



*Welcome to the 16th annual College of Letters and Science Undergraduate Research Symposium.*

This symposium is a celebration of student/faculty scholarship, 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 are proud to share how teaching and scholarship go together in the bond that develops between our faculty and their students. A fundamental role of higher education is giving our students the opportunity to discover the world of inquiry, where there are no simple answers and research leads normally to more questions as we move toward a greater understanding of our world. Our faculty are experts in their fields, whether in the social sciences, the humanities, or the natural sciences and mathematics. This expertise is shared with our students by involving them in the process of inquiry which is so much a part of higher education. As I often say in our media and to faculty and students who visit UW-Stevens Point ... the *faculty/student relationship* is the most important unit of currency making a difference in our students' lives and expectations, giving them a glimpse of the exciting and often difficult questions posed by our world. In the College of Letters and Sciences, and indeed, in all activities at UW-Stevens Point, we strive to empower our students to question, discover and celebrate the process of scholarship. Faculty are the focal point of expertise of our campus, and that expertise is transferred to our students in the process of undergraduate research. As teacher/scholars, our faculty strive to raise the expectations of our students, giving them the intellectual tools needed to become professionals in whatever field they pursue in their careers.

Please visit the lectures, demonstrations and posters created by our student, with guidance by our faculty. This is the highest impact practice we offer to students as they move on in their exciting professional careers.

A handwritten signature in cursive script that reads "Christopher P. Cirino".

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

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

Science Building (A-wing) 1<sup>st</sup> and 2<sup>nd</sup> Floors

### **Group 1**

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

#### ***Development of a Multiplex-PCR Diagnostic Test for Detecting Three Tick-Borne Diseases Simultaneously-*** (Biology)

By: Matthew Swiatnicki

Faculty mentor(s): Diane Caporale

Moderator: Diane Caporale

Cases of Lyme disease, Anaplasmosis, and Babesiosis have more than doubled in the U.S., since 2005. Although there are over 27,000 reported cases of Lyme disease annually, the CDC estimates a 10-fold increase in the actual number of cases, due to cases being either unreported or misdiagnosed at early stages of infection. These three diseases can be transmitted simultaneously from the bite of a black-legged tick. An ELISA is the current diagnostic test for each disease, but this test is only capable of detecting antibodies that take 6-8 weeks to develop, rendering it unreliable for the detection of acute disease. Our goal was to develop a more reliable and effective diagnostic test using a DNA replication technique called multiplex-PCR. This diagnostic test will identify each pathogen in the blood simultaneously. We first developed PCR protocols for the identification of each pathogen that causes Lyme disease, Anaplasmosis, and Babesiosis separately. Each primer pair was designed to amplify the DNA specific to one pathogen and unique in length. PCR methods were then optimized to detect the presence of any two combinations of pathogens concurrently in one reaction. Our ultimate goal was to generate three different size PCR products, each representing a different pathogen, within one reaction tube. We hope that our research will lead to a more cost-effective and reliable diagnostic test for the simultaneous detection of Lyme disease, Anaplasmosis, and Babesiosis.

#### ***Screening for Possible KIAA0319 Gene Variants Associated with Dyslexia*** - (Biology)

By: Bethany Blank

Faculty mentor(s): Diane Caporale

Moderator: Diane Caporale

Dyslexia, a type of learning disability, is the most common neurodevelopmental disorder in the United States, with a prevalence of 5-17%. Even though this disorder is fairly common, the underlying genetics are not well known and, as a result, there is currently no effective method of diagnosis. Many susceptibility loci have been identified through Genome-Wide Association studies, but results have not been well replicated in the literature. One of the most commonly associated genes is KIAA0319. My objective was to investigate whether there is a certain KIAA0319 allele type common among dyslexic individuals. I sequenced two exons of the gene from 20 subjects, a cohort of 10 participants diagnosed with dyslexia and a cohort of 10 participants with no known

learning disability (as our control group). DNA sequences were generated and compared to identify alleles (sequence variants) within each cohort. Here I report any significant variant(s) associated with the dyslexic cohort that were distinct from those within the control group. These findings may lead to a better understanding of the underlying causes of dyslexia and better diagnosis of the disorder.

## **Group 2**

**2:20-3:10 p.m. Room A208**

### ***Scooby Doo and the Mystery of the Different Aconitase Variants - (Biology)***

By: Zachary Coleman, Jessica Boelter

Faculty mentor(s): Devinder Sandhu

Moderator: 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 has been used to study allele switching. For the study, parent plants BSR 101 and PI 290136 were crossed. The F<sub>2</sub> generation was scored for Aconitase-4 (Aco-4) alleles and was used to make two bulks: one displaying the BSR 101 allele pattern, and one displaying the PI 290136 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 marker located on Molecular linkage group (MLG) B1 (Chromosome 11). All the polymorphic MLG B1 primers were used on entire F<sub>2</sub> 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. Glyma11g080600 is the most likely candidate as it shares sequence similarity to an aconitase gene. We have designed long range PCR primers to amplify Glyma11g080600 from two variants. We are in the process of sequencing Glyma11g080600. Sequence comparison may reveal critical differences between two isozyme variants and confirm isolation of the Aco-4 gene.

### ***Where's the Genetic Waldo? The Active Transposable Element in Soybeans - (Biology)***

By: Tyler Cina, Eric Baumert, Taylor Atkinson, Callie Johnson, Alex Ollhoff

Faculty mentor(s): Devinder Sandhu

Moderator: Devinder Sandhu

The W4 locus in soybeans encodes dihydroflavonol-4-reductase (DFR2) that regulates pigmentation patterns in flowers and hypocotyls. The w4-m allele has arisen through insertion of the Tgm9 transposon in the gene. In the mutable w4-m line, generation of purple flowers from white flowers indicates transposon's excision, and its insertion into a second locus. We have used Tgm9 in isolating a male-sterility, female-sterility gene encoding a helicase. Sequencing revealed precise excision of the element from the helicase gene. Analysis of Tgm9-insertion sites among 142 independent Tgm9-induced

mutants demonstrated that Tgm9 hops randomly to all 20 soybean chromosomes from its original location in DFR2 on chromosome 17. Although, transposition was random throughout the soybean genome, Tgm9 inserted more than once in 14 loci in the genome. Tgm9 appears to have a preference to jump into genes as observed for active transposable elements in other plant species. About 27% of the mutations induced by Tgm9 were in genes. Among the 116 unique mutants 22% contained insertions in exons or introns and are expected to cause complete loss of function. This study establishes the utility of this element for functional characterization of soybean genes.

### **Group 3**

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

#### ***Minimizing Reticulation In Poly(alkylene Mercaptosuccinate) Films - (Chemistry)***

By: Tyler J. Gill

Faculty mentor(s): Dr. John P. Droske

Moderator: John Droske

The synthesis of poly(alkylene mercaptosuccinates) has been performed in our group via both zinc chloride catalyzed and uncatalyzed (i.e., self-catalyzed) conditions. Use of catalyzed conditions required isolation and purification of the polymer product via precipitation into a non-solvent. After removal of the non-solvent, the materials were dissolved in methylene chloride and cast into high quality, transparent thin films. When self-catalyzed conditions were employed, no isolation (i.e., workup) of the product was necessary. However, when films were cast from the resultant materials, reticulation was observed. This resulted in films having a patterned appearance and variation in thickness. To further characterize the mechanical properties of these materials, non-reticulated uniform films were desired. HNMR and gel permeation chromatography (GPC) suggested that the reticulation observed in films prepared from resins from self-catalyzed reactions likely was attributable to processing rather than differences in chemical structure. A number of different substrates and various processing conditions were attempted in an effort to minimize reticulation. It has been determined that film thickness is a major contributor to reticulation formation under the free-standing processing conditions employed. High quality, transparent films have been prepared from resins made under self-catalyzed conditions when the film thickness was controlled.

#### ***LuceneX: A Search Engine for XML Collections - (Computing and New Media Technologies)***

By: Aaron Salisbury

Faculty mentor(s): Weimin He

Moderator: Dan Albert

In this research project, we have developed a prototype system termed LuceneX that serves as a search engine for XML data across a directory containing XML documents. Our search engine was built on top of Apache Lucene, which is a high-performance, simple text-based search engine library written entirely in Java. We utilized Windows forms in .NET to design and implement the graphical user interface of LuceneX. In order to embed Java code into .NET application, we leveraged IKVM.NET to convert our Java code into .NET DLL files.

Our system allows the user to specify a directory of XML documents to create an in-memory index. Then the user may pose a query, with a built-in syntax assist feature, against the index that was created. The query result is a list of XML document hits, each of which can be viewed as a raw document as well as a stylized HTML document. Any well-formed XML document can be styled dynamically, regardless of structure, thanks to a combination of SAX and XSLT technologies built on top of Lucene. Types of queries supported by LuceneX include simple keyword, keyword intersection, document title, range of document titles, document date range, and proximity of keywords to each other. In addition to this base functionality, it has been expanded to make XML specific searching possible using LINQ to XML. Here tag (element) names can be searched on, as well by a tag's value equaling or not equaling something.

#### **Group 4**

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

***Consuming the Fruit: Reexamining Morality and the Female Body in Christina Rossetti's Goblin Market* - (English)**

By: Paul Grosskopf

Faculty mentor(s): Robert Sirabian

Moderator: Robert Sirabian

Western folklore as the cautionary tale has long communicated morals concerning womanhood. Through Little Red Riding Hood and other stories like it, the female is seen as an object of purity or innocence, with sexual curiosity or desire being depicted as an external force of corruption to be avoided. This long-standing tradition of teaching female morality through folklore and the cautionary tale provides an interesting context for Christina Rossetti's *Goblin Market*. Rossetti's poem instead argues that the development and growth that these moral-driven fairytales hope to achieve is only possible through negotiating the spiritual or secular ideals we live by with the physical realities that define our existence. Indeed, *Goblin Market* also proves a stark contrast to the stories that precede it, with its intriguing use of fruit to depict sexuality or desire (something beautiful, natural, and edible) and the deeply physical and spiritually intimate relationship between Laura and Lizzie. However, the most prominent difference is perhaps the poem's happy ending, which results only from the two sisters immersing themselves in the outside world, confronting the goblin men, and interacting with the goblin fruit as both a poison and an antidote. In this sense, *Goblin Market* refutes the tradition of viewing female sexuality as that which is external, instead arguing that it is internal in nature and therefore an integral part of womanhood.

***Hyde: Terror of Evil Among and Within Us* - (English)**

By: Kaycee Kaiser

Faculty mentor(s): Robert Sirabian

Moderator: Robert Sirabian

Robert Louis Stevenson's *The Strange Case of Dr. Jekyll and Mr. Hyde* (1886) is a story about Dr. Jekyll's desire to separate his evil nature from his nature that is solely good. Instead of eliminating evil, he releases a monster, Hyde, who eventually overpowers Dr. Jekyll's "better self." The novella reveals that instead of trying to hide the evil within, one needs to confront and understand it. Stevenson was shaped by Calvinism and the

folk tales told to him as a child. In those stories the evil-beings looked distinctly evil. They were easily distinguished from “good” beings. Hyde, who is capable of heinous acts, is nearly indistinguishable from the average person. The character of Hyde was terrifying to the Victorians, those in the novella and the readers, because he appears to look like everyone else. He is a member of society, and he infiltrates the society of professional gentlemen, a class that many Victorians respected. Hyde’s lack of outward evil appearance allows him to go unnoticed and hurt and kill innocent people without capture. As Jekyll’s experiment shows, not only is everyone capable of having evil within them, but also it is impossible to separate that evil. In the Victorian era, the simple dichotomy of good and evil was called into question by the advancements in science and psychology. Stevenson uses Dr. Jekyll and Mr. Hyde to show the complexities of good and evil that are within us all.

## **Group 5**

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

### ***Does Embracing Eros Hinder or Help Us in Achieving Our Greatest Good?* - (Philosophy)**

By: Stephanie Czimer

Faculty mentor(s): David Chan

Moderator: Karin Fry

The subject of Plato’s Symposium is to define and explain love, or eros. Plato believes the most fruitful philosophy is crippled by our servile love of loveliness. Only in pursuing the wisdom of the Forms can anyone truly mitigate the risks that come with all the vagaries of life, known as *tuche*. By contemplating something pure, stable and perfectly good, Plato is not opening himself up to the same risks that most people do. This is illustrated by Alcibiades drunkenly barging in to the reasoned discourse, much like how powerful emotions barge in to our otherwise well-reasoned lives. Alcibiades’ speech shows us how eros can be directed at a particular person who is of great intrinsic value and without equal. This knowledge is quite different than Socrates’ ideal in the Ascent of Desire. Socrates is pursuing an unyielding, universal understanding, whereas Alcibiades is pursuing a practical understanding, unique to Socrates. These pursuits seem to be at odds with each other and we, as philosophers, must decide if we can lead the best life as Plato intended while still maintaining our humanity. Despite their contingency of success, deeply loving relationships are the foundation of humanity, so it seems that absolute belief in the Forms is necessary to complete the Ascent of Desire.

### ***The Hidden Bias Against Down Syndrome* - (Philosophy)**

By: Kate Kierzkowski

Faculty mentor(s): Karin Fry

Moderator: Karin Fry

Prenatal testing has given us the ability to identify the likelihood of having a child with Down syndrome and advances in science continue to increase both the accuracy and safety of testing. But with increased identification comes the possibility of a subsequent increase in the termination of Down syndrome pregnancies and the further devaluation of people currently living with the condition. I use the disability critique to argue that bias, or the negative social stigma that comes with being disabled due to Down syndrome,

plays a large part in the high selective abortion rates of Down syndrome fetuses. This bias is often unintentional and usually hidden. My research unveils the manifestation of this bias against Down syndrome in the decision making process to terminate a pregnancy. Furthermore, the disabilities of people with Down syndrome are focused on while their abilities and positive contributions to society are undervalued, much like the abilities and contributions of women to society. In conclusion, I offer ways in which we can counteract this dangerous bias with the hope that people with Down syndrome continue to enrich our society and are seen simply as people, valued for who they are, and not rejected for what they are not.

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

Science Building (A-wing) 1<sup>st</sup> and 2<sup>nd</sup> Floors

### **Group 6**

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

#### ***Are Differences in Limb Morphology of Lizards Among Populations Due to Evolution or Phenotypic Plasticity?***- (Biology)

By: Laura Wright

Faculty mentor(s): Pete Zani

Moderator: Pete Zani

Recent research has indicated that limb-dimension differences among lizards may or may not be the result of phenotypic plasticity. We studied 12 populations of lizards that differ in predation pressure and that show differences in limb dimensions in the field related to total predator density and diversity. We tested whether these same populations exhibit phenotypic plasticity in the lab by rearing animals in a common-garden environment, so that any differences between populations can be attributed to evolved differences and not the environment. At the end of their first growing season, hind limb dimensions were measured on 181 lab-reared male lizards (avg. = 15 per site). Analyses on limb dimensions averaged for each population indicate no differences among populations. These results perhaps refute the idea that limb-morphology differences among populations in the field are due to evolution, but rather instead that environmental causes are more likely.

#### ***Environmental Cues Influencing Winter Activity Behavior of Lizards***- (Biology)

By: Joy Gadouas

Faculty mentor(s): Pete Zani

Moderator: Pete Zani

Surviving winter by retreating into hibernacula is a key aspect for many animal species' survival. However, animal behavior is usually studied during the growing season and is not well documented during winter. Previous research suggested that reptiles remain inactive during the entirety of the winter with periodic arousals due to warm temperatures. In order to determine if lizard activity was related to thermal cues or other environmental variables (i.e., convection, radiation, or time of winter), we used wildlife

cameras and temperature sensors to observe known hibernacula of side-blotched lizards. We also acquired wind and irradiance data from nearby weather stations. Cameras took pictures regularly allowing us to score lizard activity, which was episodic throughout winter. These data allowed us to analyze winter emergence cues used by lizards. We found that lizards emerge from their hibernacula to bask when wind speeds were low, when irradiance was high, and when further from mid-winter. These results suggest that lizards are not relying strictly on temperature to cue winter activity, but rather also use other environmental variables.

## **Group 7**

**4:00-4:50 p.m. Room A208**

***Two (Soy) Beans in a Pod: Lethal-Yellow and Viable-Yellow, Two Chlorophyll-Deficient Mutants*** - (Biology)

By: Taylor Atkinson, Alicia Meis, Andrea Noll, Isabela Caukins, Brittay Erickson

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

Moderator: Devinder Sandhu

We have identified a viable-yellow and two lethal-yellow mutants in soybeans. The three phenotypes green, lethal- and viable-yellow were easily distinguished based on their light reflectance indices, chlorophyll abundance and photochemical conversion efficiency. A reduction in thylakoid stacking was apparent in the viable-yellow plants. In lethal-yellow plants proplastids did not differentiate into chloroplasts and few membranes were present. Genetic analysis revealed recessive epistatic interaction between one of the lethal- and viable-yellow genes. One lethal-yellow gene was mapped to a 347 kb region on chromosome 3 that contained 45 predicted genes. We have identified four potential candidate genes in this region. The other lethal-yellow gene was mapped to a 153 kb region on chromosome 15 that contained 14 predicted genes. Glyma.15g275900 is an excellent candidate gene for this lethal-yellow gene as it displayed homology to an Arabidopsis gene which codes for a chloroplast-localized protein that is involved in biogenesis of Photosystem I and II. The viable-yellow gene was mapped to a 227 kb region on chromosome 2. We located 24 predicted genes in the region. Of these, one candidate gene is of particular interest, Glyma.02g233700, as it showed homology to a translocon in the inner membrane of chloroplast in Arabidopsis. Characterization of lethal- and viable-yellow genes may help to better understand the biosynthetic pathways involved in the development of chloroplasts.

***Bivariate Mathematical Induction For n-consecutive Game Athletic Schedules*** - (Mathematical Science)

By: Tyler Peters, Craig Beer

Faculty mentor(s): Andy Felt

Moderator: Andy Felt

When creating athletic schedules a common request that is made is to limit the number of consecutive home and away games, ignoring bye dates. In many cases, this means that a team cannot have more than the specified number of home or away games in a row, regardless of the byes between them. In the past, we solved this by creating many separate constraints in the integer linear program. Each constraint would require varying window sizes – referring to the number of games being observed – to accomplish the

work of our new single constraint. Once cumbersome, this request is now easy to implement with our new single family of constraints using mathematical induction. We found that this new family of constraints could easily be adapted to any requests regardless of the number of consecutive games. We found this to be most helpful when there are an odd number of teams, because in this case byes are required. During this presentation we will walk through a proof by induction showing how this powerful constraint works. Further, we will demonstrate the effectiveness of the constraint through a sample athletic schedule in the context of the mathematical programming language AMPL.

## **Group 8**

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

***Cornerstone Press: Broadening a Local Press with a National Reach at the AWP 2015 Book Fair*** - (English)

By: Sylvia Kies, Kendra Lenius

Faculty mentor(s): Gail Folkins

Moderator: Gail Folkins

Cornerstone Press, run by students in Editing and Publishing (English 349), provides a unique opportunity to participate in applied learning endeavors such as manuscript selection, copyediting, and marketing. This presentation by Sylvia Kies and Kendra Lenius, 2014 Cornerstone Press Managing Director and Marketing Manager, respectively, discusses ways in which students have expanded the geographic reach of Cornerstone Press. In 2014, the press published and hosted a California author along with producing an e-version of her book *Eddie and Harry*. In April, represented Cornerstone Press at the 2015 Association of Writers and Writing Programs (AWP) Conference, hosted in Minneapolis. This conference of more than 10,000 attendees, located this year with reach of Stevens Point, provides an excellent opportunity to broaden exposure of Cornerstone Press along with a chance to acquire additional, high-quality manuscript submissions for upcoming editorial staff members. We will report our findings from this conference, including responses from writers and interactions with other publishers. In particular, we would like to explore how other small presses market, distribute, and sell their books. We will measure our success in broadening the reach of Cornerstone Press not only through conference anecdotes and experiences shared, but also through the number of contacts and manuscript submissions we receive.

***LSD: Drug or Reformer?*** - (History)

By: Kyle Ebel, Ryan Bottomley

Faculty mentor(s): Sarah Scripps

Moderator: Sarah Scripps

“LSD: Drug or Reformer?” is a historical documentary that analyzes the presidency of Lee Sherman Dreyfus at the University of Wisconsin-Stevens Point during the late 1960s and early 1970s. Although Dreyfus “the man” serves as an important component to this project, the documentary uses Dreyfus as a lens for evaluating broader changes on campus involving student life. In particular, the documentary focuses on issues such as Vietnam War protests, environmentalism, feminism, the civil rights movement, and the rise of drug culture. Incorporating both oral history interviews as well as archival

research, we provide a snapshot of student life during a moment of great uncertainty. We compare these changes to the activism on other campuses, such as UW-Madison, and conclude that although students during the Dreyfus years challenged the status quo, they never resorted to violence or other extreme measures to express their point of view. In this regard, Dreyfus demonstrated a unique ability to address student concerns while maintaining order and preserving the interests of the administration.

## **Group 9**

**4:00-4:50 p.m. Room A210**

### ***Promotion from the Netherworld: A Symbolic Transformation of Social Gender Roles in Tibetan Delok Narratives*** - (Philosophy)

By: Ryan Schwobe

Faculty mentor(s): Luke Whitmore

Moderator: Luke Whitmore

Tibetan Buddhist delok narratives are stories of individuals who have out of body experiences that force them to recognize their deaths, travel to the netherworld, and then return to their corporeal bodies to deliver religious messages to the people of Tibet from Lord Yama. Before this experience, males embody roles of religious and social authority, and females embody a role of domestic authority, but after this experience, both males and females embrace a role of increased religious authority. Analyzing these gender groups through E. Tory Higgins regulatory fit theory, we see that the females inhabit a preventative role that is concerned with domesticity before the experience and after the experience they join the male dominant promotional group that is concerned with global issues. As regulatory fit theory posits, promotional groups hold more progressive social influence than preventative groups. The female deloks transition from a group of prevention to the group of promotion by telling their stories of becoming a deloks, traveling through the netherworld, and promulgating a religious message from Lord Yama. This group transition is achieved by becoming a symbol for the cosmic realm of the netherworld. Both females and males experience an increase of religious authority after the delok experience, but the degree to which females increase their promotional religious authority is greater than the males who underwent delok.

### ***Analysis of the H $\beta$ Balmer Broad Emission Line Profile Shape of Quasars*** - (Physics and Astronomy)

By: Adam Waldvogel

Faculty mentor(s): Sebastian Zamfir

Moderator: Sebastian Zamfir

Quasars are cosmological objects that were discovered about 50 years ago. They are very energetic active galactic nuclei thought to be powered by matter falling onto (i.e., accreting) supermassive black holes (SMBH) at the center of some galaxies. The spectra of quasars show strong broad emission lines from X-ray through infrared. The widths of these lines indicate the presence of gaseous clouds moving at thousands of km/s, found within light-weeks to light-months of the SMBH. Our project focuses on the analysis of the H $\beta$  broad emission lines, which typically show velocity fields in the range 700-20,000 km/s. Using the Sloan Digital Sky Survey optical spectra, we evaluate the H $\beta$  line profile of the quasars where it is narrower than 4000 km/s. We fit mathematical functions (e.g.,

Gauss versus Lorentz) to the profile shape. An adequate modeling of the broad lines is necessary because: 1. determination of the mass of the SMBH is quadratically-dependent on the width of the lines ( $M_{SMBH} \sim \text{width}^2$ ) and 2. both theoretical and observational studies hint at a transition from Lorentz to Gauss as the H $\beta$  line becomes broader. We average spectra based on luminosity, accretion rate, and SMBH mass and invariably find that the function that best fit our profiles is a Lorentz.

## **Group 10**

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

### ***Virtue Responsibilism Is a Feminist Epistemology*** - (Philosophy)

By: Anna Powers

Faculty mentor(s): Karin Fry

Moderator: Karin Fry

Virtue epistemology is a normative approach to epistemology (the branch of philosophy concerned with the study of knowledge) which emphasizes the importance of intellectual virtues. Virtue responsibilism is a type of virtue epistemology that maintains that the primary intellectual virtues are character traits like responsibility, conscientiousness, and humility. Virtue responsibilism is not typically considered a feminist epistemology because it is endorsed by non-feminist virtue theorists for non-feminist reasons. This paper argues that virtue responsibilism should be considered a feminist epistemology because virtue responsibilism acknowledges the the epistemic location and situated identities of each knower.

### ***Wage Gaps in Understanding: An Evaluation of Economic Models Behind the Gendered Wage Gap*** - (Philosophy)

By: Simone LaMarche

Faculty mentor(s): Karin Fry

Moderator: Karin Fry

It has been well documented that women in the United States, on average, earn between 75% to 80% of what men earn. Though women continue to make huge strides in the public sphere, this wage gap has remained stagnant since the 1990's. In an effort to understand this wage gap, we look to several economic models including The Human Capital Model, The Taste for Discrimination Model, Statistical Discrimination, and Occupational Segregation. These models are evaluated on their theoretical validity, empirical evidence, and statistical significance. The discussion also takes into consideration feminist epistemology, by examining the attitudes and values these models encourage. The seemingly polarized social sciences of feminism and economics are married in order to provide a more transparent and objective understanding of the wage gap.

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

Science Building (A-wing corridors)

### ***A Comparison of Extensively and Intensively Raised Early-life Stage Walleye Fed Minnows* - (Biology)**

By: Samuel Hempel

Faculty mentor(s): Chris Hartleb

Two commonly used techniques for propagating walleye are intensive and extensive production treatments. Fish reared using both methods can be fed commercialized feed or natural feed or a combination of the two. The two treatments have different control levels with their own advantages. The objective of this research was to compare growth of walleye reared using intensive and extensive methods. Walleye fry were reared in either an intensive system (commercial feed) or extensive system (zooplankton) for 54 to 70 days. At that time juvenile walleye were brought indoors, separated by treatment, and evenly distributed among three flow-through tanks at a density of 20 fish per tank. All fish were then fed fathead minnows for the duration of the experiment. Total length (mm) and weight (g) of all fish were recorded every four days. Mean total length, mean weight gained and specific growth rates were calculated and compared between the treatments. The intensive treatment exhibited significantly higher sizes at the beginning and end of the experiment, along with total length and total weight gained over the course of the experiment. However, specific growth rates were higher in the extensive treatment. The results suggest that the extensive treatment was deficient in essential nutrients and when provided ample feed, walleye growth rates increased.

### ***Ancient Mating Habits of Side-Blotched Lizards: Lack of "Handedness" in Use of Penile Organs* - (Biology)**

By: Chun Huai Luo

Faculty mentor(s): Pete Zani

Lizards have paired penile organs called hemipenes. Lateralization (or handedness) of hemipene use in reptiles may relate to reproductive success of males by affecting the success of sperm transfer. To test whether or not male side-blotched lizards have a preference for one hemipene over the other, we applied a different UV fluorescent colored powder to each side of males' tails. Each male lizard was then placed in a cage with three females. After one day, we checked for UV powder transfer to females with a UV light to determine which hemipene males used during mating. Our results indicate that male side-blotched lizards do not have a preference of one hemipene over the other suggesting that hemipene use is random and not "handed".

### ***Are Abundances of Diseases in Local Deer Ticks Changing?* - (Biology)**

By: Nathan Nelson

Faculty mentor(s): Diane Caporale

The main purpose of this ongoing study is to monitor the prevalence and spread of three tick-borne pathogens in a blacklegged (deer) tick population from Schmeekle Reserve.

Lyme disease, caused by *Borrelia burgdorferi*, is the most common vector-borne illness, where symptoms start flu-like and can develop into joint pain and brain swelling. Anaplasmosis is a disease developed from an intracellular infection of *Anaplasma phagocytophilum*, which also causes flu-like symptoms. Babesiosis is a disease caused by *Babesia microti* which is a protozoan parasite that infects red blood cells, causing malaria-like symptoms and anemia. Deer ticks first pick up these pathogens from rodents and, after molting, can then transmit them to people. Since the year 2000, ticks near the trail around Lake Jonas have been monitored every fall by Biol 319 students for *Borrelia* infection, whereas student researchers have been identifying ticks carrying *Anaplasma*, *Babesia*, or any combination of the three pathogens. Previous results have shown new emergences of *Anaplasma* and *Babesia*, and increases in prevalence of all three. Here I report the current infection rates and coinfection rates of these pathogens in deer ticks collected in fall 2014 and provide ecological explanations for the changes in infection rates from the previous year. Predictions of future changes in abundance of these disease-causing agents will also be provided.

### ***Association of the COMT 'Warrior' and 'Worrier' Alleles with Academic Major*** - (Biology)

By: Rayne Nimz

Faculty mentor(s): Aaron Davis

The catechol-O-methyltransferase (COMT) gene is involved in the degradation pathway of the neurotransmitter dopamine within the prefrontal cortex. Dopamine signaling plays a role in cognition and the speed of dopamine breakdown has been shown to influence academic performance by affecting stress level responses. The fast acting 'warrior' allele of the COMT gene results in the rapid breakdown of dopamine and is more advantageous in stress processing, conferring an advantage during adverse stimuli. Alternatively, the slow acting 'worrier' allele of the COMT gene results in prolonged dopamine exposure caused by the slower enzymatic breakdown of dopamine, which translates into a less efficient stress response. Despite the less favorable processing of stress, the 'worrier' allele confers an advantage with attention and memory tasks. Academic achievement has been associated with COMT genotypes. The goal of this analysis was to ascertain if a correlation existed between a COMT allele and the selected major a student pursues while in college. DNA was collected from 500 students at the University of Wisconsin – Stevens Point, who self-identified their academic major. Allele specific PCR was used for SNP genotyping and the frequency of each of allele present in students grouped by academic discipline was tabulated, analyzed, and assessed for association significance.

### ***Characterization of ACE and ACTN3 Genes in Division III College Runners*** - (Biology)

By: Elliot Franczek

Faculty mentor(s): Aaron Davis

The genes ACE and ACTN3 have been associated with elite athletic performance. Angiotensin I Converting Enzyme (ACE) impacts an athlete's physical performance with respect to endurance based on the I/D polymorphism. The ACE I allele confers an advantage in elite endurance athletes. The gene  $\alpha$ -actinin-3 (ACTN3) has been strongly associated with sprint/power performance. The ACTN3 R allele is associated with

enhanced power and sprint performance, while the ACTN3 X allele leads to reduced performance in sprint and power events. Although the association of both genes in elite runners is well established, it is not known if either gene is strongly associated with runners at the Division III college level. In order to determine if ACE and ACTN3 are associated with runners in Division III athletes, we characterized the genotypes of members of the track team at the University of Wisconsin-Stevens Point. Sixty members of the UWSP track team were genotyped for both the ACE and ACTN3 genes. We examined if performance among distance runners was stratified based on the ACE gene (I allele outperforming the D allele), and if performance among sprinters was stratified based on the ACTN3 gene (R allele outperforming the X allele). Additionally we examine if individual improvements in personal record times are associated with an individual's ACE or ACTN3 genotype.

### ***Comparative Studies of Normal Human Skin Cells and Metastatic Melanoma Cells*** - (Biology)

By: Kevin Neveau, Kevin Pardon, Dustin Buntrock, Eric Baumert, Callie Johnson  
Faculty mentor(s): Ed Gasque

Matched-pair cell lines were used to investigate differences between normal skin cells and melanoma cells at the morphological, cellular, and molecular levels. Two matched-pair cell lines were used in these studies: Hs895.Sk normal skin and Hs895.T melanoma cells; and HTB-102 normal skin and HTB-64 melanoma cells. The matched-pair lines were each isolated from the same person. Phase-contrast microscopy with a calibrated scale was used to compare the shapes and dimensions of normal skin and melanoma cells. Fluorescence microscopy was used to compare the shapes, sizes, and densities of stained mitochondria in the cytoplasm as well as distributions of cadherin adhesion proteins in the plasma membranes of normal skin versus melanoma cells. Growth kinetics studies were performed to determine the population doubling times for normal versus cancerous cells. Relative metabolic rates of normal and melanoma cells were compared by measuring rates at which they release acidic wastes into their medium. Gel electrophoresis and immunoblotting were employed to evaluate the degree to which MITF, a transcription factor, is expressed in normal skin versus melanoma cells. Finally, assays were conducted to quantify the "invasiveness" of melanoma cells in terms of their ability to digest and move through a matrix of connective tissue proteins toward chemicals that attract cells and stimulate migration in metastatic cancer. Results of these studies will be presented at the symposium.

### ***COMT Gene Variation in Attention Based Collegiate Sports*** - (Biology)

By: Abigail Clement , Katherine McDonnell  
Faculty mentor(s): Aaron Davis

The catechol-O-methyltransferase (COMT) gene encodes an enzyme that mediates the degradation of dopamine which is present in the pre-frontal cortex during periods of adverse stimuli. A single nucleotide polymorphism (rs4680) alters the rate of dopamine degradation between the two alleles of COMT. The slow acting enzyme includes a methionine at codon 158 (Met158) and the fast acting enzyme includes a valine at codon 158 (Val158). The fast acting allele gives an advantage in high stress circumstances, while the slow acting allele gives an advantage in memory and attention. Although

COMT is a well-studied gene, it is not known if either COMT allele confers an advantage in sports performance. In order to determine if the slow acting COMT allele gives an advantage in high-attention sports, we genotyped the COMT gene in athletes and compared the allele frequency to a control population. We hypothesized that student-athletes in high attention sports (softball, baseball, volleyball, and tennis) would have a higher frequency of the slow acting COMT allele as compared to controls. Seventy-one Division III student-athletes at UWSP from the softball, baseball, volleyball, and tennis teams were compared to 350 control students from UWSP. Our results suggest that the slow acting COMT allele gives a slight advantage in baseball, while the fast acting allele is found with higher frequency in volleyball.

### ***Does Color Polymorphism Play a Role in Lizard Attack Frequency in *Uta stansburiana*?*** - (Biology)

By: Drake Rekowski

Faculty mentor(s): Peter Zani

We experimentally simulated color polymorphism of a lizard (*Uta stansburiana*) with clay models. This included all three color morphs known to exist within this species, which was orange, yellow, and blue. By doing this we were able to test if there was a direct correlation with lizard color and which models were attacked the most frequent. Models were all placed at 10 meter intervals at various perch elevations and surfaces. There were a total of 330 models created for the experiment of which 139 models were attacked: 36 orange, 49 yellow and 54 blue models. Data collected from the attacked models included 1. predator type, 2. attack intervals, and 3. attacks per hour. We could not detect any effect of color polymorphism on lizard attack frequency.

### ***Don't Touch Me, I'm Sterile: Molecular Mapping of Five Soybean Genes Involved in Male-Sterility, Female-Sterility*** - (Biology)

By: Tyler Cina, Benjamin Speth, Joshua Rogers, Naparskorn Boonyoo, Andrew J. VanMeter

Faculty mentor(s): Devinder Sandhu

In soybeans, asynaptic and desynaptic mutants lead to abnormal meiosis and fertility reduction. Several male-sterile, female-sterile mutants have been identified and studied in soybeans. Some of these mutants have not been mapped to locations on soybean chromosomes. The objectives of this study were to molecularly map five male-sterile, female-sterile genes (st2, st4, st5, st6, and st7) in soybeans and compare the map locations of these genes with already mapped sterility genes. Microsatellite markers were used in bulked segregant analyses to locate all five male-sterile, female-sterile genes to soybean chromosomes and markers from the corresponding chromosomes were used on F2 populations to generate genetic linkage maps. The st2, st4, st5, st6, and st7 genes were located on molecular linkage group (MLG) B1 (chromosome 11), MLG D1a (chromosome 01), MLG F (chromosome 13), MLG B2 (chromosome 14), and D1b (chromosome 02), respectively. The st2, st4, st5, st6, and st7 genes were flanked to 10.3 cM (~399 Kb), 6.3 cM (~164 Kb), 3.9 cM (~11.8 Mb), 11.0 cM (~409 Kb) and 5.3 cM (~224 Kb) and the flanked regions contained 57, 17, 362, 52 and 17 predicted genes, respectively. Future characterization of candidate genes should facilitate identification of

the male- and female-fertility genes, which may provide vital insights on structure and function of genes involved in the reproductive pathway in soybeans.

### ***Effects of Alcohol on the Immune Response in the Brain*** - (Biology)

By: Cody Griffith, Mary Stone

Faculty mentor(s): Jennifer Bray

It is well known that alcohol causes dysregulation of many proteins in the brain, including neuroinflammatory factors such as cytokines and chemokines. It is unknown whether these proteins further depress or protect neurons from impaired neurological function following alcohol consumption. Two neuroinflammatory factors involved in the inflammatory response include CCL2 and IL-6, both of which demonstrate increased levels in the brains of humans and mice following alcohol intake. Surprisingly, studies have shown that increased levels of CCL2 protect against the depressing effects of alcohol on learning and memory in mice. The focus of the current research project is to utilize biochemical techniques, such as ELISA to study CCL2 protein levels and other chemokine levels in various brain regions of mice throughout different developmental ages. ELISA techniques are useful for quantifying protein expression and to determine how alcohol affects protein levels. Prior studies in the laboratory have focused on the hippocampus, the brain region involved in learning and memory, and have shown altered expression in adult mice. We are interested in determining if other brain regions also demonstrate altered CCL2 levels. Current studies will explore CCL2 levels in the hippocampus, cerebellum, and cortex over a wide age range of mice. These findings will help to discern distinctions in immune activity between different brain regions in various aged mice following alcohol exposure.

### ***Examination of Blood-Lactate Levels in Correlation with Behaviors Associated With Potentially Stressful Activities in Three Endemic South African Small-Bodied Shysharks (Scyliorhinidae: Actinopterygii)*** - (Biology)

By: Ellie Wallace

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

Angling potentially exposes sharks to physical exhaustion and various types of stress. One of the many shark groups upon which angling has relatively unknown effects is the shysharks (F: Scyliorhinidae), endemic to the coast 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), I gathered data on blood lactate data and behaviors of wild-caught, captive-held shysharks that were either actively foraging or being chased by a simulated predator. I defined and quantified several shark behaviors in video footage (line changes, turning, circling, head raises, tail whips, suspensions and stimulus approaches) while the sharks were being subjected to chasing or foraging stimuli. I hypothesized that blood lactate levels correlate with evasive and stressful behaviors exhibited by the sharks under the two stimuli. I also explored whether changes in blood lactate levels indicate stress or simply are a byproduct of vigorous activity. I found three behaviors that have a significant positive correlation with blood lactate levels: type of activity, number of line changes, and number of tail whips (all with p-

values  $< 0.001$ ). All three of these behaviors are measures of activity intensity, suggesting that blood lactate is primarily influenced by increased anaerobic metabolism during periods of physical exertion.

***Examining Total Nitrogen Levels Found in Baitfish Wastewater and Comparing the Effects of Tomato Seedling Growth Under Fish Wastewater Versus Commercial Fertilizer Treatments.*** - (Biology)

By: Erik Halverson

Faculty mentor(s): Justin Sipiorski, Robert Michitsch, John Hardy

We examined the effects of water containing fish wastes on the growth of tomato (*Solanum lycopersicum*) seedlings. In the TNR greenhouse, for six weeks, three groups of tomato seedlings were exposed to three different watering regimes: control, tap water; fish wastewater; and a liquid emulsion of commercial fertilizer. The commercial fertilizer treatment had total Nitrogen levels adjusted to match those found in the fish wastewater. The fish waste was generated in tanks of Common Shiners (*Luxilus cornutus*) a common baitfish from Wisconsin waters. We are currently analyzing our results. Preliminarily it appears that tomatoes watered with fish wastewater had growth rates similar to or slightly better than those treated with the commercial fertilizer emulsion. Seedlings in both treatment groups showed better growth than those in the control treatment. We are currently starting trials to examine the effects of other nutrients found in fish wastewater (Potassium, Phosphorus) on the growth of tomato seedlings. We also have plans to examine various types of biological activity in soil used in these trials.

***Exercise Physiology of Yellow Perch (*Perca flavescens*)*** - (Biology)

By: James Miazga, Josh Keller, Alex Birkle

Faculty mentor(s): Chris Hartleb

Most traditional fish hatchery settings use minimal water velocity in fish tanks. Recently, studies have shown that salmonids grow optimally at moderate velocities, gaining more muscle and little fat. Exercise is a mechanism that can increase metabolic efficiency and may help with energy expenditure and the cost of growth. In this study, we propose to test exercise physiology of yellow perch using a variety of water velocities. Water inflow is directed through spray bars shaped as an “inverted L” to create tank velocities. Treatments will consist of a control group (0 cm/s), slow (4-6 cm/s), medium (8-10 cm/s), fast (10-12 cm/s), and very fast (12-14 cm/s) velocities. The tanks will be part of a recirculating aquaculture system, with minimal water added or taken out. Fifteen fish will be added per tank and will be fed optimum rations (2-4% BW). The fish will be fed continuously by an automatic feeder and records of food and growth will be used to calculate feed conversion. All fish will be measured biweekly to track their growth throughout the 120 day experiment. Water velocity and quality will be measured weekly. Preliminary data with velocities set as control (0 cm/s), slow (4-6 cm/s), and fast (8-10 cm/s) showed evidence that flowing water increased growth of the fish compared to no flow. Feed conversion ratio decreased with time, as the fish grew larger. Fish in the fast velocity started the experiment with slower growth rates, but this increased dramatically later.

## ***Extracting Natural Dyes from Common and Glossy Buckthorn Berries***

- (Biology)

By: Evan Ballentine

Faculty mentor(s): Virginia Freire

The purpose of this experiment was to test an oral report that a green dye could be extracted from the berries of common buckthorn (*Rhamnus cathartica*) and to find out if a natural dye can be extracted from its relative, glossy buckthorn (*Rhamnus frangula*). Both common and glossy buckthorns are invasive species, and a serious problem in Wisconsin. Berries from the two species were collected and prepared to extract the dye that was tested on silk and corn husks (animal and plant fibers). It was found that common buckthorn produces an intense green dye and that a blue/purple dye can be extracted from the berries of glossy buckthorn. Both dyes were proven color fast when washed and exposed to light. This is an important study if we consider that the dyes extracted have vibrant colors, usually hard to get from plants and that sources for blue natural dyes are rare. By collecting the buckthorn berries the spread of these invasive species could be slowed down while providing a good source of natural dyes.

## ***Fixatives for Ovarian and Uterine Histology: A Pathway to Understanding***

- (Biology)

By: Erica Kleist, Drake Rekowski, Cali Hagen

Faculty mentor(s): Karin Bodensteiner

Chemokines are a class of cytokines (small proteins involved in cell signaling) with many functions. The chemokine C-C motif ligand 2 (CCL2) is the first discovered human chemokine in the CC family. During isolation of ovarian follicles for use in *in vitro* culture, we noted inconsistencies in follicular numbers obtained from mice that may be transgenic for overexpression of CCL2. Recent studies have demonstrated expression of CCL2 in mouse testes, thus, we suspect there may be an effect of the transgene on follicular populations in these mice and we are planning to examine ovarian and uterine histology to determine if there is an effect of CCL2 expression on these reproductive tissues. However, before histological examination of ovarian tissues can begin, we need to develop an appropriate fixation and sectioning technique. To date, we have isolated ovarian and uterine tissue from two-week old female mice. Tissue was fixed in Histochoice MB (Bioworld, Dublin, OH) or Safefix II (Fisher Scientific, Kalamazoo, MI) for four hours, post-fixed overnight in PBS-sucrose at 4°C, embedded in O.C.T. medium, and frozen at -20°C. Cryosections were cut at thicknesses ranging from 10-20 µm. Tissues were then stained with Hematoxylin and Eosin and tissue morphology evaluated. To date, we are not satisfied with the quality of fixation for either the Histochoice MB or the Safefix II. Testing of fixation and mounting techniques (i.e. paraformaldehyde fixation and paraffin embedding) is ongoing.

## ***Identification of Lactobacillus Species From Craft Brewery Samples Using Morphological, Physiological, and Genetic Methods***

- (Biology)

By: Melanie O'Connor

Faculty mentor(s): Terese Barta

Lactobacillus is a Gram-positive bacterium important in fermentation processes,

including the production of sauerkraut, yogurt, and even certain styles of beer. However, some species of *Lactobacillus* can be beer spoilage agents, resulting in off-flavors, undesired sourness, and decreased shelf stability. About 12 species of *Lactobacillus* have been reported as beer spoilers. The goal of this research project is to determine which species are the most common spoilage agents in Wisconsin craft beer. Twelve isolates from a variety of styles of beer from Wisconsin are being analyzed. Several isolates were from the same brewery, collected over a three-year period, allowing us to determine if reoccurring problems are due to the same or different species. Also included in the study were known strains of *L. plantarum*, *L. brevis*, and *L. delbrueckii*. The bacteria were Gram stained and observed for cell morphology. They were also tested for their differential ability to ferment nine carbohydrates. Based on the morphology and carbohydrate utilization patterns, most isolates appeared similar to *L. brevis* or *L. delbrueckii*. Isolates and known cultures were also tested using the Biolog GENIII MicroPlate™ test panel. The Biolog results were inconclusive. DNA has been purified in order to amplify the 16S rRNA gene by the polymerase chain reaction. The gene will be sequenced in all isolates and compared to sequences of known species in the GenBank sequence database.

### ***Investigating the Microbial Safety of Aquaponic Systems*** - (Biology)

By: Jon Mielke, Shelly Sonsalla  
Faculty mentor(s): Matt Rogge

Aquaponics is an agricultural practice that combines techniques used in aquaculture with those used in hydroponics, resulting in the production of food in a soil-less environment. In these systems, fish are fed a high quality diet. Fish waste in the water is processed through biofiltration, which converts nitrogenous waste into nitrate. Plants in a separate branch of the system use the nitrate and other nutrients from the water, which is cycled back to the fish. The result is an efficient and sustainable system for the production of fish and plant produce. Because water containing animal waste is used to nourish the plants, it is necessary to ensure that the water does not contain microbes associated with human foodborne illnesses. In this study, water from a commercial aquaponic system was sampled and analyzed for the presence of coliforms, a group of indicator organisms commonly associated with contaminated water. Additional tests were performed on isolated microbes to confirm their identification as coliforms. Although initial results suggest that aquaponic water contains high levels of coliforms, further analyses indicate that many of the organisms generating positive coliform results were non-coliform organisms. These findings suggest that alternative methods of coliform detection are necessary to reduce the possibility of false-positive results during coliform testing in aquaponic facilities.

### ***Investigation of Genetic Markers Associated with Non-Celiac Gluten Sensitivity*** - (Biology)

By: Maci Sprosty  
Faculty mentor(s): Diane Caporale

Non-Celiac Gluten Sensitivity (NCGS) is a disorder whereas a person exhibits gastrointestinal problems within 72 hours of gluten ingestion. NCGS is estimated to occur in about 3-6% of the U.S. population. Other less common digestive conditions,

such as celiac disease and wheat allergies, are diagnosed with blood tests. However, there is currently no diagnostic tool for NCGS. Instead, physicians have to first rule out other possible causes of digestive issues, before diagnosing their condition as NCGS. This process of elimination can be time-consuming and costly. Therefore, there is a need to identify a genetic marker that can be used for direct diagnosis. Recent publications suggest certain types of human leucocyte antigens (HLAs) are associated with celiac disease. My objective focused on identifying other DNA variants of the HLA gene to help find patterns associated with Non-Celiac Gluten Sensitivity. This was achieved through identifying HLA-DQ allele types and genotypes among 20 UWSP volunteers who have NCGS and 20 UWSP volunteers who never experienced gluten sensitivity. In addition, HLA-DQ genotypes were compared among individuals from an affected family to look for correlations between their genotypes and their level of gluten sensitivity. Here I report the results of this family pedigree and association study between HLA-DQ allele types and Non-Celiac Gluten Sensitivity and discuss the implications of these findings.

### ***LED Light Color Effects on Yellow Perch Growth*** - (Biology)

By: Kevin Schmidt, Richard Mahoney

Faculty mentor(s): Chris Hartleb

Many different factors can contribute to growth and survival when raising yellow perch (*Perca flavescens*). Handling, netting, and even walking by the tank can startle the fish which halts feeding and suspends growth. By using in-tank lighting the startle response by fish can be reduced and previous studies have shown that the spectrum of light may also play a significant role. LED lighting is gaining popularity in aquaculture due to low running cost, high light output and longevity. This study will compare the growth and survival of yellow perch raised under five different spectrums of commercially available monochromatic LED lights installed in-tank. In this study, yellow perch will be placed into two recirculating aquaculture systems, with each system having ten, 38-gallon round Fiberglass tanks. Ten fish will be placed into each tank and four replicate tanks will be used for each color light: blue, green, red, yellow and white. Yellow perch will be fed 2-3% of their body weight per day using ST International auto feeders which distribute the food 6-8 times per day. Water temperature will be held constant at 21-22oC using an inline heater and pH, dissolved oxygen and temperature will be monitored daily, as well as ammonia-N and nitrite-N weekly. Fish growth, length and wet weight, will be recorded every two weeks. The predicted results, due to previous studies, indicate that fish may grow and survive more efficiently in lighting of the red spectrum.

### ***Lizards Pooping Rainbows: Seasonal Changes in Food Intake and Passage Rate In Side-Blotched Lizards*** - (Biology)

By: Bridget Walker

Faculty mentor(s): Pete Zani

For many animals, food intake shifts seasonally to reduce ice-nucleating agents such as bacteria. We tested the idea that lizards anticipate the onset of winter by ceasing to feed and clearing their guts. We also measured how long it takes lizards to pass fecal pellets and re-initiate digestion following winter. To do so we fed insects dusted with UV-fluorescent powders to a colony of side-blotched lizards as they transitioned seasonally.

We then collected fecal pellets to determine time between feeding and passage. Our results indicate that lizards did not cease feeding in anticipation of winter and may not feed for the first week following the onset of spring. Our results also showed that many lizards retain fecal pellets for the entirety of winter and even for weeks after the onset of spring as the digestive system resets. From these results, we concluded that while ingestion, digestion, and elimination are regular processes during the growing season, individual variation in the re-set of these processes in the spring initially leads to an irregular pattern in lizard digestive physiology.

***Potential Spatiotemporal Patterns in Body Size and Armament In Wisconsin Populations of *Culaea inconstans* (Gasterosteidae: Actinopterygii), a 65-year Perspective.*** - (Biology)

By: Fred Glassen, Anna Hogan  
Faculty mentor(s): Justin Sipiorski

Sticklebacks (F: Gasterosteidae) are small, marine, and freshwater fishes found throughout the Northern Hemisphere. They have served biologists for decades as models to study phenotypic plasticity and speciation. As part of their ecology, many stickleback species rely upon dermal bony plates and fin spines as armaments defending against potential predatory acts. Researchers have documented shifts in body size and armament correlated with changes in the environment and changes in intraspecific food resource competition. *Culaea inconstans* (Brook Stickleback) is an eastern North American species — one of the most common Wisconsin fishes — that is poorly studied in regard to the aforementioned potential shifts in armament and body size. We have measured total length and mass as well as counted dorsal fin spines from about 1,200 individual *C. inconstans* specimens preserved in the Becker Memorial Ichthyological Collection of the UWSP College of Letters and Science Museum of Natural History. The collections come from locations throughout Wisconsin over a 65-year time span. We are currently analyzing our data. We will be looking for correlations in shifts in body size and dorsal fin spine number with numerous environmental, spatial and temporal factors such as: habitat type, connectivity of water body to others, and latitude. We will also be looking at potential trends in body size and armament in several local populations that have been sampled repeatedly over time.

***Prevalence and Intensity of Blackspot Parasite Infestations In Wisconsin Populations of *Luxilus cornutus* (Cyprinidae: Actinopterygii), a 60-year Perspective.*** - (Biology)

By: Erik Halverson  
Faculty mentor(s): Todd Huspeni, Justin Sipiorski

We are currently constructing a dataset comprising all specimens of the Becker Memorial Ichthyology Collection (University of Wisconsin-Stevens Point 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. Our accessioning and cataloging is ongoing, and to date we have gathered data from over 10,000 specimens. This represents approximately 30% of the total individuals in this collection. For each specimen cataloged, we recorded total length (mm), preserved mass (g), gonad mass (g) and estimated age. We also recorded the number of individual Black Spot parasites

(metacercariae of *Uvilifer ambloplites*) on the left side of each specimen. Considering size classes of fish over 30 mm and sample sizes of at least 30 fish, prevalence (percent of individuals with at least one parasite) varied across populations from 10% to 100%. Considering similar size classes and sample sizes, average intensities (average number of parasites on the left side of infested individuals) varied from zero to over 100. Separate analyses were conducted for each sex for individuals ranging from 30 – 80 mm (ages I & II). Multiple regression analyses were calculated to evaluate the relationships among parasite intensity, sex, location, season, latitude, and total length. The results of these are reported here.

### ***Quantifying the Effects of Nitrogen Deposition on Inciting Ecological Change Inferred From Fossil Diatom Communities in Swedish Lakes-*** (Biology)

By: Jacob Champeau, David Strong  
Faculty mentor(s): Krista Slemmons

Global concentrations of atmospheric nitrogen have increased dramatically over the last 150 years. While the effects of nutrients, particularly phosphorus, on aquatic systems are well known, the increase of atmospheric nitrogen to these aquatic systems remains unclear. This increased in nitrogen has been attributed to rapid shifts in the biota of aquatic systems across the globe particularly in high latitude regions. We observed fossil diatoms from lakes with varying atmospheric nitrogen deposition throughout Sweden to determine the effect of augmented nitrogen on lakes. Given the sensitivity of diatoms to environmental change, examination of lake sediments can provide clues as to the conditions of the lake such as nutrient concentrations, temperature, pH lake turbulence and ultraviolet light at a certain period of time. These paleo analyses allow for comparisons to present conditions and offer predictions of lake conditions under future nutrient scenarios. Using a top-bottom analysis, we observed diatom community structure, species diversity and community turnover from four Swedish lakes. Preliminary results indicate major shifts in diatom community structure over time and declines in diatom species richness over the last 150 years. These results may provide insight into the trajectory in which these lake communities may proceed as the result of industrialization and a changing climate and may be applicable to other freshwater ecosystems experiencing nutrient shifts.

### ***Short Height Is the Key to Success: Using Virus to Shrink Bread Wheat-*** (Biology)

By: Eric Baumert, Christopher Navarro, Jerott Moore, Alina Ott  
Faculty mentor(s): Devinder Sandhu

Brassinosteroids (BRs) are fundamental plant hormones involved in the growth and development of a 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.

### ***Should the TNR Vivarium Be Used for Some Other Purpose? - (Biology)***

By: Tessa Collins, Jaide Ryks, Maggie Nannenhorn, Amy Nakano  
Faculty mentor(s): Peter Zani

The Vivarium and associated plant and animal display space in the lobby of the TNR is one of the primary focal points of the TNR building as well as of the UWSP campus. Along with future renovations, greater change is being considered. Therefore, we performed a survey of students, faculty, and staff to determine their opinions regarding the current and future use of the Vivarium in the lobby of the TNR. We specifically wished to know how people currently use the space, how they think it should be used, and if changed, in what ways. We followed these surveys with observations of students outside the Vivarium to determine where and for how long they interacted with the display. Our goals are to use this information to propose changes to the current space so as to improve its appeal to the UWSP community, the greater Stevens Point community, and future UWSP students.

### ***Sterile Males? What is Wrong? - (Biology)***

By: Sandi Thu, Zachary Christensen, Echko Holman, Kai Chang, Matthew Phillips  
Faculty mentor(s): Devinder Sandhu

Sterility refers to spores and gametes that are abnormal or absent, or individuals that fail to produce functional gametes to produce offspring. Since manual cross-pollination to produce large quantities of hybrid soybean seed is difficult and time consuming, identifying a stable male-sterile system would create a breakthrough in hybrid seed production. Six male-sterile soybean mutants (ms1, ms3, ms4, ms5, ms6, and ms8) have been identified and mapped. Objectives of this investigation were to fine map and clone these five genes controlling male fertility in soybeans. Genetic linkage mapping was used to locate ms1, ms3, ms4, ms5, ms6, and ms8 genes to chromosomes 13, 2, 2, 11, 13, and 7, respectively. The comparisons of the genetic linkage maps with the sequence based physical maps helped in localizing ms1, ms3, ms4, ms5, ms6, and ms8 to 76, 3988, 216, 1988, 1142, and 160 Kb regions, respectively. Predicted genes in the corresponding regions were studied for the predicted functions and candidate genes were identified for each of the male-sterility genes. We are currently sequencing wild type and mutant alleles to identify causes of mutants. Characterization of the genes involved in male fertility may play a critical role in development of economically feasible soybean hybrids.

## ***Suitability Analysis for Aquaculture Businesses in Wisconsin -*** **(Biology)**

By: Mason Johnson

Faculty mentor(s): Chris Hartleb, Christine Koeller

Aquaculture entrepreneurs are periodically searching for suitable locations to build their businesses in Wisconsin. A suitability analysis was conducted for the state of Wisconsin in 2014-2015 to model suitable sites for aquaculture facilities. Data were obtained from a variety of sources that include: surface water quality, groundwater quality, soils, topography, land use/cover, and hydrology. Water quality was converted from a tabular to a geospatial format using ESRI ArcMap 10.2. Water quality was interpolated from stations using a Kriging algorithm. Soil Survey Geographic Database (SSURGO) soils from each of the 72 counties was merged. A weighted overlay analysis was performed on SSURGO soils for pond (5ft) and raceway (3ft) systems using a Natural Resources Conservation Service (NRCS) application. Slope was derived from 30 meter digital elevation model (DEM) Parameters were included in a weighted overlay analysis. Weighted overlay values were obtained from a pairwise comparison matrix given to professionals in differing fields. Pairwise comparison matrix consisted of comparing and ranking each parameter against each other for suitability importance. Pond and raceway systems were divided into two different analyses for their suitability criterion. This presentation will show state-wide results based on the aforementioned factors and their influence on site selection for Wisconsin aquaculture businesses.

## ***The COMT 'Warrior' Allele in Power Sports at the Collegiate Level -*** **(Biology)**

By: Kelsey Blob, Liam Hicks, Abigail Ullrich

Faculty mentor(s): Aaron Davis

The Catechol-O-Methyltransferase (COMT) gene is involved in the enzymatic breakdown of the neurotransmitter dopamine. Within the pre-frontal cortex the release of dopamine activates post-synaptic neurons and plays an important role in the stress response. As COMT is responsible for the breakdown of dopamine, the speed at which COMT is able to do so influences how much stress is felt by an individual under adverse stimuli. A missense mutation at codon 158 (rs 4680) has resulted in two COMT alleles; a fast acting enzyme termed the 'warrior' allele, and a slow acting enzyme termed the 'worrier' allele. The 'warrior' allele results in an advantage in stress processing and a higher pain tolerance. The 'worrier' has a disadvantage in stress processing, but has an advantage in attention and memory. While the COMT gene has been well studied, it has not been well characterized in athletes. The 'warrior' allele could predispose an athlete to excel in high-contact/power sports. To test this hypothesis we genotyped the COMT gene in student-athletes at the University of Wisconsin-Stevens Point who participate in a power sport (football, wrestling, basketball, hockey, mixed martial arts, and soccer) to determine if the 'warrior' allele is found at above average frequency. Our results suggest that the COMT 'warrior' allele is slightly higher in soccer and mixed martial arts, but that the 'worrier' allele is more prevalent in basketball and wrestling.

## ***The Effect of Drought On Activity Behavior in Side-Blotched Lizards - (Biology)***

By: Elizabeth Wagner

Faculty mentor(s): Pete Zani

Water is vital for all living organisms and lack of water can alter an organism's behavior. In this study, we tested the effects of drought on the activity behavior of side-blotched lizards. We hypothesized that in order to minimize water loss, the overall activity of lizards would decrease in the absence of water. Two groups of wild-caught animals were lab-reared with or without available drinking water. Activity behavior was quantified using photos of lizards to determine if they were inactive (under rocks) or active (with only heads exposed, with body exposed under heat lamp, or exploring their cage). We found that there was no difference in behavior between the two treatment groups, most likely because water was extracted from their food metabolically. Despite this, we found that there was a difference in behavior between the sexes and also between time of day. Specifically, males were more active than females, especially during late afternoon, possibly because of the territoriality of males.

## ***The Role of Vocalizations in Pair Bond Formation in Monogamous Zebra Finches (*Taeniopygia guttata*) - (Biology)***

By: Porscha Carriveau

Faculty mentor(s): Sarah Jane Alger

Among monogamous species of birds, pair bond formation is essential for reproduction to occur successfully. Our hypothesis was that the pair bond of zebra finches (*Taeniopygia guttata*) relies on different vocalizations to occur during the different phases of reproduction. We monitored directed song, undirected song, distance calls, whines, and arc calls during the courtship, incubation, and parenting phases of reproduction of newly paired birds. Our data suggests that males produced significantly more undirected song during the incubation phase compared to the courtship phase ( $p = 0.048$ ) and significantly more arc calls during the parental phase compared to the courtship phase ( $p = 0.008$ ). The number of female vocalizations was not affected by reproductive phase. Whine vocalizations did not occur during any phase of our observations. These data suggest that undirected songs may play a role in attracting extra pair copulations and that arc calls may play a role in rearing offspring.

## ***To Be Yellow Or Not To Be? Investigating Cotyledon Color Mutants In Soybean - (Biology)***

By: Eric Baumert, James Ferrell, Zach Coleman

Faculty mentor(s): Devinder Sandhu

Cotyledon color is a useful trait in soybeans 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 soybeans 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 Glyma.01G214600 and for D2 was Glyma.11G027400. Soybean genes show homology to stay green gene in pea that is responsible for cotyledon color in pea. Glyma.01G214600 and Glyma.11G027400 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.

### ***Using Diatoms in Stoneroller Gut Contents to Track Potential Environmental Changes In the Plover River Watershed of Central Wisconsin*** - (Biology)

By: Blair Hill

Faculty mentor(s): Krista Slemmons, Josh Wied, Justin Sipiorski, Robert Bell

The Central Stoneroller (*Campostoma anomalum*) is a stream-dwelling fish feeding upon periphyton, microscopic plant films covering bottom substrates. The Becker Memorial Ichthyologic Collection of the UWSP Museum of Natural History holds stoneroller collections from the last 45 years. Using specimens collected from the Plover River in Portage County from the same locales during four time intervals (September 1967, 1989, 2010, 2014), we analyzed the diatom gut contents preserved in collected individuals. The fish were dissected, gut contents removed and organic materials rendered with chemical washes. Diatoms produce siliceous frustules that preserve well and are not digestible by the fish. We hypothesize that the diatom communities assayed by stoneroller feeding activities are representative of environmental diatom communities. Various diatom taxa are indicators for certain environmental conditions and changes in relative abundance of taxa may be correlated with environmental change. Pilot studies on gut contents indicate that there are potentially significant changes to Plover River diatom communities over time. These changes may be correlated with significant environmental changes such as those caused by land use patterns or climate change. We are now collecting data from more specimens from other time periods to address potential sampling biases in pilot studies. We are now identifying diatom frustules at the species level, which may lend higher resolution to our findings.

### ***Using Paleolimnology Proxies to Examine Past Climates and Address Current Topics In Global Environmental Change In a High School Setting*** - (Biology)

By: Brittany Federspiel

Faculty mentor(s): Krista Slemmons

Paleolimnology is the study of the sediment record of freshwater systems to understand environmental dynamics over time often beyond recorded history. In particular, examination of diatoms, microscopic algae sensitive to environment change, can provide clues as to the conditions of a lake at a certain period of time. As a result, paleolimnological studies can serve as a platform to ask numerous questions regarding change in landscapes, climate and atmospheric input over time. For this reason, activities

involving paleolimnology are appropriate for the high school classroom and can serve as a springboard for addressing topics dealing with global climate change and pollution. We propose high school inquiry based activities centering around paleolimnology including the use of an inexpensive lake sediment corer, methodology for isolating and viewing diatoms, and a data analysis package appropriate for high school students. We further included simulated activities involving a paleo approach. When students are actively involved in asking questions and conducting research they begin to cultivate a genuine interest and long-term retention of a given topic.

### ***Winter Physiology of Lizards: Testing for Energy Storage Differences Across a Latitudinal Gradient*** - (Biology)

By: Brady Nelson, Laura Wright  
Faculty mentor(s): Pete Zani

Ectotherms inhabit diverse winter conditions across latitudinal gradients and appear able to adjust their energy-storage physiology across latitude in order to fit the energy demands of their environment. We hypothesized that the energy content in the liver of lizards will increase at latitudes with harsher winters. To test this idea, side-blotched lizards were collected from 12 populations across a latitudinal gradient and offspring of these animals were raised in common lab conditions to their first winter. These lab-reared animals were subjected to conditions that mimicked nature in order to induce normal winter preparation. At the start of winter lizards were sacrificed and energy stored in the liver was quantified. Results should allow us to determine if overwinter energy storage in seasonal ectotherms is affected by latitude.

### ***WInvertebrates: Progress Report of the Freshwater Invertebrate Taxa of Wisconsin, USA*** - (Biology)

By: Shelby Wollin, Richard Mahoney  
Faculty mentor(s): Daniel Graf

The WInvertebrates 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. Since January 1, 2015, the website has had 6,820 views by 1,987 users in 97 countries. 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 and BIOL 490 senior seminar here at UW-Stevens Point create content on some invertebrates for a grade and 27 selected student 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 March 24, 2015, the WInvertebrates website has information on 29,538 taxa, from phyla to species. From the total taxa, 1,191 genera from the fresh waters of North America and 377 species from Wisconsin and the surrounding region have been documented.

## ***Construction of an Apparatus to Measure the Effect of Surfactants on Gas-Liquid Reactions*** - (Chemistry)

By: Aaron Navarro

Faculty mentor(s): Dan Albert

Aerosols, particles composed of suspended liquid/solids in the atmosphere, are sites where chemical reactions can take place. When a gas-phase molecule strikes an aerosol it can bounce off of the particle without reacting, react on the surface of the aerosol, or pass through the outer layers of the particle and enter the interior of the aerosol. All of these processes involve interaction of a gas-phase molecule with the surface of an aerosol and are influenced by surfactants, compounds within the liquid that tend to separate to the surface. Construction has begun on a Knudsen cell, which we will use to model how surfactants influence reactions on aerosols. A Knudsen cell consists of a low pressure reaction chamber connected to a mass spectrometer to measure the concentrations of gas-phase molecules. A liquid surface within the reaction chamber can be exposed to gas reactant, and the products of the reaction can be determined by the mass spectrometer. By altering the type and concentration of surfactant within the liquid, we will be able to determine quantitative relationships between these values and a variety of reaction outcomes. Our initial goal is to obtain an understanding of NO<sub>2</sub> reactivity on aerosols. NO<sub>2</sub> plays an important role in atmospheric processes including ozone formation. An enhanced understanding of these processes will contribute to our ability to predict chemical reactions taking place on aerosols in the atmosphere.

## ***Development of Methods for Assessing the Exposure of Fire Fighters to Particle Pollution during Controlled Burns*** - (Chemistry)

By: Dennis Haak

Faculty mentor(s): David Snyder

Exposure to elevated levels of fine particle pollution (PM<sub>2.5</sub>) is known to have adverse health effects, and firefighters who are exposed to high levels of wood smoke may be at an increased risk for developing exposure related illnesses. PM<sub>2.5</sub> is of particular concern due to its ability to penetrate deep into lung tissues and access the blood stream via the alveoli. In order to assess the exposure of fire fighters to PM<sub>2.5</sub>, a real-time instrument pack was developed to monitor personal exposure during controlled burning operations. In order to test their effectiveness, five instrument packs were co-located downwind of a pile-burn training exercise. Initial tests indicated that a 5-minute averaging period produced the most robust comparison between instruments. PM<sub>2.5</sub> concentrations observed downwind of the burn averaged 240  $\mu\text{g m}^{-3}$  with maximum values exceeding 2,500  $\mu\text{g m}^{-3}$ . In addition to the down-wind tests, two firefighters were also outfitted with the packs during the burn. Average concentrations observed during these tests were 660  $\mu\text{g m}^{-3}$  with maximum values approaching 20,000  $\mu\text{g m}^{-3}$ . These levels exceed the 24-hour national ambient air quality limits set by the US EPA for PM<sub>2.5</sub> (35  $\mu\text{g m}^{-3}$ ) and the 8-hour personal exposure limits (PEL) for coarse particles (PM<sub>10</sub>) and total suspended particles (TSP), which are 5,000 and 15,000  $\mu\text{g m}^{-3}$  respectively. These results suggest that exposure to PM<sub>2.5</sub> during controlled burns may represent a significant health risk for fire fighters.

## ***Intramolecular Halogen Bonding of Fluorinated Haloarenes in Solution*** - (Chemistry)

By: Rachel Thorson

Faculty mentor(s): Nathan Bowling

Two compounds capable of intramolecular halogen bonding were studied by  $^{15}\text{N}$ ,  $^{13}\text{C}$ , and  $^{19}\text{F}$  NMR spectroscopy. Fluorine atoms within the compounds were used to activate the iodine and bromine halogen bond donors and as spectroscopic handles. These two compounds were then compared to eight related control compounds. The  $^{15}\text{N}$  NMR showed the greatest effect of halogen bonding, with nitrogen atom halogen bond acceptors displaying chemical shift decreases of 6 ppm and 1 ppm in iodo- and bromo-functionalized systems, respectively. Similarly,  $^{13}\text{C}$  NMR spectra showed evidence of intramolecular halogen bonding in the alkynyl carbons of the 2-ethynylpyridine system, with chemical shifts up to 2.4 ppm different than related control compounds. The  $^{19}\text{F}$  nuclei provided a means to study the effects of solvents on halogen bonding by providing evidence of intramolecular halogen bonding in dilute samples. The magnitude of  $^{19}\text{F}$  chemical shift changes in different solvents was directly correlated to the strength of the halogen bond in solution. Halogen bond strengths were found to decrease in different solvents in the following order: cyclohexane > toluene > benzene > dichloromethane > acetone > pyridine.

## ***Intramolecular Halogen Bonding of Non-activated Aryl Halides in Solution*** - (Chemistry)

By: Emily Robinson

Faculty mentor(s): Nathan Bowling

The purpose of this study is to investigate intramolecular halogen bonding in non-activated systems and to determine if these halogen bonds can be detected through  $^{13}\text{C}$  NMR in solution. The control molecules in this study possess a 3-ethynylpyridine unit (A) that is incapable of halogen bonding between the nitrogen and X atoms because of the location of the nitrogen on the pyridine ring. However, an isomeric 2-ethynylpyridine-based system (B) is capable of halogen bonding because of the proper alignment of the nitrogen and halogen atoms. Comparison of  $^{13}\text{C}$  NMR chemical shifts of these molecules in benzene- $d_6$  gives some indication of whether or not halogen bonding has occurred in the 2-ethynylpyridine systems. For example, the chemical shifts of the  $\text{C}_\alpha$  and  $\text{C}_\beta$  signals in A-I and A-Br are very similar. The chemical shifts of the  $\text{C}_\alpha$  and  $\text{C}_\beta$  signals of B-I and B-Br, on the other hand, vary due to differences in intramolecular halogen bonding in the benzene solution. Halogen bonding is indicated by a modest shielding of the  $\text{C}_\alpha$  nucleus and a more significant deshielding of the  $\text{C}_\beta$  nucleus. By utilizing intramolecular halogen bonding, this study probes the limits of halogen bonding in solution when entropic concerns are eliminated.

## ***Manipulating the Electronic Properties of Aryleneethynylenes with Halogen Bonding*** - (Chemistry)

By: Garrett Woller

Faculty mentor(s): Nathan Bowling

Aryleneethynylenes have been studied for years for both their electronic properties and

their conformational flexibility. Control over the conformations of these conjugated systems allows access to molecules with desirable electronic properties. Previously, hydrogen bonding and transition metal coordination have been used as tools to alter the electronic properties of aryleneethynylene systems. In this study, halogen bonding is used to enforce planarity in molecules of this type. The result of this increased coplanarity is enhanced effective conjugation of the unsaturated backbone. Comparisons of electronic spectra of molecules with restricted rotation due to intramolecular halogen bonding and isomeric molecules that are not restricted by this intramolecular attraction demonstrate that a halogen bond can be used to bias the conformational preference of an aryleneethynylene structure. This type of control could potentially lead to the ability to tune the electronic properties of a variety of unsaturated organic compounds.

### ***Metal Binding and Electronic Properties of Aryleneethynylene Trapezoids*** - (Chemistry)

By: Zakarias Driscoll

Faculty mentor(s): Nathan Bowling

Aryleneethynylene trapezoids have been synthesized in order to study their metal binding and electronic properties. The parent molecule contains a central benzene ring with rigid pyridine arms which are held in a trapezoid formation by coordination of the pyridine ligands to a transition metal center. The strength of metal cation binding and the electronic properties of the coordinated and uncoordinated ligand have been the major areas of study. Binding of the unsaturated ligand to Ag(I) and Pd(II) centers has been confirmed via x-ray crystallography and NMR spectroscopy. NMR studies reveal that binding of the Ag(I) cation is more dynamic than binding to the Pd(II) centers. Electronic spectra reveal that metal binding does little to inhibit the free rotation of the central benzene ring, making the UV-vis spectra of the complex very similar to the unbound ligand.

### ***Modeling the Solution-Phase Structure, Energetics, and Acidity of Flavonoids*** - (Chemistry)

By: Sierra Giebel, Mikayla Schaalma, Netzali Pacheco-Rojas, Lily Wanta

Faculty mentor(s): Erin Speetzen

Flavonoids are naturally occurring antioxidants that are widely consumed in the human diet and are linked to a number of health benefits such as antioxidant, antibacterial, antihypertensive, and anticancer effects. These molecules typically contain between one and six phenolic OH groups, and the location of these OH groups has been found to be crucial to their biological activity. Much experimental and computational work has gone into trying to understand how flavonoids interact with biological molecules such as DNA and proteins, however, much of the computational work has been done in the gas-phase rather than in solution-phase. Additionally, most computational work has focused on neutral flavonoids, despite the fact that many of these molecules contain OH groups with pK<sub>a</sub>s at or near physiological pH. This project investigates the structure and energetics of flavonoids in aqueous solution in order to gain important insight into the structure, energetics, and acidity of these molecules. By understanding the structure and protonation state of these molecules in solution we may gain valuable information about

how they are able to interact with macromolecules and the role that the OH groups play in their biological activity.

### ***Simulating Gas Chromatography with a Random Walk Model - (Chemistry)***

By: Benjamin Demchik

Faculty mentor(s): Dan Albert

Gas chromatography is an analytical tool that is used to separate, identify, and quantify chemical analytes in mixtures. A gas chromatograph (GC) contains a column, through which an analyte is forced by a mobile phase. This mobile phase is typically an inert gas like helium. On the inside of the column is a stationary phase, which is a solid packing inside the column. Different analytes have varying probabilities to condense onto the stationary phase, and to evaporate off of the stationary phase. Because of this, different molecules move through the column at different rates. In this project, LabView software was used to simulate a GC. To this end, a random walk model is used to simulate the movement of individual particles inside a GC column. At each step of the random walk, the position of the particle changes according to a constant mobile phase flow rate, diffusion of the particle in the mobile phase, and a sticking factor. The sticking factor represents the probability of any particular particle being condensed on the stationary phase. If the particle is condensed on the stationary phase, the particle's movement is frozen for the duration of the step. This model could be used for educational purposes, to teach people about the inner workings of a gas chromatograph, or it could be used as a model to predict how conditions can be optimized for operation of a real gas chromatograph.

### ***Synthesis of Micelle-forming Block Copolymers - (Chemistry)***

By: Jarred D. Lawson

Faculty mentor(s): John P. Droske

Polymeric micelles have been synthesized from block copolymers of a polyester, such as poly(lactic acid) (PLA) or poly(caprolactone) (PCL), with poly(ethylene glycol) (PEG). The amphiphilic block copolymers form micelles because the PEG acts as a hydrophilic portion and the polyester functions as a hydrophobic portion. To prepare micelles with enhanced properties for possible use in drug delivery systems, we have synthesized a block copolymer of a poly(alkylene mercaptosuccinate) with PEG. The poly(alkylene mercaptosuccinate) block in this copolymer contains pendant thiol groups that may be suitable for later crosslinking and control over degradation of the micelle. The copolymer was synthesized by first heating 1,5-pentanediol and mercaptosuccinic acid (MSA) at the reflux temperature. Additional MSA was then added to ensure that the polyester chains contained only carboxylic acid end-groups. This was monitored and confirmed by <sup>1</sup>HNMR. Finally, methyl-terminated PEG containing only one hydroxyl chain-end was added to form the amphiphilic block copolymer. The resulting block copolymer was characterized by <sup>1</sup>HNMR, <sup>13</sup>CNMR, and FTIR and it was shown to successfully solubilize a yellow dye through micelle formation.

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

By: Chelsea Mueller, Albert Webster

Faculty mentor(s): Jason D'Acchioli, Erin Speetzen

Oxidation states are an incredibly useful tool in chemistry, particularly in inorganic chemistry. We are attempting to find a non-ambiguous method of determining the oxidation state (OS) of transition metals (TM) within complexes and create new models for transition metal chemistry. We are developing a method using density functional theory (DFT) and Natural Bond Orbital (NBO) theory to aid us. Our theoretical values will be correlated to verify determined oxidation states and extrapolated to novel complexes.

### ***Twists and Turns: WGS "Catalysts" of Fe, Ru, and Os - (Chemistry)***

By: Alexandra Eschmann, Eugenia Wulff Fuentes, Zachary Hecht, Garrett Seichter

Faculty mentor(s): Jason D'Acchioli

Hydrogen gas is an attractive alternative to using petroleum-based energy sources. Generating hydrogen through the water-gas-shift reaction is one method, but is usually energy intensive (high temperatures and pressures). Our group is exploring the use of organometallic compounds to catalyze the reaction. The organometallic compounds studied by our group take the form of RML (R=h5-cyclopentadienyl, h5-indenyl; M=Fe, Ru, Os; L=[(CO)3] or [(CO)2I]).

### ***Understanding the Effects of Mutations on Human N-acetyltransferase 2 Structure and Dynamics - (Chemistry)***

By: Tyler Jensen, Shaelyn Christman

Faculty mentor(s): Amanda Jonsson

N-Acetyltransferase 2 (NAT2) is an enzyme that is important in metabolizing arylamines and hydrazine drugs. NAT2 catalyzes the transfer of an acetyl group from acetyl Co-A to arylamines and hydrazines. Several single nucleotide polymorphisms (SNPs) of NAT2 have been associated with lower protein levels and enzyme activity. These SNPs have also been associated with cancer susceptibility and drug toxicity.

A previous study performed molecular dynamics simulations to try and find the structural basis for the slower rate of transfer of an acetyl group in NAT2 SNPs. The study suggests that a change in the hydrophobic core and loss of the substrate binding site pocket is what is responsible for slower acetylation. We are using molecular dynamics simulations to look at the mutations R64Q and D122N. By changing a single amino acid (R64Q or D122N), we will study the ramifications of how these changes affected the movement, shape and function of the enzyme compared to the wild-type protein.

## ***Environmental Regulations and Control Technologies of Bavaria and Wisconsin, As Implemented In the Paper and Related Industries - (Foreign Languages)***

By: Tyler Shimulunas

Faculty mentor(s): Tobias Barske

Wisconsin has a history deeply rooted in preservation of its natural resources and beauty. Wisconsin environmental activist John Muir is known today as the “Father of the National Parks.” The Department of Natural Resources and the Environmental Protection Agency work together with Wisconsin’s industries to regulate industrial processes and their waste in order to limit potential damage to the environment. Wisconsin shares several things with Germany, not least being cuisine, climate, heritage – and indeed support for protecting the environment. This work seeks to compare environmental regulations in Wisconsin and Bavaria, Germany. It identifies those pollutants which are most heavily regulated in the paper and related industries, highlight overlaps, and, if applicable, identify differences. This work will also identify key technologies and control methods used in the industries to meet environmental regulations, paying particular attention to exhausts and effluents. The research will identify those technologies and controls in common between these two regions, and will attempt to identify any region-specific methods that may exist. A series of questions which focuses on the areas of interest mentioned above, control upgrade implementation, and results of implementation was developed and translated in order to understand the industries in both regions. These questions were forwarded to representatives of the environmental departments of paper companies from the two regions.

## ***Language Immersion Camps - (Foreign Languages)***

By: Mitchell Kolodziej

Faculty mentor(s): Tobias Barske

The Department of World Languages and Literatures is planning to offer two-week language immersion camps at UWSP starting in the summer of 2016. These camps are designed for sixth and seventh graders from local middle and junior high schools. Students who register for these camps will use either French, German, or Spanish for two weeks almost exclusively. The rationale for these camps is threefold. First, many students will never travel to countries where any of these three languages are spoken. An immersion camp offers the closest opportunity to experience living in a non-English environment. Second, foreign languages are not considered part of the public school core curriculum. A summer camp, therefore, offers students to engage in a subject area that is normally not as important. Third, immersion in a language triggers maximum gains in terms of language acquisition. In this poster, we will demonstrate the format of the proposed German immersion camp. Aspects that will be covered include a research-based justification for such a camp, the curriculum, establishing a budget, and ways to offset costs by pursuing grants and other sources of funding. The presentation of this project will illustrate a viable avenue for providing additional educational opportunities in the public schools.

***Are Fossils Endangered in the Classroom? A Summary of the UWSP Geoscience Outreach over the 2014-2015 Academic Year - (Geography and Geology)***

By: Bryan Hoff, Chase Bayer, Anthony Evans

Faculty mentor(s): Kevin Hefferan, Neil Heywood, Ray Reser

Fossils effectively delineate paleoenvironment, evolution, climate change, geologic time and the sedimentary record. Fossils are key indicators for modern studies of climate change and many serve as “parakeets in the coal mine” for human survival. In the midst of what many scientists now consider the sixth major extinction, emphasis on fossil analysis and evolutionary change continues to diminish in the undergraduate curriculum of many universities. In this undergraduate research program, we explore the increasing role that the UWSP Geoscience and UWSP Natural History fossil collection can serve in educating K-12 students and the undergraduate population regarding fossil life forms, paleoenvironments, geologic time, climate change and the sedimentary record in a variety of outreach programs performed in the 2014-2015 academic year.

***Examining Historic Tax Parcel and Land-Use/Land-Cover Change to Help Protect Public Lands in Bayfield County, Wisconsin - (Geography and Geology)***

By: Benjamin Bruening

Faculty mentor(s): Timothy Kennedy

Wisconsin has a long history of conserving and protecting prime natural habitat through the Wisconsin State Natural Areas program. Currently, there are 673 natural areas encompassing over 373,000 acres protecting a variety of geologic, geographic and biologic features. Changes to nearby lands can affect habitat quality on publicly protected lands. This research examines the spatial pressure to a state natural area in forested Bayfield County, Wisconsin, by examining historic parcelization, the subdivision of larger landholdings into smaller landholdings, and land-use/land-cover trends to tell a story of what spatial change has occurred during the past 60 years. The second phase of this research examines the risk of future parcelization based on the social, economic, geographic/biophysical, and regulatory factors of land subdivision and land-use/land-cover change. A statistical logistic regression model was employed to determine the probability that a tax parcel will subdivide in the future. The results will help land and resource managers by identifying which parcels are most susceptible to future subdivision, thus allowing managers to target limited resources to the area with the greatest risk.

***Examining Historic Tax Parcel and Land-Use/Land-Cover Change to Help Protect Public Lands in Columbia County, Wisconsin - (Geography and Geology)***

By: Ben Imberg

Faculty mentor(s): Timothy Kennedy

Wisconsin has a long history of conserving and protecting prime natural habitat through the Wisconsin State Natural Areas program. Currently, there are 673 natural areas

encompassing over 373,000 acres protecting a variety of geologic, geographic and biologic features. Changes to nearby lands can affect habitat quality on publicly protected lands. This research examines the spatial pressure to a state natural area in a historical agricultural working lands area in Columbia County, Wisconsin. By examining historic parcelization, the subdivision of larger landholdings into smaller landholdings, and land-use/land-cover trends we tell a story of what spatial change has occurred during the past 60 years. The second phase of this research examines the risk of future parcelization based on the social, economic, geographic/biophysical, and regulatory factors of land subdivision and land-use/land-cover change. A statistical logistic regression model was employed to determine the probability that a tax parcel will subdivide in the future. The results will inform land and resource managers of the historic changes and pressures to public lands, and provide a probability forecast of where nearby parcelization may occur.

### ***Lineament Analysis of the Proposed Pocatello Segment of the Wasatch Fault, SE Idaho - (Geography and Geology)***

By: Mason Johnson

Faculty mentor(s): Kevin Hefferan

The Wasatch fault consists of 10 fault segments that collectively extend from Fayette, Utah to north of Malad City, Idaho. On the basis of field mapping, researchers have proposed an 11th Wasatch fault segment which would extend the Wasatch fault zone from north of Malad City to Pocatello, Idaho. This study analyzes 10 meter digital elevation model (DEM) data acquired from the United States Geological Survey's (USGS) National Elevation Dataset (NED) to test this hypothesis. Hillshade was derived from 10m DEM to display prominence of the Pocatello segment. ESRI ArcMap 10.2 and GIS data were used to document the significant lineament feature that correlates with the proposed Pocatello segment of the Wasatch fault zone, 80 km north of its previously recognized terminus. Lineament analysis supports the extension of the seismically active Wasatch normal fault zone northward to Pocatello, Idaho. Based upon our analysis, we propose that: 1. lineaments clearly identify a conspicuous feature that correlates with the proposed Pocatello fault segment. 2. the Wasatch normal fault continues at least 80 km northward beyond its previously documented northern terminus in Malad City to Pocatello, Idaho; 3. the Pocatello segment has the potential to generate greater than M 6 earthquakes in southeastern Idaho, as has been observed to occur to the south in Utah and to the north in Borah Peak Idaho.

### ***Springtime Hydrologic Distribution of Road Salts within Schmeeckle Reserve, 2015- (Geography and Geology)***

By: Grant Haynes, Brian Adams, James McCoy, Shane Loesch

Faculty mentor(s): N.C. Heywood, David Ozsvath

Hydrologic factors play an important role in the dispersal of road salts. Road salts travel by two different water systems, surface and groundwater flow. Using Schmeeckle Reserve, a heavily used urban forest preserve bordered by roads, as our test site, we investigated how each of these systems moved road salts. Knowing that water accumulates at the lowest elevation, and that Schmeeckle has a very high water table, a geographic information systems (GIS) model was created to indicate areas where saline water would most likely concentrate. Because of the high water table, the areas where

surface flow accumulated also showed where the salt could infiltrate more readily into groundwater. Multiple surface and ground water samplings were conducted to gather conductivity readings testing salt dispersal within these risk areas.

### ***Disclosing the Secrets: The Transformation of the 10%*** - (History)

By: Alexander Purdy

Faculty mentor(s): Sarah Scripps

There is evidence of LGBTQ+ organizations since 1976 on the UW-Stevens Point campus. There has been an incredible shift in the purposes of the organizations and how they operate. The organizations originally started off as a support group (only doing some educational outreach for UWSP at large) and have now become focused on creating support for those in the LGBTQ+ community, but also greatly focused on creating awareness and understanding towards the community itself. Because there were many issues surrounding the organization and oppression of the campus groups' members through the years, the organizations and members had to respond in various manners to protect themselves, respond to criticisms, and change the focus/purpose of the groups. Shifting ideology revolving around the LGBTQ+ population on the UWSP campus has evolved over time and is still changing. Oppression led older LGBTQ+ groups to meet in secret, where now open dialogue is being made about how to best include the LGBTQ+ population on campus. Work on campus has been done, and work still has yet to be done to make this campus one that is fully inclusive and safe for individuals that identify with the LGBTQ+ community.

### ***Recaptive Africans and the Settlement of Liberia*** - (History)

By: Blake Marlowe, Jordan Straight, Ryan Bottomley

Faculty mentor(s): Lee Willis

In 1808, Congress forbade the importation of African slaves into the United States and the interstate (or domestic) slave trade became the only legal method of buying and selling human chattel until the abolition of slavery in 1865. Though long overlooked by historians, the international (or clandestine) slave trade continued until the Civil War. Historians estimate that slave traders still smuggled approximately 60,000 people onto southern plantations between 1808 and 1865. American efforts to thwart the international slave trade were initially minimal, but did increase over time. This poster presentation examines the lives of Africans who were liberated by these anti-slaving efforts. Slave ships that the U.S. Navy successfully intercepted were required to disembark the "Recaptive Africans" in the American colony of Liberia on the West Coast of Africa. For the former slaves, most of whom were from the Congo basin nearly 2,000 miles away, Liberia was not home. Originally created by the United States in the 1810s as a place to settle freed American-born slaves, Liberia received more than 5,000 immigrants from confiscated slavers between 1830 and 1860. Along with the approximately 15,000 American-born freed people, the Congo group settled among the indigenous populace to create a complicated and diverse ethnic population that would struggle to form a stable nation-state.

***The Forgotten Mansion in the Woods: Remembering the 1975 Takeover of the Alexian Brothers Novitiate in Gresham, Wisconsin - (History)***

By: Marlo Fields

Faculty mentor(s): Neil Prendergast

This is the history of a residence that was once the pride of Shawano County, a Southern antebellum based mansion that would be hard to find even in Wisconsin's ritzy areas such as Lake Geneva, Door County, or the Madison area suburbs, on the quiet banks of the Red River. To the people who inhabited the greater the counties near Gresham (Shawano, Brown, Marathon, Menominee, and Portage) the Novitiate would be seen as something from *Gone with the Wind* or other southern tales, a real slice of royalty in blue collar Northeast/Central Wisconsin, yet it was all but forgotten in the wake of a takeover on New Year's Day 1975, by a militant group of Menominee Indians known as the Menominee Warrior Society, a group represented the angst of the Menominee people towards the local Wisconsinites and were fueled by the greater American Indian Movement (AIM) of the 1970s. Furthermore the Novitiate takeover continues the dialog amongst historians about how events are remembered. However, where the Novitiate differs from works like Orvell, in that this is a not a history of memory, it is ironically a history of how things can be forgotten, and more importantly how events with layers of racial content fail to be preserved in American memory.

***The Lynching that Hung a Community - (History)***

By: Bethany Barlowski

Faculty mentor(s): Sarah Scripps

During the late 1800s, Stevens Point had a reputation of being a disorderly river town with a biased justice system. There was a series of murders during this time period that never made it to the judicial system. Instead, the justice system revolved around taking crimes into your own hands and carrying out punishment based on what you saw fit. The most infamous case of personal justice was the double lynching of the Courtwright brothers in October 1875. This was the only lynching to take place in Portage County and one of only a few to be recognized in Wisconsin. The purpose of the poster exhibit is to reveal events leading to the lynching, why it took place, and the effects to the community as a whole.

***Gödel's Meta-Language - (Mathematical Science)***

By: Angelica Hope

Faculty mentor(s): Edwin Herman

The 20th century was a profound epoch in the history and advancement of logic and mathematics. I will focus on one of modern history's most important achievements towards this end. Kurt Gödel, following the challenge of Dr. Hilbert, sought to prove (or disprove) the possibility of a complete formal system which would encompass the whole of mathematics. From 1909-1911 Russell and Whitehead published a series of volumes in which they believed they had achieved the formation of such a system, however, Gödel used that system to show that any formal system capable producing all of mathematics was impossible. This proof showed not just the incompleteness of Russell and

Whitehead's Principia Mathematica, but any similar system which had the ability to carry out primitive recursive arithmetic.

My presentation will focus specifically on the way in which Gödel constructed his proof in the language of Principia Mathematica. The isomorphic technique that Gödel utilized was ingenious because it mapped statements about the meta-language into the language itself. This mapping is known in the literature as the Correspondence Lemma and is vital to the first proof of incompleteness because Gödel could not have been able to express the Epimenides Paradox with as much validity as he did without it.

### ***Bulge-Disk-Bar Decomposition of Galaxies in Groups in the Context of ALFALFA Undergraduate Project*** - (Physics and Astronomy)

By: Jacob Tatro

Faculty mentor(s): Adriana Durbala

We perform a detailed photometric analysis of spiral galaxies in group environments. Our targets belong to the galaxy group NRGb206 and lie within the ALFALFA (Arecibo Legacy Fast ALFA survey) and SDSS (Sloan Digital Sky Survey) footprints and have been observed at X-ray wavelengths. We use green (g) and red (i) filter images from SDSS. 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. The larger context of the current project is to compare the structural properties of the galaxies in different types of environments, from very isolated (CIG; Catalog of Isolated Galaxies) to loose groups of few (4-10) members (LGG; Lyon Groups of Galaxies) and groups like NRGb206 (several tens of members, AGC galaxies). We explore the relative role of "nature versus nurture" (intrinsically versus environmentally driven effects) in influencing the morphology and colors of galaxies. A specific goal is to investigate the nature of the bulges (classical or pseudo-) hosted by early-type spiral galaxies (S0a/Sa/Sab) as a function of environmental density.

### ***Exploration of the Parameter Space of a Mathematical Model for Quorum Sensing*** - (Physics and Astronomy)

By: Jacob Doney

Faculty mentor(s): David Tamres

The behavior of some strains of bacteria (e.g., *Pseudomonas aeruginosa*) is sensitively dependent on the bacteria's population density (Salmond et al., 1995; Rumbaugh et al., 1999). At low population density, the bacteria behave benignly, staying "under the radar" of the host's immune system. When the population density reaches a critical level, however, the bacteria suddenly turn virulent, releasing toxins and tissue-damaging enzymes. To behave in such a way, these bacteria require the ability to monitor their own population density. They do this by producing, releasing, and detecting "quorum sensing molecules" (QSMs). In our research, we follow the evolution of a system made up of QSMs, down-regulated (i.e., benign) bacteria, and up-regulated (i.e., virulent) bacteria by numerically solving a set of three coupled differential equations governing such a system (Ward et al., 2001). We explore the influence of several key parameters on the system's evolution.

## ***Exploring Radio-Loud/Radio-Quiet Quasar Dichotomy Using Radio Morphology and Optical Spectra*** - (Physics and Astronomy)

By: Neil Oligney

Faculty mentor(s): Sebastian Zamfir

Quasars are intriguing and still modestly understood astrophysical phenomena, although more than half a century has passed since their discovery. They are some of the most energetic astrophysical phenomena, releasing copious amounts of energy by accreting matter onto supermassive black holes (BH) at the center of some galaxies. A defining characteristic of quasar spectra are the broad emission lines, from X-ray through IR. The lines' widths indicate velocity fields of thousands of km/s. The clouds emitting these lines occupy a relatively small volume around the BH, light-weeks to light-months in size. Only a minority (~10-20%) of all quasars show strong radio emission and are called "radio-loud" (RL). It is still a matter of debate whether the RL and radio-quiet (RQ) quasars are fundamentally distinct groups. We also lack a standardized, accepted definition of radio-loudness, and there is disagreement over specific RL/RQ boundaries. In this context we explore the hypothesis of a RL/RQ dichotomy by: 1. defining large, homogeneous samples of quasars based on Sloan Digital Sky Survey, 2. proposing a definition for radio-loudness based on radio morphology, i.e., quasars that exhibit jets and/or lobes extending far beyond the outskirts of the host galaxy would be seen as typical RL quasars, and 3. using broad emission lines' widths and strengths measured in optical spectra, thus trying to find connections between the central engine and the large-scale (radio) structures.

## ***Modeling Population Dynamics Using a Cellular Automaton*** - (Physics and Astronomy)

By: Yueyang Meng

Faculty mentor(s): David Tamres

Population growth and decay in an unbounded but finite environment is modeled using a cellular automaton. The environment is partitioned into 2,500 equally-sized cells. Each cell has a center that is equidistant from the centers of its six neighboring cells. At  $t=0$ , a population is distributed randomly among the cells of the environment. The evolution of the population is then followed, using a scheme in which the occupancy of a cell at a given time step is determined by the application of a "rule" that takes into consideration only the occupancy of that cell, and that of its six neighboring cells, at the previous time step. The effects of different rules on the population's evolution are examined. For certain rules, we find surprising patterns in the early phase of the population's evolution. We also find, for certain rules, that the system has an attractor: after many time steps, the total population tends toward a fixed value for a wide range of initial conditions.

## ***Predicting the Diffusion of Diesel Emissions from Idling Trucks at the Rothschild Biomass Plant*** - (Physics and Astronomy)

By: Isaac Ford

Faculty mentor(s): David Tamres, Neil Heywood

We are in the process of constructing software to predict the diffusion of diesel emissions from trucks at the biomass plant in Rothschild, Wis., in an effort to gauge the potential

hazard that such emissions may pose to the health of those who live, work, or attend school in the local area. We employ a Gaussian puff model (Seinfeld, 1986) to track the diffusion of a burst of aerosol from a single truck and a Gaussian plume model (Nepf, 2008) to obtain the diffusion pattern of aerosol emitted continuously (e.g., by one or more idling trucks) at the plant site. We use an empirically-determined diffusion coefficient and take into account both wind speed and wind direction. By overlaying calculated diffusion patterns onto a map of the Rothschild area, we obtain a preliminary view of the potential regional impact of these emissions.

### ***Thermal Characterization of Vertical Cavity Surface Emitting Lasers (VCSELs) by Wavelength Shift Measurements*** - (Physics and Astronomy)

By: Vinicius Garcia

Faculty mentor(s): Maryam Farzaneh

Vertical Cavity Surface Emitting Lasers (VCSELs) are semiconductor laser diodes with a wide variety of applications in many areas such as fiber optic communication and laser printers. Many of the operational and optical properties of VCSELs, including gain, threshold current, polarization, and output power are affected by temperature. Therefore, it is necessary to gain an understanding of the thermal effects in VCSELs in order to improve the design of the laser and its thermal management. In this presentation, we discuss the dependence of the VCSEL's change in temperature on the changes of its dissipated electrical power by measuring the shift in the laser's wavelength. In this method, the peak wavelength of the VCSEL's lasing spectrum is measured for different bias currents and temperatures. The experimental setup allows for the control of both the current and the temperature by using a power supply and a thermoelectric cooler, respectively. The wavelength measurements are done using a spectrometer. The experimental results yield a measure of the average thermal resistance of the laser. These results are a preliminary step towards a more in-depth characterization and analysis of the thermal effects in VCSELs. Future studies will be carried out by thermal profiling using thermoreflectance microscopy technique, from which valuable information about temperature distribution and thermal properties of VCSELs can be extracted.

### ***BiVO<sub>4</sub>-Coated Electrodes for Photoelectrochemical Water Splitting*** - (Physics and Astronomy)

By: Mae Voeun

Faculty Mentor: Kenneth L. Menningen

The rapid growth of global energy consumption demands a long-term sustainable solution. Research over the past several decades has been focused on meeting this demand with solar production of hydrogen fuel via a process called photoelectrochemical water splitting. Recently, much of the focus has been on bismuth vanadate (BiVO<sub>4</sub>), which has been shown to improve solar-to-hydrogen conversion efficiency and to be stable against corrosion. Efforts at UW-Stevens Point have successfully deposited a BiVO<sub>4</sub> film on a fluorine-doped tin oxide electrode. An initial evaluation of the first attempt to synthesize a similar film on a GaInP<sub>2</sub> electrode are presented here. Future efforts will explore alternative deposition methods and intermediary layers to increase adhesion between the BiVO<sub>4</sub> and GaInP<sub>2</sub> layers of the electrode.

***Cross National Determinants of Participation and Voting in Five Democracies Across Europe and North America*** - (Political Science)

By: Laura Brigman

Faculty mentor(s): Jennifer Collins, John Blakeman

The purpose of this research project is to further the understanding of the connection between interest in politics and voter turnout. This project seeks to contribute to this field by studying the relationship between voter views of their political systems and voter turnout. The working hypothesis I am testing is that high levels of interest in politics will be correlated with high voter turnout. While a relationship between these two may seem obvious, the hypothesis merits empirical testing. The countries included in the study are the United States, United Kingdom, Germany, Sweden, and Mexico. I chose them because they represent variation in terms of electoral systems as well as levels of economic development. Quantitative data for this study was obtained from the following sources: World Values Survey, International Institute for Democracy and Electoral Assistance, Transparency International, and The World Factbook. I used regression and graphical analysis to analyze the data. The independent variables measured individual motivations and interest in politics and the dependent variable was an average voter turnout in elections between 2005 and 2010. In order to control for outside factors, the following control variables were included in the analysis: type of electoral system, level of corruption, and economic development. In conclusion, these findings could be translated into larger studies related to voter turnout in democratic countries.

***A Content Analysis of Positive Psychological Constructs in Major Counseling Psychology Journals*** - (Psychology)

By: Kelsey McNamee, Steven Kreul, Elizabeth Parks, Jemimah Vettrus, Laci McCann

Faculty mentor(s): Rhea Owens

As part of a major contribution on Counseling Psychology's focus on positive psychology, Lopez et al. (2006) conducted a content analysis on four respected Counseling Psychology journals since their inception. The authors found 29% of the randomly selected articles included a positive psychological construct. Since the late 1990's literature in positive psychology has blossomed. The purpose of this study is to examine the trends in the same journals and determine the current representation of positive psychology in major Counseling Psychology journals. The methodology created by Lopez et al. (2006) was replicated. Twenty percent of the articles from 2004-2014 were randomly selected for inclusion in the content analysis, and 60 positive psychological constructs (e.g., empathy, optimism, well-being) were coded as a major or minor focus.

***A Strengths-Based Peer Mentoring Intervention*** - (Psychology)

By: Lhea Owens, Steven Kreul, Shelby Haas, Lindsay Liljenberg, Jena VanderLogt

Faculty mentor(s): Rhea Owens

Research in positive psychology suggests there are many benefits to using strengths, such as greater well-being, hope, and self-confidence (Hodges & Harter, 2005; Harter, Schmidt & Hayes, 2002). This study aims to test a strength development intervention

with children using a peer mentoring format, which has been shown to be an effective approach (DuBoise, Holloway, Valentine & Cooper, 2002). Participants will include 10 college-student mentors and 20 child mentees. The children will be recruited from a Boys and Girls Club. Measures to examine positive emotions, optimism, hope, and life satisfaction will be given at pre- and post-test. Each week for 4-6 weeks the mentor will guide the child through a variety of 30-minute activities designed to develop their strengths. Examples include creating a collage of people they are grateful for (gratitude) and a comic strip (humor).

***Children's Status Ratings and Stereotypes of STEM Careers: Exploring the Role of Gender, Age, and Depictions of Scientists-***  
(Psychology)

By: Kaitlin Klitzke, Bruce Benson, India Hawkins, Brooke Johnson  
Faculty mentor(s): Erica Weisgram

In today's society, there is an underrepresentation of women in STEM (Science, Technology, Engineering, and Mathematics) careers and a lower level of interest among girls than boys toward these fields. There are numerous factors that may affect children's interest including stereotypes of science as associated with men. The purpose of our study was to examine the role of depictions of male and female scientists on boys' and girls' interest in, and status ratings of, STEM careers. In addition, gender and age differences on these constructs were examined. Our participants included 51 children (24 boys, 27 girls) ages 6-11 ( $M=7.55$ ) who were recruited from summer daycare programs in the Central Wisconsin area. Children were presented five posters each representing a science career (astronomer, chemist, biologist, physicist, and computer scientist) and were told brief descriptions of each job. Each poster was manipulated to portray either all male or female scientists performing the job. Participants were asked to indicate which gender should perform each job (boys, girls, or both), their interest in the job, and the status of the job. We found that interest in science careers boys' interest and status ratings of STEM careers increased with age while girls' decreased. Whether the scientist was male or female did not have an affect on children's interest or status ratings of the presented STEM career. The majority of children indicated that both men and women should do each job.

***Effects of Developmental Exposure to Bisphenol-S (BPS) on Anxiety in Rats-*** (Psychology)

By: Steven Kreul, Ruby Klish, Tiffany Becker, Kristina Fletty, Stephanie Haseker  
Faculty mentor(s): Heather Molenda-Figueira

Findings of negative effects on health of endocrine disrupting chemicals, such as Bisphenol A, or BPA, have prompted the removal of BPA from many plastic products. However, it has been replaced with a similar chemical, BPS. Like BPA, BPS alters estrogen's actions in a variety of tissues, potentially leading to illness. Little is currently known about the impact of BPS on health or behavior. We are investigating the impact of developmental BPS exposure on anxiety-like behaviors in rats, and whether sex differences in response to BPS treatment would be present. Rats were exposed to BPS dissolved in water, or plain water control, during early gestation, through postnatal day 45. Anxiety tests were conducted sequentially beginning at 21, 37 and 60 days of age. To

assess anxiety, we used three common assessments of anxiety in rodents: the elevated plus maze, light-dark box and open field tests. Anxious behavior in the elevated plus maze was determined by the amount of time spent in the closed versus open arms of the maze. Anxiety-like behavior in the light-dark box was determined by the amount of time spent on the dark versus brightly illuminated side of the chamber. Anxious behavior in the open field chamber was determined by time spent exploring the center versus perimeter of the chamber. We predicted that as with BPA, BPS-treated rats would exhibit higher levels of anxious behaviors and that no sex differences in anxiety would be observed.

### ***Examining a Strengths-Based Assessment Approach to Psychopathology*** - (Psychology)

By: Jena VanderLogt, Kelsey McNamee, Jemimah Vettrus, Lhea Owens, Lindsay Liljenberg

Faculty mentor(s): Rhea Owens

The diagnostic process has a long history of being skewed towards negative traits (Seligman & Csikszentmihalyi, 2000); however, through the influence of positive psychology literature, there is now a greater focus on strengths (e.g., Seligman, Steen, Park, & Peterson, 2005). Abnormal psychology courses require an examination of negative symptoms that comprise psychological disorders. Thus, the purpose of this study is to examine the impact of incorporating a strengths-based assessment model on students' conceptualization skills. Approximately 160 students will be recruited. The subjects will be attained through the PI's sections of Abnormal Psychology. Students in one section will be assigned to the Strengths Group and students in another section will be assigned to the Control Group. At pre- and post-test, students' stereotypes regarding psychopathology, views towards the assessment and use of strengths in clinical interventions, optimism, and hope will be examined.

### ***Exploring STEM Careers: Factors that Predict Girls' Interest in and Attitudes Toward STEM*** - (Psychology)

By: India Hawkins, Bruce Benson, Samuel Bruun, Nicole Ewig, Kaitlin Klitzke

Faculty mentor(s): Erica Weisgram

The underrepresentation of women and minorities in STEM (science, technology, engineering, and mathematics) careers is a concern to many in the U.S. (NSF, 2014). Programs have been developed across the country to encourage STEM participation and interest in adolescents — particularly those individuals of underrepresented populations. UWSP STEM Exploration Day is an event dedicated to help middle school students become more involved and interested in STEM careers. With the help of STEM career professionals as well as faculty from UWSP (i.e., female scientists), students are shown career opportunities and paths while participating in hands-on workshops. Each event includes a keynote presentation and three one-hour workshops. As part of the STEM Exploration Day for Girls in February 2015, we distributed surveys before the event to assess girls' attitudes toward, and interest in, STEM careers to determine the factors that affect interest. 390 girls in seventh and eighth grade completed a survey. This survey measured teachers' support of a career in STEM, girls' perceptions that they belong in STEM, communal beliefs (beliefs that STEM would help people and allow people to

work together), agentic beliefs (beliefs that STEM would help an individual be successful), interest in science, and positivity and enjoyment of STEM careers. Through this survey we found that girls' communal beliefs, agentic beliefs, and sense of belonging were most correlated with and predictive of their interest in STEM.

### ***Factors Influencing the Accuracy of Interest Forecasts*** - (Psychology)

By: Rathorn Scholz, Sarah Petitte

Faculty mentor(s): Thomas Motl

Interest forecasting is the process of predicting future interest levels during anticipated situations. Greater clarity about how these predictions are made is particularly would help guide individuals when choosing a career, major, or hobby. Participants included 50 volunteers from a mid-sized Midwestern university.

In the first phase of the study, participants completed a variety of assessments to measure a number of personality traits and behavioral factors. In addition, participants made a number of predictions, based on a short list of descriptions, about how interested they would be while watching three different videos. These circumstances of these predictions were manipulated by researchers. One prediction was made under conditions conducive to an explicit and logical approach to decision-making, while another prediction was made under conditions intended to foster an implicit intuitive decisional approach.

In the second phase, participants watched the three 15-minute videos and reported their interest levels. Researchers were thus able to compare participants' interest forecasts with their actual interest levels. This research design allowed researchers to answer the following questions: 1. What traits, experiences, and habits are associated with interest forecast accuracy? 2. Do the conditions under which interest forecasts are made produce different predictions? If so, in what way do they diverge? Results are discussed and preliminary conclusions are offered.

### ***How Priming Religious Themes Affects Pattern Perception in Random Visual Stimuli*** - (Psychology)

By: Sarah Petitte, Rathorn Scholz

Faculty mentor(s): Thomas Motl

Evolutionary theories regarding the origin of religion (e.g., Buss, 2008) and its psychological functions (Atran, 2002) have led some researchers to hypothesize that activating religious ideas would falsely increase pattern perception in random stimuli. However, Motl et al., (2014) found that, contrary to expectation, religious priming words (e.g., prayer, pastor, church) reduced pattern perception in ambiguous visual stimuli.

The current study represents an extension of this research and will add clarity to those findings. The methodology departs from the aforementioned study in two ways: an alternate priming procedure, unconscious semantic priming, was used; and pattern search time was limited to two seconds. Participants included 60 undergraduate students. All participants were shown random visual stimuli (black-and-white matrices), and asked how "patterned" the images appeared to be. The stimuli were displayed on computer screens for two seconds. Unbeknownst to the participants, words were flashed on the

screen for very brief periods (40 ms) before they were shown the stimulus matrix. One group was shown religious words; the other was shown neutral words. Group ratings of perceived patternedness of the stimuli were compared to determine if the religious words had any effect on visual pattern perception. Conclusions from the original study by Motl et al. (2014) are re-presented alongside the new data to offer a comprehensive view of the phenomenon.

### ***How the Type of Description May Influence the Perceived Adoptability of Cats Viewed on Shelter Websites*** - (Psychology)

By: Danielle Schmoll

Faculty mentor(s): Jody Lewis

This research project explored which factors are most important to people when they are deciding to adopt a cat from an animal shelter. Reducing adoption time for cats is important to minimize the chances of shelter cats catching diseases and to minimize the number of animals which must be euthanized. Previous research suggests that there are several characteristics which make cats more appealing to potential adopters, such as the color and the personality of the cat. The first place that many people view animals (sometimes before even stepping into a shelter) is on websites provided by shelters. These websites typically display a photograph and a brief description of that animal. Our goal was to determine how animal shelters could improve their descriptions of each animal to increase the chances of adoption. This project examined three different types of descriptions and participants' perceived adoptability of each animal. The three types of descriptions were: 1. basic information about the animal, 2. the personality of the animal, and 3. prior health conditions of the animal. We expected that participants would find animals with pleasant personality descriptions to be the most adoptable, and those with prior health conditions in their descriptions to be the least adoptable.

### ***Mindfulness and College Students*** - (Psychology)

By: Bridget Grzywacz, Hillary Grgich

Faculty mentor(s): Angela Lowery

Mindfulness is the mental state in which an individual is aware of the present moment and is conscious and accepting of their thoughts, feelings, and bodily sensations. The purpose of our study was to investigate the relationship between mindfulness and depression symptoms, anxiety symptoms, addictive behaviors, religiosity, and technology usage. Currently there are no studies that examine the relations between these constructs in college students. Participants were undergraduate students enrolled in an introductory psychology course at the University of Wisconsin-Stevens Point. Participants were instructed to complete questionnaires related to depression, anxiety, addictive behaviors, religiosity, technology usage, and mindfulness. We hypothesized that those who were more mindful would have fewer depression symptoms, fewer anxiety symptoms, fewer addictive behaviors, higher religiosity, and lower technology usage.

## ***Mothers Versus Others: Caregiving Experience Influences Perception of Infant Vocalizations*** - (Psychology)

By: Lily Molik, Haley Roenneburg, Jena VanderLogt, Emily Lindberg, Rebecca Pletka  
Faculty mentor(s): Rachel Albert

Caregivers' responses to infant babbling have long-term effects on infant language learning. However, the factors that influence caregivers' responses are not well understood. We hypothesize that caregiving experience impacts responses to and perceptions of infant vocalizations. We compared the responses of inexperienced non-mothers with non-mothers who had experience working with infants under two (e.g. childcare workers). Participants viewed a series of prerecorded audio-visual examples of infants vocalizing and were asked to provide an immediate response. Then, they were asked to rate each vocalization on a seven-point scale, which denoted how speech-like the babble sounded. Preliminary results suggest caregiving experience did not influence perception of infant vocalizations as experienced and inexperienced non-mothers provided similar ratings of the quality of the vocalizations. However, experienced and inexperienced non-mothers did differ in the types of responses they provided to the infant vocalizations. Inexperienced non-mothers asked significantly more questions than experienced non-mothers. Determining how experienced and inexperienced caregivers respond to infant vocalizations clarifies our knowledge of the factors that influence infant language acquisition. Since most childcare providers in the U.S. are non-mothers, understanding the impact of caregiving experience on responding has potential implications for shaping infant language learning.

## ***Students' Use of Strengths in Their Daily Life: A Targeted Intervention*** - (Psychology)

By: Brooke Johnson, Lhea Owens, Jemimah Vettrus, Amy Van Grinsven, Steven Kreul  
Faculty mentor(s): Rhea Owens

The purpose of this study is to examine the effect of college students' use of strengths on their well-being in their daily life. Previous research suggests there are a number of benefits to utilizing strengths. In a college student sample, academic self-empowerment, academic efficacy, academic expectancy, and extrinsic motivation improved through the use of a strengths intervention (Hodges & Harter, 2005; Harter, Schmidt & Hayes, 2002). Thus, the researchers aim to examine the impact of a targeted, brief strengths intervention on well-being and career related constructs with a college student sample. Specifically the researchers plan to compare the daily use of strengths versus a comparison group. Approximately 120 students will be recruited. The subjects will be attained through an Introduction to Psychology course's research pool. At pre- and post-test, positive emotions, optimism, hope, life satisfaction, personal growth, meaning, and burnout will be examined.

## ***Thinking About Ingroup Advantages and Disadvantages Influences Intergroup Policy Support*** - (Psychology)

By: Amanda Jakups  
Faculty mentor(s): Mark Ferguson

One-hundred and twelve undergraduate students completed an online survey to examine

whether perceiving oneself as advantaged or disadvantaged increases support for gender equality. Male and female participants were exposed to questions that encouraged them to see their gender as privileged or disadvantaged. They were then asked to indicate their degree of support for campus policy proposals that benefitted men, women, and students more generally. We found that men who perceived themselves as advantaged indicated the lowest levels of support for all three types of policies. Conversely, women in the disadvantaged condition were more likely to support all three types of policies. These results suggest that perceptions of privilege and disadvantage shape support for policies to improve intergroup outcomes for both ingroup and outgroup members.

### ***Visual Search and Video Gaming: The Effects of Experience - (Psychology)***

By: Jacob Brinkman-Hernandez, Danielle Pockat, Amy Heller, Rachel Ackley  
Faculty mentor(s): Patrick Conley

This study examined the effect of an individual's video gaming history on visual search task performance. The key subject variables recorded were the participants' total amount of video gaming, age of first exposure to video games, amount of action-based video games played, and self-rating at video gaming skill. Other variables regarding the current amount of video gaming, amount of competitive play, and similar characteristics were also measured. The results revealed that, consistent with previous studies, greater amounts of video gaming experience led to superior visual search performance, but additionally that lower age of first exposure to video games and self-rated video gaming skill also predicted visual search performance. These findings demonstrate that the background of video game players must be taken into account when determining the effects of video game practice on visual attention, but also partially support criticism that individuals with greater amounts of video game experience seek out such studies for participation.

### ***Who Participates in Dance Research from Psychology Participant Pools: A Representative Sample? - (Psychology)***

By: Cailleigh Zimmerman, Dana Buettner, Molly Wilmsen, Jessica Hanson, Whitney Schroeder  
Faculty mentor(s): Amy Gervasio

Research demonstrates that students can correctly identify emotions presented in brief abstract dances. We examined the demographic information provided by participants in our dance research since the spring of 2013. Students in Psychology 110 classes receive partial credit for participating in research. They often have choices as to which experiments interest them. We were surprised to find that of about 80 students, 61.2% of the participants in our research had formal dance training in at least one area of dance, 91.3% had seen an amateur dance performance, and 88.8% watched dance-related TV programs sometimes or regularly. We also analyzed which factors influence whether individuals considered themselves to be dancers, as well as the relationship between dance experience and GPA. The information gathered in this study will help us analyze the data from our research on emotions to determine if dance experience, familiarity with dance, or college major has an impact on accuracy in determining the emotion being

conveyed through a dance. Additionally, we connect these findings to studies on the representativeness of students in psychology participant pools to the general population.

***A Comparative Analysis of Religious Minorities*** - (Sociology and Social Work)

By: Bryan Richmond

Faculty mentor(s): David Barry

This study is intended to compare and analyze the experiences of Jewish and Hindu communities within Wisconsin, in order to better understand their place within state society. Since the events of 9/11, various minority groups have been under both public scrutiny and bigotry in the U.S. The 2012 shooting at the Sikh temple in Oak Creek, Wis., has more recently shed light on a continued intolerance against minorities. By analyzing the experiences of one of the oldest minority groups as well as one of the newest (Jews and Hindus, respectively) to establish themselves in Wisconsin, I intend to explore similarities and differences between these two groups in order to better understand their integration (or lack thereof) in Wisconsin culture. I want to explore the perspectives of each group, paying particular attention to how each feels their religion is presented, integrated, and understood by the larger Wisconsin society. I feel this topic is important because these experiences, as told by the people themselves, play an important role in the contemporary national dialogue. My focus will be varied, encompassing both the history and experiences of each group on the national level to better understand the experiences of those in Wisconsin.

***Movement of Study Abroad: China and the US*** - (Sociology and Social Work)

By: Cheryl Reichling

Faculty mentor(s): David Barry

This study is to look at the history of study abroad, specifically the views and comparisons from China and the U.S. The study is focused on exploring the study abroad opportunities offered to both U.S. and Chinese students to see the opportunities of being a global citizen they have. In particular, I am looking to see whether a relational link between the globalization forming study abroad opportunities can be concluded. I am interested in learning what affects the choices students make when they decide to pursue a study abroad program. My study also takes an in-depth look at the history of globalization and study abroad to see if they influence one another. The focuses on finding the compromising of views for peace between the two nations, as well as exploring stereotypes and the effect they have on both globalization and study abroad. I believe this study to be important due to the every growing movement to be more connected and a global citizen to each other. Study abroad is one of the largest factors of the movement and the most vital key in it success of making students global citizens.

***Secularization and Morality*** - (Sociology and Social Work)

By: Michael Sandgren

Faculty mentor(s): David Barry

Traditionally, morality has been considered inextricably linked to religion. In fact, a

primary function of religion can be the definition and guidance of ethical behavior. The increasing prevalence of a social phenomenon known as secularization in recent centuries has introduced a challenge to the idea that religion and morality are inherently codependent. Secularization is defined as the transformative removal of religion and religious influences from society. If morality is guided by religion, how is morality formed in a secular context? Is a purely secular context plausible? How are ethical guidelines defined apart from religious influences? As the concept of secularization rises in popularity, examining the relationship between it and morality becomes important.

Based on this historical development and the issue it presents, the object of inquiry in this independent study course is the relationship between attitudes toward secularization and the basis of morality. The guiding question, which serves to frame the entire investigation, is as follows: Are those who view secularization as positive more or less likely to trace their personal morals back to religious roots?

### ***Social Effects of the Tobacco Ban on Student Smokers at UWSP-*** (Sociology and Social Work)

By: Hayden Barber

Faculty mentor(s): Sue Bailey

This study examined some of the social effects of the UWSP tobacco ban through surveys given to student smokers at UWSP, and through quantitative observation of common smoking spots. Because the tobacco-free policy is socially enforced (law enforcement will not be giving out tickets or fines for people smoking on campus), the question arises as to whether it might affect social smokers (students who smoke primarily in social settings) more so than regular smokers. To this end the study investigated the following research questions:

1. Determine where students have gone to smoke before and after ban
2. Determine differences between social smokers' and regular smokers' toward their:
  - a. Support of the ban
  - b. Attempts to quit smoking before and after the ban.

To answer these questions I administered surveys, and counted cigarette butts at locations surrounding campus.

### ***The Living Environments of the Elderly in Wisconsin: Evidence from the 2008-2012 American Community Survey 5-year PUMS Data -*** (Sociology and Social Work)

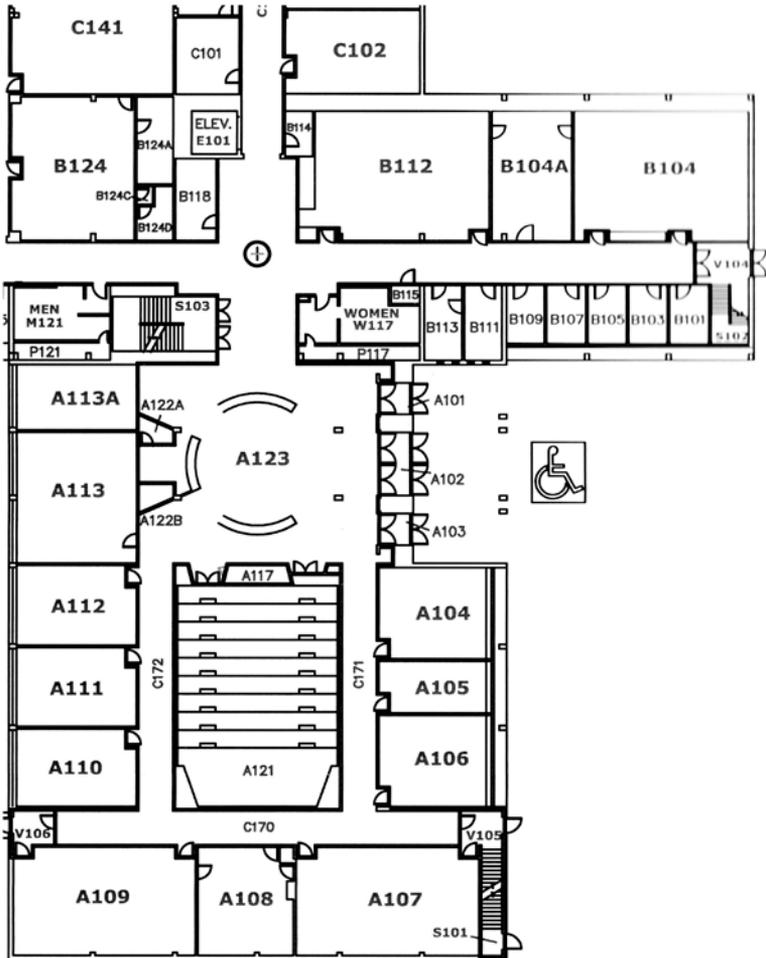
By: Matthew Teachout

Faculty mentor(s): David Chunyu

This study examines the living environments of the elderly in Wisconsin and how they are affected by an array of socio-demographic factors. Using the 2008-2012 American Community Survey 5-year PUMS data, I looked into such variables as age, gender, race, marital status, family income, homeownership, family size, and self-care difficulty. The preliminary analyses suggest that older aged people are less likely to be homeowners, more likely to live alone, and are more likely to report self-care difficulty. Regarding the

living arrangements of the elderly, I found that women are more likely than men to live alone, which is probably because women live longer than men and are more likely to be widowed. But once the marital status is controlled for, such gender difference tends to be reversed, with men more likely to live alone sometimes. In addition, people who live with another person are the least likely to report having self-care difficulties. Regarding homeownership, I found that men are more likely than women to own a home. There is also a racial pattern: whites' homeownership rates tend to decrease with age while blacks' homeownership rates vary in a quite different way, and the racial gap tends to close or even reverse at advanced ages. Homeownership rates are also higher among those who are married and who have higher family income, but once the total family income reaches \$60,000, the income effect becomes insignificant.

# Science Building – First Floor



# Science Building – Second Floor

