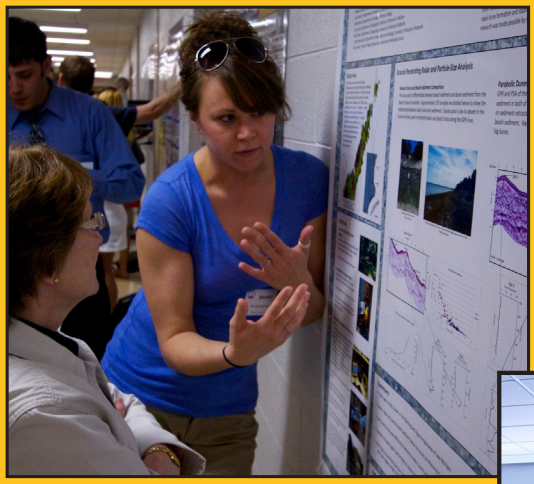
Undergraduate Research Symposium

presented by

The College of Letters and Science

The College-at-the-Core



- Natural Sciences
- Social Sciences
- The Humanities

April 26, 2013

www.uwsp.edu/cols

University of Wisconsin
Stevens Point

Dean's Welcome

Room A121, Science Building

2:00 – 2:10pm

Presentations

Science Building (A-wing) 1st and 2nd floor

Individual room locations and times inside

2:20 – 3:10pm

Oral presentations

3:10 – 4:00pm

Poster presentations

4:00 – 4:50pm

Oral presentations

We encourage participants to attend both oral and poster presentations at the times designated above. Posters are on display all afternoon.

University of Wisconsin-Stevens Point
College of Letters and Science
Office of the Dean

Stevens Point WI 54481-3897
715-346-4224; Fax 715-346-4213
www.uwsp.edu/cols

Welcome to the 14th annual College of Letters and Science Undergraduate Research Symposium.

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

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

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

Join Scholar Society of UWSP

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

Oral Presentations 2:20–3:10pm

Science Building (A-wing) 1st and 2nd floor

Group 1
2:20-3:10 p.m. Room A107

Are BRCA Mutations Related to Lung Cancer? - (Biology)

By: Erica Swenson
Faculty mentor(s): Diane Caporale
Moderator: Diane Caporale

Breast and lung cancer are two of the most common malignancies in the United States, causing approximately 40,000 and 160,000 deaths each year, respectively. Approximately 5-10% of breast cancer cases are hereditary, with about 84% of those cases due to mutations in two large breast cancer predisposition genes, BRCA1 and BRCA2. Recently, studies have begun investigating the roles of BRCA1 and BRCA2 in lung cancer. The objective was to conduct a case study on an individual of Scottish/Irish heritage who was consecutively diagnosed with breast and lung cancer. DNA was extracted and isolated from the individual's hair follicles. Specifically, three common regions within the BRCA1 and BRCA2 genes were screened for mutations by molecular methods, such as allele-specific polymerase chain reaction (AS-PCR). DNA sequencing is being performed to verify the presence or absence of mutations in these regions. This study allowed for the opportunity to evaluate multiple BRCA1 and BRCA2 mutations and provide information to the individual about possible risk factors according to the most current research. If a deleterious mutation is found, then the individual's family will be screened as a case study.

Phosphodiesterase Knockouts in Zebrafish using Transcription Activator-Like Effector Nucleases - (Biology)

By: Nyssa Maki
Faculty mentor(s): Diane Caporale
Moderator: Diane Caporale

Polycystic Kidney Disease (PKD) affects 1 in 500 people and is the most common genetic cause of kidney failure. PKD is associated with mutations in PKD1 or PKD2 genes in 90% of PKD patients. These genes encode a calcium ion channel in the epithelial cells of kidney tubules. Mutations in these genes lead to lower intracellular calcium, decreased activity of calcium-regulated phosphodiesterases and increased levels of cAMP, causing increased cell proliferation, fluid secretion and cyst formation. However, disease onset and progression vary among patients, indicating the importance of phosphodiesterases (PDE). Its primary function is to hydrolyze and inactivate cAMP, which is decreased in cystic kidneys. Preliminary studies I performed at Mayo Clinic

showed that knockout of the gene PDE family 1a, using Transcription Activator-Like Effector Nucleases (TALENs), rendered the PDE-1a gene non-functional and caused renal cysts in the zebrafish animal model. In this study, I have constructed the TALEN DNA sequence using the Voytas TALEN protocol to knockout two other PDE isoforms (3a and 3b) in zebrafish embryos. This last step will be done by homologous recombination and verified by PCR. Ultimately I hope to observe the effects on cyst development in zebrafish. Investigating the PDE-1 and PDE-3 families in its involvement within the Polycystic Kidney Disease pathway, new therapeutic drugs can be designed to alleviate the symptoms that affect many people.

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

Bioacoustics Working Group: Spring Arrival Sequence and Summer Activity of Bat Species at Schmeeckle Reserve and Kemp Wildlife Station. - (Biology)

By: Jennifer Gruettner, Alyssa Grelecki, Eric VanNatta, Kyle George, Molly Schleif
Faculty mentor(s): Christopher Yahnke, Jim Buchholz, Karla Ortman
Moderator: Christopher Yahnke

Wisconsin currently has healthy bat populations. Cave-hibernating bats are threatened by a fast-moving fungal infection known as White Nose Syndrome (WNS). The fungus was first discovered in New England and has since spread and may reach Wisconsin soon. WNS is a mucosal membrane infection which arouses bats during hibernation causing starvation, exposure, and death. WNS has affected large numbers of bats and threatens some species with extinction. Tree-dwelling bats experience high mortality rates due to wind farms. This research project is an effort to contribute to baseline data being collected by the WDNR. It is important to collect this data before WNS begins affecting resident bat populations.

Data was collected from Anabat detectors permanently mounted by the WDNR at Schmeeckle Reserve in Stevens Point and at Kemp Wildlife Station on Lake Tomahawk, in Woodruff, Wisconsin. The Bioacoustics Working Group at UWSP analyzed echolocation calls collected from both sites in the spring and summer of 2009, 2010,2011 and 2012 to determine the spring arrival sequence and overall summer activity patterns of individual species from both locations. Analook software was used to identify individual species of bats and to record time and date of activity. Knowledge of bat activity is also critical to develop an ecologically responsible plan for wind energy in Wisconsin. This knowledge will be used to further understand rate and spread of WNS, and risk to resident bat populations.

What can seed color tell us about male fertility? - (Biology)

By: Yang Yang, Alina Ott
Faculty mentor(s): Devinder Sandhu
Moderator: Christopher Yahnke

In soybean, genic male sterility can be utilized as a tool to develop hybrid seed. Several male-sterile female-fertile mutants have been identified in soybean. The ms5 male-sterile, female-fertile mutant was the result of fast neutron irradiation mutagenesis. Male-sterility due to ms5 was shown to be associated with the "stay-green" cotyledon color mutation d1 or d2. Association between cotyledon color and male-sterility can be instrumental in early phenotypic selection of sterility for hybrid seed production. The use of such selection methods saves time, money and space, as fewer seeds need to be planted and screened for sterility. The objectives of this study were to map Ms5, D1 and D2, and to determine association between cotyledon color and male-sterility. The microscopic analysis of anther development showed disintegrating, optically clears microspores and enlarged, engorged pollen in the male-sterile line. The D1 locus was mapped 3.0 cM distal to Satt129 on molecular linkage group (MLG) D1a. The ms5, and d2 loci were mapped to MLG B1. Both ms5 and d2 mapped to the same chromosome arm and showed linkage with Sat_270, indicating the linkage between ms5 and the cotyledon color phenotype occurs on MLG B1. The distance between ms5 and d2 was 24.1 cM. These results will facilitate the use cotyledon color to select for fertility, which is crucial in using ms5 in hybrid seed production.

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

Deposition Of Iron Microwires On Ultrananocrystalline Diamond (UNCD) Electrodes - (Chemistry)

By: Jeffrey Machovec, Lori Lepak
Faculty mentor(s): Michael Zach, Anirudha Sumant, Ralu Divan, C. Suzanne Miller, Daniel Rosenmann
Moderator: Michael Zach

New applications in clean energy, electronics, and biotechnology will require the use of novel, nanostructured materials, manufactured through economical and environmentally friendly techniques. Electroplate-and-Lift (E&L) Lithography, developed jointly by students at UWSP and scientists at Argonne National Laboratory, is one such technique which can be used to mass-produce metal and semiconductor nanowires of a variety of shapes, sizes, and chemical compositions. In E&L, wires are electrochemically deposited on a reusable electrode made of ultrananocrystalline diamond (UNCD)TM. One advantage of making templates from UNCD is that it is chemically stable over an unusually

wide range of electrochemical potentials – a far wider range than other types of electrodes.

Due to this stability, UNCD templates have the potential to be used for the deposition of highly reactive metals from non-aqueous electrolytes known as ionic liquids. Ionic liquids are salts which are liquid at or near room temperature, able to dissolve many water-reactive and water-stable metals, and are stable even at extreme voltages at which water decomposes.

In this work, iron nanowires are electrodeposited from ionic liquids onto E&L templates. Iron itself is a useful material for making magnetic nanowires. It also serves as a nonhazardous model system for the future E&L-based production of nanowires made of water-reactive materials, which would otherwise be impossible to make using benchtop methods.

Mass Production Of Microwires On Ultrananocrystalline Diamond (UNCD) Electrodes Using Electroplate And Lift (E&L) Lithography - (Chemistry)

By: Samuel Hempel, Andrew Zimmerman, Lori Lepak, Jeffrey Machovec, Ruth Gervais
Faculty mentor(s): Michael Zach, Alan Marten, Anirudha Sumant, Ralu Divan, Daniel Rosenmann, C. Suzanne Miller
Moderator: Michael Zach

Improvements in the manufacture of standard silicon-based electronic devices, now produced in multi-million dollar cleanroom facilities by energy-intensive high-vacuum or high-temperature processes, are most likely to arise through the mass production of components such as micro- and nanowires by new, more economical and less energy-intensive nanomanufacturing techniques. One such technique, Electroplate-and-Lift (E&L) Lithography, can rapidly electrochemically synthesize metal and semiconductor nanowires of a variety of sizes, shapes, and chemical compositions. E&L electrodes consist of a silicon wafer, coated with a film of alternating layers of insulating ultrananocrystalline diamond (UNCD) and conductive nitrogen-incorporated UNCD (NUNCD). This layered film is lithographically patterned into a template, such that wires may grow only on the exposed patterned edges of the NUNCD layer.

In this work, we report the development of an automated E&L system, for the rapid, roll-to-roll mass production of microwires. The E&L template is attached to a wheel, and slowly rotated through an electrochemical plating bath to deposit the wires. Another wheel coated with an adhesive polymer removes and collects the wires, re-exposing the edges of the NUNCD for reuse. This process is calculated to be capable of producing either patterned wires with 100 nm < diameter < 10 um at a rate of ~ 8 grams/day, or a single continuous wire < 1 um in diameter at a rate of > 1 km/ day.

Group 4
2:20-3:10 p.m. Room A210

Implementing a vCloud Infrastructure

(Computing and New Media Technologies)

By: Joshua Cutting, Sam Novak, Kevin Siems, Josef Staniszewski
Faculty mentor(s): Sasithorn Zuge
Moderator: Robert Dollinger

IT infrastructure is expensive, especially when it involves hosting servers and datacenters. With a low budget and high demands from multiple areas, we utilized VMware to create a virtualized environment to support multiple classes and their needs.

The vCloud infrastructure we created was designed to provide a backbone for multiple areas. These include: general class usage for multiple networking classes, a security lab to test systems security in a sandbox environment, a CISCO networking lab to provide hands-on experience with routers and switches, and final dedicated resources to assist students in their research projects.

We utilized a vCenter Server located in our vCloud infrastructure to manage multiple ESXi hosts. These hosts contained multiple virtual machines designed to provide all of the necessary network roles. We also used iSCSI and round robin multipathing to create a centralized datacenter that provides data redundancy to both of our hosts.

By utilizing virtualization and cloud computing technologies, the environment created provides rapid delivery of services, as well as an easily updated infrastructure, not limited by physical hardware or outdated processes.

XGoogle: A Search Engine for XML Data

(Computing and New Media Technologies)

By: Kevin Siems
Faculty mentor(s): Weimin He
Moderator: Robert Dollinger

Due to the popularity of XML as a universal format for data exchange on the web, searching XML data has attracted much attention. In this research project, we have developed a prototype system termed XGoogle that serves as a search engine for XML data. Our search engine was built on top of Apache Lucene, which is a high-performance, full-featured text search engine library written entirely in Java. We exploited Windows forms in .NET to design and implement the graphical user interface of XGoogle. In order to embed Java code into .NET application, we leveraged the IKVM.NET, which is a Java Virtual Machine (JVM) for the .NET runtime environment.

Our system allows the user to specify a directory of XML documents to create the index through the use of a sax parser. The user can also pose a search query over the data from the Lucene index that was created. The query result is a list of XML document hits, each of which consists of the matching XML fragments that highlights the terms specified in the query. The system also allows the user to specify a date range to search for data produced at a specific time and supports fuzzy search over XML data.

The purpose of this project is to improve the student's ability of exploiting a third party library to develop a search engine for XML data. The student also learned how to integrate Java and C# code by using the IKVM.NET. Finally, the prototype system developed can serve as a foundation for the development of XML search engine.

Group 5
2:20-3:10 p.m. Room A225
Patient Input Collection Prototype for Sleep Research
(Computing and New Media Technologies)

By: Kaitlin Reim, Maiko Lor, Amy Kucksdorf
Faculty mentor(s): Tim Krause, David Gibbs
Moderator: Tim Krause

Most current methods for data collection while undergoing sleep research revolve around paper and pen sleep "diaries." This method can result in inaccurate data due to time lapses and general forgetfulness of the participants in these studies. As a possible solution to this problem, we are developing a mobile application prototype to serve as an engaging way to involve patients with data collection about their sleep and related habits during a clinical sleep trial. By restructuring the data collection and involving mobile device input, the goal is to reduce study participants who are noncompliant or those who drop out of the study prematurely.

With the help of the Marshfield Foundation, our focus is to create an intuitive and easy to use interface that relies heavily on patient engagement in the process of collecting their sleep data. Although most of the attention will be focused on the visual design and usability of the application, the final prototype will be partially developed with jQuery Mobile and jQuery in addition to HTML5 and CSS3 to show its possible functionality as a mobile application for users.

With the help of the Marshfield Foundation, our focus is to create an intuitive and easy to use interface that relies heavily on patient engagement in the process of collecting their sleep data. Although most of the attention will be focused on the visual design and usability of the application, the final prototype will be partially developed with jQuery Mobile and jQuery in addition to HTML5 and CSS3 to show its possible functionality as a mobile application for users.

Patient Portal Redesign

(Computing and New Media Technologies)
By: Elise Ewers, Rebecca Schmidt, Andrew Fogo
Faculty mentor(s): Tim Krause, Dave Gibbs
Moderator: Tim Krause

The Marshfield Clinic system provides patient care, research and education with more than 50 locations in northern, central and western Wisconsin, making it one of the largest comprehensive medical systems in the United States. The healthcare industry is transitioning toward managing medical information electronically to be easily accessible anywhere. The team of students redesigned and updated Marshfield Clinic's current patient portal while focusing on the user experience. In this redesign the team aimed to engage patients to be more proactive about their health.

The team focused on four main areas for this project: Research, Design, Development and Usability Testing. The team conducted research on patient portals and Marshfield Clinic as a company. From there they analyzed Marshfield Clinic's competition through competitive analysis. The team reviewed the types of users of the patient portal and reference those to make sure they are hitting the users' needs. Then they moved onto the design phase and created wireframes and prototypes. Once the design was finalized they took it into development, creating an interactive prototype. The last step is performing usability testing on their interactive prototype such as eye tracking to make sure their new patient portal is easy for users to use and understand.

Based on the research and usability testing, the final interactive prototype will be used as a proposition tool to suggest a new design for Marshfield Clinic's patient portal.

Group 6
2:20-3:10 p.m. Room A106

"They Making a Bluegum out of You": The Consequences of Transgressive Sexuality in William Faulkner's The Sound and the Fury - (English)

By: Jessica Lila
Faculty mentor(s): David Arnold
Moderator: John Coletta

This critical analysis applies Michel Foucault's theory concerning the interrelationship of sexuality and race to William Faulkner's The Sound and the Fury, particularly to the character Maury Compson. Foucault's conception of the "deployment of sexuality" explains how society dictates normative sexuality and constructs conceptions of miscegenation and degenerescence which serve to surround transgressive sexual behavior with taboos and stigmatization. During the Jim Crow era in the American South, in which the novel is set, Black males

represent a specifically sexual threat to white homogeneity. Because Maury's cognitive disability represents a threat to a healthy white society, he comes also to be perceived as a sexual threat. In order to negate this threat, society subjects Maury to the same treatment imposed upon Black males such as castration, name change, and eventually dehumanization and animalization. Because race, according to Foucault, is a cultural construction which becomes real through consequences, Maury's subjugation to these treatments essentially blackens him.

I Can Has a Voice: A Semiotic Study of Internet Memes and Their Relation to Culture - (English)

By: Ashley Freund
Faculty mentor(s): John Coletta
Moderator: John Coletta

Internet **memes** are indicative of the internet itself and of internet society as well as active agents in the mutual transformations of those systems because (1) they are very responsive to technological advances; (2) internet memes play technology and culture off one another, using the internet as a "Nottingham Forrest" from which to launch Robin-Hood-like stealth attacks; (3) internet memes can be seen as virtual embodiments of the Wild-West nature of the internet, flouting any and all copyright laws; and (4) memes can serve as proxies to reflect positive and negative traits as so deemed by the internet community.

Not all videos/gifs/pictures shared on the internet are memes though: a Nike ad published all over the internet by the Nike company is not a meme (instead it is a "**deme**," a meme that is propped up by money and/or influence to appear to be a meme). Using the Nike symbol in some other context, one created by someone independent of the Nike corporation, might generate memes. Also, a meme is a "**seme**" if it does not obey the codified language of the meme or is used without reflecting the actual meaning behind the image and/or text (thus reflecting a meaning only evident to the maker). I will explain what a meme is, what memes do, who typically makes memes, who typically views/shares memes, and where on the internet they can be seen.

Group 7
2:20-3:10 p.m. Room A110

"The Good and the Bad: Conditions at Camp Randall and Andersonville During the Civil War" - (History)

By: Elise Brandt
Faculty mentor(s): Nancy LoPatin-Lummis
Moderator: Nancy LoPatin-Lummis

"The Good and the Bad: Conditions at Camp Randall and Andersonville During the Civil War"

This paper is a comparison between conditions at prisoner of war camps in the North and the South during the Civil War, specifically looking at Andersonville in Georgia and Camp Randall in Wisconsin. The paper discusses the differences in the food provided to the prisoners, treatment of the sick, shelter provided, and the effect of the weather on the prisoners in both camps. It also compares the planning and building of both camps, as well as the leaders of the camps. The information for this paper was found by examining letters and diary entries of the time, along with secondary sources written by historians. Conditions at Andersonville and Camp Randall differed greatly in many aspects, showing differences in the North and South during the Civil War.

Group 8
2:20-3:10 p.m. Room A202

Using integer linear programming to optimize the location of firefighting capacities in Siberia - (Mathematical Science)

By: Eli Towle
Faculty mentor(s): Andy Felt
Moderator: Andy Felt

Integer linear programming has been used to optimize everything from product production to athletic scheduling. AMPL, a mathematical programming language, is a driving force behind obtaining optimal solutions for such problems. Here, a very specific and unique application of AMPL is examined.

The French Federation of Mathematical Games and the Société de Calcul Mathématique, SA have jointly presented an annual problem concerning fires in Siberia. Siberia, a territory spanning 13 million square kilometers, is heavily burdened by the cost of fires, particularly between April and September. In order to combat these fires, Siberia has been divided into nearly 100 individual cells based on longitude and latitude, whose centers can host firefighting capacities in the form of vehicular brigades or specialized firefighting planes. We attempt to distribute the fixed number of brigades and planes among the cells in order to minimize the total cost of all fires in Siberia during this six month period. Each cell has a unique proportion of land which varies the cost and probability of a fire breaking out. AMPL is used in conjunction with Java to generate a model capable of addressing all of these concerns.

Zombie Apocalypse: Prisoners' Dilemma Game Theory and Strategy - (Mathematical Science)

By: Kane Mach
Faculty mentor(s): Andy Felt
Moderator: Andy Felt

This is an introductory game theory presentation modeling a “Zombie Apocalypse” into a two-person Prisoner’s Dilemma game using game theory

mathematics. The presentation will begin with the opportunity for everyone to play the game against an opponent. We will then look at the properties of the game and the psychology involed in playing the game repeatedly, as found in my research.

Group 9
2:20-3:10 p.m. Room A111

Wagering Ethically?: The Proper Foundation to Build On

(Philosophy)

By: Jasper St. Bernard
Faculty mentor(s): Dona Warren
Moderator: Dona Warren

Metaphysical systems (also known as worldviews) are a crucial component of the individual. It is through these systems that individuals make sense of the world. However, what is arguably more important than having a worldview is how that worldview is formed. W.K. Clifford argues that any beliefs that compose one's system should not be held if they are based on insufficient evidence. This is important because an individual's actions emerge from these systems. Blaise Pascal takes a different approach. He contends that a lack of evidence is to be expected (in respects to belief about God. His existence, nature, etc.), and that a person is not only justified, but expected to make the most reasonable decisions based on the available evidence. For Pascal this is important because he also believes actions emerge from beliefs. His arguments are considered. Epistemic circularity is also employed as a possible solution for problems that manifest from the wager. The goal is not to determine the legitimacy of Pascal's wager, but to place it in its proper context so that the argument can be correctly assessed.

Women and Science: Increasing Girls's and Women's Participantion in STEM through Changing Perceptions

(Psychology)

By: Elizabeth Wescott, Amanda Jakups, Devin Ramker
Faculty mentor(s): Erica Weisgram
Moderator: Amy Gervasio

While women are gaining an increasing presence in many fields previuosly seen as stereotypical male jobs, they are lacking behind in STEM (Science, Technology, Engineering, and Mathematics) careers. STEM careers such as engineering, mathematics/statistics, physical sciences, and computer sciences, are represented by women degree holders at only 20.94%, 29.76%, 31.55%, and 20.56% respectively (Snyder et al., 2009). Weisgram and Bigler (2006) examined this problem by studying middle school girls who went to an intervention to increase girls' interest and egalitarian attitudes toward science-related careers. The girls' listened to presentations by female scientists that either emphasized

altruism or did not emphasize altruism. The girls who came to think that science could help people were more likely to want to work in a science-related field. In her work, Diekman et al. (2011) found that girls women endorse communal goals (helping, working with others) more than men, have stereotypes about STEM careers consisting of lonely scientists, and found that portraying science careers as high in communal goals increased interest in science.

In the UWSP Gender Development Lab, we are working on evaluating the UWSP Women and Science Day as well as creating a video to be shown to girls to help demonstrate a link between STEM Careers and communal goals. Our progress toward these goals will be demonstrated here and will work to close the gap between men and women in STEM based careers.

Oral Presentations 4:00–4:50pm

Science Building (A-wing) 1st and 2nd floor

Group 10
4:00-4:50 p.m. Room A208

Jumping Genes: Not an Olympic Event…Yet - (Biology)

By: Alexandrea Ollhoff, Callie Johnson, Olivia Schiefelbein, Katelyn Nett, Garrett Seichter
Faculty mentor(s): Devinder Sandhu
Moderator: Devinder Sandhu

In soybean, a single gene controls purple pigment production in flowers. The mutant version of the gene is characterized by variegated flowers rather than the normal solid purple. Loss of pigment production was shown to be due to the insertion of a jumping gene (Tgm9) into the flower color gene. Reversion of the unstable allele from variegated to normal purple color flower would indicate the transposon's excision, and its insertion at a second locus. The objectives of our investigation were i) to study the jumping pattern of the jumping gene in the soybean genome; and ii) to determine the function of genes broken by the jumping gene.

To provide proof of the concept we studied a male-sterile, female-sterile mutant generated from the progeny containing Tgm9. To isolate the jumping gene, we genetically mapped the fertility gene to chromosome 16. Southern blot analysis confirmed that Tgm9 co-segregated with the fertility/sterility phenotype, suggesting that Tgm9 caused the sterility. We used the genome-walking approach to show that the transposon insertion occurred in a helicase gene, which is known to play a role in crossing over during meiosis.

We are using the Transposon Tagging approach to characterize 100 soybean mutants that may become instrumental in increasing yield, drought tolerance, frost tolerance, resistance to diseases, or many other valuable characteristics that will ensure food security for people all over the world.

Mini-Wheat: Virus Induced Gene Silencing - (Biology)

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

Traditional methods to reduce wind shearing in wheat involve the mutation of the gibberellin (GA) hormone pathway. However, in arid climates GA mutants can be ineffective due to the reduced coleoptile length. The Bri1 gene, which codes for a brassinolide protein receptor, is characterized in Arabidopsis thaliana and presents an alternative height control to GA mutants. Results from sequence comparison suggest that the Bri1 gene in wheat (TaBri1) is similar to A. thaliana Bri1 (AtBri1) gene, and that the genes may be orthologous. Expression studies using tissue from root, lower stem, upper stem, leaf sheath, leaf, and ear show that highest gene expression is observed in stem (lower and upper stem) and lowest in leaf and leaf sheath. Virus-Induced Gene Silencing (VIGS) is an effective strategy for controlling post transcriptional gene level, and involves the introduction of an infectious, antisense RNA construct into the developing organism. VIGS analyses with two different antisense constructs for TaBri1 show induction of dwarfing in the treated plants compared to negative controls. Plants treated with the photo-desaturase virus at the two leaf stage show a visible change in phenotype. The results suggest that TaBri1 is true orthologue of AtBri1 and is a good candidate for inducing dwarfing in wheat. Further studies will reveal suitability of manipulation of TaBri1 in deep sowing conditions in water-deprived cultivation of wheat.

Group 11
4:00-4:50 p.m. Room A210

The Value of Museum Collections - (Biology)

By: Anna Lutz, Adam Kordus, Rex Raasch
Faculty mentor(s): Jamee Hubbard
Moderator: Jamee Hubbard

Museums and museum collections have long been a part of academic history, but they often go unnoticed and are under-appreciated. This presentation serves to highlight the value of collections in teaching, research, the development of technical skills that can be useful in many fields, and public outreach. We will incorporate the knowledge we gained by speaking with curators and other staff of several museums of Wisconsin, visiting the UWSP Museum of Natural History Collections in Biology and Geology, and by working as student curators in the

UWSP Museum of Natural History collections. We will also discuss how students and the public can become involved in collection and curation, what it takes to be an effective curator, and will give students an idea of how these skills can transfer easily into other fields. After the presentation, the audience will be invited to see for themselves the value of the collections by observing various specimens on display.

Group 12
4:00-4:50 p.m. Room A107

Seasonality of Fine Root Growth, Mortality, and Carbon Allocation in Temperate Forest Trees - (Biology)

By: Samuel Knapp
Faculty mentor(s): Eric Singsaas
Moderator: Terese Barta

Large amounts of carbon annually pass through forests, and the phenology of carbon flux through forests is an important variable for accurately modeling climates. Aboveground phenology has been extensively studied in temperate forests, but due to the difficulties of studying below ground systems, seasonal changes in root growth and death are relatively unknown. This study investigated fine root phenology in two prevalent temperate tree species, northern red oak (*Quercus rubra L.*) and eastern hemlock (*Tsuga candadensis* (L.) Carrièr). Weekly underground photographs of fine root systems were taken to determine seasonal growth and death patterns. This study also investigated an alternative method for calculating forest level carbon flux. Allometric relationships between diameter and linear mass density were determined for fine roots of five temperate tree species*: Q. rubra, T. canadensis, Fagus grandifolia, Acer saccharum*, and *Fraxinus americana*. Density relationships were used to calculate percentage mass production and carbon allocation rates. This method of scaling from 2D minirhizotron photos to 3D ecosystems may be superior to others using questionable assumptions regarding soil viewing depth and equality between length and mass production percentages. Data from this study will be incorporated in the Ph D. thesis of Rose Abramoff of Dr. Adrian Finzi's Lab at Boston University.

Teaching an Old Bird New Tricks: Using the model-rival technique to teach an African Grey parrot (Psittacus erithacus) to associate words with objects - (Biology)

By: Porscha Carriveau, Sarah Stowe, Lori Rusch
Faculty mentor(s): Terese Barta
Moderator: Terese Barta

There are many similarities between the way birds learn songs and how human infants learn to vocalize in acquiring language, such as the sensitive period and

babbling stage that occur in the first year of life. Prior research conducted by Dr. Irene Pepperberg showed that the African Grey parrot () has the vocalization abilities equivalent to a four-year-old child. The basic goal of this research is to teach an African Grey parrot to produce English phonetic vocalizations associated with particular objects. The technique involved is called the model-rival technique. The technique involves two participants, one to give instructions (trainer), and one to model the vocalization (student). The technique encourages the parrot to act as the rival for the trainer's attention. This technique is the same one used successfully by Pepperberg with her parrot Alex during his sensitive period. Our experiment seeks to determine if the model-rival technique can be used successfully with a parrot that is past the sensitive period. Our research subject is Kimby, a 13-year-old African Grey parrot. During the past three semesters, Kimby has had daily model-rival training sessions. He has progressed from producing no vocalizations during training to vocalizing in response to the trainer's cue (question, "what toy?"), although he has not yet produced the target word for the object. His vocalizations and word acquisition outside of the training sessions have also dramatically increased.

Group 13
4:00-4:50 p.m. Room A110

A histological investigation for the occurrence of Batrachochytrium dendrobatidis in preserved specimens from the UWSP Museum of Natural History Herpetological Collection.

(Biology)

By: Spencer Siddons
Faculty mentor(s): Robert Schmitz
Moderator: Todd Huspeni

The population declines of amphibians across the globe have occurred due to a number of factors such as habitat loss, overexploitation, agrochemicals, and invasive species. One of the major and more recent causes is the emerging infectious disease, Chytridiomycosis. The etiology of this disease that has been documented to affect more than 400 amphibian species around the world is *Batrachochytrium dendrobatidis* (*Bd*) or Chytrid fungus. During the infectious mobile spore stage of its life history, Bd infiltrates the skin of amphibians. When the number of spores in the skin is high enough, the gas exchange that occurs naturally in amphibians will be affected enough to become fatal. The University of Wisconsin-Stevens Point Museum of Natural History Preserved Herpetological Collection contains numerous individuals from Central and South America. If *Bd* is found on these specimens then that information can be added to the database. Hererin, I report the procedure and findings of a histological investigation for the presence of *Bd* on specimens from Central and South America due to the high amounts of amphibian population declines and

extinctions that have occurred there. The chance of finding *Bd* on preserved specimens provides further support for the importance of having and maintaining a collection of preserved specimens from around the world. This project will have the ability to provide data to the scientific community regarding a major threat to amphibians.

Intensity of Skrjabingylus nasicola infection in ermine (Mustela erminea) - (Biology)

By: Matthew Buchholz
Faculty mentor(s): Todd Huspeni, Shelli Dubay
Moderator: Todd Huspeni

Ermine (*Mustela erminea*) are trapped as legal furbearers but are not actively managed by the Wisconsin Department of Natural Resources. Carcasses from trappers provide a unique opportunity to investigate wildlife health. In the past, we have identified *Skrjabingylus nasicola*, a parasitic nematode of the nasal sinuses, in over 95% of the weasels. This parasite is transmitted to weasels when they consume an infected adult gastropod or small mammal. Intensity of infection (number of worms per host) varies dramatically from as little as 1-2 worms to over 50. This year, our goals were to: 1) identify differences in intensity by year and by gender, 2) identify differences in intensity by age for male weasels, and 3) investigate if infection affects body condition of weasels. Weasels were necropsied and parasites were identified using reference specimens in the Steven Taft Parasitological Collection. Total length and weight was used to identify species. We used baculum shape to age males and all females are adults because they are capable of reproducing in their first year. We use log10 weight divided by log10 length as an index of body condition because measuring body fat is unreliable in weasels. This year, we necropsied 66 weasels and S. nasicola was found in all but one. Average intensity for weasels this year was 14.84 worms per weasel (SD = 11.43). We will update statistical analyses to include data from this year and discuss implications of our findings.

Group 14
4:00-4:50 p.m. Room A109

Molecular Analysis of Bourbon and Canadian Whiskey Samples (Chemistry)

By: Jon Sauer
Faculty mentor(s): Jim Lawrence
Moderator: Jim Lawrence

Whisky, a product of fermentation and distillation, is scrutinized under high standards from both industry and consumers. Dependent on the ingredients and methods of production, specific types are mandated through federal definition. Separations between whiskies, i.e. Kentucky Bourbon and Canadian Blended,

have previously not been investigated at a molecular level. Our lab, used a high resolution, ultra-sensitive Liquid Chromatograph Quadrupole Time-of-Flight Mass Spectrometer capable of analyzing complex samples to identify small molecules present in several whiskey samples. This analysis, coupled with automated and hand data curation, yielded very large, rich data sets for inspection. Our results show that hundreds of molecular differences and similarities exist between the molecular profiles of Kentucky Bourbon and Canadian Blended Whiskies.

Water-Gas-Shift catalysts: A new use for classic compounds

(Chemistry)

By: Drew W. Cunningham, Nicholas Walters, Brittany Schreiber, Albert Webster, Lucas Burgan, Kyle Spielvogel
Faculty mentor(s): Jason D'Acchioli
Moderator: Jason D'Acchioli

As the world's petroleum resources continue to be depleted, researchers are charged with the task of making efficient use of those resources. One efficient use of petroleum feedstocks is the synthesis of homogeneous organometallic catalysts. We propose the investigation of several complexes of the form RML_n ($R=\eta^5$-cyclopentadienyl, η^5-indenyl; M=Fe, Ru, Os; $L_n=(CO)_3$) for use as water-gas-shift reaction catalysts. Prior investigations from our laboratory show the complex $[(\eta^5\text{-indenyl})Ru(CO)_3]+$ is active in a water-gas-shift cycle. We propose exploring the catalytic role of the aforementioned RML_n complexes in a quantitative way through gas chromatography-mass spectrometry; the Os analogues have not been previously isolated. This presentation will describe the results of our work thus far.

Group 15
4:00-4:50 p.m. Room A225

Timeline of the Hmong in Portage County

(Computing and New Media Technologies)

By: Maiko Lor
Faculty mentor(s): Tim Krause
Moderator: Tim Krause

This study seeks to graphically chronicle the story of the Hmong people in Portage County from 1976-Present. Through the use of a visual interactive timeline of Hmong in Portage County, the insights gained from this research will help educate and bring more awareness within the community about the history of the Hmong people which in turn will lead to a better understanding and acceptance of the Hmong people. Through the creation of a visual interactive illustration illustrating a year by year timeline of the Hmong history in Portage County through an explanation of each event/unless the event is self-explanatory

in hope to show others that the Hmong people are more similar than they are different. A goal for the interactive timeline is to be used as a historical learning tool that can be used within the classroom, libraries, on the internet or any occasion to show the Hmong people immerse within the community and their rapid growth in a short amount of time.

After the Vietnam War in 1975, many Hmong families fled Laos to come to the United States as refugees in fear of subjugation and death at the hands of the Vietnamese Government. In 1980, Portage County had their first wave of Hmong refugees and in 2004; they had their second wave of refugee. Currently there are approximately over 1000 Hmong people living in Portage County, data taken from the 2010 Census of Population and Housing, SF1. There has been little research done on the Hmong people in Portage County.

UWSP Virtual Tours

(Computing and New Media Technologies)

By: Kayla Stuebbe, Spencer Oberstadt, Sam Novak, Jonathan Christian, Matt Luckow
Faculty mentor(s): David Gibbs, Tim Krause, Mike Ritter
Moderator: Tim Krause

UWSP Virtual Tours is an augmented reality application that allows users to take a "tour" through Schmeeckle Reserve. On this tour, users hold their phones or tablets up to discover different points of interest. These points of interest are displayed either on a map view mode using Google maps, or a camera view mode which uses the user's camera. Upon discovering a point of interest, the app allows users to touch the point of interest marker for more information. This information consists of history, facts, and pictures about the point of interest. The application gives the choice between a free roam mode, which allows users to freely wander throughout Schmeeckle Reserve, and a quest mode, which directs users from one specific point to the next. With the use of a server, the app is expandable beyond Schmeeckle Reserve, giving the opportunity to create new tours in any imaginable location. UWSP Virtual Tours will help build and inspire future augmented reality applications in the university and beyond.

Group 16
4:00-4:50 p.m. Room A106

Ghosts of the Past: The Choctaws, the Confederacy, and the United States in the Civil War - (History)

By: Jordan Straight
Faculty mentor(s): Rob Harper
Moderator: Rob Harper

The story of the American Civil War is often told in black-and-white, with little

attention to stories of Native Americans. The Choctaw people, originally from the Mississippi region, faced a dilemma when it came to deciding whether to support the Confederacy or the Union. It was a difficult decision to make; breaking with the United States meant the tribe would have to separate itself from the government that had provided for them since forcibly moving them to Oklahoma in the 1830s. Yet the Confederate States offered a relief from the decades of grief that haunted the relationship between the Choctaws and the United States government. These ghosts maintained too strong of a presence in the hearts of the Choctaws to make joining the Union a viable option. Although the Choctaw's initial policy was neutrality, they ultimately chose to join the Confederacy because of their poor relations with the United States in regards to money, land, and representation in government.

Wisconsin's Cold War "Hero": Joseph McCarthy's Election to United States Senate - (History)

By: Catrina Conway
Faculty mentor(s): Rob Harper
Moderator: Rob Harper

At one time newspapers praised Cold War villain, Joseph McCarthy, for his "Irish wit and sparkling personality," his "ruggedness that inspires human trust," and his "driving ambition," characteristics that jar with the perception of McCarthy today. Much of the research done on the Senator from Wisconsin focuses on his 1950 decision to take up the anti-Communist cause and his dramatic rise and fall thereafter, yet the question of how he originally managed to steal the senate seat from the long reigning La Follette family dynasty persists. My research into the papers of 1946 Republican Party Chair Thomas Coleman, newspaper editorials, and election results revealed that McCarthy's victory resulted from three factors: La Follette's critical mistakes; an opportunistic grassroots campaign strategy; and strong support from the Wisconsin Republican Party. McCarthy ultimately defeated La Follette by a slim margin of 5,000 votes. Had La Follette put more effort into his campaign and fought harder to hold his senate seat, the "red scare" agenda of the Cold War might have looked very different.

Group 17
4:00-4:50 p.m. Room A111

Do women show more skin and feel more attractive during ovulation? - (Psychology)

By: Dana LaVake
Faculty mentor(s): Jody Lewis, Karin Bodensteiner
Moderator: Jody Lewis

Women's highest point of fertility is during ovulation and women perceive themselves as more attractive during this time (Roder, Brewer, Fink, 2009). Previous research has found that women may promote their fertility by going to lengths to appear more attractive to potential mates (Durante, Li, Haselton, 2008). For example, women wear more revealing clothing and ornamentation during this time (Haselton, et al, 2006). We had 15 undergraduate women pick out clothing from a website called looklet.com for 35 days and answer a daily survey. In the daily survey we asked if they were menstruating and to rate how attractive they felt. Looklet.com allows people to choose from many different varieties of clothes and dress an avatar. We asked our participants to use the same avatar and dress her how they would dress if they were going to a party that evening. From the daily outfits we were able to collect data on several variables related to fertility promotion such as the amount of exposed skin. Our hypothesis is that women are more likely to feel more attractive and pick out clothing that show more exposed skin and when they are ovulating.

What Works to Motivate Students To Participate in Service-Learning? - (Psychology)

By: Ashley Majewski, Brooke Allen, Liz Fraser, Sarah Peterson, Sha Quese Jones
Faculty mentor(s): Jeana Magyar-Moe, Debbie Palmer
Moderator: Jody Lewis

Service-learning is an experiential teaching method where in which students learn and develop through active participation in and reflection upon thoughtfully organized service that is conducted in and meets the needs of the community. Although service-learning is considered to be a high-impact teaching practice and many within higher education advocate the incorporation of service-learning into college classrooms, little scholarship is available regarding what factors make service-learning appealing to students. Indeed, many students are apprehensive when they first learn about a service-learning component in their classes. The present study is designed to measure what aspects of service-learning are likely to increase or decrease student willingness and motivation to participate in service-learning via examination of the underlying values students may hold, level of parental involvement in service activities, individual levels of positive and negative affect, and student knowledge (or lack thereof) regarding service-learning and the benefits of service-learning. Participants were 117 college students enrolled in an Introductory Psychology course. A host of quantitative and qualitative information regarding factors related to motivation (or lack thereof) to participate in service-learning and personal characteristics of students and their backgrounds that are related to willingness to participate were collected and will be reported.

Group 18
4:00-4:50 p.m. Room A202

Argentina: A Leader in Human Rights Innovations

(Political Science)

By: Christine Sanderson
Faculty mentor(s): Jennifer Collins
Moderator: Jennifer Collins

My paper examines Argentina's emergence as a world leader in dealing with human rights violations. From 1976-1983, a right-wing military dictatorship kidnapped, tortured, and killed thousands of suspected dissidents. Since the return to democracy Argentina has made great strides in investigating the abuses that occurred during this period and in bringing many of the perpetrators to justice.

My paper discusses the role played by innovative human rights organizations, such as the Mothers and Grandmothers of the Plaza de Mayo; the Equipo Argentino de Antropologia, the first human rights forensic organization in the world; and HIJOS, formed in the 1990s by the grown children of the disappeared. These organizations, together with transnational actors, and members of Argentina's government were instrumental in acheiving many "firsts" for human rights, including the 1983 Truth Commission, which produced the first ever-published truth commission report, Nunca Mas. This report led to the trial of all nine members of the Argentine junta, which was the first time that any Latin American authoritarian leader had ever been tried for human rights abuses. Finally I offer an explanation for why these precedent-setting actions occurred in Argentina. My explanation focuses on the level and type of repression, the nature of Argentina's democratic transition, the country's high levels of development and education, and the importance of multiple and diverse human rights organizations.

Peronists vs. Tories and the Impasse over Falklands/Malvinas: Exploring the Role of Parties in International Disputes

(Political Science)

By: Aldis Siltumens
Faculty mentor(s): Jennifer Collins

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

Moderator: Jennifer Collins

The dispute over the control of the Falkland Islands/Malvinas has been going on for almost two centuries, and throughout British-Argentine relations the fate of these islands has remained a point of contention. My research seeks to explain the historical events behind this dispute and to elucidate the important roles that various government leaders and particular parties in each country have played.

The rhetoric of the British and Argentine governments on this issue has varied a great deal in its tone. Particularly tense periods have coincided with the elections of Peronist leaders in Argentina and Conservative leaders in the United Kingdom, and as such my paper seeks to explain the role that these particular leaders and parties played in the question over the sovereignty of the Falklands/Malvinas Islands. Questions about race, culture, and nationalism have also influenced this dispute, and therefore an examination of these overarching themes is imperative in order to fully understand this ongoing conflict.

The question of who should have control over the Falklands/Malvinas Islands is one that has remained unanswered for over 180 years. At times it has seemed that a solution could have been reached, however key actors and events have unfolded in ways that have made that solution elusive.

Poster Presentations 3:10-4:00pm

Science Building (A-wing corridors) 1st and 2nd floor

2012 Mosquito Surveys of the Chequamegon Moraine and Outwash Plain and the Glacial Lake Wisconsin Sand Plain

(Biology)

By: Dan Phillips
Faculty mentor(s): Jamee Hubbard

Wisconsin has over 50 different species of mosquitoes, due to its varied habitats and its abundance of lakes, rivers, and wetlands. A large scale study of mosquitoes of Northern Wisconsin was published in 1968, but recent studies have been restricted to certain counties in Central and Southern Wisconsin, and focused on disease vectors. The northward migration of species into Wisconsin and introduction of new species from other countries are of concern because these events can result in competition of immigrants with native mosquitoes and an in increase in disease vectors. These concerns indicate the need for more current assessment of the mosquitoes of Wisconsin and their geographical and seasonal distribution. For this ongoing study of mosquitoes of Wisconsin, the state was divided into 27 different ecoregions that represents Wisconsin's diverse ecological and geological landscape. Over the summer of 2012 adult female mosquitoes were sampled in two of the 27 ecoregions - the Chequamegon Moraine and Outwash Plain and the Glacial Lake Wisconsin Sand Plain - using light traps baited with dry ice. My contribution to this project has been identifying the mosquitoes collected and comparing species presence and abundance with previous samples. My work and that of other involved students contributes to our understanding of the potential migration of new species into Wisconsin and will enable us to create a checklist of mosquito species in the state and their preferred habitats.

A comparison of seining techniques for sampling small-bodied fishes in Wisconsin glacial lakes - (Biology)

By: Emily Fleischauer, Forrest Fleishauer, Benjamin Balika, Michael Howard
Faculty mentor(s): Justin Sipiorski

The use of conventional seining techniques in glacial lakes is often made difficult by the presence of steep dropoffs and soft benthic substrates close to shore. Standard beach and kick seining are rendered nearly useless as techniques to reliably capture small-bodied fishes out of small, mucky weedy mesotrophic and eutrophic lakes typical of Wisconsin. We explore the use of a miniature floating purse seine, as an alternaitve to conventional seines, in a study of small glacial lakes in Marathon County Wisconsin. We report initial findings from ongoing research. Thus far, the miniature purse seine appears to be a superior method for netting small fishes from inshore areas of these small glacial lakes.

A Preliminary Study of the Biogeography of Freshwater Mussels (Bivalvia: Unionidae) in Wisconsin, USA - (Biology)

By: Ryan Pappas
Faculty mentor(s): Daniel Graf

Freshwater mussel (Bivalvia: Unionidae and Margaritiferidae) distributions in Wisconsin follow post-glacial basin connections. In this study, we synthesized various literature sources to summarize mussel species distributions among drainages. A total of 49 freshwater mussel species inhabit Wisconsin waters. We identified six distinct faunal assemblages in 8 different drainage regions. General statewide taxa such as *Lampsilis siliquoidea* occur in all catchments, including Lake Superior. *Fusconaia flava* represents a similarly widespread assemblage, with representatives in all drainage regions except Lake Superior. Species that are only in the Superior drainage (*Elliptio complanata*) invaded from the Atlantic Slope. Some taxa are prevalent within the Ohio drainage, but have expanded to the Lower Fox and the Rock Rivers in southeast Wisconsin as well as Lake Michigan (*Villosa iris*). Other species, such as *Quadrula fragosa*, have only been found in the Interior-Mississippi Basin. A post-glacial confluence between the Upper Fox (Great Lakes) and Wisconsin (Interior Basin) rivers has been proposed in the literature, based on species found in both systems (*Leptodea fragilis*). This set of faunal distributions can be used to test hypotheses of the history of colonization of aquatic taxa in Wisconsin as well as provide a baseline for future studies regarding freshwater mussel distributions.

A statewide, 45-year perspective on spawning phenology, age and growth of the White Sucker (Catostomus commersoni) in Wisconsin (Actinopterygii: Catostomidae) - (Biology)

By: Jordan Brillowski
Faculty mentor(s): Justin Sipiorski

We are studying the life history of Wisconsin populations of white suckers (Catostomus commersonii), an abundant and important forage fish. Length (mm), preserved weight (g), and gonad weight (g) are being taken for each individual specimen in the Becker Memorial Ichthyology Collection of the COLS Museum of Natural History and the Wisconsin Fish Distribution Collection obtained from the Milwaukee Public Museum. Age will be estimated from scale annuli. Length-weight regression and length-at-age analyses will be performed to determine the size and age structure of the past and present white sucker communities represented in the preserved specimens. Gonadal somatic index (GSI) will also be determined across all time periods to estimate the average time of spawning activity in white suckers over the past 45 years. This work is ongoing with a completion goal of late 2014. Comparison of historical spawning dates phenologically to spawning activities of present populations will then be finished.

Aconitase-4: Gene Mapping in Soybean - (Biology)

By: Jessica Boelter
Faculty mentor(s): Devinder Sandhu

Isozymes are different variants of the same enzyme that differ in sequence but catalyze same chemical reaction. These enzyme variants can be different products of same gene or products of two unrelated genes. Aconitase isozymes catalyze the interconversion of the three tricarboxylic acids: citrate, cis-aconitate, and isocitrate in the Krebs cycle. Aconitase-4 has been used in mapping studies in soybean and is shown to be involved in allele switching. The purpose of this study is to map this gene on a soybean chromosome. For the study, parent plants BSR 101 and PI 290136 were crossed. The F2 generation was scored for Aconitase-4 alleles and was used to make two bulks: one displaying the BSR 101 allele pattern, and one displaying the PI 290136 allele pattern. The bulks were then used in bulk segregant analysis (BSA), and tested with 700 primers. The gene was determined to be closest to Satt509, a primer located on Molecular linkage group (MLG) B1. All the polymorphic MLG B1 primers were used on entire F2 population and genetic linkage map was developed. BARC_11- 316, was found to be 5 cM from the Aconitase-4 gene. Findings of this study will help in characterization of Aconitase-4 in soybean.

Amino Acid Tetris: Bioinformatics Approach to Characterizing Helicase in Soybean - (Biology)

By: Christopher Navarro, Kaylin Kleinhans, Daniel Vaz
Faculty mentor(s): Devinder Sandhu

Helicases are enzymes involved in nearly all aspects of RNA and DNA metabolism including double stranded nucleotide separation via ATP hydrolysis. The protein traditionally unwinds DNA but recently the role of helicase has extended to metabolic processes of both RNA and DNA. Because helicases share a high degree of conservation within the amino acid residue sequence, a genome-wide characterization of this enzyme family has been conducted to survey the gene structures, organization patterns, chromosome locations, conserved motif alignment, domain order and phylogeny. Classification of these conserved sequences in soybean have shown the locations of 545 sequences related to helicase. Annotations and sequence analysis has broken the list of genes in to sub families defined by amino acid sequence: DEAD Box, DEAH/ RHA, SKI2, UPF1, PIF 1, RAD3 and REC Q. Conserved motifs have been found for all families and show the similarities and differences among proteins of different function. The motif map was used to construct a phylogeny based on sequence similarity and has shown how gene types can diverge within the genome. Sequence comparison has also shown homology between redundant proteins and reaffirmed the paleoploidy nature of the Glycine max genome. The nature of this characterization is to gain a better understanding of the homology, genome location domain structure and evolution of helicase within the genome.

Classification and Reorganization of the UWSP Entomology Teaching Collection Specimens - (Biology)

By: Springer Amy
Faculty mentor(s): Jamee Hubbard

Zoological collections are kept by universities as a valuable historical record of biologic diversity, a resource for scientific research, and a hands-on tool for education. The UWSP entomology collection houses over 16,000 specimens for research and teaching purposes. Due to recent changes in location, developments in insect classification, and acquisition of new specimens, the UWSP entomology collection has accumulated approximately 2000+ unlabeled and unorganized specimens. A key purpose of the entomology collection at UWSP is to provide a resource to students learning about the phylogeny, anatomy, and identification of insects. Specimens need to be properly identified and sorted to serve this purpose. To preserve the educational value and accessibility of the collections, a detailed process of identification and reorganization has been employed with the goal of

classifying and organizing all unidentified specimens. As a result of this process, many unique and unusual specimens have been added to the collection. Six previously unrepresented insect families have been discovered in the collection thus far, increasing the diversity and value of the collection for students. Future goals for the collection include completing reorganization of the teaching collection and beginning work on the research collection.

Color-phyll: Color Does Matter - (Biology)

By: Callie Johnson, Nigel Golden, Taylor Atkinson, Carley Gorecki
Faculty mentor(s): Devinder Sandhu

Plant pigments, chlorophylls, play a vital role in absorbing sunlight that is used to fix carbon dioxide into glucose. Any mutations in development of chlorophylls are detrimental to plants and result in yellow plants. In soybean, we have identified two yellow lethal and one yellow viable mutants. In yellow viable, the mutant plant survives, but its function can be reduced. In yellow lethal, mutant plant dies. Both traits are recessive, meaning they only show phenotypes in the homozygous recessive condition. Objectives of our investigation are to i) determine if the new mutants are unique, and ii) map the new mutants to the soybean genome. We generated an F2 population between a homozygous green plant (YY) and a heterozygous green mutant plant (Yy). For all three populations, F2 segregated into 75% green and 25% yellow plants, suggesting monogenic inheritances of the traits. We utilized bulked segregant analysis (BSA) to locate the mutant genes on soybean chromosomes. A total of 700 simple sequence repeat (SSR) markers were used on the bulks. In BSA, yellow viable mutant showed association with Satt703. The genetic linkage mapping on whole chromosome showed yellow viable locus 5.5 cM from the marker BARC_02-1477. One of the yellow lethal mutants showed association with markers on MLG I. BSA for the second yellow lethal mutant is in progress. Updated results will be presented in the poster.

Comparing Diatom Communities of the Plover River via Gut Content Analysis of the Central Stoneroller (Campostoma anomalum) - (Biology)

By: John Grosch, Joshua Wied
Faculty mentor(s): Justin Sipiorski

The central stoneroller (Campostoma anomalum) is a benthic, stream dwelling fish. Stonerollers feed upon periphyton along the substrate of streams. Housed within the Becker Memorial Ichthyologic Collection of the University of Wisconsin-Stevens Point, are a number of specimens collected and preserved with in the last 45 years. Using groups of specimens collected in the same geographic range during three time frames (1967, 1989, 2010), we analyzed the diatom communities present at 3 time intervals. The fish were dissected and gut contents were removed. The contents were acid washed using 12M HCl, and 40%

H2O2. The samples were dried, prepared, and analyzed using an electron microscope. Pictures of the samples were taken in a predetermined pattern at specified magnification for further identification. Numbers were tallied for each genera present. A Chi-Square analysis was done to examine community shifts in number of individuals from each genera present through the different time frames, and a Bonferroni Correcton was applied. We concluded the communities present in 1967 and 1989 were relatively similar However, a dramatic shift in community composition occurred between 1989 and 2010. This was correlated to land use practice changes and water quality shifts of this time frame. We were able to identify indicator genera, which shifted dramatically as caused by specific hydrologic changes.

Comparison of House-Keeping Genes of Spirochete Isolate W97F51 with American Borrelia Species - (Biology)

By: Xee Yang, Steven Lenz
Faculty mentor(s): Diane Caporale

Borrelia isolate W97F51, discovered in a black-legged tick from the Southern Unit of the Kettle Moraine State Forest in Eagle, WI, is a highly mutated strain of the local species *Borrelia burgdorferi*, the bacterium that causes Lyme disease. To clarify the taxonomic status of this isolate, 5 gene comparisons of several *B. burgdorferi* sensu lato isolates representing American genospecies *B. burgdorferi* sensu stricto, *B. bissettii*, and *B. andersonii* were conducted. A previous phylogenetic study revealed Isolate W97F51 was most closely related to *B. bissettii* but still resided outside that cluster. Students felt these analyses supported the recognition of W97F51 as a novel species in the *B. burgdorferi s.*l. complex. However, reviewers of the manuscript felt that the norm of today is to also compare at least several house-keeping chromosomal genes among them. Therefore, we are sequencing up to seven house-keeping genes to show variation among different *Borrelia* isolates. These sequences will be placed contiguously for each isolate and a phylogenic tree will be developed. He we report whether previous data inferring W97F51 as a new *Borrelia* species continues to be supported and, if so, named *Borrelia wisconsinensis*.

Curation of the Daniel J. Bereza Collection of Freshwater Mollusks at the Smithsonian National Museum of Natural History: Phase I - (Biology)

By: Caitlin Luebke
Faculty mentor(s): Daniel Graf

In 2011, the Smithsonian National Museum of Natural History (NMNH) acquired a collection of preserved freshwater mollusks from the family of Daniel J. Bereza (1950- 2007), formerly of the Academy of Natural Sciences of Philadelphia, Pennsylvania. This collection was accompanied with associated field notes.

These field notes contain an entry for each collecting event, including the collecting localities and lists of the species found. This collection is of special interest to us because it contains rare species of freshwater mussels (Bivalvia: Unionidae) from Central America. Starting in January 2013, we began assisting with the process of accessioning this collection into the Smithsonian. The first phase was to build a database of the individual collecting events. To do this, we captured the field notes verbatim, converting digital images of handwritten notes to searchable text strings. While completing this first phase, we learned that the field notes contain entries for over 700 collecting events from 17 U.S. states and parts of Mexico, spanning the years from 1971 to 1984. The second phase will be to normalize the collection event data into separate fields (collectors, state, county, water body, etc.) and georeference the localities. The third phase will be to assist with sorting and cataloging the specimens at the NMNH. Each specimen lot will be assigned its own catalog number and our data will be imported into the NMNH catalog.

Disease Surveillance (Avian Cholera, Avian Influenza, and Avian Malaria) in Long-tailed Ducks (Clangula hyemalis) and Common Eiders (Somateria mollissima) in Churchill, Subarctic Canada - (Biology)

By: Linda Lyon and Matthew Perry (USGS Patuxent Wildlife Research Center)
Faculty mentor: Todd Huspeni

Due to the remote habitats of seaducks little is known about diseases affecting these waterfowl. In June 2009, surveillance for three potentially significant diseases of waterfowl (avian cholera, avian influenza, and avian malaria) was conducted in two species of seaduck, the long tailed duck (*Clangula hyemalis*) and the common eider (*Somateria mollissima*), in Churchill, Subarctic Canada. These species have been exhibiting long-term population declines in North America. Declines in long-tailed duck and common eider populations are of concern for conservationists, wildlife managers, and indigenous communities who rely on these species for subsistence. Surveillance for avian disease has not been conducted in the Churchill region with these species. Choanal and cloacal swabs were collected for avian cholera (n = 19) and avian influenza (n = 13) analysis, and blood smears (n = 16) were evaluated for avian malaria. No evidence of avian influenza or avian malaria was found in these populations. Avian cholera results are pending. It is important to survey for disease in healthy populations as well as declining populations as the climate changes. This study gives wildlife managers a better understanding of the incidence of disease in seaducks in the Churchill area, which is an important area for breeding seaducks as well as ducks migrating down the Churchill River on their way to molting areas in James Bay. The study also provides a baseline for continued disease surveillance.

Effects of Early Maternal Separation on Timing of Puberty in Wistar Rats - (Biology)

By: Aldis Siltumens, Julie Krzykowski, Corrina Lyster, Kelsey Kowenstrot
Faculty mentor(s): Karin Bodensteiner

Rodent maternal separation (MS) protocols are widely used as models to study the effects of MS on the development of the hypothalamic-pituitary-gonadal axis. This research project builds upon a previous study, which found that maternal separation led to a delay in the onset of puberty in male Wistar rats. This previous study separated male pups from the dam for 3 hr daily from postnatal day (PND) 1-14. To determine the critical period in which MS has an effect, in the present study, pups were randomly assigned to three groups; control, PND 1-7, and PND 8-14. Control rats did not undergo MS, while treatment groups underwent 3 hr daily MS on either PND 1-7 or PND 8-14. It was hypothesized that maternally separated rats would exhibit earlier (females) or delayed (males) time to puberty and altered hormone secretion during the peripubertal period. Following neonatal maternal separation, subjects were examined for preputial separation (PND 36-48) or vaginal opening (PND 22-38). Blood samples were also collected throughout the study for serum hormone analyses. Investigation into the effects of MS on fecundity and reproductive behavior are ongoing. Information gained from this study will further our understanding of how events during the early neonatal period influence puberty, hormone secretion, development of the hypothalamic-pituitary-gonadal axis, and fecundity in both male and female Wistar rats.

Effects of LED Lighting on Growth of Cultured Yellow Perch (Biology)

By: John Tix, Michael Kizewski
Faculty mentor(s): Christopher Hartleb

Many factors can affect the growth of yellow perch such as stress caused by handling, netting, disturbance, and suboptimal lighting intensity, spectrum, or quality. When fish are stressed, they feed less and are more susceptible to diseases which have a profound negative effect on their culture success. Traditionally, fish hatcheries are lit using incandescent lighting that provides a fairly well established intensity and spectrum. The Energy Independence & Security Act of 2007 established new energy management goals including the phased-out use of incandescent lighting prompting many fish hatcheries to seek information about replacement lighting such as fluorescent and LED. LED lights provide a unique alternative based on low cost of operation, longevity, and singular spectral application but the effects of LED lights on fish response has not been investigated. This study compared the growth and survival of yellow perch cultured in four different colors (red, green, blue and white) of LED lights. Replicate groups of yellow perch were raised under each type of lighting for 10 weeks. All other culture factors were consistent across treatments. Fish were

measured biweekly for weight, length and survival. Data have shown the best growth and survival for fish raised under red LED lighting indicating that it would be beneficial for aquaculturists to raise yellow perch under red LED lighting since it provides the best growth, survival, and the lowest operating cost.

Effects of Salicylic Acid and Lemon-Lime Soda on the vase life of Fresh Cut Chrysanthemums (Dendranthema grandiflorum (Ramat.) Kitamura) - (Biology)

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

This experiment was done to investigate the effects of different water additives on the vase life of fresh cut garden mums. Flowers were placed in solutions of tap water (control), lemon-lime soda, aspirin, and a commercial fresh cut flower food. Observations of aesthetics and signs of senescence were recorded every other day for the course of the experiment. The experiment ran for 40 days until the last head, on the lemon-lime solution, was considered totally senesced. Data were analyzed using one-way ANOVA and two-sample T-tests in Minitab. Statistical analysis showed significant differences between all of the treatments. The greatest vase life was achieved with the lemon-lime (Sprite) treatment, with an average of 33.27 days. Aspirin and commercial fresh cut flower food were not effective to increase the vase life of the flowers when compared with the control.

Exploration of potential cryptic speciation within the Longnose Gar (Lepisosteus osseus)(Actinopterygii:Lepisosteidae) (Biology)

By: Yang Yang
Faculty mentor(s): Sipiorski Justin

Longnose Gar (Lepisosteus osseus) populations were thought to comprise a single species. DNA evidence has strongly shown that phylogenetic relationships (on an evolutionary tree) of the seven gar species (Longnose Gar among them) are greatly resolved, thus confirming the existence of the seven gar species. However, other DNA-based studies have shown that Longnose Gar populations from the Carolinas may be genetically unique from other populations (Gulf of Mexico drainages). They may be unique enough to warrant species status (i.e., there are two similar looking Longnose Gar species that may only be diagnosable genetically). I am going to use mitochondrial DNA (complete Control Region sequences) to examine the genetic uniqueness of North Carolina Longnose Gars. I will also sequence, from the nuclear genome, an intron sequence from the RAG1 gene to potentially add support to the Control Region findings. With Drs. Brian Sloss and Justin Sipiorski's help, I will extract DNA from tissues and will begin my Polymerase Chain Raction (PCR) optimization, then begin work on automated sequencing of the DNA fragments in Dr. Sloss's lab. Once I have my

completed sequence data, I will align sequences and analyze these data to see whether or not the sequences from the Carolina populations of Longnose Gars are similar to one another and to see if these from a cluster separate from sequences from other Longnose Gars populations (from Sipiorski 2011).

Fossil Accessioning and Taphonomic Processes Associated with UWSP Paleocene Plant Collection - (Biology)

By: Porscha Carriveau, Ellen Riedel, Zachary Schuman, Monica Wayner
Faculty mentor(s): Pat Zellmer, Ray Reser

The Sentinel Butte Member of the Fort Union Formation near Almont, North Dakota is known for its well preserved late Paleocene flora. This fossil locale contains the only known Paleocene plant specimens exhibiting clear anatomical structure representing 50 genera. These are among the best preserved and most diverse late Paleocene plant fossils in the world. At the present time UWSP houses the most extensive collection of Almont plant fossils recovered. The small extent of the outcrop where these fossils have been found, coupled with intensive excavation by multiple institutions has led to the near exhaustion of this particular site. The rarity of plant fossils from this era and a paucity of similar sites greatly enhance the research value of this unique UWSP collection. The current student project focuses on accessioning and cataloging the numerous specimens recovered. Relevant data extracted from these specimens to date has helped recreate a late Paleocene riparian environment and climate in the region now known as North Dakota. Research goals include scientific internet access to the UWSP fossils, including information on taphonomic processes leading to flora preservation in a high bed load fluvial ecosystem. The intent of this poster is to serve as a detailed guide for students working on the documentation of specimens comprising the collection.

GreenAdvocates Plant Program - (Biology)

By: Chelsey L Ehlers
Faculty mentor(s): Pat Zellmer, Cindy Von Gnechten, Chris Brindley

Creating a green and beautiful environment is an essential component of a healthy community. Each summer thousands of students and visitors come to UWSP. Every fall, almost 10,000 students and 1500 faculty and academic staff return for another academic year. Many enjoy the grounds, flowerbeds, and walkways throughout campus that contain plantings designed for continued blossums and attractive foliage from early spring through late fall. This spring, UWSP Residence Hall Green Advocates have initiated the first annual Plant Program. Students in all 12 residence halls took on the responsibility for caring for 600 perennial "starter plants" in their rooms. The plants were delivered in recycled plant containers filled with soil amended with composted organic food waste provided through the residence hall-composting program. The plants will

be installed in beds throughout campus during summer months by Building and Grounds. Student involvement allows students to develop a vested interest in the campus. The group plans to continue this program to reduce costs for grounds improvement and sustain a greener, more beautiful campus.

Hybrid Soybean: Is it possible? - (Biology)

By: Yang Yang, Benjamin Speth, Napatsakorn Boonyoo, Eric Baurmert, Moye Xu
Faculty mentor(s): Devinder Sandhu

Sterility refers to spores and gametes that are abnormal or absent, or individuals fail to produce functional gametes to produce offspring. In soybean, manual cross-pollination to produce large quantities of hybrid seed is difficult and time consuming. Identification of an environmentally stable male-sterility system could make hybrid seed production commercially viable. There are eleven male-sterility (ms) genes that have been identified in soybean. Six of these have already been mapped on soybean chromosomes. However, locations of 5 genes are completely known. The objectives of this study were to i) locate the remaining five genes (Ms1 Ms4 Ms5 Ms6 Ms7) on to soybean chromosomes, and ii) generate genetic linkage maps of the regions containing these genes. To map the male sterility genes, five F2 mapping populations were generated by crossing Male Sterile (P1) and Fertile (P2) parents. Each F2 population consists of 94 plants. Bulked segregant analysis (BSA) was used to locate the ms genes to soybean chromosomes. Genetic linkage maps of the regions containing ms genes were developed using the complete F2 populations. The Ms1, Ms4, Ms5, Ms6, Ms7 were mapped on molecular linkage group (MLG) F (chromosome 13), D1b (chromosome 2), B1 (chromosome 11), F (chromosome 13), and D1b (chromosome 2), respectively. Fine mapping will help us clone the genes involved in male fertility and understand the biological mechanism leading to sterility.

Impact of predator presence on hind limb morphology of side-blotched lizards (Uta stansburiana) - (Biology)

By: Patrick Bula
Faculty mentor(s): Peter Zani

Current evidence suggests that hind limb length in lizards is positively correlated with increased locomotor performance. Furthermore, past studies have demonstrated hind limb length to be a heritable trait. Populations exposed to predation should therefore exhibit longer hind limbs and greater locomotor performance due to a necessity for predator evasion. The purpose of this research was to determine how predator presence has influenced hind-limb morphology amongst populations of side-blotched lizards (Uta stansburiana). This species

appears to have only recently expanded to occupy their current range and has done so relatively swiftly. This rapid radiation has resulted in a difference of predator presence between populations. I measured hind limb morphology from photographs of lizards from 15 populations with dorsal and ventral surfaces visible. These measurements were used to test for morphological variation among populations. This knowledge will be used to help further our understanding of how predator-prey interactions actively shape the course of populations over time.

Investigating the Nutrient Value of Musk Ox Manure - (Biology)

By: Lorelei Carroll
Faculty mentor(s): John Hardy, Rob Michitsch

The trophic interactions between herbivorous arctic animals and the plants they graze upon interrelate with the availability of nutrients in the environment. Current understanding is that musk oxen are such efficient digesters that their manure provides little to no nutrient contribution to the soil. The objective of this research is to evaluate the potential use of musk ox manure as a fertilizer. Four different musk ox manure tea treatments, a commercial fertilizer, and a no-fertilizer control were applied to radish plants in the UWSP greenhouse. For six weeks, 11 radish plants were each given manure tea obtained from fresh-food manure either once or three times a week, manure tea obtained from hay-fed manure either once or three times a week, Miracle-Gro® fertilizer once during the entire six week experiment, or no fertilizer treatment. Plants will be evaluated for size, appearance, and vigor, and chemical analyses of the plants will help to quantify the potential value of musk ox manure as a fertilizer for agricultural crops. The plants will be analyzed for nitrogen, phosphorous, ammonia, and other essential nutrients. To date, the control plants receiving no fertilizer show less vigorous growth than the other treatments. The results will indicate if there is potential for the Musk Ox Farm in Palmer, Alaska to sell this byproduct from their animals to increase revenue, and support the farm's mission to create sustainable agriculture in rural Alaska.

Isolation and in vitro Culture of Rat Ovarian Follicles - (Biology)

By: Erin Donahue, Kathryn Hood, Amanda Pionek
Faculty mentor(s): Karin Bodensteiner

Ovarian follicles are structures within ovaries that allow for development of oocytes, or eggs, for eventual ovulation and fertilization. Survival of oocytes depends upon attachment with cells from surrounding ovarian tissue. These supporting cells are comprised of a combination of granulosa and theca cells; both of which produce hormones and promote egg growth. The development of a protocol that successfully isolates and cultures ovarian follicles has importance in reproductive health science. Currently, women undergoing in vitro fertilization must provide oocytes for preservation. If there is a limited amount of oocytes, in

vitro follicular culture techniques would make it possible to isolate follicles for later fertilization. Thus far, our experimentation has included extraction of rat ovaries and subsequent isolation of follicles via mechanical and/or enzymatic dissection. We discovered using enzymes prior to mechanical isolation of ovarian follicles increased the number of follicles we were able to successfully isolate. We also found that younger rodents provided a greater number of viable follicles, while older ovaries produced fewer follicles for potential culture. The next step in our experimentation will consist of determining optimal follicular culture methods. These methods will mimic the natural environment of ovaries for production of an oocyte. Thus, protocol development is ongoing and suggestions for optimal in vitro culture methods will be presented.

Male spring peeper (Pseudacris crucifer) abundance in relation to pond pH and specific conductance - (Biology)

By: Alyssa DeRubeis
Faculty mentor(s): Erik Wild, Todd Huspeni

Amphibians are experiencing severe population declines and extinctions worldwide. Because they have semipermeable skin, salamanders and anurans are sensitive to water quality changes caused by fertilizer and pesticide runoff, mining, and other anthropogenic activities. One common method used to estimate frog abundance is a frog call survey. The objective of this study is to determine if there is a correlation between spring peeper (*Pseudacris crucifer*) abundance, as measured by male spring vocalizations, and water quality as measured by pH and specific conductance. Members of the University of Wisconsin-Stevens Point Herpetology Society measured the relative abundance of vocalizing spring peepers at 7 wetland sites in the Stevens Point area during April 2012 and also collected pH and specific conductance measurements at these same sites. I analyzed the data using simple linear regression. I found no statistically significant relationship between male spring peeper abundance, pH, and specific conductance.

Measuring the Success of Common Propagation Techniques: A Comparison of Tip Cutting and Air Layering - (Biology)

By: Sarah Yaunke, David Schreiner
Faculty mentor(s): John Hardy, Virginia Freire

Finding the most successful method of vegetative propagation for a particular plant is valuable knowledge that can be practically applied in both home and professional horticulture. This study compared the effectiveness of air layering and tip cutting techniques on the popular houseplant Ming Aralia (Polyscias fruticosa) by observing root growth. Six weeks after each technique was applied, air layered specimens of P. fruticosa had higher quantities of roots and longer

individual roots on average, and greater survivorship than specimens treated by tip cutting. In this study, the air layering propagation technique produced larger, stronger propagules in P. fruticosa than tip cutting.

Paleofossil Plant Key - (Biology)

By: carriveau porscha, Jeremy Jess, Cody Rebischke, Keaton Katarincic, Jesse Becl
Faculty mentor(s): Pat Zellmer, Ray Reser

Plant remains from the Paleocene are rare worldwide. UWSP houses the most extensive collection of Almont site plant fossils collected from the Sentinel Butte Member of the Fort Union Group in North Dakota. Known primarily for its coal beds in Wyoming and Montana, this geologic strata also contains silicified shales, sandstones and mudstones within which plant remains are locally numerous. The Almont site fossils are thought to have been preserved within low-energy fissile swamp facies grading laterally to channel and crevasse-splay facies consisting of cross-bedded silty sands and silty clays interspersed with lens-shaped beds of silty sands. The immediate area surrounding the collection site exhibits concentrations of fossil wood; early research suggests all or much of this deposit existed originally as an ox-bow type lake, perhaps associated with the ancestral Little Missouri River. Currently recovered flora contains 50 genera including Ginkgo, Juglandaceae, Betulaceae, Buxaceae, Taxodiaceae, and Gentianaceae. Uncommon specimens of flowers and fossil seeds, including winged fruits and nuts, occur within the collection. The limited extent of the collection area, compounded with extensive academic and avocational quarrying have largely exhausted this locale, rendering the UWSP collections even more valuable. The current student project focuses on developing a key to aid in identifying the prominent flora, with a photo-essay of diagnostic species.

Relationship between Environmental Challenge and Morphological Features of Early Development in the Brine Shrimp, Artemia franciscana. - (Biology)

By: Courtney Neumeyer, Shannon Gildersleeve
Faculty mentor(s): Sol Sepsenwol, Joseph Covi

Artemia franciscana, is a model organism with a long history of use in biochemical, molecular, developmental and ultrastructural research. Early development in A. franciscana is classically divided into four stages: encysted embryo, emergence 1, emergence 2 and free-swimming nauplius larva. These stages are delineated by emergence from successive cuticles and are difficult to apply when there are aberrations in emergence. Such developmental abnormalities have been documented in the presence of decreased levels of sodium bicarbonate associated with low embryo density or increased levels of heavy metals. Importantly, abnormal embryos resulting from either of these chemical challenges share similar gross morphological characteristics. Our

hypothesis is that shared aberrant morphology may originate from a common problem: an inability for the embryo to emerge from the first or second embryonic cuticle. An embryo that is unable to properly emerge will continue to grow within the confined space of the cuticle(s). If such an embryo reaches the nauplius stage, its abnormal structural characteristics should reflect its restricted development. In previous studies, we developed a modified nomenclature to account for these shared aberrant morphologies, using dechorionated embryos (viable embryos stripped of their proteinaceous chorion). A time-lapse imaging system is being developed, using a micro-perfusion chamber, to examine the modified nomenclature under highly controlled conditions.

Screening for RYR1 and CACNA1S Gene Mutations in a Family Associated with Malignant Hyperthermia - (Biology)

By: Jinzhi Li
Faculty mentor(s): Diane Caporale

Malignant Hyperthermia (MH) is a rare life-threatening and dominant human disorder that causes extreme fever, muscle rigidity, acidosis and rapid heart rate when exposed to general anesthesia. The purpose of this study was to identify any defective forms of the RYR1 and CACNA1S genes that cause MH in a German family that has an individual with this disorder. It has been found that a mutated RYR1 gene and the CACNA1S gene have been found to cause MH, with RYR1 mutants being most common. Thus screening for mutations of both genes provides confidence in determining whether each family member is susceptible to Malignant Hyperthermia. DNA from About 10 hair follicles obtained from fifteen individuals from this family was extracted using the Qiagen kit. PCR was performed to amplify two of the most common hypervariable exon regions of each gene for each individual. Amplified products were excised out and sequenced. The sequences from the MH individual will be compared with normal sequence provided by Genbank database to determine the mutation. Finally, the sequences of other family members will be screened for this mutation to identify those who are also susceptible to Malignant Hyperthermia.

The Curation and Restoration of the UWSP Stephen J. Taft Parasitology Collection - (Biology)

By: Madalyn Zimbric, Joan Schumitsch
Faculty mentor(s): Todd Huspeni

The Stephen J. Taft Parasitology Collection was established as part of the UWSP Museum of Natural History to honor a lifetime of parasite collection by Dr. Stephen Taft and his students. It is one of the largest parasite collections remaining in the nation, with over 10,000 slide-mounted specimens and hundreds of wet-preserved specimens spanning nearly every parasitic group. This

collection of parasites is a gem among the UWSP Natural History Museum collections. The collection contains many invaluable specimens-such as those from hosts that no longer occur in Wisconsin and others from hosts for which lethal sampling is no longer permissible. However, until recently, the collection is a collection in name only. Many of the specimens have not been adequately maintained. None had been accessioned or catalogued. Among the more laborious aspects of curation that we must complete are: accessioning each specimen in a database, cataloging accessioned specimens (with available host data), and repairing slide mounts that were embedded in now decaying Permount™ mounting medium (an unfortunately common problem with Permount™ mounted specimens). As of this writing, our growing museum database contains 425 lots of approximately 1700 specimens. Additionally, over 200 previously unusable specimens have been restored and remounted. Our ultimate goal is to provide a collection database that is accessible and searchable online with excellently preserved and accessible specimens.

The Curious Case of Soybean Fertility - (Biology)

By: Benjamin Speth, Austin Henderson, Andrew VanMater, Joshua Rogers, Jordan Baumbach
Faculty mentor(s): Devinder Sandhu

In soybean, manual cross-pollination to produce large quantities of hybrid seed is difficult and time consuming. Identification of an environmentally stable male-sterility system could make hybrid seed production commercially viable. Understanding genes involved in fertility pathways may shed light on biology of reproduction in plants. There are 11 male-sterile, female-sterile (MSFS) mutants identified in soybean. For the characterization of these genes we first need to analyze if these are unique genes. This will involve crossing all the mutants with each other and looking for complementation. Alternatively, all genes can be mapped and their map locations may confirm if they are unique genes. In last five years our group has mapped six MSFS genes to soybean chromosomes. The objectives of this study were to map the remaining five genes on soybean chromosomes and to identify and name unique genes. F2 populations were generated for all the genes. Bulked segregant analysis (BSA) was used to locate each gene to a soybean chromosome and genetic linkage maps were developed for the regions the containing genes. The st2, st4, st5, st6 and st7 genes were mapped on molecular linkage group (MLG) B1, D1a, F, B2, and D1a, respectively. The genes st4 and st6 are located on MLG D1a but are more than 40 cM away from each other. Information generated in this study resulted in development of a comprehensive source of mapping information for all the MSFS genes in soybean.

The Effect of Handling and Training/Feeding on Breathing Rate of the University of Wisconsin-Stevens Point's American Alligator (Alligator mississippiensis) - (Biology)

By: Ryan Manders, Alex Roszkowski
Faculty mentor(s): Peter Zani

In husbandry, it is important to ensure the well-being over the long term for that animal. Numerous factors can cause stress for an animal in captivity, which can have negative consequences for the health of that animal. We examined the breathing rate of the University of Wisconsin-Stevens Point's American Alligator (Alligator mississippiensis) during regular handling and training/feeding periods. The goal of this study was to determine whether handling and training/feeding potentially increased stress of this animal. Breathing rate was recorded both inside and outside the enclosure in 30 second intervals during each treatment. One treatment included handling, which involved securing and lifting the alligator where he was held at an elevated position while measurements were taken. The second treatment was a training/feeding period, which involved managers using a training pole to control navigation of the alligator throughout his enclosure, being rewarded with food. Lastly, the alligator's breathing rate was recorded during a period of no treatment to represent control data. Average control breath rate was 18.9 ± 5.1 breaths per 30 sec. Whereas handling treatment had an average of 22.6 ± 5.2 and the training/feeding had an average of 26.6 ± 5.4 breaths per 30 sec. This study will allow UWSP's vivarium managers to better care for the alligator and will also encourage other captive animal facilities to monitor their animals to lower stress levels.

Chemical Synthesis of Novel Antibiotic Molecules - (Chemistry)

By: Joshua Olive, Mark Merucci, Brooke Geiger
Faculty mentor(s): Nathan Bowling

With an ever-increasing number of bacteria that are resistant to known antibiotics, it is becoming crucial to investigate new ways to fight microbes. To that end, our goal is to create a small library of water-soluble organic compounds with structural features that are expected to provide antimicrobial activity. These novel molecules can be produced and isolated in a laboratory setting using techniques and reactions commonly performed in our group. Once purified, these molecules will be sent to collaborating labs to have their potential antimicrobial properties tested against infectious bacterial strains, including ones that are resistant to current antibiotic drugs.

Computational Study of DNA-Flavonoid BInding - (Chemistry)

By: Matthew Phillips
Faculty mentor(s): Erin Speetzen

Flavonoids are naturally occuring molecules that have numerous biological activities such as anticancer, antiviral, antimicrobial, and antihypertensive properties. While the exact mechanisms that flavonoids exhibit these biological actions are not well understood it is believed that their interactions with biological molecules such as DNA may hold important keys to understanding their mechanism of action. In this project we have used computational methods to analyze the interactions of three flavonoids (quercetin, luteolin, and 3-hydroxy-flavanone) with DNA. The goal of this research is to see if computational chemistry can lend insight into why small changes to flavonoid structure can have such large changes in how the molecules interact with DNA.

Conversion Of Flavone To Isoflavone: A Computational Study on Substituent Effects - (Chemistry)

By: Alyce Ruhoff
Faculty mentor(s): Erin Speetzen

It has be determined that isoflavones are formed when flavones undergo a phenyl shift with a radical. Little is understand on how this process happens and whether substituent groups in the fourth position of the phenyl group play a role. Structures containing various substituents were optimized using B3LYP and M06-2X. The Electronic and Gibbs Free energy trends didn't match between the two methods. It has yet to be determined which method is correct. Another aspect of the project is to determine how the cytochrome P450 enzyme aids in this conversion. Docking experiments with different flavones show how the structure fits within the enzyme.

Determining the Contribution of Wood Smoke to Fine Particle Concentrations in Grand Rapids, WI - (Chemistry)

By: Jake Fahrenkrog, Jerad Servais, Travis Kahl, Ethan Mueller
Faculty mentor(s): David Snyder

As a part of the Grand Rapids Wood Smoke Case Study, an organic molecular marker based chemical mass balance model (OMM-CMB) was used to determine the contribution of wood smoke to fine particle organic carbon (PM2.5 OC) concentrations observed in Grand Rapids, Wisconsin during the winter of 2011 - 2012. The CMB model uses the measured mass concentrations of molecular markers, including levoglucosan, elemental carbon (EC), and selected polycyclic aromatic hydrocarbons, to apportion organic carbon to primary sources of air

pollution. The contribution of wood smoke to overall PM2.5 concentration was determined via a mass closure study, which included measured concentrations of OC, EC, and secondary inorganic ions (nitrate and sulfate). The CMB model was run for days in which measured PM2.5 exceeded 18.0 μg m-3 (n = 11). The model indicated that during the study, wood smoke contributed between 40-80% of the measured PM2.5 OC. Additional sources of OC included mobile sources (2-12%), natural gas combustion (0-2%), and secondary OC (11-45%). The mass closure model indicated that, on average, 27% of measured PM2.5 could be attributed to wood smoke, making it the largest single primary source of PM2.5 during the study period.

Electrochemical Deposition of Patterned Micro- and Nanowires on Prototype Templates - (Chemistry)

By: Dylan Schnese, Anne Llinas
Faculty mentor(s): Michael Zach, Lori Lepak

Electroplate-and-Lift (E&L) Lithography was developed as fast, simple, scalable technique for the controlled, solution-based, electrochemical synthesis of patterned metallic and semiconducting nanowires. E&L represented a fundamental advance over prior nanowire production methods, by limiting the high-temperature, high vacuum, energy-intensive clean room work to the initial 3-day production of the template. In this work, we report a one-day, energy efficient process for fabricating templates which are functionally similar to the original E&L substrates, but are made entirely outside of a clean room.

As in the standard E&L templates, the simplified templates use a patterned insulating/conductive/insulating film structure to control the diameter of electroplated wires, by confining wire nucleation to the edge of a thin conductive layer. Classic E&L templates alternated insulating ultrananocrystalline diamond (UNCD) with conductive nitrogen-incorporated UNCD (NUNCD). In the non-UNCD templates, the base insulating layer was made of SU-8, a spin-deposited plastic. The conductive layer was made of palladium, and capped with another spin-deposited plastic, Shipley 1805 photoresist. Patterns were defined photolithographically, and wet-etched to expose edges of the metal layer. Although the non-UNCD templates lack the extreme physical and electrochemical stability of UNCD, they have been used to electroplate copper microwires from aqueous solution as a proof of concept.

Mass Production Of Microwires On Ultrananocrystalline Diamond (UNCD) Electrodes Using Electroplate And Lift (E&L) Lithography - (Chemistry)

By: Andrew Zimmerman, Samuel Hempel, Lori Lepak, Ruth Gervais, Jeffrey Machovec
Faculty mentor(s): Michael Zach, Alan Marten, Anirudha Sumant, Ralu Divan, Daniel Rosenmann, C. Suzanne Miller

Improvements in the manufacture of standard silicon-based electronic devices, now produced in multi-million dollar cleanroom facilities by energy-intensive high-vacuum or high-temperature processes, are most likely to arise through the mass production of components such as micro- and nanowires by new, more economical and less energy-intensive nanomanufacturing techniques. One such technique, Electroplate-and-Lift (E&L) Lithography, can rapidly electrochemically synthesize metal and semiconductor nanowires of a variety of sizes, shapes, and chemical compositions. E&L electrodes consist of a silicon wafer, coated with a film of alternating layers of insulating ultrananocrystalline diamond (UNCD) and conductive nitrogen-incorporated UNCD (NUNCD). This layered film is lithographically patterned into a template, such that wires may grow only on the exposed patterned edges of the NUNCD layer.

In this work, we report the development of an automated E&L system, for the rapid, roll-to-roll mass production of microwires. The E&L template is attached to a wheel, and slowly rotated through an electrochemical plating bath to deposit the wires. Another wheel coated with an adhesive polymer removes and collects the wires, re-exposing the edges of the NUNCD for reuse. This process is calculated to be capable of producing either patterned wires with 100 nm < diameter < 10 um at a rate of ~ 8 grams/day, or a single continuous wire < 1 um in diameter at a rate of > 1 km/ day.

Mobile Monitoring of Atmospheric Fine Particulate Matter in Grand Rapids, WI - (Chemistry)

By: Jerad Servais, Ethan Mueller, Brennan Rhode, Kelley Embree
Faculty mentor(s): David Snyder

As a part of the Grand Rapids Wood Smoke Case Study, a vehicle equipped with a GPS data logger and a portable nephelometer was used to determine fine particle concentrations (PM2.5) throughout the Town of Grand Rapids, WI. Mobile monitoring was conducted between 7:00 PM and 11:00 PM local time on eight evenings during January, 2012. The monitoring vehicle was driven at speeds between 15-20 mph along two fixed routes. In order to examine the relationship between wood burning and fine particle concentrations, the routes were selected to include areas likely to be influenced by known sources of wood smoke. PM2.5 concentrations observed during mobile monitoring were highly variable and ranged from below detection to as high as 371 µg/m3. The highest

concentrations were observed on evenings when temperature inversions were present and when the monitoring vehicle was in close proximity to known sources of wood smoke. The most notable event occurred on the evening of January 20 – 21, when observed fine particle concentrations exceeded 100 µg/m3 across large areas of the town. The results of the mobile monitoring work suggest that PM2.5 emitted from outdoor wood boilers, fireplaces, and other wood-burning appliances is often highly localized and may not impact areas further than 1 km from the source.

Oxidation states: Bookkeeping or fundamental problem?

(Chemistry)

By: Albert Webster, Drew Cunningham
Faculty mentor(s): Jason D'Acchioli

The oxidation state (OS) concept is arguably one of the most useful formalisms in chemistry. OSs are used to explain a variety of phenomena at transition metal centers, from chemical reactivity to spectroscopic properties. Attempting to define a theoretical method of evaluating this construct, however, has resulted in a broad debate among chemists, particularly inorganic chemists. With this in mind we propose a simple, unambiguous method for determining the oxidation states of transition metal centers using Natural Bond Orbital (NBO) theory. A description of the wavefunction (or electron density in the case of density functional theory, as presented in this investigation) is obtained from quantum chemical calculations. The 5 × 5 d-orbital Natural Atomic Orbital (NAO) occupation matrix is then obtained, and diagonalized. The resulting eigenvalues deliver the d-orbital occupations, from which the oxidation states can be inferred. The NBO-driven method also allowed us to probe "ambiguous" cases where the strong π-acid CO was involved. The scope of the method is described, along with promising future applications.

Seeding and Combinatorial Growth of Zinc Oxide Nanowires

(Chemistry)

By: Pa Houa Cheng
Faculty mentor(s): Michael Zach, Lori Lepak

Crystal nucleation and growth is a highly temperature-dependent process. At low temperatures, the growth of one crystal facet may predominate, leading to elongated wires. At higher temperatures, several facets may grow at comparable rates, to produce more rounded morphologies. Full characterization of this relationship would require a series of tedious and time-consuming growth experiments at a range of temperatures.

To make this process faster and easier, a new instrument has been designed and built in the Zach laboratory to grow nanowires by thermal decomposition along a

temperature gradient. As a model system, we studied the growth of zinc oxide, a wide band-gap semiconductor with useful properties for solar cell applications. A dilute zinc nitrate solution stabilized with a hexamethylenetetramine (after Baxter, et.al.) is flowed at a controlled rate from the cold end to the hot end of a glass microscope slide whose ends are fixed at different temperatures. As the solution temperature increases, the zinc-amine complex gradually decomposes, allowing gradual increase of the zinc ion concentration. These ions self-assemble into zinc oxide crystals on the microscope slide. By observing the crystalline products at different locations along the substrate using optical microscopy, scanning electron microscopy (SEM), and atomic force microscopy (AFM), the changes in morphology may be correlated with a particular growth condition.

Synthesis and Processing of Degradable Thermosetting Polymers - (Chemistry)

By: Neiko Levenhagen
Faculty mentor(s): John Droske

Due to their biodegradable properties, aliphatic polyesters (i.e., plastics) have been used for many years as resorbable sutures and plugs for heart bypass and other surgeries. Recently, the use of polylactic acid (PLA) has broadened the use of these materials beyond medical applications to compostable, thermoplastic food storage containers. PLA and related materials offer much promise and have the potential to be materials with a fully sustainable life cycle: They can be synthesized from renewable natural resources and they can be fully broken down after use. Thermoset polymers offer increased strength and thermal resistance over thermoplastic materials, however, because of a 3d-network structure, they are very resistant to degradation. We have synthesized thermosetting polymers of mercaptosuccinic acid (MSA) and 1,3-propanediol, that show desirable degradation by straightforward hydrolysis. In addition, the rigidity and strength of the resulting co-polymers can be controlled by varying the percentage of MSA (and extent of crosslinking) by incorporating succinic acid in place of MSA. We also have shown that a catalyst is not required, although use of an acid catalyst, such as zinc chloride, may give a slight increase in molecular weight.

After processing, cured polymers show remarkable adhesive properties and the materials can only be removed from glass with much difficulty. Recent work has shown that this can be improved with the use of a release agent.

Ultrananocrystalline Diamond (UNCD) Transmission Electron Microscopy (TEM) Grids for the Electrochemical Deposition of Nanowires - (Chemistry)

By: Katherine Ebensperger, Lori Lepak, Daniel Dissing Ruth Gervais, Ephriam Daniels Corina Grodek, Bradley Stroik
Faculty mentor(s): Michael Zach, Anirudha Sumant, Ralu Divan, Daniel Rosenmann, C. Suzanne Miller

Electroplate and Lift (E&L) Lithography is a fundamental advance in the electrochemical synthesis of metal and semiconducting micro- and nanowires. Determining the physical and electrical properties of individual nanowires will require adaptations of current characterization methods. For example, transmission electron microscopy (TEM) is often used to study the crystal structure of very thin materials. At present, nanowires must be produced on a standard E&L substrate, and then transferred to a TEM grid. Nanowires are often damaged or lost during the transfer, preventing analysis.

We report the development of a TEM grid which allows nanowire growth directly upon the grid itself, for the rapid, immediate, easy characterization of the deposits. Within a circular area 3 mm in diameter, each TEM grid contains six independent, electrically addressable electrical contacts to a film with a structure similar to standard E&L templates. This permits the E&L-style growth of metal nanowires directly upon the edges of one or more lithographically patterned small holes in the center of the grid. The lithographic patterns may be varied to allow the deposition of different metals in different holes on the same TEM grid, or, in holes which span more than one circuit, different metals in different regions of the same hole. Given this adaptability, these TEM grids have great potential to impact research ranging from fundamental materials science to biomedicine.

Water-Gas-Shift catalysts: A new use for classic compounds (Chemistry)

By: Nicholas Walters, Drew W. Cunningham, Albert Webster, Brittany Schreiber, Lucas Burgan, Kyle Spielvogel
Faculty mentor(s): Jason D'Acchioli

As the world's petroleum resources continue to be depleted, researchers are charged with the task of making efficient use of those resources. One efficient use of petroleum feedstocks is the synthesis of homogeneous organometallic catalysts. We propose the investigation of several complexes of the form RMLn (R=η5-cyclopentadienyl, η5-indenyl; M=Fe, Ru, Os; Ln=(CO)3) for use as water-gas-shift reaction catalysts. Prior investigations from our laboratory show the complex [(η5-indenyl)Ru(CO) 3]+ is active in a water-gas-shift cycle. We propose exploring the catalytic role of the aforementioned RMLn complexes in a quantitative way through gas chromatography-mass spectrometry; the Os analogues have not been previously isolated. This presentation will describe the results of our work thus far.

UWSP Security Event Log Collection

(Computing and New Media Technologies)

By: Ambud Sharma
Faculty mentor(s): Dave Gibbs, Peter Zuge, Tim Krause

UWSP IT Info-Security Office is responsible to maintain the security and integrity of UWSP Campus Network and IT Assets. The project is creating a dedicated Hadoop/Big-Data based solution for gathering and processing campus workstation event logs such that they can be queried in reasonable amount of time. The existing system stores just server event logs and has limitations in querying capabilities. being a traditional RDBMs system due to constraints in basic design principals of RDBMs systems.

The new system is a pilot project for UWSP Information Security Office to provide a technology prototype and provide hands-on performance and feasibility analysis to the IT for use of BigData / Hadoop based approach for solving this problem.

Changing Roles of Hmong Women - (English)

By: Qeng Lee
Faculty mentor(s): Rebecca Stephens

Hmong women who grew up in America have very different values placed on them than Hmong women in Laos, the former homeland of most Hmong refugees in the United States today. There are many factors that affect this change, such as the socio-economic status, the political structure, religion, and access to educational institutions.

Traditional Hmong society is patriarchal, with men being the decision-maker and holding positions of prestige and power. The first wave of Hmong refugees still carries a strong belief in this system, as compared to the generation of Hmong individuals who were born here in America, or been here since a young age. The roles of Hmong women in a traditional family are no longer the same.

This study seeks to expand our understanding of the changing values of Hmong-American women and the significances of those changes within the Hmong community. By carrying out in-depth ethnographic interviews with Hmong women and men in the Portage County region, this research will consider the socio-economic, political, religious, and education factors that most influence the changing roles of Hmong men and women. The insights gained from this study will foster understanding and lead to improved awareness of the changing roles of Hmong-American women.

Alexian Brothers Novitiate - (History)

By: Anthony Meier
Faculty mentor(s): Neil Prendergast

The Alexian Brothers Novitiate is an old building, out of place in rural Gresham, Wisconsin. It is considered a mansion, though it was also once a religious building. It is best known for the Menominee Warrior Standoff in 1975. A group of militant Menominee Indians took over the abandoned building and claimed it for the Reservation. The National Guard was called in, and a 34 day standoff occurred, with tension and shots exchanged on both sides.

The reasons for this event is closely tied to the events occurring around Menominee at the time. However, this is not the first, nor last time that the Alexian Brothers Novitiate would be tied to Menominee Indian history. From its beginning, it was tied intimately with the fate of the Reservation. This continues to the present day.

This presentation will focus on the interrelated history of the Alexian Brothers Novitiate and the Menominee Reservation, in the hopes of shedding light on the reasons for why they are how they are today.

Beyond Images of a "Dying Culture": Narratives of Hmong Identity in Portage County, WI - (History)

By: Deng Vang
Faculty mentor(s): Valerie Barske, Tori Jennings

In this poster, I will present my original ethnographic research, which seeks to challenge the assumption that the Hmong in Portage County, Wisconsin represent a "dying culture." The framework for this research moves beyond the simple notion that immigrant populations in the U.S. either "assimilate" or remain marked as "culturally different." As part of the larger documentary project *Finding the Middle Way*, I conducted interviews as a native ethnographer working with individuals of different generations living in Stevens Point who self-identify as Hmong. These individuals provided a much more complex view of how Asian-Americans grapple with living in a bicultural context. Drawing from the disciplines of Anthropology and History, I emphasize the importance of considering how Hmong individuals negotiate shifting narratives of identity rather than clinging to images of a "dying culture."

Splicing Culture: Japanese Filmmaking and the U.S. Occupation (History)

By: Reid Jolin
Faculty mentor(s): Valerie Barske

In this project, I will examine the growth and evolution of Japanese cinema in the U.S. occupation and beyond ca. 1945-1970. Looking at primary films and secondary literary sources, I will show how the Japanese were depicted through film, and how these depictions defined Japan not only in a national context but also for consumption by foreign occupiers. I will look at how Japanese cinema transitioned from the 1920s and 30s to the expansive and creative "Golden Age" of the 1950s. I plan to focus on a few key filmmakers and cultural figures of the time to show how they shaped postwar narratives. One of the key figures I will consider is the legendary Akira Kurosawa (1910-1998). I will analyze some of his films from a historical and cinematic perspective and explore how the Japanese, as well as foreign audiences, perceived him and his works. This entire project centers around the importance of cultural mediums during the post-WWII era, particularly in the field of filmmaking to highlight how this easily accessible format helped define Japan in a very tumultuous period of modern history.

Mathematical Tetration: the next step beyond exponents (Mathematical Science)

By: Jimmy Scott
Faculty mentor(s): Edwin (Jed) Herman

We remember exponents from junior high school math: x^2, x^3, and so on. But what happens when we look at x^x? Or even x^x^x? This project explores some of the properties of this operation, using both real and complex numbers.

A novel approach to measuring the tension of freestanding liquid-crystal films - (Physics and Astronomy)

By: Tim Twohig
Faculty mentor(s): Mick Veum

Our research involves studying the surface properties of smectic liquid-crystals as a function temperature. Liquid crystals are compounds with fluid-like properties similar to liquids, but whose molecules organize in a crystal-like fashion. The particular substances we study can be prepared as stable films without the support of a substrate (reminiscent of a soap bubble on a ring). The films, which can be as thin as two molecular layers, provide great systems in which to study the properties of fluid surfaces. We are in the final stages of developing an experiment to study film tension as a function of temperature. The tension

properties of such a film can be probed by monitoring the pressure difference necessary to inflate a film to a given radius (like a soap bubble). We have developed a feedback system that uses the position of a reflected laser beam to hold the radius of the bubble at a constant value. We will present preliminary results on measuring film tension as a function of temperature as well as our overall research goals.

Characterizing the dynamics of a microscopic mechanical oscillator in an ultra-high vacuum environment

(Physics and Astronomy)

By: Edward Lynch
Faculty mentor(s): Palash Banerjee

The measurement of a force plays a fundamental role in physics. These measurements are especially delicate when the measured forces are less than a pico-Newton. We are building a force magnetometer designed to detect these tiny forces between a microscopic magnetic disk and a fragile mechanical oscillator within an ultra-high vacuum environment. The presence of an external force causes a slight shift in the frequency of vibrations of the oscillator. To keep track of these shifts, we have designed a feedback control system that drives the oscillator using a sequence of carefully timed pulses. We will present experimental results that show our feedback scheme works well to control the dynamics of the oscillator. This control also allows us to completely characterize the important parameters of the oscillator such as its natural resonant frequency, force constant and quality factor. The low force constant together with a high quality factor obtained within an ultra-high vacuum environment lead to a force sensitivity approaching one femto-Newton. We will discuss how we plan to use this exceptional force sensitivity to perform ultra-sensitive magnetic microscopy of individual micromagnets.

Designing and calibrating a custom electromagnet coil for a force magnetometer - (Physics and Astronomy)

By: Sean Minster, Edward Lynch
Faculty mentor(s): Palash Banerjee

We are building a magnetometer to study the properties of micrometer sized magnetic disks. These experiments require the presence of a uniform magnetic field which can be varied with minimal hysteresis. The purpose of this research was to determine the magnetic field along the axis of a finite short solenoid with multiple layers. Since the solenoid has a finite resistance, the power dissipated sets the limit for the maximum allowed current. We have derived expressions for the optimum geometry of the coil that produces the largest magnetic field possible within the power budget of our experiment. This optimum geometry

includes a set of numbers for the length of the solenoid, the number of layers and the diameter of the wire used for making the windings. We have carefully measured the magnetic field from such an `optimized' solenoid and studied its variation with position. We find that our preliminary test solenoid performs as expected and produces a magnetic field of approximately 120 Oersted with 30 W of dissipated power. We will discuss further design improvements to our solenoid including the choice of a suitable high permeability core to increase the magnetic field produced per unit power dissipated.

Exploration of Thin Film Electrodes for Photoelectrochemical Water Splitting - (Physics and Astronomy)

By: Jeremy Falk, Skylor Schermer
Faculty mentor(s): Kenneth Menningen

The goal of this project is to find an efficient means of splitting water into hydrogen and oxygen using only sunlight. Photoelectrochemical water splitting uses electrons that are energized by light absorption in a semiconductor to drive the chemical reaction. If it were produced on a large scale, hydrogen gas would provide a clean and nearly limitless source of energy to power the world. For our project we plated electrodes with thin films of iron, tungsten, cobalt, and nickel oxides in order to test their capability for splitting water. Preliminary results will be presented and evaluated in the context of competing PEC water splitting efforts.

Improving Sheet Formation by Increasing Shear Forces in the Headbox - (Physics and Astronomy)

By: Brock Brandner, Jordan Hansen, Lindsey Hoffman, Kelli Hultman, Tommi Kuusisto, Seth Nelson, Adam Offerdahl, Gerrit Spiess, Rachel Strelow, Jamie Tauscher
Faculty mentor(s): Mick Veum, Gerry Ring

The purpose of this project is to demonstrate that the headbox of the Mead Witter Foundation Paper Machine headbox located in the Paper Science and Engineering process engineering laboratory was specially designed to increase sheet formation by using a series of sluice plates to reduce fiber flocking. As stock flows underneath each sluice plate, the increased flow velocity breaks large flocs into smaller flocs allowing more uniform sheet formation.

This machine was originally built in the early 1960s as Scott Paper Company's research machine. Its headbox has a unique design consisting of six sluices, four inboard sluices before the slice lip and two outboard sluices above the forming wire. The two outboard sluices that make this headbox design unique and

puzzling, because the purpose and use of these outboard sluices was not documented.

Our hypothesis was that the outboard sluices were intended to reduce floc size directly on the forming fabric allowing for the use of longer fiber that had a higher floccing tendency. We designed a series of experiments to explore this hypothesis running the paper machine at 185 feet/minute and producing a sheet weight of 75 grams per square meter with variable quantities of softwood as the long fiber source. Sheet formation was measured using the OpTest Micro Scanner.

Measuring the Film Tension of Liquid Crystal Thin Films

(Physics and Astronomy)

By: Chris Woitula, Sammy Chaara
Faculty mentor(s): Brad Hinaus

We measure the film tension of a liquid crystal thin film experimentally by using an apparatus that blows a bubble from the material. The film tension is determined experimentally by measuring the size of the bubble from a digital photograph and by measuring the pressure difference between the inside and the outside of the bubble using a pressure gauge. The pressure gauge is calibrated using films with a known film tension, and the camera is calibrated for distance by taking photographs of a washer of a known size. After calibration, the film tension of a series of unknown compounds is measured. Results and any interesting trends will be discussed.

Modeling the Hβ Emission Lines in Radio-Loud Quasar Spectra

(Physics and Astronomy)

By: Zachary Meadows
Faculty mentor(s): Sebastian Zamfir

We construct median optical spectra of quasars that show extended radio emission. We bin spectra based on core:lobe radio flux ratio at 20cm wavelength. The sample includes N=30 low-redshift ($z < 0.7$) Sloan Digital Sky Survey optical spectra that show signal-to-noise $S/N > 15$. Our focus is to study the broad Balmer Hβ emission line; we model the total profile of the broad Hβ emission line under the assumption that it requires both a classical (unshifted) broad component (BC) and a (redshifted) very broad component (VBC). We investigate the properties of the two spectral features as a function of core:lobe radio flux ratio and report our preliminary results.

Reduction of Hα Images of Groups and Clusters of Galaxies in the Context of the ALFALFA Undergraduate Project

(Physics and Astronomy)

By: Jesse Watson
Faculty mentor(s): Adriana Durbala

This project was developed in the context of the proposal entitled, "An Hα Survey of Star Formation in the Undergraduate ALFALFA Team Groups and Clusters". I reduced images of different fields within the (loose) group of galaxies named NRGb206. The observations were carried out in April 2012 with the 0.9 meter WIYN telescope at Kitt Peak National Observatory using the MOSAIC CCD camera. As a guide for the reduction process I used a cookbook made in the summer of 2011 by student Benjamin Hendrickson. Furthermore, I then updated the cookbook by improving the clarity of the steps and enhancing the areas that needed greater development. I report our preliminary results.

Spectroscopic Studies of Atomic Cesium Vapor

(Physics and Astronomy)

By: Daniel Dombrowski, Kyle Leaf
Faculty mentor(s): Seth Ashman

We present our progress towards a high resolution spectroscopic analysis of cesium vapor. This experiment focuses on collisions between the argon atoms and cesium atoms as a function of the argon gas pressure. In its current state the experiment utilizes just one laser to excite the $6S1/2 \rightarrow 6P1/2$ transition, while future experimental plans will involve a second laser to further excite the $6P1/2 \rightarrow 8S1/2$ transition of cesium. Our vacuum system allows control of the Argon pressure in the experimental chamber down to ~0.01 Torr, and a photomultiplier is employed in conjunction with a chopper and lock-in amplifier to detect fluorescence emitted by the excited cesium atoms. Work is still being done to improve the fluorescence spectroscopy setup. We describe here the next stage of the experiment in which the technique of polarization spectroscopy will be used to detect the excitation of the cesium atoms. This sensitive technique involves splitting the laser beam into two components (pump and probe beams). The pump beam is prepared with a circular polarization while the probe beam is linearly polarized, these two beams are then made to counter-propagate and overlap inside the experimental chamber. The basis of the polarization spectroscopy technique relies on detecting small changes of the probe beam polarization after it passes through the experimental chamber.

The critical current across superconducting tunnel junctions in the presence of magnetic vortices. - (Physics and Astronomy)

By: Ben Hendrickson
Faculty mentor(s): Brad Hinaus

The critical current across a superconducting tunnel junction is highly dependent on the magnetic field at the junction. Through computer simulations, we numerically study how the critical current across the junction varies as a function of the applied magnet field and the number of magnetic vortices that enter the crystal adjacent to the junction. We find as the number of vortices increases, the maximum critical current decreases as a power law with the maximum field applied to the junction.

Body Mass Index and Measures of Esteem - (Psychology)

By: Brittany Iczkowski, Corrina Hendricks, Shirley Jackson
Faculty mentor(s): Angela Lowery

Body mass index (BMI) is calculated using an individual's height and weight. BMI is designed to indicate body fat level and is used to screen for potential health problems. The purpose of this study was to determine if BMI influenced a person's self-esteem and/or body-esteem. Self-esteem is a personal evaluation of worth, whereas body- esteem is an evaluation of personal thoughts about one's body. Participants of the study were undergraduate students enrolled in an Introductory Psychology course at the University of Wisconsin-Stevens Point. Participants were asked to complete questionnaires measuring self-esteem and body-esteem. Researchers then gathered participant's height and weight. Results of one-way ANOVAs found no significant relation between participant's BMI and self-esteem, but a significant relation between participant's BMI and body-esteem. Post-hoc analyses revealed that those who were underweight had significantly lower body esteem than those who were normal weight or overweight and that participants who were obese had significantly lower body esteem than those who were normal weight.

Do You Think I'm Sexy? Effects of Male Rat Pubertal Housing and Testosterone Treatment on Female Proceptive and Receptive Sexual Behaviors. - (Psychology)

By: Andrew Dieterich, Amy Crane
Faculty mentor(s): Heather Molenda-Figueira

Sexual motivation in the female rat is determined by hormones, but it may also be determined by her attraction to mates. This study explores the relationship between famale rats' willingness to solicit mating and male rats' pubertal housing and hormonal treatments. In a previous study, male rats underwent one of the

following treatments: castrated + singly-housed, castrated + pair-housed, testosterone (T)-treated + singly-housed or T-treated +pair housed. As adults, tests of the males' sexual performance were videotaped, and the videos are used for the present analyses. The previous study suggests that levels of sexual behavior are more dependent on pubertal housing condition than T levels. However, it is unknown whether pubertal housing or hormone treatments affect female's desire to mate with the males. Female rats indicate their willingness to mate by displaying both proceptive and receptive sexual behaviors. Proceptive behaviors consist of hopping and darting and ear wiggling, all behaviors that help to entice the male to mate. Receptive behavior consists of the frequency and intensity of the lordosis posture, a body position taken by the female during mating. We predict that females will display a greater number of proceptive behaviors and lordosis postures when mating with pubertally-pair housed males, regardless of hormone treatments, suggesting females find socialized males more desireable.

Effects of Couples Gratitude Journaling on Hmong-American Relationship Satisfaction - (Psychology)

By: Mya Lor, Ashley Majewski, Sheng Lor, Angelica Ransom, Nancy Erikkson
Faculty mentor(s): Jeana Magyar-Moe

Gratitude is a positive psychology construct that has been researched extensively, showing that brief gratitude interventions result in a variety of positive psychological, physical, and interpersonal outcomes (Emmons & McCullough, 2003). The effects of gratitude journaling within the context of couples relationships had not been empirically examined until recently (Magyar-Moe et al., 2010). Results indicated that participants in the gratitude listing condition showed significant decreases in negative affect and significant increases in levels of gratitude over time in comparison to those in the neutral events listing condition. In addition, couples who completed and shared their gratitude lists on a weekly basis scored higher on the positive feelings towards partner questionnaire, indicating greater relationship satisfaction. The aforementioned study was conducted with a primarily Caucasian (98%) sample, thereby limiting the generalizability of the findings to people of other cultural backgrounds. Indeed, an area of weakness within positive psychology scholarship is the largely individualistic, one-size-fits-all approach which neglects the cultural embeddedness of all human activities (Lopez et al, 2002; Becker & Marecek, 2008; Sandage & Hill, 2001). The purpose of this study is to situate positive psychology within a cultural context by examining the role of gratitude journaling on relationship and personal well-being outcomes for Hmong-American couples.

Examining the relationship between Social Support, Feelings of Control, and Socioeconomic Status in UWSP students

(Psychology)

By: Trevor Neukirchen, Cameron Barton
Faculty mentor(s): Jody Lewis

We asked college students at the University of Wisconsin – Stevens Point to complete a survey to assess many psychological and social variables related to academic success. From this larger survey, we examined the relationships between socioeconomic status (SES), feelings of control, and social support. We included measurements of both objective and subjective SES. A student's feelings of control were measured by using the Locus of Control scale and measures of self-efficacy. We also assessed the amount of social support a student receives from his/her family, friends, teachers, and classmates. The relationships between these variables are important because previous studies have suggested that SES, feelings of control, and social support are correlated with GPA and college retention (Cabrera et al., 1992; Robbins et al., 2003). We predict that students with lower SES will tend to have lower feelings of control and less social support. We also predict that students who have less social support will tend to have lower feelings of control. Understanding the relationships between these variables may inform efforts to increase student GPA and retention by forming focused intervention programs.

Fraudulent Academic Excuses: Perceptions of Appropriateness and Believability - (Psychology)

By: Denise Calhoun, Alex Wouters
Faculty mentor(s): Craig Wendorf

Past survey research has indicated that the use of false excuses is prominent in university settings (Caron, Whitbourne, & Halgin, 1992; O'Dell & Hoyert, 2008; Roig & Caso, 2005). It is often perceived by excuse makers that more benefits can be gained from a false excuse than accepting the consequence of their actions, but this requires that the excuses be effective. In this study, student perceptions of the appropriateness and believability of fraudulent academic excuses were assessed. UWSP students (N= 87) completed a survey in which they described their use of fraudulent academic excuses and measured their affective states when recollecting the excuse. They also evaluated hypothetical situations in which a peer had given a fraudulent academic excuse, rating how appropriate and believable they found the excuse to be for the situation. Sixty-eight percent of the respondents reported giving a fraudulent academic excuse at least once while in college. On average, students reported feeling desperate before the giving the excuse, nervous while giving the excuse, and relieved afterwards – all highlighting the importance of providing excuses that are both appropriate and believable. Overall, participants rated illness, a death in the family, and weather conditions as excuses with high amounts of both appropriateness and believability across situations.

How Gender of Worker Affects Adults' Status Ratings of Novel Jobs: A Study of Varying Proportions - (Psychology)

By: Ryan Bufton
Faculty mentor(s): Erica Weisgram

Gender segregation is prevalent in the United States with the majority of occupations being dominated by one gender or another (BLS, 2012). In a novel technique to study consequences of witnessing gender segregation, the Novel Job Paradigm (Liben, et al. 2001), children are shown line drawings of workers performing fictitious or obscure jobs and asked to indicate their interest in and judgments in those jobs. In their initial research with children, Liben et al. found that jobs depicted with male workers were rated as higher in status than the identical job depicted with females. In this research, we are exploring how the proportion of workers depicted in an occupation may affect adults' status ratings of and interest in novel occupations. Participants included 50 men, 72 women recruited from introductory psychology classes . Each adult was told about 10 novel jobs depicted with line drawings of a different ratio of male and female workers ranging from 1 male: 5 females to 5 males: 1 female. Interest and status ratings of each job were assessed. For job interest, no significant effects or interactions were present. For how easy the job is to learn and do, a significant effect of proportion was found for each variable, $F(4, 480)=2.59$, $p<.05$ and $F(4, 480)=3.66$, $p<.05$, respectively. Jobs were being perceived to be easier to learn and do when the number of women depicted was greater than the number of men.

The Use of Cognitive Aspects of Numbers in Visual Search (Psychology)

By: Cameron Barton, Sarah Adelson, Denise Calhoun
Faculty mentor(s): Patrick Conley

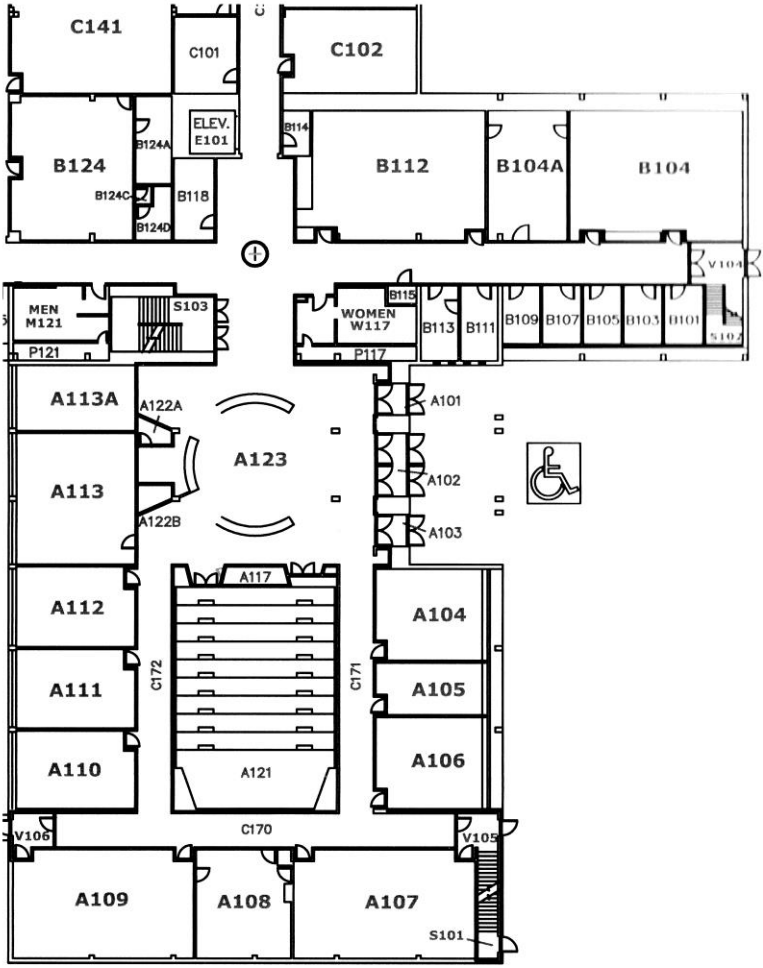
Visual search tasks are usually based on the visual characteristics of the target that distinguish it from any distractors in the same array. Previous experiments in our lab have demonstrated that the abstract qualities of numbers, such as magnitude and parity, can also be used as a basis for discrimination in a visual search task. We have extended these findings in the current research in several ways: we have demonstrated these effects within-subjects, showing that the same individuals will behave differently when prompted with different cognitive cues for search. We have also shown these cognitive effects when the numerical stimuli are combined with congruous and incongruous color cues (i.e., either the correct target or an incorrect target is shown in red). Finally, we have found these cognitive effects even at the smallest set sizes, in target arrays from 2 digits (one target, one distractor) to 16 digits. These results further support the hypothesis that the abstract qualities of numbers, and not their physical characteristics, are guiding search in these experiments.

Understanding Core Emotions in Abstract Dance: A Pilot Study
(Psychology)

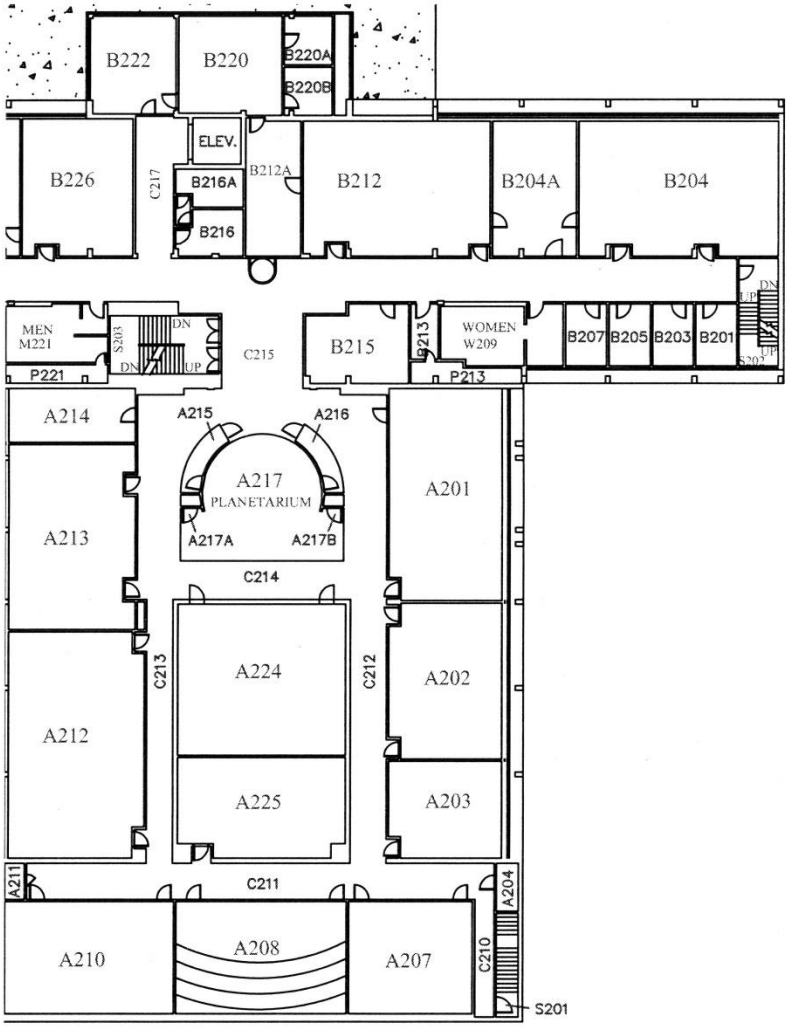
By: Megan Cahill, Mallory Polivka, Melina Velcheck, Olivia Crevier
Faculty mentor(s): Amy Gervasio

The psychology of dance is an emerging area in psychology and aesthetics. This study applies principles of visual form perception and theories of universals in emotion to understand how audiences imbue meaning to abstract dances. Research students choreographed and filmed brief dances representing various emotions. Sixty students in Psy 110 courses were divided into three groups. Each group viewed ten videotaped stimuli, approximately 10 seconds in length, representing five examples of one target emotion (happiness, sadness, or anger) along with neutral and filler pieces. Care was taken to equate stimuli by controlling for dancer height, costume, facial expression and background space. Participants chose one out of six emotions that the stimuli best demonstrated, and then rated the intensity of that emotion on a 7-pt. Likert type scale. Chi square exact tests and other statistical analyses revealed that participants correctly identified the target emotions at rates much higher than chance. Sadness and happiness stimuli were rated more consistently than anger. A convenience sample of dancers also served as participants and gave feedback. As a result of the study, choreography for anger stimuli was refined. Future research will use the most intense stimuli to study the effects of gender, solos, and duets on audience responses.

Science Building – 1st Floor



Science Building – 2nd Floor



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College of Letters and Science

130 Collins Classroom Center
Stevens Point, WI 54481
(715)346-4224
cols@uwsp.edu
www.uwsp.edu/cols

University of Wisconsin
Stevens Point