



*Welcome to the 15th annual College of Letters and Science Undergraduate Research Symposium.*

This symposium is a celebration of student scholarship...that is, the application of the knowledge gained in their classes to real world questions and problems. The exercise of scholarship is fundamentally about discovery. As part of this annual celebration, we display to our stakeholders (the public, legislators, parents, etc.) just how this discovery is encouraged. UW-Stevens Point is not a trade school, or a community college, where teaching is nearly the sole activity of the faculty. Many nationally see the role of higher education changing, and question the value of scholarship as part of our daily activities in the academy. Discovery and scholarship are critical change agents in the lives of our young people. Each experience demonstrated by the posters and presentations at this symposium is characterized by a common currency...that of faculty working with students as partners in discovery. At the College of Letters and Science, we strive to empower students to trust in their ability to contribute to and change their world. I often tell new faculty candidates that their primary job as a teacher/scholar is to raise the expectations of our students, helping them realize that they too can be professionals.

Congratulations to all our students on their work. Please let our students know that it does matter that they have taken the time to get to know their professors as teachers, mentors, confidantes and friends.

A handwritten signature in dark ink that reads "Christopher P. Cirno".

Christopher P. Cirno  
Dean, College of Letters and Science  
Professor of Geography and Geology

### **Join Scholar Society of UWSP**

Scholar Society of UWSP is a student organization that provides resources to students participating in research or who are interested in finding a professor to do research with. We help fund travel to present research, training in new research methods, and publication fees for members. To join, students can attend the first meeting after the symposium on April 30, at 7:00 in TNR 271 or email Alex Ollhoff at [aollh985@uwsp.edu](mailto:aollh985@uwsp.edu) for more information!

## Oral Presentations 2:20-3:10 p.m.

Science Building (A-wing) 1<sup>st</sup> Floor

### **Group 1**

**2:20-3:10 p.m. Room A106**

***Student Employment, Academic Success and Personal Wellbeing: A Study of Perceptions, Assumptions and Expectations at University of Wisconsin-Stevens Point*** - (Political Science)

By: Ryan Specht

Faculty mentor(s): Brad Mapes-Martins, Tori Jennings

Moderator: Brad Mapes-Martins

The sometimes untoward relationship between employment and student academic success at the University of Wisconsin-Stevens Point (UWSP) is largely unexamined. The purpose of this project is to examine the assumptions that define success at UWSP through a study of student academic performance, personal wellbeing, and employment. This interdisciplinary project uses both qualitative and quantitative methods to investigate the implicit assumptions of students, employers, faculty, and staff, and how these assumptions affect the behavior and identity of UWSP students. Furthermore, this investigation provides in-depth analysis of the social, financial, and institutional influences that shape student behavior, expectations, and outcomes at UWSP. The results of this research will help administrators, faculty/staff, students, and parents better understand the interrelationship between employment and student success at our university.

***Student Employment, Academic Success and Personal Wellbeing: A Study of Perceptions, Assumptions and Expectations at University of Wisconsin-Stevens Point*** - (Political Science)

By: David Boardman

Faculty mentor(s): Brad Mapes-Martins, Tori Jennings

Moderator: Brad Mapes-Martins

The sometimes untoward relationship between employment and student academic success at the University of Wisconsin-Stevens Point (UWSP) is largely unexamined. The purpose of this project is to examine the assumptions that define success at UWSP through a study of student academic performance, personal wellbeing, and employment. This interdisciplinary project will use both qualitative and quantitative methods to investigate the implicit assumptions of students, employers, faculty, and staff, and how these assumptions affect the behavior and identity of UWSP students. Furthermore, this investigation will provide an in-depth analysis of the social, financial, and institutional influences that shape student behavior, expectations, and outcomes at UWSP. The results of this research will help administrators, faculty/staff, students, and parents better understand the interrelationship between employment and student success at our university.

## Group 2

**2:20-3:10 p.m. Room A107**

### ***“Honey, I Shrunk the Wheat”: RNA Gene Silencing to Dwarf Bread Wheat -*** (Biology)

By: Christopher Navarro, Eric Baumert, Jerott Moore, Alina Ott

Faculty mentor(s): Devinder Sandhu

Moderator: Devinder Sandhu

Brassinosteroids (BRs) are fundamental plant hormones involved in the growth and development of wide variety of plants. A trans-membrane protein receptor kinase, Brassinosteroid Insensitive 1 (BRI1) is known to interact with BRs and is directly involved in plant development. The BRI1 loss of function mutant showed significant reduction in height in Arabidopsis, making it an ideal candidate for manipulating height in wheat. The Bri1 gene is well characterized in Arabidopsis but largely unknown in wheat and other crop plants. A cross-species sequence analysis of BRI1 suggested that the gene in Triticum aestivum (TaBRI1) shows 54%, 95%, 83% and 79% identity at amino acid level to Arabidopsis (AtBRI1), Barley (HvBRI1), rice (OsBRI1) and maize BRI1 (ZmBRI1), respectively. Comparison of BRI1 sequences from several plant species revealed distinct variation in the number of leucine rich repeats between monocots and dicots. Expression studies using tissues from root, lower stem, upper stem, leaf sheath, leaf, and ear suggested that the highest gene expression was observed in the stem and lowest in the leaf. Virus-Induced Gene Silencing (VIGS) analyses with two different antisense constructs for TaBri1 showed induction of dwarfing in the inoculated plants compared to the viral (photoene desaturase and MCS) and non-viral inoculated plants. Transient silencing of TaBri1 suggested that it is true ortholog of AtBri1 and is a good candidate for inducing dwarfing in wheat.

### ***C.S.I.: Characterization of Soybean gene Identities -*** (Biology)

By: Callie Johnson, Taylor Atkinson, Tyler Cina, Alex Ollhoff, Olivia Schiefelbein

Faculty mentor(s): Devinder Sandhu

Moderator: Devinder Sandhu

Transposable elements jump from place to place in the genome that can cause insertion mutations in the genes they land into. We have identified a highly active, native transposable element, Tgm9, from the W4 gene in soybean. Plants with intact W4 have purple flowers; in the mutant (w4-m), where transposon is interrupting the gene, flowers are variegated. Excision of the Tgm9 element from W4 results in purple flower. Objectives of this investigation were i) to study the transpositioning pattern of Tgm9 in the soybean genome, and ii) to clone genes tagged by Tgm9. We have identified 196 revertants with purple flowers by growing a mutable line, T322 (w4-m)ene. DNA from

the revertants was digested with restriction enzymes and ligated to the adaptor to generate the adaptor-ligated genomic DNA libraries. The libraries were then used to isolate the DNA fragments containing the Tgm9-specific sequences by conducting PCR. Of the total 196 mutants, insertion sites were obtained for 158 mutants. Tgm9 transposed into 18 of 20 soybean chromosomes from the original DFR2 locus located in Chromosome 17. This observation suggests that Tgm9 moves randomly around the soybean chromosomes. Seven of the 158 Tgm9 insertions mapped to a single region suggesting a preferential transpositioning in this region. About 40% times Tgm9 transposed into the genic regions. Thus, Tgm9 has a high preference for moving into genes and should be useful for creating mutants for revealing functions of soybean genes.

### **Group 3**

**2:20-3:10 p.m. Room A109**

#### ***Effects of Lunar Illumination on Bat Activity in Wisconsin*** - (Biology)

By: Eric VanNatta, Taylor Johnson, Katelyn BaDour, Matthew Brunner, Ana Breit

Faculty mentor(s): Christopher Yahnke

Moderator: Christopher Yahnke

Bats perform a number of important ecosystem services such as eating insects normally regarded as pests. It is important to improve our knowledge of resident bat populations as new threats such as White-Nose Syndrome and wind farms may impact populations. Data was collected from an Anabat bat detector permanently mounted at Kemp Field Station in Woodruff, Wisconsin. The Bioacoustics Analysis Team (BAT) at UWSP analyzed echolocation calls collected from 2011 to 2013. Analook software was used to More than 25,000 bat calls have been analyzed thus far. A potential variable on bat activity level is the lunar illumination level. We looked at the relationship between lunar illumination levels and bat activity to determine if a potential trend may exist. After the calls were sorted by individual species, date, and time, lunar data was added. Some mammals such as rodents are lunarphobic, meaning that their activity levels decrease during high illumination to protect themselves from nocturnal predators. Bats in Wisconsin have very few predators so we hypothesize that they should not be lunarphobic. After comparing the lunar phases to bat activity data we concluded there is no clear correlation between lunar conditions and bat activity. We are currently investigating other climatic variables such as temperature and precipitation in regards to activity. Knowledge of bat activity is critical to develop an ecologically responsible approach towards future bat conservation efforts.

***Soundscape Ecology of Habitats in Hawaii and Central Wisconsin* - (Biology)**

By: Katelyn BaDour, Matthew Brunner, Ana Breit, Rychia Bosman, Rebecca Stennett

Faculty mentor(s): Christopher Yahnke

Moderator: Christopher Yahnke

New technologies such as automated recording devices, inexpensive data storage capabilities, and acoustic data processing software have provided an opportunity to characterize the acoustic dimension of ecosystems. Soundscape ecology is a relatively new field of study that quantifies the collection of sounds that emanate from a landscape. The types of sound within a landscape are broken into three categories: geophony (sound generated by the physical environment), biophony (sound generated by living organisms), and anthrophony (sound generated by humans). We surveyed a variety of habitats including the deciduous forests and wetlands of Schmeeckle Reserve (Stevens Point, WI), as well as the tropical Ohi'a rainforests of Kalopa State Park and Volcanoes National Park in Hawaii. Sounds of each habitat were recorded for 60 minutes in the morning, afternoon and evening and categorized as either geophony, biophony or anthrophony. The data were analyzed using Microsoft Excel to characterize the soundscape of each location. We will demonstrate how this technique can be used to compare soundscapes both spatially and temporally. For example, these locations each contained varying levels of acoustic activity, and activity varied depending on the time of day. We will also discuss some hypotheses that can be tested using this technique.

**Group 4**

**2:20-3:10 p.m. Room A110**

***Change in Prevalence of Tick-borne Diseases in Black-legged Ticks from Schmeeckle Reserve and Marinette, Wisconsin* - (Biology)**

By: Stephanie Haseker, Bethany Blank

Faculty mentor(s): Diane Caporale

Moderator: Diane Caporale

Lyme disease is the most prominent vector-borne illness, caused by *Borrelia burgdorferi*, which, if not detected early, can lead to development of neurologic manifestations. Anaplasmosis is a disease developed from an intracellular infection of *Anaplasma phagocytophilum*, a close relative of the bacteria that cause Rocky Mountain spotted fever. Lastly, Babesiosis is a malaria-like disease caused by *Babesia microti* which is an apicomplexan parasite that infects the red blood cells of a host. The prevalence of each of these pathogens in black-legged (deer) ticks residing in Central and Northeast Wisconsin was determined in 2002-2003; only a low prevalence of *B. burgdorferi* was detected. Since then, ticks from Schmeeckle Reserve (Central WI) have been monitored for infection in subsequent years, showing new emergences of *A. phagocytophilum* and *Ba.*

*microti* and increases in prevalence of all three pathogens. In 2013, ticks from Marinette (NE WI) were tested for these three pathogens to determine if, as hypothesized based on the increase of these pathogens in Central WI, the prevalence and abundance of these tick-borne pathogens have also increased in Marinette, WI, within the last decade. Surprisingly, results showed that the *Anaplasma* and *Borrelia* pathogens have decreased in prevalence, and the *Ba. microti* pathogen still remains undetected in Marinette. Here we discuss possible explanations for the disparity in abundances of these pathogens in ticks residing in Central and NE WI.

### ***RYR1 [Arg2454His] Gene Mutation Identified in a Family Associated with Malignant Hyperthermia*** - (Biology)

By: Jinzhi Li

Faculty mentor(s): Diane Caporale

Moderator: Diane Caporale

Malignant Hyperthermia (MH) is a rare life-threatening dominant disorder that causes extreme fever, muscle rigidity, acidosis, and rapid heart rate, when exposed to general anesthesia. Researchers have previously identified four amino acid replacement mutations on the RYR1 gene in MH patients: [Arg44Cys], [Arg533Cys], [Val2117Leu] and [Arg2454His]. These mutations cause malformed and nonfunctional calcium channels in muscle cells, normally used to regulate calcium flow for essential muscle function. The objectives of this study were to screen for the aforementioned four point mutations of the RYR1 gene in a German family affected with MH and identify family members that carry the mutation. With IRB approval, 15 participants filled out a survey of which they described any signs of MH. One individual experienced all symptoms under anesthesia and was used as the positive control. DNA was extracted from 10 hair follicles each. The four segments of the RYR1 gene were amplified in separate reactions by PCR and then sequenced by capillary electrophoresis. DNA sequences were compared to normal sequences provided by NCBI GenBank. Results showed four family members that were identified with the RYR1 [Arg2454His] mutation. These findings correlated with all four experiencing signs of MH. A recommendation will be made for family members to seek genetic counseling to be screened for the RYR1 [Arg2454His] mutation.

## Group 5

**2:20-3:10 p.m. Room A111**

### ***Three Days: The Antiwar Movement, Propaganda, and the "Aquarian Exposition"*** - (History)

By: Jordan Straight

Faculty mentor(s): Susan Brewer

Moderator: Susan Brewer

While bombs and gunfire flew in Vietnam and protestors took to the streets to express their dissatisfaction with the war, Max Yasgur, a dairy farmer from the rural community of Bethel, New York, signed on to host a music festival at his 600-acre plot of land. Today, this music festival, called Woodstock, resonates with popular culture, but few look at it for what it was: a political statement. With the average age of the festival-goer being around nineteen, these people had lived their definitive years with Vietnam in the background of society. Although many festival-goers denied that the festival was about the war, the very nature of Woodstock itself blatantly contrasted with the war-torn world they lived in. Whether they consciously knew it or not, the young adults' behavior at Woodstock attempted to establish autonomy and separate themselves from the war mistakes of previous generations. Every aspect of the fair spoke to the goals and messages of the younger generation, and as such all of them have to be seen as anti-war propaganda.

### ***Embracing Uncertainty and the Possibilities of Space*** - (Political Science)

By: Calvin Boldebuck

Faculty mentor(s): Brad Mapes-Martins

Moderator: Susan Brewer

In this day and age our society seems to be captivated with the ominous concept of dystopia. Dooms day scenarios are abundant in cultural artifacts and reveal something peculiar about the collective mindset of the times. The question is thus raised, why is it easier to imagine a future dystopia rather than a future utopia? How has the fear of the negative triumphed over the hope of the positive? My thesis is that due to an overlapping and entanglement of contradictory assumptions built into the current socio-economic paradigm, we are stuck in an imaginative paralysis by these contradictions. This speaks to several deeply entrenched problems which are rooted firmly in capitalism. What is required to transcend this complex dilemma is a sorting out of contradictions, identification of their sources and a re-orientation to escape resignation and cynicism. I argue that this can be attempted using metaphors from films, what some have called "the overlook effect" and political theorist approach to the problem as a whole.

## Group 6

**2:20-3:10 p.m. Room A112**

### ***Mixed integer linear program for UWSP summer conference scheduling-***

(Mathematical Science)

By: Eli Towle, Kane Mach

Faculty mentor(s): Andy Felt

Moderator: Andy Felt

Throughout each summer, the University of Wisconsin - Stevens Point (UWSP) plays host to a variety of conferences. Each week, staffing needs for ten residence halls can change dramatically, depending on the duration and scope of each conference. Motivated by the inefficiency and marginal accuracy of creating schedules by hand, the summer conference coordinator inquired if a mathematical model could be built to automate and optimize the staffing process. As a result, a mixed-integer linear program was produced using AMPL (A Mathematical Programming Language).

It is capable of better utilizing the staffing resources available to the university by accurately meeting all staffing requirements stipulated by the summer conference coordinator. These include daily and weekly hour restrictions, honoring approved individual requests for time off, and limiting the number of shifts for each worker. The mathematical model met all requirements while successfully minimizing the number of scheduled secondary employees, reducing the total number of double shifts, and distributing hours evenly.

This model can be applied to other institutions or businesses where specific amounts of workers are required at different time intervals throughout the day, and tailored to reflect which soft constraints the entity is foremost concerned with addressing.

### ***Solving Solitaire Battleship with Integer Linear Programming-*** (Mathematical Science)

By: Tyler Peters

Faculty mentor(s): Andy Felt

Moderator: Andy Felt

Integer linear programming is a method used to obtain an optimal solution (such as lowest cost or maximum profit) in a mathematical model whose requirements are embodied by linear relationships, requiring that the variables be integers. In this talk we will discuss integer linear programming as a method of solving the game of solitaire battleship -- a single-player logic puzzle similar to the popular board game Battleship. We will play a simple game before exploring the mathematics behind an integer linear program created to solve the game. Time-permitting, we will also present other applications of integer linear programming.



## **Oral Presentations 4:00-4:50 p.m.**

Science Building (A-wing) 1<sup>st</sup> Floor

### **Group 7**

**4:00-4:50 p.m. Room A106**

***QuickSort – Not as Fast as It Could be*** - (Computing and New Media Technologies)

By: Daniel Sowka

Faculty mentor(s): Robert Dollinger

Moderator: Robert Dollinger

Most of the currently existing software is running one core at 100 percent, while all the other cores are idle, thus using only a fraction of the computing power of our hardware system. All this software will have to be rewritten. Our serial version of the QuickSort algorithm has the following optimizations: (1) the sorting very short sequences optimization – sequences up to five elements are sorted by specialized code optimizing the number of data comparisons; (2) the sorting short sequences optimization – sequences larger than 5 and up to a serial threshold value set between 15 and 20 are sorted by the low overhead insertion sort algorithm. This implementation is better as the test arrays grow larger, such that for arrays sized between 1 and 10 million elements it performs 20% better than the .NET QuickSort() function. The parallel implementation is negatively impacted by the issue of load balancing across cores. Using higher granularity data chunks, that can be uneven in size, results in an imbalanced use of the cores leaving some of them idle for considerable amounts of time. Lower granularity data chunks improve load balancing, but add considerable overhead to the scheduling of the cores. We repeatedly partition the data until the partitioning pivot is equal or approximately equal to the median to provide a near perfectly balanced execution on the existing core. This parallel QuickSort provided near optimal performance on a 4 cores machine.

***UW-Extension Electronic Health Record*** - (Computing and New Media Technologies)

By: Jorge Dosdos, Tyler Firkus, Jordan Roush

Faculty mentor(s): Robert Dollinger, Tim Krause, David Gibbs

Moderator: Robert Dollinger

The UW Health Information Management & Technology (HIMT) program is a new degree-completion program provided by the UW-Extension network that teaches skills in both the health information management and health information technology fields. The HIMT management track prepares students to be leaders in providing better patient care, administering computer information systems and cost, and managing patient information that health professionals rely on. To better train them for these tasks students will be trained in the usage of Electronic Health Records (EHRs), which are systems that allow medical professionals to maintain patient records which contain any and all medically related information (from weight to insurance providers). Most healthcare establishments

have adopted such technology, so it is essential for management HIMT students to learn how to utilize them properly.

We have developed an application to simulate a simple EHR for HIMT students to train with while working in their curriculum. The application is web-based as the HIMT program is designed for nontraditional students, providing all coursework online. In particular, the application was developed with ASP.NET 4.0 Framework, implementing the MVC 4 Development Model with the ASPX View Engine. To store data, the application uses MSSQL Server 2008. The application simulates the basic functionality of an EHR, allowing users to create and maintain patient records that store a plethora of medically related data.

## Group 8

**4:00-4:50 p.m. Room A107**

### *Easier than antherectomy: Male-sterility in soybean* - (Biology)

By: Eric Baumert, Taylor Atkinson, Benjamin Speth, Napatsakorn Boonyoo, Zachary Coleman

Faculty mentor(s): Devinder Sandhu

Moderator: Brian Barringer

In soybean, an environmentally stable male-sterility system is vital for making hybrid seed production commercially viable. Eleven male-sterile, female-fertile mutants (ms1, ms2, ms3, ms4, ms5, ms6, ms7, ms8, ms9, msMOS and msp) have been identified in soybean. Of these, eight (ms2, ms3, ms5, ms7, ms8, ms9, msMOS and msp) have been mapped to soybean chromosomes. The objectives of this study were to (i) locate the ms1, ms4 and ms6 genes to soybean chromosomes, (ii) generate genetic linkage maps of the regions containing these genes, and (iii) to develop a comprehensive map of all known male-sterility genes in soybean. Bulk Segregant Analysis was used to locate genes to soybean chromosomes. Microsatellite markers from the corresponding chromosomes were used on F2 populations to generate genetics linkage maps. The ms1 and ms6 genes were located on chromosome 13 and ms4 was present on chromosome 2. Molecular analyses revealed markers Satt516, BARCSOYSSR\_02\_1539, and Satt149 were located closest to ms1, ms4 and ms6, respectively. The ms1 and ms6 genes, although present on same chromosome, were independently assorting with a genetic distance of 32.1 cM. Using information from this study and compiled information from previously published male-sterility genes, a comprehensive genetic linkage map was generated. Eleven male-sterility genes were present on seven soybean chromosomes. Four genes were present in two regions on chromosome 2 and two genes were present on chromosome 13.

## ***Soybean 007, License to Kill: Yellow Lethal and its Counterpart Yellow Viable***

- (Biology)

By: Jessica Boelter, Taylor Atkinson, Callie Johnson, Rayne Nimz, Carly Gorecki

Faculty mentor(s): Devinder Sandhu, Eric Singsaas, Sol Sepsenwol

Moderator: Brian Barringer

Chlorophyll-deficient mutants have been studied in several plant species. We have identified a lethal-yellow and a viable-yellow mutant in soybean. Our analysis revealed recessive epistatic interaction between the viable- and lethal-yellow genes. The lethal-yellow gene was mapped to a 344 kb region on chromosome 3 that contained 46 predicted genes. The viable-yellow gene was mapped to a 168 kb region on chromosome 2. We located 28 predicted genes in the region. Of these, Glyma02g39990 is of particular interest, as it showed homology to a translocon in the inner membrane of chloroplast (Tic110) in *Arabidopsis*. Tic110 is known to play critical role in plastid biogenesis and heterozygous mutants for Tic110 in *Arabidopsis* exhibited a pale phenotype. In comparison to green plants, the viable-yellow and lethal-yellow plants showed significant reduction of Chlorophyll A and B. Photochemical conversion efficiency was reduced in the viable-yellow plants, whereas, lethal-yellow plants showed no ability to convert light energy. The three phenotypes were easily distinguished based on their light reflectance indices. A reduction in thylakoid stacking was apparent in the viable-yellow plants. In the lethal-yellow genotypes proplastids did not differentiate into chloroplasts and contained very few membranes. Characterization of lethal yellow and viable yellow genes may help to better understand the biosynthetic pathways involved in the development of chloroplasts.

## **Group 9**

**4:00-4:50 p.m. Room A109**

## ***Predation risk affects escape responses of Side-blotched Lizards*** - (Biology)

By: Sarah Manka

Faculty mentor(s): Pete Zani

Moderator: Terese Barta

Prey species often contextually differentiate escape behavior with respect to predator risk and location variation. Optimal escape theory predicts that prey species should modify flight behavior based on differences in predation risk. Previous studies have shown that predation and geographic differences have separate effects on escape behavior. This study examines how the combination of predation and geographic variation affect pre- and post-escape behavior of Side-blotched Lizards (*Uta stansburiana*). We hypothesized that individuals will maximize their survival by changing flight responses. Further, we predicted that flight behavior should vary based on predator type and local density of

predators. At each of nine sites, we studied behavioral responses of *Uta* to the approaches of two different types of predators. Pre- and post-escape behavior were recorded for each trial. Although we did not detect differences in lizard behavior prior to escape, we found that flight distance increased when a subject was approached by a snake vs. a predatory lizard. *Uta* also used refuges more often when approached by a lizard. Geographic variation explained behavioral differences such that predatory lizard densities were correlated with escape behavior. *Uta* selected higher perches when predatory lizard densities were high. From these results, we conclude that Side-blotched Lizards differentiate between types of predators, assess predation risk, and respond to maximize survival.

***The effect of predation on limb-morphology evolution in side-blotched lizards***  
- (Biology)

By: Patrick Bula

Faculty mentor(s): Pete Zani

Moderator: Terese Barta

We investigated whether populations of side-blotched lizards (*Uta stansburiana*), which have many demographically-important predators, possess longer hind limbs when exposed to greater predation pressure. Certain predators are range restricted and do not occur in northern distributions of *Uta*. Predation pressure of several predator classes was used to explain variation in male *Uta* hind-limb lengths from 22 populations in Oregon, Nevada, and Washington. Side-blotched lizards in northern populations appear to have evolved shorter limb lengths in response to reduced predation pressure. We show that variation in the length of several hind-limb elements is related to the density of total predators. Furthermore, we demonstrate that the density and diversity of one predator class (other predatory lizards) is able to explain the majority of variation in hind-limb dimensions. These results suggest that rapid limb evolution can occur under conditions of relaxed selection, potential gene flow, and in response to one class of predator.

**Group 10**

**4:00-4:50 p.m. Room A110**

***Use of genetic markers to determine change in population structure of Borrelia and its tick vector in Wisconsin*** - (Biology)

By: Cody Much, Matthew Swiatnicki

Faculty mentor(s): Diane Caporale

Moderator: Diane Caporale

Ten years ago in Central Wisconsin, less than 20% of black-legged ticks, *Ixodes*

*scapularis*, harbored *Borrelia burgdorferi*, the Lyme disease pathogen, while none were detected with *Anaplasma phagocytophilum*, the agent of Anaplasmosis. At that time, *B. burgdorferi* and *I. scapularis* populations were both found distinct among Northwest WI, Central WI, and Northeast WI, with very little gene flow between them (*Borrelia*  $p < 0.00$ ,  $F_{st} = 0.15$ ; *Ixodes*  $p < 0.02$ ,  $F_{st} = 0.15$ ). Since then *Borrelia* abundance has increased in Central WI with last year's prevalence in ticks being 40%. In addition, *A. phagocytophilum* is now being detected in Central WI, with 21% of the ticks infected last year. Possible causes for increased prevalence of these pathogens may be due to increased tick abundance and increased gene flow between high and low endemic regions in the state. Our objective was to reassess the population structure of the Lyme disease pathogen and its tick vector in Wisconsin, using *ospB* and mtDNA sequence comparisons, respectively, from ticks collected fall of 2013. Haplotypes were identified and compared with those identified one decade ago. Based on  $F_{st}$  estimates, the population distributions of these haplotypes for both *B. burgdorferi* and *I. scapularis* were determined to assess any change in the population structure and provide possible evidence of increased gene flow. Here we report our findings and the significance it brings to Wisconsin residents and travelers.

### ***An Ecofeminist Analysis of the Managed Relocation of Species* - (Philosophy)**

By: Jesha Holcomb-LaMarche

Faculty mentor(s): Chris Diehm

Moderator: Chris Diehm

In light of contemporary environmental problems such as climate change, it has been suggested that traditional approaches to species conservation, such as establishing parks and preserves, are inadequate. In response to this perceived inadequacy, the non-traditional practice of relocating species from their native habitats—referred to as “managed relocation” or “assisted migration”—has emerged as a plausible, but controversial, strategy. This paper utilizes the ecofeminist theories and concepts of Val Plumwood and Karen Warren to examine critically this form of species management. With particular focus on the case of the critically endangered pygmy-possum, it considers not only the question of whether or not this form of management is conceptually justified, but also the question of how it would have to be implanted in order to be ethically justified. Its argument is that while species relocation may be worthwhile, it should not be implemented in an aggressive, overly interventionist manner, or in a way that manifests dualistic or reductionist understandings of nature. Finally, the essay argues that radical conservation efforts should not be used to sidestep the deeper ethical, social, and political reasons why ecological problems arise in the first place.

## Group 11

**4:00-4:50 p.m. Room A111**

### *United States Coinage: From "Ye Olde Mint" to the Collector* - (English)

By: Connor Falk

Faculty mentor(s): Lynn Ludwig

Moderator: Chris Diehm

The history of United States coinage began in 1792 with coinage presses in the basement of a tool shop. It took three years for the workers to produce one million coins, while the present U.S. Mint mints the same amount in 22.5 hours. U.S. coins like the Peace dollar, the Kennedy half dollar, and the Buffalo nickel tell a history of war and peace, depression and prosperity. Important periods in U.S. history made their mark on U.S. coinage, reflected now and forever, whenever a coin collector examines the coin. My research covers the events that occurred in the nation to change the coinage and what this means to a collector today. Early depictions of liberty on coins reflected a period of hope and promise of the young nation. Later on, former presidents appeared on the coins in honor of their service as leader of the United States, beginning with the 1909 Lincoln cent. The very pocket change of today is part of the nation's history and the continuation of a legacy beginning with the first large cents bearing the "United States of America" on their reverse. My presentation offers a look into the history of the U.S. Mint and the coins it created which are now collected and preserved by numismatists for generations to come.

### *Secure distribution of InCommon client certificates to campus users via domain authentication* - (Foreign Languages)

By: Parker Smith, Pranav Dogra

Faculty mentor(s): Tim Krause

Client certificates use public key cryptography to provide a method of assuring the identity of users when communicating digitally via email. The University of Wisconsin-Stevens Point (UWSP) currently issues internally signed certificates to campus users that are not trusted by parties external to UWSP. The Information Security Office of UWSP wants a means of distributing externally trusted certificates to campus users using existing resources. The UW System currently distributes externally trusted 'UW Digital ID' certificates to certain users, but they are not made available to all campus users on demand. A few UW institutions have started utilizing InCommon certificates, but the process in which they distribute them is not easy for the average user to utilize.

We built a prototype system that allows UWSP users to enroll, collect, renew, and revoke their certificates with InCommon's certificate manager using certificate management messages. Our system requires only that the user log in with campus credentials and then access email for collection of digital certificates, which can be imported directly into their devices.

This prototype will set in motion a larger project for the Department of Information Technology of UWSP, where they will be able to utilize the framework we developed to

provide UWSP users a means to easily enroll and collect an InCommon client certificate to assure their identity to other internet users.

## **Group 12**

**4:00-4:50 p.m. Room A112**

### ***Religion and Burmese Traditional Medicine*** - (History)

By: Myo Oo

Faculty mentor(s): Brian Hale

Moderator: Jason D'Acchioli

From the dawn of the Tagaung dynasty to the end of the Konbaung dynasty, religion has profoundly influenced Burmese traditional medicine: most notably Hinduism and Buddhism. Literary sources reveal that the four foundational systems of Burmese medicine, consisting of Desana, Bethitza, Astrological, and Vezzadara systems, are underpinned by Buddhist and Ayurvedic philosophies. From the perspectives of human anatomy and physiology, to the rationality of treatment and disease causation, religion has had a defining role. Religious influences are embedded in practices such as medical tattooing, urine therapy, incantations, and variolation. Devout worship and religious dicta preserved the traditional medical system even when the Burmese monarchy was deposed at the hands of colonial aggression in 1885. This paper explores the impact of religion in creating the Burmese traditional medicine system and in preserving it against colonial efforts to impose prophylactic Western medicine.

### ***Women in Spain*** - (History)

By: Alexia M. Szabo

Faculty mentor(s): Brian Hale

Moderator: Jason D'Acchioli

Over the last decade, Spain has been crippled by a deep recession that has been felt by every person in the country. The women of Spain have been especially impacted. They have at times been completely ignored when calling for help from the government and their peers. However, Spanish women have survived the hard times caused by the recession and have found a "silver lining" in the midst of their suffering. In addition to improving themselves, they have begun to promote gender equality. Although the recession has been hard on women, they have been able to make use of it to break free from traditional roles and create a better future for the next generation.

## Group 13

**4:00-4:50 p.m. Room A121**

### ***Readily Degradable Thermosets Via Thiol-ene Click Reactions*** - (Chemistry)

By: Seth Nelson

Faculty mentor(s): John Droske

Moderator: John Droske

Thermosetting polymers are used extensively in applications where it is desired that the material does not deform when heated or exposed to solvents, such as engine components, bakeware, tires, and printed circuit boards. While imparting desirable properties, thermoset materials can only be recycled with difficulty, if at all. Previous work in our group has afforded a series of readily degradable thermosetting polymers based on aliphatic polyester resins containing pendant thiol groups. The materials cure, i.e., reach the gel point, in one to two hours which is suitable for thermoset component fabrication. However, the materials also exhibit desirable adhesive properties which require a rapid setup time. A thiol-ene click reaction was chosen in an effort to reduce the time necessary to reach the gel point, or setup time, for these resins. The reaction worked well with short curing times of several minutes with a number of different diallyl compounds and our aliphatic polyester oligomers containing pendant thiol groups. In addition, varying properties and cure times were obtained by altering the percentage of thiol pendant groups by incorporating unsubstituted succinyl moieties. The cured materials were characterized by HNMR, IR spectroscopy, and Differential Scanning Calorimetry (DSC). Hydrolysis of the cured thermoset resins was affected by heating in water under pressure. The cured resins exhibited near complete solubility in approximately twelve hours.

### ***Structure-Property Trends In Poly(Alkylene Mercaptosuccinates)*** - (Chemistry)

By: Neiko Levenhagen

Faculty mentor(s): John Droske

Moderator: John Droske

Poly(lactic acid) (PLA) is a leading example of a thermoplastic that is made from renewable resources and is recyclable. While a very useful bioplastic, PLA has a relatively low glass transition temperature which limits its suitability for many applications. Crosslinking of polymer (i.e., plastic) resins is a common method for improving thermal properties. Crosslinked resins (called thermosets) offer increased strength and thermal resistance over thermoplastic materials, however, because of a 3D-network structure, they are insoluble and infusible and thus, very difficult to reclaim. We have synthesized thermosetting polymers of mercaptosuccinic acid (MSA) and various aliphatic diols, that show a desirable life cycle. After final processing and use, the



materials have been shown to readily undergo hydrolysis to fully soluble products and many of the starting monomers have the potential to be bio-sourced. The synthesis is straightforward and versatile and has afforded materials with a wide range of properties. Fully cured polymers exhibit glass transition temperatures ( $T_g$ ) from below  $-25^\circ\text{C}$  to above  $70^\circ\text{C}$ , higher than PLA. Mechanical properties also vary widely, from elastomeric to rigid, tough materials. This presentation will relate the properties of these materials to their chemical structures. It is based upon the synthesis and characterization of a series of poly(alkylene mercaptosuccinates) containing selected diols and various levels of mercaptosuccinate.

## **Poster Presentations 3:10-4:00 p.m.**

Science Building (A-wing corridors)

### ***A Biodiversity Informatics Assessment of Wisconsin Freshwater Mussels-*** (Biology)

By: Charles Jordan, Madalyn Zimbric

Faculty mentor(s): Daniel Graf

While previous projects have gathered literature references to Wisconsin mussel presence, there has been no integrated database of verifiable mussel observations linked with location data. We started with a database with approximately 17000 records, 8619 of which are linked to specimens collected from Wisconsin. We compiled records from the Milwaukee Public Museum, Illinois Natural History Survey, Academy of Natural Science of Philadelphia, Museum of Comparative Zoology Harvard, University of Michigan Museum of Zoology, and the Wisconsin Department of Natural Resources. We then georeferenced each record to its collection site and are now able to generate maps using subsets of these records. Using these georeferenced records, we will be able to confirm species richness for Wisconsin counties and use these data to generate hypotheses regarding assemblages of species associated with river basins. These data can also be used determine similarity of species diversity between basins and perhaps test hypotheses regarding patterns of post-glaciation invasion of mussels into Midwestern water basins. We will also be able to use these distributions to correct misidentifications and data errors within these collections.

### ***A Human Pedigree Analysis on Alpha-1 Antitrypsin Deficiency-*** (Biology)

By: Allysa Olson

Faculty mentor(s): Diane Caporale

Alpha-1 Antitrypsin Deficiency (Alpha-1) affects roughly 1 in 4,000, making it 1 of 3 of the most common genetic diseases to cause death among adult Caucasians in the US. The deficiency is caused by a mutation of the SERPINA1 gene, located on chromosome 14. Inheriting this mutation from each parent can result in Emphysema, COPD, and/or

liver disease between ages 40-60. The family being studied has an individual who was recently diagnosed with this disorder and is homozygous for the affecting variant, denoted PI\*ZZ. This means that the individual has inherited two mutated alleles, one Z allele from each of her parents, resulting in Alpha-1. The objectives of this research were to design a molecular protocol to genetically test for Alpha-1 and determine the genotypes of an extended family to assess their risks of this disorder. We optimized a molecular protocol that is easy to interpret and noninvasive, which can be adapted by other researchers or genotyping companies. After receiving IRB approval and consent from 18 family members, DNA from participants were screened with positive and negative controls to test the reliability of our molecular test. We also sequenced the PCR products to verify our findings. Here we report the results of our screening tool, the reliability of the test, and the genotypes of each member within a family pedigree. The genogram reveals those that are homozygous for the disorder and those that are carriers of the mutated SERPINA1 gene.

### ***BRCA1 Screening: A Breast Cancer Family Study-*** (Biology)

By: Zach Haskins

Faculty mentor(s): Diane Caporale

Out of all cancers that affect women, breast cancer is the most commonly diagnosed and is the second leading cause of death in women. Hereditary cancers account for 5-10% of all cancers, while 15-20% of breast cancers are a result of an inherited mutation in the BRCA1 or BRCA2 gene. In addition to breast cancer, BRCA1 and BRCA2 gene mutations have been linked to other cancers, such as pancreatic cancer and colon cancer. My objective was to conduct a study on my family, as there have been multiple incidences of cancer. The study examined the cancer history of individuals in my family, as well as the cancer risk of each individual. The gene that was examined and screened for mutations was the BRCA1 gene, since two family members who had cancer were genetically tested and found to be carriers of a BRCA1 mutation (H437L). I developed a PCR/sequencing tool to first identify the same DNA mutation in both family members as my positive controls. I then screened the rest of the participants for this cancer susceptibility gene and constructed a phenogram/genogram to illustrate the inheritance throughout my family tree and potential risks for future children. The results revealed that the individuals that had cancer and were already tested positive for the H437L mutation of the BRCA1 gene were the only family members that were tested positive; all other participants from my family did not carry this mutation, which is the best case scenario for me and my family.

### ***Can the Central Mudminnow (*Umbra limi*) be reliably bred in captivity?***-

(Biology)

By: Greg Cole, Forrest Fleishauer, John Grosch

Faculty mentor(s): Justin Sipiorski

The Central Mudminnow (*Umbra limi*) is a species of fish native to Wisconsin and is found commonly throughout the Central United States. This species can tolerate very poor water quality and is generally found in high densities. Therefore, the Central

Mudminnow could be an economically beneficial species for the aquaculture and baitfish industry. Currently the Central Mudminnow has been bred in captivity, but scientifically documented cases are rare. In order to adapt breeding protocols for commercial use, experimentation will be necessary to insure protocols are reliable and repeatable. Breeding habitat and conditions will be repeated in a 40-gallon tank. Two breeding simulations will take place, requiring adjusting the water temperature and lighting to appropriate seasonal levels. The objectives of this study are 1.) to achieve breeding success of the Central Mudminnow in captivity and 2.) to achieve repeatability among breeding trials. Analyses will compare the number of eggs laid per female between the two breeding sessions and will compare survivorship of juveniles through various developmental stages.

***Candidate gene identification for the Aconitase-4 gene in soybean*** - (Biology)

By: Jessica Boelter

Faculty mentor(s): Devinder Sandhu

Isozymes are variants of the same enzyme that differ in sequence but catalyze the same chemical reaction. Aconitase isozymes catalyze the interconversion of the three tricarboxylic acids: citrate, cis-aconitate, and isocitrate in the Krebs cycle. The Aconitase-4 isozyme has been used in mapping studies in soybean and is shown to be involved in allele switching. For the study, parent plants BSR 101 and PI 290136 were crossed. The F2 generation was scored for Aconitase-4 alleles and was used to make two bulks: one displaying the BSR 101 (dominant) allele pattern, and one displaying the PI 290136 (recessive) allele pattern. The bulks were then used in bulked segregant analysis (BSA), and tested with 700 primers. The gene was determined to be closest to Satt509, a primer located on Molecular linkage group (MLG) B1 (Chromosome 11). All the polymorphic MLG B1 primers were used on entire F2 population and genetic linkage map was developed. Aco-4 was mapped to a ~292kb region with BARCSOYSSR\_11\_323 and BARCSOYSSR\_11\_336 flanking the gene. In this region, there are 40 predicted genes. Glyma11g08550 is the most likely candidate as it shares sequence similarity to an aconitase gene. We have designed long range PCR primers to amplify Glyma11g08550 from two variants. We are in the process of sequencing Glyma11g08550. Sequence comparison may reveal critical differences between two isozyme variants and confirm isolation of the Aco-4 gene.

***Case Study on a BRCA1/2 Negative Dutch Family with Breast Cancer*** - (Biology)

By: Kristin Gunnink, Paige Kluz

Faculty mentor(s): Diane Caporale

Breast cancer (BC) is the most commonly diagnosed cancer among women in the US. About 10% of BC cases are hereditary. Knowing which gene is mutated allows oncologists to determine the best course of treatment for cancer. While 84% of familial cases are due to mutations in the BRCA1/2 genes, the other 16% can be caused by one of several genes. We conducted a study on a Dutch family with multiple cases of BC. Three women were diagnosed with BC in their early 40s and one unaffected woman's

daughter had BC in her early thirties. Only two of the affected women were genetically tested and found negative for BRCA1/2. Researchers found common in Dutch BC patients mutations within three exons of the MUTYH gene. Also, mutations within two exons of the CHK2 gene were found within BRCA1/2 negative BC patients from the US. Our objective was to screen the MUTYH and CHK2 genes to identify a genetic cause of BC in this family. Methods included receiving IRB approval and consent from 9 participants most closely related to the affected women within the 85-member extended family. We isolated DNA from their hair follicles and designed primer pairs to amplify portions of the MUTYH gene and CHK2 gene. DNA products were sequenced and compared with normal DNA sequence from GenBank database. The two BRCA1/2 negative affected women were screened first to identify the putative mutation and use as positive controls. Here we report our genotyping results within the Dutch family pedigree.

### ***Change in Prevalence of Tick-borne Diseases in Black-legged Ticks from Schmeckle Reserve and Marinette, Wisconsin - (Biology)***

By: Bethany Blank, Stephanie Haseker

Faculty mentor(s): Diane Caporale

Lyme disease is the most prominent vector-borne illness, caused by *Borrelia burgdorferi*, which, if not detected early, can lead to development of neurologic manifestations. Anaplasmosis is a disease developed from an intracellular infection of *Anaplasma phagocytophilum*, a close relative of the bacteria that cause Rocky Mountain spotted fever. Lastly, Babesiosis is a malaria-like disease caused by *Babesia microti* which is an apicomplexan parasite that infects the red blood cells of a host. The prevalence of each of these pathogens in black-legged (deer) ticks residing in Central and Northeast Wisconsin was determined in 2002-2003; only a low prevalence of *B. burgdorferi* was detected. Since then, ticks from Schmeckle Reserve (Central WI) have been monitored for infection in subsequent years, showing new emergences of *A. phagocytophilum* and *Ba. microti* and increases in prevalence of all three pathogens. In 2013, ticks from Marinette (NE WI) were tested for these three pathogens to determine if, as hypothesized based on the increase of these pathogens in Central WI, the prevalence and abundance of these tick-borne pathogens have also increased in Marinette, WI, within the last decade. Surprisingly, results showed that the *Anaplasma* and *Borrelia* pathogens have decreased in prevalence, and the *Ba. microti* pathogen still remains undetected in Marinette. Here we discuss possible explanations for the disparity in abundances of these pathogens in ticks residing in Central and NE WI.

### ***Characterization of Malaria Infections in Side-Blotched Lizard Populations - (Biology)***

By: Kristina Schultz, Kayla Parham, Martina Contreras, Jenny Dombrowsky, David Strong

Faculty mentor(s): Todd Huspeni, Peter Zani

While human malaria-causing *Plasmodium* species are relatively well characterized, the other non-human hosts for malaria parasites have been less studied. For example, there

are several types of malaria that infect birds and non-avian reptiles. *Plasmodium mexicanum* has been reported from a variety of lizards, including spiny and fence lizards (*Sceloporus*) and side-blotched lizards (*Uta*) in a number of western states. Studies show malaria infections in lizards do not generally result in death of the host, but pathology is manifested in decreased reproduction (e.g., reduced egg clutch size) and stamina of tested hosts. The purpose of our study was to characterize malaria infections in *Uta* with respect to prevalence (percent infected), geographic distribution, and the relationship of infections to lizard sex and age. We hypothesized malaria infections would be negatively associated with increasing latitude. We also hypothesized there would be no significant infection differences between sex, but infection prevalence would be higher in older individuals. Blood smears were obtained from field-fresh *Uta* at 14 sites in northern Nevada and eastern Oregon. Smears were preserved, stained, and assessed for malaria infection by microscopic examination. We found no significant difference in infection between males and females, nor was there an evident latitudinal gradient of infections. We continue to analyze for effects of *P. mexicanum* infection on female reproductive success.

***Curation of the Daniel Bereza Mollusk Collection at the Smithsonian National Museum of Natural History***- (Biology)

By: Caitlin Luebke, Rachel Sommer  
Faculty mentor(s): Daniel Graf

In 2011, the Smithsonian National Museum of Natural History (NMNH) acquired a collection of preserved mollusks and associated field notes from the family of Daniel Bereza (1950-2007), formerly of the Academy of Natural Sciences in Philadelphia, Pennsylvania. These field notes contain an entry for each collecting event, which include the localities of the collecting sites and lists of the species found. In January 2013, we began the process of accessioning this collection into the NMNH. We built a database of the collecting events by capturing the field notes verbatim, converting digital images of handwritten notes to searchable text strings. We learned that the field notes contain entries for over 700 collecting events between 1971 and 1984. We then normalized the collection event data into separate fields (collectors, state, county, water body, etc.) and georeferenced the localities. In January and March 2014, each specimen lot was identified and prepared for incorporation into the NMNH catalog. The collection contained 66 freshwater mussel (Order *Unionoida*) species from 15 U.S. states and 28 freshwater mussel species from 4 Mexican states. Our primary research interest in the Bereza Collection is the freshwater mussels from Mexico. In general, the freshwater mussels of Central America have been understudied. The curation of this collection will facilitate a long overdue revision of the Central American freshwater mussel fauna.

***Design of an Aquatic Ethnobotanical Garden in the UWSP Science Building Courtyard***- (Biology)

By: Andrea Schneider, Zachary Hudson  
Faculty mentor(s): Virginia Freire

This project was done to add useful aquatic plants to the UWSP Science Building

Courtyard Herb Garden. The goal of the garden is to maintain a collection of useful plants and promote the study of ethnobiology in the community. To create a collection of aquatic plants, research was done on how to establish a successful aquatic plant community in a small garden pond setting. Then several native ethnobotanically significant specimens were researched by usefulness and growth form. Six of these plants were selected and will be introduced into a free-form pond that was previously installed into the Garden.

***Dietary manipulation of fatty acids in lizards and their insect prey***- (Biology)

By: Emily Fleischauer

Faculty mentor(s): Pete Zani

Previous research has suggested that in mammals the composition of energy-storage molecules affects winter survival. To examine if this relationship remains constant in ectotherms, we raised lizards on insect diets differing in fatty-acid composition and analyzed tissues using gas chromatography-mass spectrometry. Such a relationship would indicate that type of fatty acid, not just the amount of stored energy, need to be considered in studies of ectotherm winter biology. Future experiments will test whether specific fatty acids are related to overwintering survival in lizards.

***Do limb dimensions evolve in side-blotched lizards due to predation?***-

(Biology)

By: Laura Wright

Faculty mentor(s): Pete Zani

Phenotypic variation can be influenced by both genetic and environmental factors, but determining which factor is influencing a trait can be difficult. We sought to compare lizards from different populations to determine if limb dimensions exhibit an evolutionary response to predators, or if environmental differences between populations are responsible for the variation. To do so, we reared animals under common lab conditions to minimize environmental effects and measured limb dimensions of lizards. Preliminary analyses suggest some limb elements are related to total predator density. Further analyses indicate other predatory lizards are responsible for the observed relationships between limb dimensions. Results suggest that some of the differences in limb dimensions observed in nature are due to evolved differences among populations.

***Does winter temperature tolerance of lizards increase with latitude?***-

(Biology)

By: Madeline Michels-Boyce

Faculty mentor(s): Pete Zani

As organisms move into higher latitudes, they may evolve mechanisms to survive in the harsher climates. The capacity of ectotherms to survive at sub-zero temperatures without freezing is called supercooling. While insects are known to evolve lower freezing points (i.e., show greater supercooling) at higher latitudes to survive harsher winters, this has

not been shown in vertebrates. We measured supercooling points in 12 populations of lizards hatched and raised in common conditions to test if vertebrates have also evolved lower freezing points. Although lizards regularly supercooled beyond  $-10^{\circ}\text{C}$ , our results indicate that latitude alone does not explain supercooling capacity. Thus, it appears that populations have not evolved toward greater cold tolerance. One possible reason lizards have not evolved lower supercooling points is that they can find places to avoid extreme cold temperatures during winter.

### ***Effects of Latitude on Growth Rates in Lizards*** - (Biology)

By: Joy Gadouas

Faculty mentor(s): Pete Zani

Growth rate is an important contributor to the fitness and overall survival of a species. Due to differences in resources and timing of growing season among populations, latitudinal variation can create differences in growth rates among populations. In order to test for differences in growth rate related to latitude, we reared lizards for the entirety of their lives in common conditions to minimize environmental effects. We periodically measured individual body size to determine growth rates when resource availability and age were known. This allowed for the analysis of genetic differences in growth rate of populations from specific latitudes. We found that after removing environmental conditions, growth rate of individuals amongst populations was affected by latitudinal variation such that southern populations grow faster and attain larger mass by the end of the growing season. Our results suggest there are evolved differences in growth rate among populations based on latitude.

### ***Effects on Latitude on Liver Mass in Lizards*** - (Biology)

By: Brady Nelson

Faculty mentor(s): Pete Zani

Previous studies have found that glycogen is a major molecule in energy storage for overwintering lizards. Glycogen is stored in the liver and in theory liver mass should increase across latitudes in order to better survive harsher climates. To test this, we collected lizards from multiple latitudes and reared their offspring in the lab. The offspring were raised under equal conditions to specifically isolate their genetics based on location. After the juvenile growing season, lizards were euthanized and dissected in order to weigh their organs. We analyzed resulting data including location and body size as factors. Contradicting our original hypothesis, we found that liver size actually decreased with increasing latitude. Reasons for this could be more efficient energy storage, thus requiring less energy storage for winter. However, this finding begs the question for further research.

### ***Electrophysiological Methods in Hippocampal Slices*** - (Biology)

By: Meghan Simkins

Faculty mentor(s): Jennifer Bray

Electrophysiological methods are experimental tools used to study synaptic responses in various regions of the brain. One of the most common brain regions studied by these methods is the hippocampus. In the hippocampus the synchronous and localized currents generated by synaptic activation of a population of pyramidal or granule cells gives rise to a characteristic and easily measured response called an excitatory postsynaptic potential (EPSP). An enhancement of EPSPs, often seen following a brief high frequency train of stimuli, is called long term potentiation (LTP). This phenomenon involves the long-term modification of synaptic communication and is thought to be the basis of learning and memory. It is well known that acute and chronic alcohol (ethanol) use can lead to impairments in memory by altering neuronal excitability and synaptic function in the hippocampus. Considerable efforts have been made to determine the electrophysiological actions of alcohol in the hippocampus, since it plays a critical role in learning and memory. Using electrophysiological methods it has been shown that alcohol exposure decreases LTP, which leads to the question of its potential effects on synaptic transmission and memory formation; specifically, the long-term synaptic changes that occur when it is abused or overused. The current study used extracellular field potential recordings to study the effects of alcohol on synaptic transmission in the hippocampus.

### ***Energy Storage Prior to Winter Across a Latitudinal Gradient in Lizards*** - (Biology)

By: Lauren Alexander

Faculty mentor(s): Pete Zani

Energy storage molecules, such as glycogen, can be important for over wintering success in animals. Latitude has an important effect on energy storage due to the lengths of growing seasons. By living in environments with longer winters, animals must be able to store more energy to survive. Analyzing energy stores of lizards just prior to winter should allow us to determine which populations require more energy for survival of a longer winter. We performed glycogen assays on samples from lizard populations along a latitudinal gradient. The lizards from higher latitudes should have greater energy stores just prior to the onset of winter than those from lower latitudes. However, we found no significant difference in the amount of energy stored prior to winter between the populations, indicating that the amount of energy stored during the growing season may not be an important determinant of survival in these lizards.

### ***Gregor Mendel Ain't Got Nothing on Soybean Green Cotyledon Phenotype*** - (Biology)

By: Eric Baumert, Zach Coleman

Faculty mentor(s): Devinder Sandhu

Cotyledon color is a useful trait in soybean that is visible even before germinating the



seed. Wildtype seeds are yellow and mutants are green. Association between cotyledon color and useful agronomic traits can be instrumental in early phenotypic selection of complex traits. The use of such selection methods saves time, money, and space, as fewer seeds need to be planted and screened. The cotyledon color trait was originally studied by Gregor Mendel in peas. We have shown that the same trait is controlled by two genes, D1 and D2, in soybean and either gene is enough to show the phenotype. The objective of this study was to isolate genes involved in cotyledon color phenotype in soybean using map based cloning. The D1 locus was mapped to molecular linkage group (MLG) D1a and the D2 locus was mapped to MLG B1. We compared genetic map with the sequence based physical map to identify putative candidate genes involved in cotyledon color. Most promising candidate for D1 was Glyma01g42390 and for D2 was Glyma11g02980. Soybean genes show homology to stay green gene in pea that is responsible for cotyledon color in pea. Glyma01g42390 and Glyma11g02980 show 97.3% identity at protein level. We have developed long range PCR primers for these genes and are in the process of sequencing them. Sequence comparisons will indicate cause of mutation in green cotyledon soybean and will help in isolating these genes.

***Historical patterning of age, growth, body condition and ectoparasite loads in Wisconsin populations of the Bluntnose Minnow (*Pimephales notatus*) - (Biology)***

By: Christopher Rosenthal, Andrew Teal, Garrett Johnson  
Faculty mentor(s): Justin Sipiorski

We are gathering life history information for Wisconsin populations of the Bluntnose Minnow (*Pimephales notatus*) from all holdings in the Becker Memorial Ichthyological Collection (BMIC) of the UWSP COLS Museum of Natural History. This work is currently in progress but will eventually encompass the collection of data from thousands of individuals collected from throughout the State over the past century. The Bluntnose Minnow is one of the most ubiquitous fish species in Wisconsin. We are measuring total length (mm), body weight (g) and gonad weight (g) from all BMIC holdings. We are estimating the age of individuals by counting scale annuli and we are quantifying infestations of the "Blackspot" fluke, an ectoparasite. We will conduct length weight regressions and length-at-age analyses for historical Wisconsin populations. We hope to compare these past life history parameter values to those of present day populations. We also hope to compare past and present life history data with statewide landuse patterns, pollution patterns, climatological information and other socioeconomic patterns in a GIS framework.

***Inventory and Analysis of the UWSP Living Plant Collection - (Biology)***

By: Claire Ault  
Faculty mentor(s): John Hardy, Emmet Judziewicz

Two greenhouses are located on the Stevens Point campus, one on the 5th floor of the TNR building, and the other on the 4th floor of the Science building. Between the two there are 7 separate rooms, each representing a unique climate to support an array of plants found around the world. This collection is used extensively to support Biol 130

(General Botany) and Biol 342 (Vascular Plant Taxonomy) labs, and is also used in several other Biology and Natural Resource courses, and serves over 1,000 students each year.

This study evaluated this living plant collection for the 2013-14 school year. Family and species diversity and recommendations for plant additions and future greenhouse management were analyzed for the utility of these collections to UWSP's teaching mission. Additionally, unknown plants were identified and plant labels were verified for accuracy and replaced as necessary.

The collection consisted of 104 families and approximately 462 taxa. The most diverse families present were the *Cactaceae*, *Crassulaceae*, and *Araceae*. Some families were well-represented, but approximately 34% of all the families were represented by a just single species, and some by just a single individual. These families are at significant risk of being lost from the collection. Of the 95 families emphasized in Biol 342, 75% were represented in the greenhouses, which may serve as a guide for future collection acquisitions.

### ***Investigation of Airborne Bacteria in Microbreweries*** - (Biology)

By: Jessica Bloom

Faculty mentor(s): Terese Barta

Wisconsin is undergoing a revival in microbrewing. Many microbreweries are set up in repurposed industrial spaces such as former warehouses. The goal of this project is to gain a better understanding of the types and number of bacteria present in the air of microbreweries. Bacteria are of concern as potential product spoilage agents. Levels and types of airborne bacteria in microbreweries have received relatively little attention in terms of research. Our current project involves investigation of two microbreweries in central Wisconsin. One is in a small brew pub that produces 45 to 50 barrels each month. The enclosed brewery is approximately 650 square feet and does not contain a bottling line. The second brewery is a larger facility with a bottling line, approximately 7000 square feet, producing 120 barrels per week. A Millipore® M- Air-T sieve impaction air sampler was used to sample 100 liters of air in various locations within each brewery, including near the fermenters. The cassettes of bacterial growth media were incubated aerobically for up to five days and colonies were counted. Bacteria were Gram stained and observed for cell morphology. Isolates were also tested for catalase activity. The predominant type of culturable bacteria at the smaller facility were Gram-positive cocci. Results from the second brewery are currently being analyzed. Our hypothesis is that the larger brewery with a bottling line will have a greater diversity of bacteria.

### ***Isolation and in vitro culture of mouse ovarian follicles in an alginate matrix*** - (Biology)

By: Erin Donahue, Janel Winters

Faculty mentor(s): Karin Bodensteiner

Experimentation concerning the in vitro culture of ovarian follicles has implications for a variety of areas of study including follicular development, oocyte maturation, in vitro

fertilization, and preservation of endangered species, to name a few. In the present study, methods for follicular isolation and culture were adapted from a previous study at Northwestern University. Methods included isolation of ovarian follicles from juvenile or adult mice by first using enzymatic dissociation to degrade ovarian stromal tissue. Mechanical dissection was then used to separate ovarian follicles. After isolation, follicles were encapsulated into an alginate bead, incubated in media supplemented with FSH, and cultured for up to a week. Follicles were monitored periodically over the week and follicular and oocyte growth were measured. Comparison of two types of alginate indicated that 1% Protanal PC alginate provides stable bead formation and best supports the follicle. Imaging techniques were also improved through the use of droplets of media surrounded by mineral oil. Contrary to expectations, follicular size may have decreased over time in culture, therefore, future studies will concentrate on ways to optimize follicular growth by improving encapsulation techniques and media supplementation.

***Male Sterility, Female Sterility Genes in Soybean? There's a Map For That-***  
(Biology)

By: A.J. VanMeter, Benjamin Speth, Napatsakorn Boonyoo, Joshua Rogers, Jordan Baumbach

Faculty mentor(s): Devinder Sandhu

A strong understanding of reproductive systems in plants is critical for breeding and can improve agronomical development. In soybean, several male-sterile, female-sterile (MSFS) mutants have been identified and studied, but many of these mutants have not been mapped to locations on soybean chromosomes. The objective of this study was to molecularly map five MSFS genes in soybean. Bulk segregant analyses were conducted using 800 simple sequence repeat (SSR) markers to identify the chromosomal locations of the genes. All five characterized sterility genes were located on soybean chromosomes. The st2 gene was present on chromosome 11, st4 on chromosome 1, st5 on chromosome 13, st6 on chromosome 14, and st7 on chromosome 2. The st2, st4, st5, st6 and st7 genes were flanked to ~398 kb, ~164 kb, ~4,231 kb, ~644 kb, and 222 kb, respectively. Comparison of genetic linkage maps and sequence based physical maps resulted in identification of predicted genes for each flanked region. Of these, possible candidates were identified for each sterility gene by relating protein functions. Future characterization of candidate genes should facilitate identification of the male- and female-fertility genes, which may provide vital insight on structure and function of genes involved in the reproductive pathway.

***Physiology of stress in three endemic South African small-bodied Shysharks (Family Scyliorhinus: Actinopterygii)*** - (Biology)

By: Ellie Wallace

Faculty mentor(s): Sarah Jane Alger, Justin Sipiorski

Recreational fishing activities can have a significant impact on the viability of fisheries. Many predatory fishes including Elasmobranchs (Sharks, Skates and Rays) can be susceptible to post-angling mortality. Angling exposes sharks to intense physiological challenges associated with excessive amounts of vigorous swimming and unnaturally

rapid changes in depth. One of the many shark groups upon which angling has relatively unknown effects is the Shysharks (Family: *Scyliorhinus*) endemic to the coastal waters of South Africa including the Puffadder Shyshark (*Haploblepharus edwardsii*), Dark Shyshark (*H. pictus*) and the Leopard Catshark (*Poroderma pantherinum*). Working with the RecFishSA program at the South African Shark Conservancy (SASC), my experiments were designed to monitor potential differences in physiological stress levels among and within these species via whole-blood lactate. I evaluated lactate levels in sharks experiencing voluntary stressors like scavenging, involuntary stressors such as simulated angling by chasing, and also effects of short recovery periods. Suffering zero fatalities, these experiments featured a balanced design, showcasing twelve, hand-caught animals with 144 trials total, featuring four different types of trials including foraging/scavenging, chasing, baseline trials and chasing with a recovery period. I am currently continuing to analyze my data and I am categorizing the different behaviors which were exhibited in the videos of my trials.

### ***Ploidy and range size in California's flora* - (Biology)**

By: David Barfknecht

Faculty mentor(s): Brian Barringer

Polyploids are organisms with more than two sets of chromosomes and, although relatively rare in most groups of animals, polyploidy is extremely common among flowering plants. The ecological, evolutionary, and genetic consequences of polyploidy in plants are numerous and include changes in gene expression, an increased capacity to mask deleterious alleles, the potential breakdown of self-incompatibility systems, reduced inbreeding depression, and the evolution of self-fertilization. In addition, theory predicts that polyploids might have larger ranges than diploids, owing at least in part to increased levels of genetic variation and ecological tolerance. Although some studies support this prediction, others are equivocal, and whether this is a general pattern across the angiosperms remains unclear. We assessed the relationship between ploidy and range size in a relatively large number (4031 species; 63 families) of California angiosperms. We used basal chromosome numbers to determine ploidy for each species and then compared the numbers of California floristic provinces (a surrogate for range size and/or niche breadth) occupied by diploids and polyploids. Contrary to theoretical predictions, in the majority of families analyzed, diploids and polyploids did not differ in terms of the numbers of floristic provinces occupied; moreover, where differences were found, they were not always in the direction expected.

### ***Spawning bullheads (Ameiurus sp.) in captivity* - (Biology)**

By: Kyle Wegner, Forrest Fleishauer, Greg Cole

Faculty mentor(s): Justin Sipiorski

The Brown Bullhead (*Ameiurus nebulosus*), Black Bullhead (*Ameiurus melas*) and Yellow Bullhead (*Ameiurus natalis*) are the three species of bullhead native to Wisconsin waters. These species are well known for their hardiness and ability to survive poor water conditions including high temperatures, high turbidity and low dissolved oxygen. This hardiness makes them promising candidates for aquaculture settings, the baitfish industry and as a staple foodfish. Breeding has been achieved in outdoor settings; however, there

is extremely limited data on breeding habits in aquaria. There is some documentation of spontaneous breeding events in home aquaria but these are rare and generally not detailed. This study will attempt to achieve several successful breeding events in a laboratory setting. Breeding bouts may occur by adjusting water parameters to match breeding conditions experienced in local natural habitats. The objectives of this study include: 1) attempting to create and maintain proper captive conditions for the observation of breeding behaviors of *Ameiurus* sp. with ultimate goal being the successful spawning of *Ameiurus* sp. 2) determining whether different species within *Ameiurus* will hybridize in captivity. Analysis will be done by assessing what conditions prompted the highest level of successful spawning events and highest survivorship of juveniles.

***Spawning phenology, body condition, and age-and-growth patterns in Wisconsin White Sucker (*Catostomus comersonii*) populations over the past 45 years.*** - (Biology)

By: Matthew Anchor, Ryan Johnson, Greg Cole  
Faculty mentor(s): Justin Sipiorski

We are investigating aspects of the life history of Wisconsin populations of White Sucker (*Catostomus comersonii*), an abundant and important forage fish for game fish species. We are measuring length (mm), preserved weight (g), and gonad weight (g) for each individual specimen in the Becker Memorial Ichthyology Collection of the COLS Museum of Natural History—thousands of individuals collected from throughout the State over the past 45 years. Age will be estimated from scale annuli. Length-weight regression and length-at-age analyses will be performed to determine the size and age structure of the past and present White Sucker communities. Gonadal somatic index (GSI) will also be determined across all time periods to estimate the average time of spawning activity in white suckers over this time span. This work is estimated to be completed by the fall of 2014. Comparisons of historical spawning phenology, body condition, age structure, and length-at-age can be made with current populations. We hope to compare past and present life history information with land use, pollution, climatological, and other socioeconomic patterns in a GIS framework.

***Structural modifications of vessel-parenchyma pit membranes in tylose development*** - (Biology)

By: Jonathan Sommerfeldt, Kai Chang, Cameron Trotter, Brandon Rued  
Faculty mentor(s): Qiang Sun

The thin wall region separating two adjacent cells at a pit pair is called pit membrane (PM). A PM is structurally made up of two primary cell walls and one middle lamella and functionally serves to help intercellular communications. The current study deals with the PMs between vessel and parenchyma cell (VPPMs) with regard to their role in tylose development. It is generally believed that VPPMs are modified in the formation of tyloses that may limit both pathogen and water movement in infected plants. However, little is known about the details of this modification. Recently we used our pruning-

induced tylose system and scanning electron microscopy to investigate morphological changes of VPPMs in grapevines. Our results have indicated that a pre-modified PM is flat in the surface view with a smooth surface that contains no visible pores. The first sign of modification is a relatively rough surface after some superficial wall material has been removed from the PM. Subsequent removal of more wall material leads to the formation of a porous PM with short branched or unbranched projections and/or irregular shaped particles on the surface. After that, the PM appears as a “fabric” with larger pores and fibrous networks attached on the surface and the whole surface also bulges towards the vessel lumen. Following this are one or two tyloses forming from the bulging PM. These provide some essential information for a better understanding on the unknown early events of tylosis.

### ***The Life History of the Common Shiner (*Luxilus cornutus*) in the State of Wisconsin* - (Biology)**

By: Richard Mahoney, Erik Halverson

Faculty mentor(s): Justin Sipiorski, Todd Huspeni

We are currently building a dataset on all holdings of the Becker Memorial Ichthyology Collection (UWSP COLS Museum of Natural History) for the Common Shiner (*Luxilus cornutus*). Specimens have been collected from throughout the state of Wisconsin over the past 60 years. This work is ongoing, we've currently gathered data from approximately 8000 fish as the project is 30% complete. We are measuring total length (mm), the preserved weight (g), gonadal weight (g), and we are estimating the age of the specimens by counting scale annuli. Length-weight regression, and length-at-age analyses were performed to see what the size and age structure were for the past populations of Common Shiners. The monthly gonadal somatic index (GSI) was also determined showing that it is highest in the month of June. This finding supports that, historically, June is the month immediately before spawning activities begin to occur. We will design experiments to see if the otoliths show a more accurate age estimate than scales. Ultimately we hope to use this dataset to explore long terms trends in age, growth, body condition and spawning phenology patterns throughout Wisconsin. These patterns may correlate with ecological, land use, pollution, development, or climatological patterns. We will also return to historically collected sites to look for significant life history shifts within populations.

### ***Use of genetic markers to determine change in population structure of *Borrelia* and its tick vector in Wisconsin* - (Biology)**

By: Matthew Swiatnicki, Cody Much

Faculty mentor(s): Diane Caporale

Ten years ago in Central Wisconsin, less than 20% of black-legged ticks, *Ixodes scapularis*, harbored *Borrelia burgdorferi*, the Lyme disease pathogen, while none were detected with *Anaplasma phagocytophilum*, the agent of Anaplasmosis. At that time, *B. burgdorferi* and *I. scapularis* populations were both found distinct among Northwest WI, Central WI, and Northeast WI, with very little gene flow between them (*Borrelia*  $p < 0.00$ ,  $F_{st} = 0.15$ ; *Ixodes*  $p < 0.02$ ,  $F_{st} = 0.15$ ). Since then *Borrelia* abundance has increased in

Central WI with last year's prevalence in ticks being 40%. In addition, *A. phagocytophilum* is now being detected in Central WI, with 21% of the ticks infected last year. Possible causes for increased prevalence of these pathogens may be due to increased tick abundance and increased gene flow between high and low endemic regions in the state. Our objective was to reassess the population structure of the Lyme disease pathogen and its tick vector in Wisconsin, using ospB and mtDNA sequence comparisons, respectively, from ticks collected fall of 2013. Haplotypes were identified and compared with those identified one decade ago. Based on Fst estimates, the population distributions of these haplotypes for both *B. burgdorferi* and *I. scapularis* were determined to assess any change in the population structure and provide possible evidence of increased gene flow. Here we report our findings and the significance it brings to Wisconsin residents and travelers.

### ***Viability of growing brewing barley in a vertical aquaponics system utilizing an airlift pump*** - (Biology)

By: Zachary Larson

Faculty mentor(s): Christopher Hartleb

Aquaponics is an integration of recirculating aquaculture and soilless hydroponics to create a more sustainable environment for growing both harvestable fish and plant crops. Aquaponics operates by cycling nitrogen wastewater produced by the intensive culture of fish through a grow-bed of plant crops. The plant crops utilize the nitrogen, which has been oxidized into nitrite & nitrate by bacteria, as nutrients. The resulting clean water is then recycled back into the fish tanks. As aquaponics is commonly performed within a controlled environment system the space-saving quality of vertical growing methods is attractive. However, vertical aquaponic systems rarely have been shown to be economically viable. The exception may be the Zipgrow© aquaponics method that utilizes a vertical grow-bed called a "grow tower" which also acts as a solids filtration unit and as a biofilter. Zipgrow© towers have been shown to successfully grow low nutrient demand plants such as small lettuces. The purpose of this experiment was to test their ability to grow a high nutrient demand crop within an aquaponics system. This was achieved by growing brewing barley. An airlift delivery pump was utilized for efficiency. If successful, a niche market of aquaponically grown brewing malts may potentially be identified. However, initial experiments showed that the nutrient laden water delivery rate required for barley growth from seed was not achievable using vertical Zipgrow© towers fed by an airlift.

### ***WIvertebrates: Towards an Account of the Freshwater Invertebrate Taxa of Wisconsin, USA*** - (Biology)

By: Richard Mahoney

Faculty mentor(s): Daniel Graf

The WIvertebrates website is a resource for students and the public to find information about the freshwater invertebrates of Wisconsin USA (exclusive of parasites and insects). It is available for anyone to access via the Internet. This website provides a description and some other information on the phyla known to reside in North America. The website

is based on a database developed in FileMaker Pro, and a custom perl script is used to code the HTML from exported text files. The students of BIOL/WATER 361 Aquatic Invertebrate Zoology here at UW-Stevens Point create content on some invertebrates for a grade and a few selected papers are put on the website. Students and the general public can read these papers and gain a better understanding of various topics in invertebrate zoology. Student researchers are able to contribute to the WInvertebrates website by helping synthesize data from various literature and Internet sources. This effort will help narrow down which 1) taxa are found in fresh waters, 2) resident taxa of North America, and 3) resident taxa of Wisconsin. As of 31 March 2014, the WInvertebrates website has information on 11,826 taxa, from phyla to species.

### ***A Preliminary Assessment of Air Quality in Wausau, WI*** - (Chemistry)

By: Shawn Pierce

Faculty mentor(s): David Snyder

Like many small cities, Wausau WI does not have a permanent air quality monitoring station but relies instead on air quality forecasts generated from local and regional emissions data to estimate air quality. Because these models do not keep current with changes in local emissions and conditions, forecasted air quality can often be very different than what is observed by local residents. In order to understand overall air quality in Wausau, WI and to measure the impact of recent changes in local emissions, fine atmospheric particulate matter (PM 2.5) concentrations were monitored concurrently at two sites in the Wausau metropolitan area during the winter of 2013 – 2014. A monitoring station at Rothschild Elementary School was equipped with instruments to monitor PM 2.5 concentrations and meteorological conditions (i.e. wind speed, direction, and air temperature), and a similar monitoring station was established at the D.C. Everest High School. Results indicate that during the study period, 24-hour average PM 2.5 concentrations were below the US EPA's National Ambient Air Quality Standards (NAAQS) at both sites and ranged from 1 – 27  $\mu\text{g}/\text{m}^3$ . Data collected at both sites also indicate that local point sources did not appear to be significantly impacting PM 2.5 concentrations during the study. Extended episodes of elevated PM 2.5 concentration appear to be related to regional air pollution, while short-term episodes are indicative of emissions from residential wood burning.

### ***Examination of the Structure-Activity Relationship of Flavonoids as Topoisomerase I Poisons*** - (Chemistry)

By: Dan Klonowski, Matthew Phillips

Faculty mentor(s): Erin Speetzen

Topoisomerase type I (top I) enzymes are DNA binding enzymes that play an important role in DNA replication and cell division. As such, topoisomerase enzymes are one target for anticancer compounds. Flavonoids are naturally occurring, polyphenolic antioxidants that are commonly consumed in the human diet and are known to have a number of biological effects, including the poisoning of top I. As with all top I poisons, flavonoids are believed to act by intercalating into the bound DNA strand and preventing the enzyme from completing its catalytic step. However, the ability of a flavonoid to



poison top I depends on the number and location of OH groups present in the molecule. While an experimental structure-activity relationship (SAR) has been determined, a molecular-level explanation for this SAR has yet to be found. This project uses computational methods to study a model flavonoid-DNA system in order to better understand the structural requirements needed for flavonoid binding. Our results indicate that structure-activity relationship may be due to electrostatic interactions between the flavonoids and the DNA, and that some of the OH groups may be important for forming hydrogen bonds between the flavonoid and amino acid residues in the enzyme.

### ***Identification of Odiferous Organic Compounds in Potato Flowers - (Chemistry)***

By: Nathan Nelson, Jon Sauer

Faculty mentor(s): Jim Lawrence

Odoriferous floral organic compounds are important biological signaling agents. These compounds are often sought for their pleasant characteristics in perfumery and gardening. Wild samples of ornamental potato flower possessing an unexpected rose-resembling odor (P population) were compared to unscented potato flowers of close relation (VER Population). Volatile small-molecule analysis by GC/MS, coupled with spectral identification software, identified three volatiles connected to fragrance:  $\beta$ -farnesol, phenethyl alcohol (PEA), and phenylacetaldehyde (PA). Standards of each compound were run to ensure proper identification by comparing retention time as well as fragmentation patterns. Additionally, concentrations of PA and PEA were obtained. Elevated PEA concentrations in the P population were found to accompany depressed PA. Conversely, decreased PEA was found in the VER population with increased PA.

Phenacetaldehyde reductase (PAR), responsible for the conversion of phenylacetaldehyde to phenethyl alcohol, is now being investigated using SDS-PAGE with LC/MS. Preliminary results in SDS-PAGE show that differential protein expression exists between the P and VER populations. Determining whether PAR is the culprit opens up characterization of the genotype of the P population. These findings can be important for designer plant breeding seeking to incorporate fragrant phenotypes.

### ***Interesting Organic Molecules Provided by Intramolecular Halogen Bonding - (Chemistry)***

By: Danielle Widner

Faculty mentor(s): Nathan Bowling

Many organic materials, such as dehydroannulenes, hold the potential to conduct electrical current and would be ideal to use in place of metals as they are both renewable and flexible. Unfortunately, generating these types of molecules can be challenging. The final step in dehydroannulene synthesis, for example, provides an extremely low yield. To avoid this problem our lab is utilizing halogen bonding as a means to provide similar structures with higher synthetic yields. Outside of this work, no structures capable of intramolecular halogen bonding have ever been synthesized. The use of a novel, dehydroannulene-like template provides a near perfect molecular shape for creating such

systems.

***Polymer Micelles From PEG and Bis(Carboxyl) End-Capped Poly(Alkylene Mercaptosuccinates)*** - (Chemistry)

By: Jacob Lauer

Faculty mentor(s): John Droske

Polymeric micelles are analogous to small molecule detergents, in that the micelles contain both hydrophobic and hydrophilic portions that solubilize hydrophobic material, such as oil, via microencapsulation. While a number of compounds are known to form micelles, the purpose of the current research was to produce an amphiphilic biodegradable copolymer that would form micelles and that also could be crosslinked. These micelles are expected to provide enhanced performance in pharmaceutical drug delivery systems. In particular, crosslinking of the micelle should impart significantly improved temperature resistance. This is a viable approach as long as the micelles remain biodegradable after crosslinking and afford biocompatible breakdown products. We have synthesized a series of poly(alkylene mercaptosuccinates) (PAMS) that exhibit the unusual property of ready hydrolysis even after curing (i.e., crosslinking). To determine the suitability of these resins for the preparation of crosslinked polymeric micelles, it was first necessary to prepare a bis(carboxyl) end-capped poly(alkylene mercaptosuccinate). This was allowed to react with methyl-terminated polyethylene glycol (PEG). The bis(carboxyl) end-capped PAMS oligomer was prepared via self-catalyzed esterification of mercaptosuccinic acid that was added to a pre-formed PAMS oligomer. End-capping and triblock formation (i.e., PEG-PAMS-PEG) was monitored by HNMR and gel permeation chromatography (GPC).

***The Transition Metal Enigma: A Study of Oxidation States*** - (Chemistry)

By: Albert Webster, Chelsea Mueller

Faculty mentor(s): Jason D'Acchioli

Characterizing chemical compounds and their properties is pivotal for understanding how they interact with the world around us. Transition metal complexes in particular offer a rich diversity of academically and industrially reactions, yet understanding the behavior of such reactions still generates controversy in the chemical community. In response we've developed a method for determining the oxidation state of metals to facilitate the understanding and applications of transition-metal mediated reactions.

***A Look Inside the Vending Machine and the Creative Process*** - (Computing and New Media Technologies)

By: Sarah Johanson, Xavier Shamrowicz, Halie Wiersum, Tom Chapman, J. P. McDowell

Faculty mentor(s): Katie Stern

Creative innovation requires a working knowledge of the creative process, team dynamics, and the process of design and development. Twenty-first century creative

innovation also requires us to recognize that a product's end users may have disabilities. We need to acknowledge the impact of those disabilities and, early in the innovation process, incorporate design features that accommodate those disabilities. Participatory Action Research is a specific form of observation and is the first of many steps in creating user-friendly machines for the future. For this project, students used simulations to analyze the usability of campus vending machines by people with visual impairments. This experience guided them in the creative innovation of a new futuristic vending machine. During subsequent brainstorming sessions, the student team members bounced ideas off of each other to develop fresh and unexpected solutions. After brainstorming was complete, team analysis of ideas ensued. Students developed novel mechanical features and ultimately drew prototypes of a future vending machine that will be more user-friendly to people with visual impairments. This poster not only demonstrates the value of Participatory Action Research and the flow of a formal creative process, but also demonstrates how that process is applied to real world application and people.

### ***Vendomatic 3000*** - (Computing and New Media Technologies)

By: Joshua Krueger, Rebecca Froehlich, William Frey, Matthew Springer  
Faculty mentor(s): Katie Stern

Creative innovation requires a working knowledge of the creative process, team dynamics, and the design/development process. Twenty-first century creative innovation also requires us to recognize that a product's end users may have disabilities. We need to acknowledge the impact of those disabilities and, early in the innovation process, incorporate design features that accommodate those disabilities. Participatory Action Research is a specific form of observation and is the first of many steps in creating user-friendly machines for the future. For this project, students used simulations to analyze the usability of campus vending machines by people with visual impairments. This experience guided them in the creative innovation of a new futuristic vending machine. During subsequent brainstorming sessions, the student team members bounced ideas off of each other to develop fresh and unexpected solutions. After brainstorming was complete, team analysis of ideas ensued. Students developed novel mechanical features and ultimately drew prototypes of a future vending machine that will be more user-friendly to people with visual impairments. This poster demonstrates the value of Participatory Action Research and the flow of a formal creative process.

### ***Economical Analysis of Emerald Ash Borer Management In Oakdale, Minnesota*** - (English)

By: Bradley Kuehn  
Faculty mentor(s): Lynn Ludwig, Rich Hauer

The emerald ash borer (EAB), *Agrilus planipennis*, is an invasive insect that has killed millions of ash trees in urban regions of North America. When EAB was discovered in St. Paul, Minnesota in 2010, the Minnesota Department of Natural Resources provided grants to plan and prepare for EAB for 3 years to surrounding cities. Oakdale, Minnesota was one of the cities that received the grant in 2010 and started chemical treating the 100 best conditioned ash trees. Last year (2013), the grant ran out, forcing the city to decide

whether or not to continue treating ash trees. An economical analysis was performed to illustrate to the city of Oakdale the benefits of continuing the chemical treatment to city ash trees. The analysis compared the benefit-cost ratio of the following management options: treatment of ash tree, preemptive removal of ash trees, or no management. Our data illustrates that the continuation of treatment of city ash trees yields the highest benefit-cost ratio of the three management options. Studies done in other cities display consistent results with our findings.

***Les Hmong en Guyane française*** - (Foreign Languages)

By: Ka Lo

Faculty mentor(s): Beverley G. David

After the Fall of Saigon during the Vietnam War, many SE Asian groups became war refugees in Thailand. One of these groups was the Hmong. Thai refugee camps in were overwhelmed with the large number of refugees from Vietnam, Laos and Cambodia. Countries allied with the United States in the conflict agreed that those countries would have to relieve Thailand of some of the refugee burden. Countries that agreed to accept Hmong refugees were the United States, Canada, France, Germany, Australia, Guyane française and Argentina (Clarkin, 2005).

Originally, Guyane française (French Guiana) was not one of the places that agreed to take in Hmong refugees. Father Yves Bertrais, a French Jesuit missionary, recommended that some Hmong could be resettled there. Guyane française is a French Département d'outre-mer (Overseas Department of France). French officials agreed and Hmong were resettled there in 1977 (Clarkin, 2005).

Currently, the Hmong population in Guyane française is approximately 2,100 and they live in the cities of Javouhey, Cacao, Regina, Saül and Iracabou; with Javouhey having the largest Hmong population and Iracabou with the smallest. In order to make a living in Guyane Française, most grow and sell produce in the markets. The Hmong grow and sell about 50 to 60% of the produce in the country. Before the Hmong resettlement, most of the produce was imported from Metropolitan France and Suriname (Clarkin, 2005).

***A Comparison of Swoffer Horizontal Axis Flow Meters with a FlowTracker Acoustic Doppler Velocimeter*** - (Geography and Geology)

By: Chase Kasmerchak, Karina Casey

Faculty mentor(s): Karen Lemke

Our study compares flow velocity measurements obtained with Swoffer horizontal axis current meters and a YSI/SonTek FlowTracker Acoustic Doppler Velocimeter (ADV). Assessing the compatibility of measurements taken with these two types of meters is important if we want to combine those measurements in a single research project. We collected measurements with both meters simultaneously at multiple sites on two rivers. We compared individual velocity and depth readings as well as average depth and velocity, total discharge, cross-sectional area, and the Reynolds and Froude numbers. Differences in individual velocity and depth readings as well as the summary statistics were generally within five percent. Drawbacks to the Swoffer meters include the

necessity of frequent calibration and its inability to measure flow at very low velocities. The Swiffer meters do not calculate discharge in the field (the ADV does), which did not allow us to determine the percent of total discharge in any one section – a potentially large source of error for discharge calculations. In summary, our results show the Swiffer current meter velocities are sufficiently accurate to use combined measurements from both types of meters in a single research project, provided the Swiffer meters are calibrated correctly, but the ADV is clearly preferable.

***Analysis of historical water quality of Waushara and Marathon County lakes using loss on ignition and pollen analysis*** - (Geography and Geology)

By: Benjamin Bruening

Faculty mentor(s): Samantha Kaplan

This study examined sediment cores from 13 lakes in Waushara and Marathon Counties as part of a larger lake-health study performed by UWSP in cooperation with the Wisconsin DNR and the two counties. By examining the composition and characteristics of lake sediments we can piece together a history of a lake and events in the surrounding landscape that had an effect on a lake's water quality. We employed two laboratory methods: loss on ignition and pollen analysis. In loss on ignition we burned sediment samples from different depths to determine the relative proportions of organic matter, marl, and siliciclastic material in the sediment. Changes in the proportions of these materials are indicative of changes in water chemistry and biology of the lake, as well as disturbances in the lake basin. We used pollen analysis to establish the time-frame of human and natural events that influenced water quality. For the pollen analysis, we examined the relative amounts of ragweed (*ambrosia* spp.) pollen found at different depths for each lake. The volume of ragweed grains in the lake sediment tends to spike when the surrounding land is first cleared for agriculture by European settlers. The year of onset of European land clearance was determined using historical maps, tax documents, and other documentation. Pollen counts were done at depths that had shown changes in our loss on ignition testing to provide relative dates for the deposition of lake sediments and changes in water quality.

***Effects of Reintroduced Wolves on Elk Browsing of Aspen in Yellowstone National Park*** - (Geography and Geology)

By: Stefan Stults

Faculty mentor(s): Eric Larsen, Susan Talarico

The status of aspen (*Populus tremuloides*) on Yellowstone National Park's (YNP) northern range has long been a resource issue of concern to scientists and park managers, with a decline in overstory aspen stem replacement noted since the 1930's. The 1995 reintroduction of the gray wolf (*Canis lupus*) into YNP provided a unique opportunity to research possible top down effects of predation on Rocky Mountain elk (*Cervus canadensis nelsoni*) and subsequent browse pressure and reproduction of Yellowstone's aspen stands. Since 1999 we have been collecting data on growth, reproduction and elk browsing pressure from 113 aspen stands. We combined our 1999-2013 aspen data with elk density data and wolf kill locations of elk to explore whether positive recruitment of

new aspen overstory was related to changes in elk density and/or foraging behavior changes due to the reintroduction of the wolf to YNP.

***Lake Site Feasibility Analysis, Marshfield, Wisconsin*** - (Geography and Geology)

By: Brenton Rice, Brendon Skrzynski, Daniel Kaminski, Grant Haynes  
Faculty mentor(s): Ismaila Odogba

A number of factors influence the location and creation of artificial lakes. These include geology, topography, hydrology, and infrastructure. Using the principles of ecological planning and Geographical Information Systems (GIS) modeling, we identified three of the most ideal and optimal sites for a man-made lake within a three mile radius of the city of Marshfield, Wisconsin. We then determined the feasibility of the three sites to sustain an artificial lake using a matrix analysis of factors such as costs, proximity to municipal wells, and soil types.

***Northwoods Iconography: Paul Bunyan*** - (Geography and Geology)

By: Emma Cauley, William Langford, John Lapota, Kimberly Maedke, Kenneth Rovinski  
Faculty mentor(s): Lisa Theo

While the cultural figure known as Paul Bunyan is a familiar icon across the nation, there are several communities in Wisconsin and Minnesota that have a kinship with the giant lumberjack – an affinity that appears to be both enduring and localized. In the field of human geography, the clustering of unique cultural elements in specific areas is particularly intriguing. Perhaps one of the most intrinsic questions when reflecting on such subjects is how unique cultural factors lend to the making of place. That Paul Bunyan is a vital source of cultural charisma is not in question, however we conclude that local identity surrounding this icon functions differently according to place. This project will identify the differences between the ‘Paul Bunyan’ of then and now, and from place to place, within the region.

***The Economic and Political Implications of Mining in the Northwoods*** - (Geography and Geology)

By: Seanna Whalen, Brenton Rice, Kyle McNair, Erin Jensen  
Faculty mentor(s): Lisa Theo

Mining is an integral part of Wisconsin’s cultural, economic, and political history. Native Americans mined the shores of Lake Superior, southern farmlands such as Mineral Point were once known for their production of lead, and Ladysmith once produced 500 million dollars’ worth of cooper, zinc, gold and silver. In each instance, communities weighed the economic benefits against the environmental costs. This project investigates the viability of the proposed Gogebic Taconite mine in Northern Wisconsin. Using socioeconomic indicators from established sources such as the US Bureau of the Census, we will determine variables that will serve as indicators of both positive and negative

impacts on the region. We will also qualitatively assess the impacts of this controversial mine on community structure.

***College Students Facebook Activity as it Pertains to Introverted or Extraverted Personality***- (Health Promotion & Human Development)

By: Marissa Christensen, Alex Kaeppler, Jordyn Denzer, Kaitlyn Britz  
Faculty mentor(s): Sterling Wall, Cuiting Li

This study examines the correlation between Facebook usage and an individual's level of extraversion or introversion. Researchers examined 276 participants' social media usage and anxiety levels in regards to Facebook usage. Results indicated that participants' extraversion was negatively correlated with the amount an individual checks Facebook per day, and level of anxiety related to Facebook. Extraversion was found to be positively correlated with the total number of Facebook friends. Additional analyses revealed that anxiety was positively correlated with time spent on Facebook, frequency they check Facebook, amount of time spent writing comments on Facebook, and level of Facebook usage overall.

***A Spectroscopic Analysis of the Balmer H $\beta$  Broad Emission Line in Quasars with Extended Radio Morphology***- (Physics and Astronomy)

By: Neil Oligney  
Faculty mentor(s): Sebastian Zamfir

Quasars are galactic nuclei that release copious amounts of energy extracted from matter falling onto a supermassive black hole. They can outshine the entire host galaxy by factors of 10 – 1000. Some quasars launch relativistic jets of plasma far beyond the outskirts of the host galaxy. Quasars occur at the very core of some galaxies, in volumes of space that are light-days to light-months in size, and we only can resolve them spectroscopically. Typical spectroscopic signatures of quasars are broad emission lines, which indicate velocity fields of tens of thousands of km/s. We study the Balmer H $\beta$  broad emission line in a sample of low redshift quasars that also show extended radio morphology. We use publically available Sloan Digital Sky Survey spectra (SDSS employs a 2.5m telescope) for sources brighter than 18.5 magnitudes (almost 105 times fainter than the dimmest star we can see with no aid). We measure emission line properties e.g., widths, shifts relative to quasar rest frame, etc. We hope to understand the geometry and kinematics of line emitting regions of quasars. We look for systematic differences between quasars that exhibit strong radio emission vs. quasars that show weak radio emission from their cores. We want to understand the connection between the active galactic nucleus and the large scale radio structure.

### ***Computational studies of a magnetic vortex confined to a miniature disk-***

(Physics and Astronomy)

By: Kyle McEachen

Faculty mentor(s): Palash Banerjee

When magnetic materials are confined within a miniature disk, a vortex state is formed. Such a vortex state is described by two numbers – chirality and polarity, that describe how the magnetization vectors point at the periphery and at the center of the disk, respectively. These vortex states have many desirable qualities – they are stable and respond in predictable ways to an external perturbation. Thus, these states are being investigated for their potential use in new forms of magnetic memory and logic. Here, we report on the use of a computational approach to investigate the properties of a vortex state. These computational studies are carried out using the Object Oriented Micromagnetic Framework. We have studied the behavior of the disk as a function of applied field. We find that the vortex state is stable at zero fields, but is destroyed when the perpendicular external fields exceed 400 mT. We have also calculated a spatial map of the magnetic field created by a vortex in the volume outside the disk. We discuss how such a map can be used to interpret our imaging experiments on an array of such disks.

### ***Design of a custom electromagnet to produce a uniform magnetic field within a vacuum environment-***

(Physics and Astronomy)

By: Erin Sullivan, Sean Minster

Faculty mentor(s): Palash Banerjee

We are building a magnetometer to study the properties of miniature magnetic disks. These experiments require the presence of a uniform magnetic field which can be varied with minimal hysteresis. Two possible electromagnet designs were investigated. In one case, the magnetic field was generated by a short solenoid with a finite length, whereas in the other case the magnetic field was generated using a Helmholtz coil arrangement. Since both the solenoid well as the Helmholtz coil have a finite resistance, the power dissipated sets the limit for the maximum allowed current. We have derived expressions for the optimum geometry that produces the largest magnetic field possible within the power budget of our experiment. In each case, the magnetic field at the center of the custom electromagnet was measured as a function of coil current. The electromagnets perform as expected and produce a magnetic field of approximately 4 Oersted per Watt of dissipated power. Improvements to the design include the choice of a low carbon steel core that is expected to increase the magnetic fields by a factor of five. Initial experimental evidence indicates that the steel core within our electromagnet does not have the expected permeability. Current experiments are underway to see if a high temperature anneal can improve the magnetic properties of the core material.

### ***Exploring “Nature versus Nurture” in a Photometric Study of Bulges in Early-Type Spiral Galaxies-***

(Physics and Astronomy)

By: Jane Christenson, Jesse Jahn, Kyle Leaf

Faculty mentor(s): Adriana Durbala



We perform a detailed photometric analysis of spiral galaxies found in different environmental densities: isolated versus loose groups (the latter indicates 4-10 member galaxies gravitationally bound). We use green (g) and red (i) filter images from SDSS (Sloan Digital Sky Survey). We employ a Fortran code called BUDDA (BUlge/Disk Decomposition Analysis) to model the light profile of the main components of a spiral galaxy (bulge, disk, bar) with appropriate mathematical functions. We explore the relative role of “nature versus nurture” (intrinsically versus environmentally driven influences) in shaping the morphology of galaxies. Modern studies suggest that early-type spiral galaxies (i.e., disk galaxies with relatively large, spheroidal bulges) are usually found in higher density environments, and the large majority of isolated spiral galaxies have pseudobulges (disky) rather than classical bulges (spheroidal). The main goal is to understand if bulges in isolated early-type spiral galaxies are pseudo- or classical structures. We select two samples of early-type spiral galaxies (isolated and members of loose groups), and present a comparison of the bulges and reflect on our photometric analysis.

***Search for Effective Electrodes for Photoelectrochemical Water Splitting-***  
(Physics and Astronomy)

By: Katrina Nass, Jeremy Falk

Faculty mentor(s): Ken Menningen

The goal of this project is to find an electrochemical device that can split water into hydrogen and oxygen using only sunlight. In photoelectrochemical water splitting, light absorption in a semiconductor energizes electrons to drive the chemical reaction. If it were produced on a large scale, hydrogen gas could become a clean and nearly limitless source of energy. This poster will summarize efforts at UW-Stevens Point to develop a surface chemistry that can meet the stringent requirements for an operational electrode. These efforts have recently focused on mixed oxides of cobalt and nickel, but no viable electrodes were produced. This poster will also describe two other related efforts at international laboratories.

***Tension versus temperature measurements with freestanding liquid-crystal films-*** (Physics and Astronomy)

By: Tim Twohig, Mae Voeun, Zach Perzynski

Faculty mentor(s): Mick Veum

Our research group studies a class of liquid-crystal compounds that can be prepared as freestanding films. “Liquid-crystal” refers to a phase of matter that simultaneously possesses both liquid-like and crystal-like properties. A freestanding film is simply a fluid film that is suspended across an opening, relying on no substrate for mechanical support. A soap bubble on a ring is the quintessential example. Such systems allow for the study of surface properties without the complication of the fluid interacting with a substrate. Using a novel technique, we measure the film tension as a function of temperature. Our measurements give insight into the molecular ordering at the film surface. Our poster will give an overview of the experimental technique as well as our recent measurements using a particular liquid-crystal compound.

### ***The Inverted Kapitza Pendulum: Stability and Bifurcation Boundaries -***

(Physics and Astronomy)

By: Timothy McAuliffe

Faculty mentor(s): David Tamres

The inverted pendulum is a pendulum attached to a base that oscillates in the vertical direction with a variable amplitude and frequency. It is an interesting dynamical system because its time evolution can be either stable or chaotic, depending on the values of parameters characterizing the system. Following the lead of Kapitza and other investigators, we explore the stability regimes of an inverted pendulum, focusing on the characterization of the stability/instability bifurcation boundaries in amplitude-frequency space. Our computational experiments provide dramatic confirmation of two such boundaries. We report on the functional forms that closely describe them

### ***Torque-Free Rotation of a Cube having a Nonuniform Mass Distribution -***

(Physics and Astronomy)

By: Jesse Anderson

Faculty mentor(s): David Tamres

Astronomical objects (e.g., stars, planets, moons, asteroids, and comets) typically undergo rotation. Observational evidence suggests that, in some cases, these rotations are chaotic. It is of interest to understand the circumstances that would give rise to unusual rotational behavior of an astronomical body as they might shed light on the body's mass distribution and/or its dynamical history. As a step toward modeling the rotational behavior of real astronomical bodies, we begin with a simpler structure – namely, a cube with a nonuniform mass distribution. We solve Euler's equations in the torque-free case numerically using a fourth-order Runge-Kutta algorithm and generate an animation of the rotational motion of the cube from which we may assess the cube's rotational stability. While this special geometry is not common for naturally-occurring astronomical bodies, it has relevance to artificial satellites and Borg cubes.

### ***A Comparison of Pell Grant and Non-Pell Grant Students on Factors Related to Academic Success at UWSP -*** (Psychology)

By: Wendy VanMeter, JohnQuell Tucker, Brittany Wecker, Steven Kreul, Keng Her

Faculty mentor(s): Jody Lewis

Previous studies have shown that low income students tend to score lower than higher income students on measures of academic self-efficacy, social integration, and psychological well-being (Wang & Castañeda-Sound, 2008). In our study, we examined how Pell and Non-Pell Grant students would differ in terms of thoughts of dropping out of school, emotion, social environment and support, and academic motivation. Participants included UWSP students enrolled in introductory psychology courses. Out of the 140 students, 51 were men and 89 were women; 46 were Pell Grant students, while 78 were Non-Pell students. Participants were asked to complete a survey that assessed several variables that pertain to academic success in college. We predict that compared

to Non-Pell Grant students, Pell Grant students will have more thoughts of dropping out of school and more emotional difficulties. In addition, we predict that Pell Grant students will have lower levels of social integration, social support, and less academic motivation than Non-Pell Grant students. It is our hope that the results found in this study will aid faculty and administrators in creating solutions that directly address the current issues of diversity and student retention at the University of Wisconsin-Stevens Point.

### ***An Investigation into the Effects of Bisphenol-S on Anxiety and Reproduction in Rats*** - (Psychology)

By: Shelby Emerson, Ruby Klish, Steven Kreul, Justine Specht, Vanessa Ritter  
Faculty mentor(s): Heather Molenda-Figueira

The effects of endocrine disrupting chemicals have lately been the subject of popular press. Many of us are familiar with Bisphenol A, or BPA, which has been removed from many plastic products, but replaced with a similar chemical, BPS. Like BPA, BPS alters estrogen's actions in a variety of tissues, leading to illnesses. BPA increases depressive-like symptoms and anxiety in rodents, but little is known about the impact of BPS on the psychological health and reproduction. We are investigating the impact of developmental BPS exposure on anxiety-like behaviors and reproduction in rats. Rats are exposed to BPS dissolved in water, or plain water control, during early gestation, through postnatal day 45. To assess anxiety, we use the elevated plus maze, light-dark box and open field tests. Tests are conducted sequentially at ages 21, 37 and 60 days of age. Experimental groups consist of 10 animals of each sex and treatment. Following completion of anxiety tests, animals are assessed for quantity and quality of adult, sex-specific sexual behaviors and reproductive capacity as determined by quantity of offspring produced following mating. This is an ongoing study; however, we predict that as with BPA, BPS-treated rats will exhibit higher levels of anxious behaviors, and lower levels of sexual behaviors. Likewise, if the endocrine system of BPS-treated animals is permanently altered by early exposure to the chemical, these animals may produce fewer offspring.

### ***Barriers to academic achievement for student Veterans: A qualitative study*** - (Psychology)

By: Patrick Riley, Alex Kaeppler, Elizabeth Parks, Petite Sarah, Hilary Rowe  
Faculty mentor(s): Thomas Motl

In 2013, approximately 660,000 Veterans were enrolled in colleges and universities nationwide under the Post 9/11 GI Bill. There is a general paucity of research regarding the student Veteran population. For instance, there is a significant contention as to the exact graduation rate of student Veterans. Most estimates, however, indicate that the graduation rate for student Veterans is significantly lower than that of their peers. Furthermore, Durdella and Kim (2012) found that the average GPA of student Veterans was significantly lower than that of non-veterans. This was particularly surprising because student Veterans reported studying more often, and engaging in a number of other behaviors usually predictive of academic success at higher rates than their non-Veteran counterparts. A number of Veterans, all students from mid-sized Midwestern Universities, were interviewed to better understand the impediments to academic

achievement among student Veterans. Transcripts were examined for emergent themes using a broad qualitative framework, which included psychological issues (PTSD, depression, anxiety, etc.), alcohol and other drug use, decreased structure in post-military lives, deficient academic skills, multiple role interference, increased individualism, and difficulty asking for help. Themes and their implications are discussed. This work will be used to guide further research as well as interventions intended to promote the success of this population.

***College Student Opinions of Therapy Dogs*** - (Psychology)

By: Marissa Harfert, Sarah Raganyi

Faculty mentor(s): Angela Lowery

Pet therapies have been used in the past to help with illness and pain treatment. Dog therapy is moving towards helping college students lower stress levels and perform better in classes. Results from a study by Somervill, et al. (2008) indicated a significant decrease in diastolic pressure occurring immediately after interacting with a cat or dog. A similar study was conducted on the interest level of college students about the use of pet therapy programs. Adamle, et al. (2009) found that of the 246 college freshmen surveyed, about 41 percent had previously heard of or participated in pet therapy. The purpose of our questionnaire was to determine student knowledge about therapy dog programs, student interest in interacting with therapy dogs, and the benefits that students believe they might gain from interacting with therapy dogs. Participants were undergraduate students enrolled in an Introductory Psychology course at the University of Wisconsin-Stevens Point. We hope to obtain results in support for increased use of dog therapy, student interest, and information about the benefits that therapy dogs could serve. Using dog therapy is an excellent new initiative for students who are struggling to cope with stress. The use of pet therapy in healthy populations is still a fairly new area of research and, it could provide much needed support for the increased stress levels that being a college student provides.

***Decisional Conflict and Decision Satisfaction in Relation to Other Psychological Constructs*** - (Psychology)

By: Samantha Wimmer, Shirley Jackson

Faculty mentor(s): Angela Lowery

Decisional conflict and decision satisfaction are two factors used to measure aspects related to decision making. This study aimed to compare self-reported measures of various constructs including depression, anxiety, body-esteem, self-esteem, need for cognition, and weight related quality of life to decisional conflict and decision satisfaction. Participants of this study were undergraduate students at the University of Wisconsin-Stevens Point. Participants were asked to make a treatment decision between two types of bariatric surgery using either a decision aid or a comparison pamphlet. Participants were also asked to complete questionnaires related to decisional conflict, decision satisfaction, depression, anxiety, body-esteem, self-esteem, need for cognition, and weight related quality of life. A significant negative correlation was noted between decisional conflict and decision satisfaction, but there were no significant correlations between these decision-making factors and the other constructs. There were other significant findings including a significant correlation between need for cognition and

good self-esteem and body-esteem.

***Effects of caregiving experience on perception of infant vocalizations - (Psychology)***

By: Corinn Cramer, Emily Lindberg, Lily Molik

Faculty mentor(s): Rachel Albert

Caregivers' responses to infant babbling have long-term effects on infant language learning. However, the factors that impact how and when caregivers respond to infant vocalizations are not well understood. One factor that may impact both responses to and perceptions of infant vocalizations is prior caregiving experience. Understanding the effects of experience on responding is important given that non-parents primarily provide childcare in the U.S. To investigate the influences of caregiving experience we compared the responses of non-mothers who have extensive caregiving experience with infants under the age of two with inexperienced non-mothers who have no prior caregiving experience. Participants viewed a series of prerecorded audio-visual examples of infants vocalizing and were asked to provide an in-the-moment response. Participants also rated each vocalization on a seven-point 'speechiness' scale. We predict that experienced caregivers will respond selectively to more speech-like vocalizations. Further, previous work in our lab demonstrates that mothers rate mature vocalizations as more speech-like. Therefore, we expect experienced participants to also rate the more mature vocalizations higher on the 'speechiness' scale than the inexperienced caregivers. Understanding the impact of caregiving experience on responding to infant vocalizations will enhance our knowledge of the factors that influence how infants learn language.

***Examining the Effect of a Strengths-Based Approach in Abnormal Psychology: A Pilot Study - (Psychology)***

By: Kelsey McNamee, Brooke Johnson, Lhea Owens, Jemimah Vettrus, Brianna Schmidt

Faculty mentor(s): Rhea Owens

The diagnostic process has a long history of being skewed towards the negative aspects of human traits and functioning (Lopez & Snyder, 2003; Seligman & Csikszentmihalyi, 2000). Abnormal psychology involve a thorough examination of negative symptoms that comprise psychological disorders; however, research in positive psychology suggests that identifying strengths is equally important, as strength development leads to increased well-being (Seligman, Steen, Park, & Peterson, 2005). The purpose of this study is to examine the effect of incorporating a strengths-based approach in an undergraduate abnormal psychology course.

Sixty-four students in Abnormal Psychology were recruited. At the beginning of the semester, students were given a case vignette and asked to identify client information they would like to know more about. The information varied, including individual and environmental strengths and weaknesses. There were two groups—the Strengths Group and the Control Group. The Strengths Group had exposure to the strengths perspective while the Control Group did not. At the end of the semester, the students read the same

case vignette from the beginning of the semester and were asked again to identify information they would like to know more about. Differences in scores will be analyzed to determine whether instruction related to strengths influenced the types of diagnostic information students wanted to inquire about.

***High-Identifiers Support Deviance from Unsustainable Future Norms -***  
(Psychology)

By: Julie Olaf, Elizabeth Parks, Jeremy Becker  
Faculty mentor(s): Mark Ferguson

One-hundred and thirty UWSP undergraduates participated in an online study to determine whether group identification moderated the effects of future group norms on willingness to perform sustainable behavior. Participants first completed a group identification measure. They then received information about the amount of carbon emissions that students would produce over the next five years. As a manipulation of future group norms, participants read that the average UWSP student would either produce a small or large amount of carbon emissions over the next five years. Consistent with our hypotheses, the results showed that high-identifiers were actually more willing to perform sustainable behavior when reading about unsustainable group norms, rather than sustainable group norms. Low-identifiers did not generally differ on their willingness to perform sustainable behavior. The results suggest that high-identifiers might deviate from group norms when doing so seems to serve their collective interests.

***Perceptions of Fairness Impact University Satisfaction, Identification, and Extra Role Behaviors -*** (Psychology)

By: Bethany Riley  
Faculty mentor(s): Craig Wendorf

Past studies have shown that perceptions of fairness are correlated with workplace satisfaction, identification with the corporation, and willingness to engage in extrarole behaviors (Blader & Tyler, 2009). This study extended past research by examining students' satisfaction, identification, and extrarole behaviors in the academic context.

UWSP students (N= 220) completed an online survey. They answered a series of questions examining perceptions of fairness (procedural and distributive justice for oneself and for others), satisfaction with the university (specifically with instructors, courses, and grades), identification with the university (i.e., feelings of pride, respect, and esteem), and the willingness to go above and beyond regular classroom involvement.

Path analyses showed that the relationship between beliefs in justice for the self and extrarole behaviors was mediated by satisfaction and identification. However, beliefs in justice for others had no effect on satisfaction, identification, or extrarole behaviors. In general, participants who believed that processes and outcomes were fair exhibited more pride and satisfaction with their university which, in turn, led them to be more willing to exceed minimal classroom requirements.

***The Effect of Music on Test Anxiety: A Pilot Study***- (Psychology)

By: Brian Linscott, Lhea Owens, Brooke Johnson, Heather Crawford, Kelsey McNamee  
Faculty mentor(s): Rhea Owen

The Broaden and Build Theory of Positive Emotions suggests positive emotions broaden thought-action repertoires (Fredrickson & Branigan, 2001). Research has demonstrated positive emotions leads to flexible and creative thought patterns (Isen, 1987) and broadens mind-coping (Fredrickson & Joiner, 2001). In addition, positive emotions can also reduce the experience of negative emotions, resulting in an upward spiral of positive emotions and well-being. Previous studies have shown writing about positive experiences during challenging times (Nelson & Knight, 2010) and incorporating humor into exams (Smith, Ascough, Ettinger, & Nelson, 1971) helped diminish test anxiety. The purpose of this study was to determine if playing music before exams enhanced positive emotions and decreased anxiety.

Thirty-three Midwest undergraduate introductory psychology students were recruited for this study. The participants represent students across a variety of majors.

On the 2nd and 4th exam days, music was played while the students assembled into the classroom. Music was not played during the 3rd exam as a control. Immediately before the exam, each participating student completed a few questions related to their appraisal of the current stressor, as well as their level of current anxiety, positive emotion, and confidence. Exam scores were also recorded. Differences in scores will be analyzed to determine whether playing music before exams is an effective strategy to decrease test anxiety.

***The Prevalence of Fraudulent Excuses at UW - Stevens Point*** - (Psychology)

By: Alex Wouters  
Faculty mentor(s): Craig Wendorf

Past research suggests that university students regularly fabricate excuses to avoid academic responsibility (e.g., O'Dell & Hoyert, 2008; Calhoun & Wouters, 2013). This study was designed to identify factors that influence why and when students give fraudulent excuses.

UWSP students (N= 141) completed a survey in which they recalled their own and peers' use of fraudulent academic excuses. Students indicated their reasons for offering the fabricated excuses, their professors' excuse policies, and the acceptance rates of the excuses.

Overall, fifty percent of students surveyed reported giving at least one fraudulent excuse while enrolled in college. Of the students who fabricated an excuse, thirty percent desired an extension on the assignment. Of all students surveyed, seventy-five percent reported being less likely to give a fraudulent excuse if the professor requires documentation. The results of this study differ in important ways from past research, suggesting further need for the study of fraudulent academic excuses.

***The Relationship Between Gender Occupational Stereotypes and Perceived Attractiveness*** - (Psychology)

By: Devin Ramker, Brianna Schmidt, Heather Crawford, Jemimah Vettrus, Brooke Johnson

Faculty mentor(s): Rhea Owens, Erica Weisgram

One variable that has not been examined in relation to gender-occupational stereotypes is perceived attractiveness. Previous research demonstrated attractiveness influences perceptions of personality characteristics (Dion, Berscheid, & Walster, 1972), as well as impacts occupational outcomes, such as raises and promotions (Heilman & Saruwatari, 1979). The purpose of this study is to determine whether gender typical, atypical, or neutral occupations affect the perception of individual characteristics (e.g., competence and friendliness), with a focus on perceived attractiveness.

One-hundred and eighty-two Midwest undergraduate students were recruited for this study. The participants represent students across a variety of majors. Students were randomly assigned to one of three groups—gender typical, gender atypical, and gender neutral.

Participants viewed three photographs—one male, one female, and one de-identified—and read a corresponding description that was either gender typical, gender atypical, or gender neutral based upon the occupation listed in the description. The students rated descriptors for each picture and described what they found attractive.

Group differences based upon gender typicality will be examined. Qualitative analyses will also be conducted to examine what variables are noted to influence ratings of attractiveness based upon group membership.

***What Works to Motivate Students to Participate in Service-Learning: A Follow-Up Study*** - (Psychology)

By: Liz Fraser, Aubree Lombness, Brittany Oblak, Elizabeth Parks, Cortney Sabin, Samantha Sherman, Sage Stiebs-Mathewson

Faculty mentor(s): Debbie Palmer, Jeana Magyar-Moe

Little research is available regarding what makes service-learning appealing to college students. In our first study, individuals were most willing to enroll in a course that included service-learning when the potential personal benefits were made clear; logistical considerations also mattered (Palmer, Magyar-Moe, et al., 2013). Participants are being provided with a scenario in our new, ongoing study where they are given an option of enrolling in a course with service-learning. Then they rate their willingness to enroll in the course based upon their own definition/understanding of service-learning and again after a definition of service-learning is given. Participants then receive information regarding service-learning with personal benefits, logistics, and community benefits



items varied randomly. Participants then rate their willingness to stay enrolled after each piece of information is provided and also explain why they would stay enrolled or choose to drop the course. Data about the personal characteristics and volunteering experiences of the participants are also being collected. Of primary interest is whether the presentation order matters for the participants' willingness to enroll and stay enrolled in the course; associations with their scores on the Volunteer Functions Inventory (Clary et al. 1998), the number of hours previously volunteered, demographic characteristics are also being examined.

***A Comparative-Historical Investigation of Ethnic and Racial Stratification in Latin America*** - (Sociology and Social Work)

By: Casey French

Faculty mentor(s): David Barry

Beginning as early as colonialism, racial stratification has defined society in Latin America. Each individual caste had specific privileges and norms that distinguished themselves within society. Multiethnic environments in Latin America contribute to discrimination of unequal distributions of wealth and opportunities. These environments are influential in all facets of society and indicate a lingering obedience to the hierarchical platform of contemporary Latin America despite its emergence centuries ago. My research discusses the caste roles of colonial Latin America, specifically the hierarchy of racial mixing and their relationship within society. It is evident that Latin America has a highly integrated society of people from indigenous, European, African, and mestizo origins. In this study, I explore the ideology of racial purity and the implications attached to their ethnicity such as socio-economic status. Racial discrimination still exists in countries of Latin America, creating the same counterproductive atmosphere of inequality that originated during colonization. An analysis of the literature suggests that inhabitants in many Latin American countries continue to be categorized by skin, which determines levels of opportunity in all facets of society. The results from this study show that preconceived racism associated with multiethnic societies continues to hinder the opportunities for advancement in one's circumstance and fatigues the unification of one's country.

***A Socio-Demographic Portrait of Early Chinese Immigrants in San Francisco, 1880*** - (Sociology and Social Work)

By: Ryan OLoughlin

Faculty mentor(s): David Chunyu

This research examines the socio-demographic characteristics of Chinese immigrants in the late 19th century in San Francisco. Using the full 1880 Census data for San Francisco, this study takes a new and closer look at various aspects of this oldest Chinese community in America including their demographic composition, marital and family status, as well as their employment and occupation outcomes. In particular, this research seeks to understand the mechanism of economic mobility among the early Chinese immigrants, as indicated by their attainment of desirable self-employment outcomes. On the one hand, this research confirms the prevailing stereotype about the early San

Francisco Chinatown: the Chinese were mostly males of working ages and with very few children and they were concentrated in a limited number of occupations. On the other, this study reveals some new patterns and details that were unnoticed before: although most Chinese men did not have a female partner living with them, the proportion of those who were ever married was actually very high, implying that many had left their wives behind in China; at the same time, Chinese women were even more likely to be married and many of them actually lived with their husbands. The preliminary analysis also suggests that economic mobility was more likely to be experienced by men who were older, married, living together with family members, and engaged in particular trades of work.