltutis, Religious Studies
Presented at: McNair Showcase, Oshkosh, WI, September 2014, and the National McNair Conference, Delavan, WI, October 2014

A common element of religion is the act of gathering for worship, study, and community, but research has shown that an increasing number of people are turning to the Internet for their religious and spiritual experiences, and that a steady increase in Internet usage has occurred which shows no sign of slowing. At the beginning of the twenty-first century, a survey of American teenagers showed that one in six teens had indicated that they expected to use the Internet as a substitute for their current religious practices. As this group matures, they will take their religious practices with them and pass them on to the next generation, indicating a shift in how the practice of religion may look in the future. Many sociologists, especially Durkheim, have mapped religious behavior as needing certain elements to be considered a community practice. The presence of collective representations and collective effervescence was foremost for Durkheim's theories of religion. The question now becomes how people will experience collective elements when separated by other practitioners of their faith geographically. The computer screen and cyberspace becomes the sacred space that churches and temples have provided for thousands of years. The religious studies scholar is on the edge of a new frontier in research striving to understand this new religious behavior and how it is changing the way individuals and communities practice their religions. This freedom from the brick-and-mortar locations has also shown an increase in new religious followings. One such religious practice is Wicca, an Earth-based Neo-Pagan practice that has experienced explosive growth on the Internet. By examining participatory Websites that allow participants to interact with each other, specifically those of the Wiccan following, this research will attempt to discover the activities that draw participants to the sites and the emotional responses that are causing participatory communities to form and thrive.