



University of Wisconsin - Stevens Point

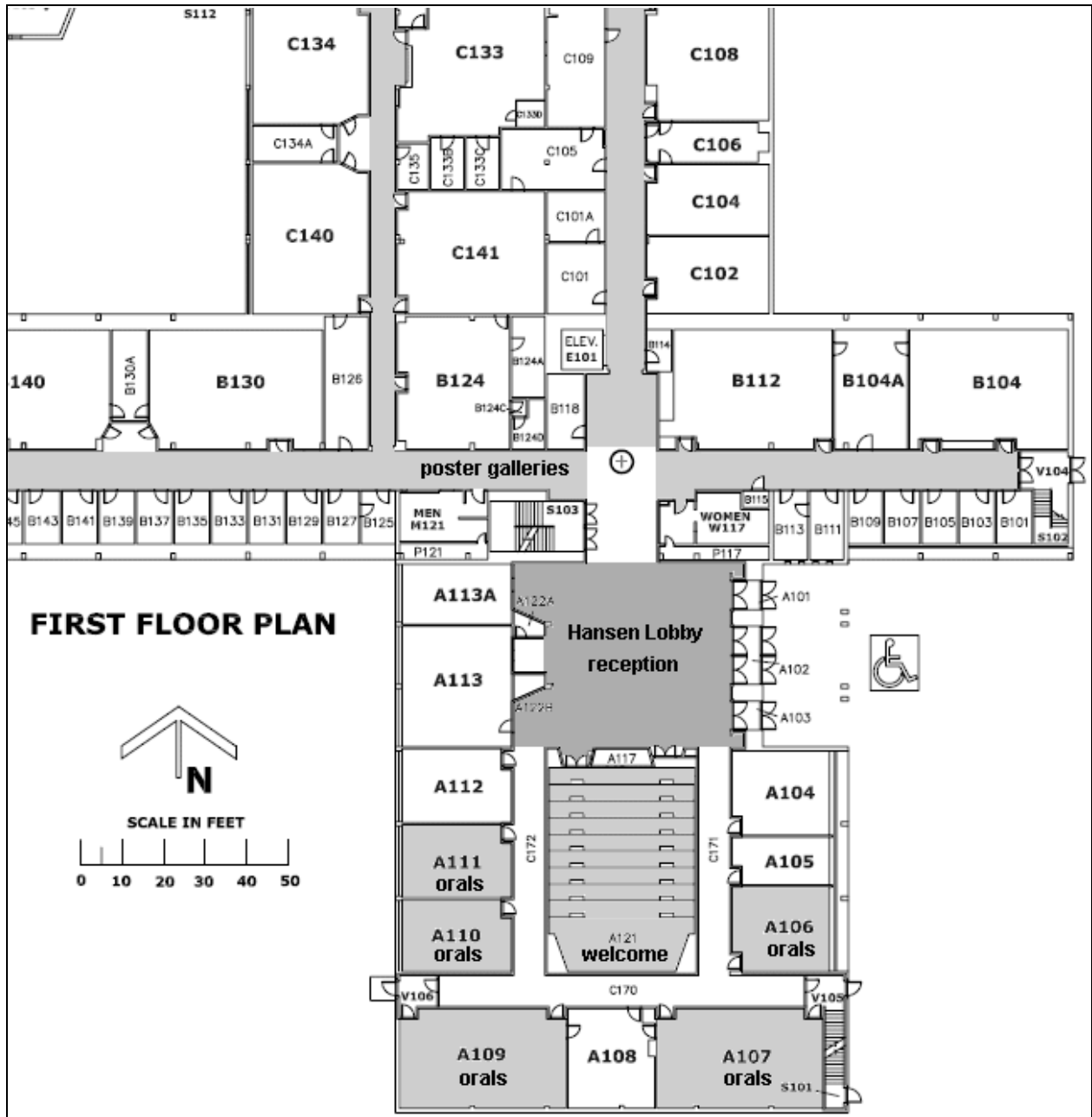
College of
Letters and Science

The Tenth Annual

Undergraduate Research Symposium

Friday, 24 April 2009

Science Building, A and B wings.



Dean's Welcome

Room A121, Science Building

2:00 PM

Oral Presentations

*See Program for Individual Room Locations
and Time Assignments*

Session I: 2:15 PM - 3:10 PM

Session II: 4:05 PM - 5:00 PM

Poster Presentations

1st Floor B Wing Corridors, Science Building

3:05 PM - 4:00 PM

Interim Dean Charles Clark will welcome the participants and attendants at 2:00 PM in Room A121 of the Science Building. Please plan to attend this welcome and enjoy some pre-program refreshments in the commemorative Hansen (east) Lobby of the Science Building.

Oral presentations will last twenty-five minutes, and resume after a five minute break; i.e., 2:15 until 2:40 and 2:45 until 3:10 for Session I, and 4:05 until 4:30 and 4:35 until 5:00 for Session II.

Please adhere to these starting and ending times. This will allow for smooth transitions between presentations.

Poster presentations will occur between 3:05 and 4:00 PM, but will remain on display in the B wing gallery corridors throughout the event.

The College of Letters and Science sincerely

Thanks You.

Oral Presentations

Session I

2:15 - 3:10

Science Building A106 *Moderator: Edgar Francis*

O01. US Relations with Iran: 1969-1972

Kimberly Beckman; History *Time: 2:15 Mentor: Susan Brewer*

When Americans today think about Iran, the words “theocracy,” “radical,” “dangerous,” “nuclear weapons,” and maybe even “axis of evil” come to mind. The Iranian-American relationship, however, has not always been so publicly hostile. For many years before the late 1970s, Iran was one of the strongest US allies in the Middle East. “US Relations with Iran: 1969-1972” dissects the Iranian-American relationship during President Nixon’s first term. During this time, there was much unrest in the Middle East, mostly caused by the British decision to pull out of the Persian Gulf in 1968 and the general fear of Soviet encroachment. At the same time, the US was in the middle of an increasingly costly war in Vietnam. This situation led to the application of the Nixon Doctrine in Iran, which called for military aid for US allies to promote regional stability. From the outside, it appeared that Iranian-American relations were strong and Iran itself was stable enough to be the US-backed proxy of the region. Inside the upper echelons of the bureaucracy, however, many policymakers did not support the use of the Nixon Doctrine in Iran. A war of words raged from 1969 to 1972, usually pitting the Departments of State and Defense against the US Embassy in Iran and the duo of Nixon/Kissinger. The amount of weapons, technical assistance and other aid given to Iran during Nixon’s first term was hotly debated and generally resulted in only moderate increases, balancing US and world interests with the risk of losing influence in Iran. Underneath the surface, however, the debate was being won by Nixon/Kissinger who gave Iran its ultimate victory, a “blank check” for weapons, in 1972. By this single action, years of debate about the Iranian ability to absorb the weapons it received was wiped away. Similarly, questions of US popularity and internal stability in Iran were brushed under the table. The trivialization of these important questions, however, came screaming back to US policymakers in less than a decade.

O02. The Israeli National Youth Service Program

Valerie M. Crochiere; Sociology *Time: 2:45 Mentor: Robert P. Wolensky*

In Israel, with a population of over 7,000,000 located in the Middle East bordering the Mediterranean Sea, young adults are required to participate in the National Youth Service program. The National Youth Service of Israel (also known as Sherut Leumi) can be served in two different ways. The first option, that two-thirds of the Israeli youth choose, is to serve eight hours of community service per day for one year. The second option is to serve in the military for two years (often referred to as conscription). The points I would like to address during my presentation relate to the advantages and disadvantages of the National Youth Service requirement that is present in Israel and in more than 30 countries worldwide. I would also like to look at the opinions of the Israeli youth that are currently taking part in this requirement and those alumni of the service. I will also examine how national service affects the personal growth and development of its participants. Such internal aspects include: attitude towards one’s country (patriotism), transition into careers, and community

service continued independently. In contrast, I will compare how the United States would possibly benefit from a national service program. My personal interest in Israel's program was influenced by an interaction with an Israeli citizen who has served in Sherut Leumi. I will conduct an in-depth interview with this citizen and include the results in my presentation. Other resources for my research will include scholarly books and articles related to the national service requirement in Israel and elsewhere.

Science Building A107

Moderator: Robert Sirabian

O03. Entertaining an Audience in an Age of Immediacy: Adapting Dickens's *Oliver Twist* for a Twenty-First-Century Audience

Tracy Berg; English

Time: 2:15

Mentor: Robert Sirabian

In 2005 Roman Polanski produced the film *Oliver Twist*, an adaptation of the classic nineteenth-century novel by Charles Dickens. The film adaptation interestingly follows a fidelity model, while simultaneously reinterpreting parts of the original novel. Throughout most of the film, it is apparent that Polanski wants his film to be faithful to the Dickens novel because it maintains the main plot lines and the main characters. To make his film meet a length that audiences in the twenty-first century would consider reasonable and enjoyable, Polanski omits subplot lines and minor characters. In the place of complicated plot lines, he develops the main character of Fagin and his relationship to Oliver. In the novel, Fagin is portrayed as evil and inhuman, but Polanski's reinterpretation presents him as more compassionate, and much more of a father figure to Oliver. Additionally, Polanski utilizes the advances in cinematography as a way to reinforce themes that were addressed in Dickens's novel.

O04. Dickens's Daughters: An Analysis of Female Characterization in *Dombey and Son*

Shelley Auer; English

Time: 2:45

Mentor: Robert Sirabian

Charles Dickens was a writer known for his detailed works and memorable characters. He expressed his own concerns about the Victorian era through the art of writing, at the same time bringing forth the issues of social injustice to the eyes of his Victorian readership. *Dombey and Son*, although introduced as a male-dominated novel via a masculine title, actually focuses much of its content on the novel's female characters. Dickens chooses to focus the novel on the social injustices faced by women of the Victorian era. He acknowledges and addresses the social and familial expectations which daily confronted women as well as the exploitation women faced when dealing with society's biased class and gender structures. Although Dickens points out some of the more masculine issues of the era, such as commerce and imperialism, his chief focus resides with the female characters and the confrontations they encounter in the masculine world of *Dombey and Son*. Dickens's own understanding and use of Victorian stereotype superbly create a sense of reflection in his female characters, causing the reader to reflect as well. His creation and use of complex story lines involve more than typical Victorian stereotype. He creates female characters and plunges them into realistic situations which involved all people of the Victorian era. The encounters and social injustices of *Dombey and Son* cause readers to take a look at their own lives and re-evaluate personal bias and stereotype as well as the basis with which a nation's people treats its female population.

O05. Gender Relations among the Maasai: Personal Experiences and Sociological Analyses

Pauline E Holmes; Sociology *Time: 2:15* *Mentor: Robert P. Wolensky*

The research for this study began last July. I found myself in a dark place from which I became determined to never find myself in again. In the past my annual renewed zest for life would occur during my summers. It was then that I was, once again, able to feed my appetite for service and community. I began searching for an organization that could help me effectively refocus my resources in a meaningful manner. I came across an organization that was determined to allow a new community to change me via a home stay in addition to providing me with many opportunities to change the reality of others. Preparations for the trip included conducting research on the United Republic of Tanzania. My in-country research was recorded by means of journal entries, internet records, and digital media. The introduction of my presentation will provide a description of Tanzania as noted by numerous international organizations as well as individuals who have invested time in this region. After briefly describing the culture I'll focus on the evolution of my relationships within the Maasai village known as Kiyoga, emphasizing gender relationships. I will illustrate how I went from being referred to as "neupe" (white) to being an accepted member of the community. I will be using PowerPoint to ensure smooth transitions between each of the sections of my research and analysis. I'll focus on personal experiences that occurred while living with the Maasai of the Arusha region in Tanzania. Throughout the presentation I will be making connections that will illustrate the influence that components of social structure have on relationships between members within the Maasai culture. In addition, I will argue that my experiences also illustrate globalization at the micro level.

O06. The Importance and Value of Collaboration in Creative Writing Tutorials

Barbara Thatcher, English *Time: 2:45* *Mentor: Dan Dieterich*

This study explores collaboration and creative writing. Its purpose is to show that all writing, especially creative writing, is collaborative. Using research in language and cognition theory, I demonstrate that all creative writing emanates from conversation – either internal or external – and that such conversation enables us to make sense of the world. I also demonstrate the effectiveness of a collaborative approach to tutoring students in creative writing by drawing upon my own personal experience working with creative writers. Based on this experience and my research, I conclude that collaboration is an effective strategy for tutoring students in creative writing.

O07. The Ties that Bind: New Regionalism as a Developmental Tool

C. Joelle Groshek; Political Science *Time: 2:15 Mentor: Jennifer N. Collins*

The pre-eminence of market power in today's globalized world demands the examination of the viability of interstate economic integration via regional trade associations as a developmental tool. I argue that the aggregation of national economies into larger economic associations affords emerging nations more political power on the global stage. I examine and compare the successes and limitations of the European Union and Mercosur (The Common Market of the South) as examples, respectively, of deep and shallow economic integration in the new regionalism. I argue in favor of Mercosur's progression towards the EU model, which I assert would strengthen democratic institutions, global voice for the region, and trade among member states. However, I also consider the limitations of EU-Mercosur comparisons, citing disparities in depth of integration, cultural history, and capitalistic progression. Analysis of these factors suggests, however, that deeper economic integration could facilitate the reduction of Mercosur's alleged social and institutional deficits and consequently yield increased global power to lead developing nations, in line with the National Intelligence Council's prediction of the "rise of the rest."

O08. The Moonie Kingdom: The Unification Church and a New World Order

Chad R. Johnson; Political Science *Time: 2:45 Mentor: Jennifer N. Collins*

Reverend Sun Myung Moon's Unification Church is a religious organization with influence far beyond its small number of members. Through a series of organizations, Moon has direct control over areas as diverse as media, arms manufacturing, automobiles, and others. Through direct donations, the Unification Church links to politicians and evangelical preachers. Sun Myung Moon advocates that religion and politics cannot, and should not, be separate. I feel this is a sentiment echoed in the neoconservative movement in the United States. Whether he is an architect of the neoconservative movement, or merely benefits from it, the blending of conservative politics and conservative religion is exactly what Reverend Moon has been hoping for. In my research of this Church, I will attempt to determine the extent of the influence the Unification Church on American politics. One of the goals of the Unification Church, as laid out in their main theological text *Exposition of the Divine Principle*, is the eventual creation of a literal "Kingdom of Heaven" on Earth. In effect, a global theocracy headed by the Unification Church. I intend to lay out the specific details of this ideal society in my presentation, and explore the veracity of the claims made by the Church's critics regarding Moon's personal political aspirations.

O09. Ultrafast Hydrogen Sensors

K.L. Wawrzaszek, T. Shogren, K. Levanetz, K. Bretl, B. Warner, D. Dissing, D. Seley; Chemistry *Time: 2:15* *Mentor: Michael Zach*

Although it is not a primary source of energy, hydrogen attracts a lot of attention as a method to store energy from sources such as hydroelectric, solar and nuclear. A major issue with switching over to hydrogen gas is safety. Current commercial sensors are expensive to make, require expensive instrumentation or are very slow at detecting hydrogen even when at flammable concentrations. Sensors being developed in our laboratory are shown to be ultra fast even at levels far below hydrogen's flammability. This technology was originally developed at Argonne National Laboratory and won a RandD 100 Award in 2006. Palladium metal thermally evaporated onto a silane treated surface forms an ultrathin layer of small nanometer diameter beads rather than a continuous sheet that forms on a bare glass surface. This work focused on improvements to the original design of the sensor. Improvements include utilizing interdigitated platinum array contacts and modified silanes for improved response.

O10. Poly(propylene succinate-co-L-lactic acid), a Model Copolymer for Bioresorbable Bone Adhesives

Wayne A. Huberty, Mark J. Juetten; Chemistry

Time: 2:45 *Mentor: John P. Droske*

Polymers are useful materials for bioresorbable medical applications. They have been used as bioresorbable sutures and stents and in bone replacement surgery. In the latter application, the polymer acts as a bioresorbable adhesive to bond bone together and is porous, allowing for new bone growth throughout the material. While in vitro studies have been promising, in vivo use of these materials for bone adhesion sometimes has been complicated by variable degradation times and insufficient strength. We have developed synthetic procedures for the synthesis of bioresorbable bone adhesives comprised of copolymers of lactic acid and diethyl fumarate (Droske, et al Polymer Preprints 2007, 48(1), 998). In the present work, poly(propylene succinate-co-L-lactic acid) was prepared as a model copolymer, as it does not contain the crosslinkable olefin moiety present in diethyl fumarate. This copolymer was prepared by zinc chloride-catalyzed transesterification of diethyl succinate and propylene glycol with L-lactic acid. Characterization by ¹H-NMR, gel permeation chromatography, MALDI mass spectrometry, and FT-IR, confirmed that each of the monomers was incorporated into the copolymers. The results were consistent with those obtained with the analogous copolymer, poly(propylene fumarate-co-L-lactic acid). Some of the work that will be presented was done by WH at Louisiana State University during a summer research fellowship in 2008.

O11. A Long-term Study of the Community Ecology of an Amazonian Amphibian Fauna

Jaimie Klemish; Biology

Time: 2:15

Mentor: Erik R. Wild

The Amazon rainforest is perhaps the most diverse biome in the world, including some of the most speciose amphibian faunas on the planet. Amphibians are of special interest because they can serve as excellent indicators of overall ecosystem health, yet this makes their global decline even more troubling. Although amphibian declines have not been as severe in the Amazon, baseline information of species richness and abundances that can provide a baseline to document future changes are lacking, especially for over long time periods. Sequential surveys of amphibian species diversity were performed at a site in the Peruvian Amazon to document species richness and abundances and their fluctuation over time. Surveys employing active searches of numerous habitat types (e.g. seasonal ponds, permanent ponds and swamps, interior forest, and trails) have been conducted during December and January of the rainy season at Reserva Amazonica biennially since 2002. Species richness and relative abundance were compared over years standardized by sampling effort (time and observations). Surveys have documented no apparent wholesale decline, according to Mau Tau rarefaction run using estimates (Colwell 2005), but rather fluctuations in abundance within species. The establishment of this baseline will allow the detection of problems with this amphibian community and the whole ecosystem into the future.

O12. Identifying Pseudoscience

Alicia DeGroot; Philosophy

Time: 2:45

Mentor: James Sage

Pseudoscience is an area of research that appears to be scientific but in reality is not. While there is the appearance of correct scientific method and empirical data, pseudoscience fails to live up to the standards of genuine scientific inquiry. Examples of pseudoscience discussed in this paper include alien abductions, palmistry, and fad diets. While some forms of pseudoscience are entertaining, others are dangerous, or lethal. Thus, it is important to be able to distinguish genuine science from dangerous pseudosciences. This leads to the question: What is the difference between science and pseudoscience? In this paper, I develop two criteria that will serve to distinguish science from pseudoscience. There have been many reports of UFO sightings. Some people even claim to have been abducted by aliens. Others claim that reading the lines on one's palm can provide insight into their personality past or future. Finally, in the quest to look young and thin, millions of people follow the latest diet programs. I will argue that credibility serves as a keystone indicator that is present in science, but absent in pseudoscience. Typically, scientific credibility involves the empirical study itself, the author of the claims, and/or the publisher of the results. Pseudoscientific research fails to live up to standards of credibility in these areas. I will argue that consideration of alternative hypotheses is a keystone indicator of science that is lacking in pseudoscience. While it may be tempting to "jump to conclusions" based on a few preliminary findings, scientific reasoning will always include careful consideration of alternative hypotheses. Pseudoscience, however, tends to focus on just one hypothesis and the evidence that supports it.

Poster Presentations

Science Building B wing 3:05 - 4:00 PM

Biology

P01. Macro and micro parasites found in captive reptiles and amphibians housed in the College of Natural Resources, UWSP

Shelly Samet and Natalie Johnson *Mentor: Terese Barta*

There has not been a lot of research published on bacteria normally found in reptiles. Many of the common problems that captive reptiles and amphibians have are caused by bacterial and fungal infections. Furthermore, there is no complete record of the parasites that the reptiles in this captive collection have been diagnosed with and treated for. The objective of this study is to improve the level of care and health of reptiles and amphibians in our captive collections. We collected and analyzed fecal samples, mouth swabs, and plastron cultures in order to diagnose macro and micro parasites as well as any bacterial and fungal infections. Pinworm was the most common macro parasite found in our captive collection. Gram-positive bacteria were also very common with animals that appeared to be healthy whereas Gram-negative bacteria were found in higher concentrations with animals that were considered diseased. A record of the flora found within those animals was established and will be communicated to future staff and volunteers of our captive collection thereby increasing the overall health and husbandry of our captive collection.

P02. Feed Comparison of Grower Diets using Rainbow Trout (*Oncorhynchus mykiss*)

Steve Schmidtke *Mentor: Chris Hartleb*

Two of the most popular commercial fish diets, Nelson's Silver Cup and Purina Aquamax, were tested using rainbow trout at Rushing Waters Trout Farm in Palmyra, WI, to see which yielded the highest growth rate while maintaining low mortality and high overall health of the fish. The study lasted eight weeks with the growth rate being recorded each week. Growth rate was used to calculate the Feed Conversion Ratio ($FCR = \frac{\text{Mass of food eaten}}{\text{Body mass gain}} / \text{Period of time}$); FCR is an indicator of the fish's efficiency in converting feed mass into increased body mass). The results showed that Silver Cup (45% protein, 16% fat, and 3% fiber) out-performed Aquamax (41% protein, 12% fat, and 4% fiber). Silver Cup had an average FCR of 1.26 as compared to a FCR of 1.40 for rainbow trout fed Aquamax. The apparent difference in the FCR for rainbow trout fed each diet could be due to the higher fat percentage present in the Silver Cup trout feed. The extra amount of fat in the diet allowed the rainbow trout to build up and store fat in their bodies more rapidly, thereby increasing their body weight. The fish on Nelson's Silver Cup diet not only had a lower feed conversion ratio but grew faster. The overall health of the fish was also better with the Nelson's Silver Cup diet. After being harvested and transferred between flow-through systems, the rainbow trout fed the Purina Aquamax diet experienced high mortality due to stress. This study showed that rainbow trout fed Nelson's Silver Cup diet yielded

better overall performance based on growth, feed conversion, and survivorship. Future feed trials should compare diets with similar fat and protein content while investigating stress-reducing factors that could influence growth and survivorship on a larger scale.

P03. Characterization of six male-sterile female-sterile soybean mutants

Sarah Pritzl, Katie Krause, Reid Palmer, Madan Bhattacharyya

Mentor: Devinder Sandhu

In sexual reproduction, a plant undergoes meiosis to produce pollen and egg cells. During this process, chromosomal segments that contain genes are exchanged. Minor alterations in genes controlling meiosis can lead to male-sterile and female-sterile mutant plants. In soybean, six male-sterile, female-sterile mutants were identified in a previous study. With an objective to characterize these mutants, we initially investigated if any of these new mutants mapped close to an already characterized sterility gene *st8*. Three of the six mutants mapped to the *st8* region on Molecular Linkage Group (MLG) J. For other three mutant populations we used Bulk Segregation Analysis (BSA) to find chromosomal location. Using 400 Simple Sequence Repeat (SSR) DNA markers, all three mutant genes were mapped on the same Molecular Linkage Group (MLG) B2. To make genetic linkage map of the regions containing the genes, individual plants from the F₂ populations were tested with SSR markers that are known to be close to the genes of interest. Further progress and detailed genetic maps will be presented in the poster.

P04. Biology of Magnolia Scale

Abigail Strobel

Mentor: Jamee Hubbard

Magnolia scale, *Neolecanium cornuparvum* (Thro), is one of the most conspicuous scale insects in North America. It feeds solely on trees in the genus *Magnolia* and is native to the southern portions of the United States. Magnolia scale is not ordinarily a pest on native species of magnolia trees, and many factors have allowed this insect to become a pest in Wisconsin within the past 10 years. Nothing has been published about the biology of this insect, and little is known about magnolia scale in northern states, such as Wisconsin, where the climate is very different than in the insect's native range. During the summer of 2006, magnolia scale was observed on a weekly basis. The size, color, consistency of the exoskeleton and associated components, molting events, presence of males, presence of eggs, and presence of parasitoids, as well as any other associations, were noted each week. This poster presents the results of these observations.

P05. Configuring Systemic Acquire Resistance Pathway in Soybeans

Ryan Frasch, Made Tasma, Madan Bhattacharyya

Mentor: Devinder Sandhu

Systemic acquired resistance (SAR) is induced systemically following infection by avirulent pathogenic strains to provide broad-spectrum protection against subsequent infection by an array of pathogens, including virulent forms. In previous investigations, two homologous genes thought to affect expression of SAR, *GmNPR1-1* and *GmNPR1-2* were identified in the soybean. In model plant *Arabidopsis*, the NPR1 gene works as a key regulator in the activation of SAR. The objective of our study was to determine if *GmNPR1-1* and *GmNPR1-2* complemented the NPR1 function in the *Arabidopsis npr1-1* mutant, which is unable to

induce the SAR response. We used two different approaches to determine whether the 2 *GmNPR1-1* and *GmNPR1-2* genes from soybean would activate the SAR response in the *npr1-1* Arabidopsis plants. In the first approach, we used the *BGL2-GUS* fusion gene. *BGL* is a SAR marker encoding β -glucanase and it requires the protein *NPR1* for its induction. *GUS* is a reporter gene and will provide visual confirmation for *BGL2* induction in the form of a blue coloration within the leaves of the inoculated plant. After inoculation with an avirulent pathogen, the blue coloration was observed in the *npr1-1* Arabidopsis plants transformed with the soybean genes *GmNPR1-1* or *GmNPR1-2*. These results confirmed that the genes from soybean complimented the SAR in these mutant Arabidopsis plants. In the second approach, we used the transgenic *npr1-1* Arabidopsis plants and inoculated those with an avirulent *Pseudomonas syringae* pv. tomato (*Pst*) strain followed by a virulent strain. A bacterial count in the leaves after infection clearly showed induction of SAR in *npr1-1* plants, complemented with either of the soybean *NPR1* homologues. Results using both approaches confirmed that SAR pathway is conserved in soybean.

P06. Effects of Early Maternal Separation on Subsequent Adult Aggression and Reproductive Behavior in Male Rats

Angela Larsen and Robert Dykstra *Mentor: Karin Bodensteiner*

Adult behavior in rodents (including emotionality, response to stress, male aggression, and maternal behavior) is affected, at least in part, by events experienced during neonatal life. Although maternal separation is a known neonatal stressor in rodents, the effects of maternal separation on adult male aggression and reproductive behavior are not well understood. To assess the effects of maternal separation on later aggressive and reproductive behaviors, male pups were separated from their mothers for 8 hr (long-term separation; LTS), 4 hr (short term separation; STS), or 0 hr (no separation; NS) from post-natal day (PND) 2 through 20. Lactation performance, nest building, grouping, and hovering over pups were measured during the separation period. Aggression testing and timed mating of subjects to females in estrus will also be performed. Although data collection and analysis is ongoing, it is hypothesized that male pups periodically separated from their mothers will show increased aggression and decreased reproductive success as adults.

P07. Confirming *Sturnella* meadowlark sympatry with molecular biology, and testing the reliability of song for inter-specific differentiation in a sympatric zone

Wyatt Wiedenfeld *Mentor: Diane A. Caporale*

We conducted standardized bird surveys to document the frequency and distribution of Eastern Meadowlark (*Sturnella magna*, hereafter EAME) and Western Meadowlark (*S. neglecta*, hereafter WEME) songs in the Nebraska Sandhills during the 2008 breeding season. The proposed breeding range for WEME includes the state of Nebraska, while the western extent of the EAME proposed breeding range is limited to the river valleys of Nebraska and Oklahoma. EAME and WEME are almost identical morphologically, thereby limiting field biologists to using primarily song for inter-specific differentiation during standard avian point counts. Bird song, however, is a learned behavior that may be inter-specifically shared in zones of sympatry (i.e., species range overlap), thereby potentially compromising the accuracy of our bird surveys. Therefore, we collected nestling feather samples from nests found in the two habitats that we suspect WEME and EAME are partitioning (based on the song frequency and distribution) to differentiate nesting distribution with molecular biology

methods. We can then spatially correlate and predict the occurrence of WEME and EAME songs with nesting distribution, and potentially validate the reliability of using song to identify species in a sympatric zone. These questions will be answered using DNA sequencing comparisons and previously created nest site distribution maps. We isolated DNA from bird feathers taken from nestlings. We then amplified and sequenced the COI mitochondrial gene. In a phylogenetic analysis, we plan to demonstrate whether the Eastern and Western Meadowlark sequences cluster in their own separate clades. This will help to verify the reliability of song for inter-specific differentiation.

P08. The Risk of Contracting Multiple Tick-borne Diseases at Treehaven, in Tomahawk, WI

Amanda Nowak *Mentor: Diane A. Caporale*

Wisconsin is known for its white-tailed deer, but with those deer come deer ticks. Deer ticks carry pathogens causing Lyme disease, Human Babesiosis (HB), and Human Granulocytic Ehrlichiosis (HGE). Lyme Disease is the most commonly found and caused by the spirochete *Borrelia burgdorferi*. The far less common diseases HB and HGE are caused by a protozoan *Babesia microti* and an intracellular bacterium *Anaplasma phagocytophilum*, respectively. Human cases of Lyme disease have been consistently increasing in our state. Since many of our students from UWSP are required to take courses at Treehaven, it is important to identify the risks of contracting these diseases. In October 2008, 130 specimens were collected from Treehaven in Tomahawk, WI, from two different locations within their boundaries. The DNA was then isolated and quantified. The 50 ticks with the highest DNA concentrations from both locations (totaling 100) were tested for the presence of each pathogen. PCR was used to target a gene that only each pathogen had. Thirteen percent (13/100) of the deer ticks harbored the Lyme disease pathogen. Surprisingly, 25% of the ticks harbored the HGE agent; 7 of which were coinfecting with the Lyme disease agent. Since both pathogens are bacteria, antibiotics (doxycycline) can be used for treatment of both. PCR results also revealed 29 ticks with the *Babesia* protozoa. Since primers amplify *Ba. microti* as well as *Ba. odocoilei* (infectious only to deer), I am currently sequencing the fragments to identify their species. This information is very useful to our students here at UWSP and to those who live in the Tomahawk area. They need to be aware of the dangers deer ticks pose and could prevent infection rather than have to be treated for a tick borne illness.

P09. Development of an In Vitro Culture System for Rat Ovarian Follicles

Shelly Kellner and Alexandra Garber *Mentor: Karin Bodensteiner*

In vitro fertilization has become an important interventional medical procedure for individuals who wish to conceive, but the success of this procedure is highly dependent on oocyte availability. Superovulation techniques are commonly used to increase the number of oocytes available for fertilization, but results are variable and a large number of women fail to produce fertilizable oocytes or transferable embryos. To increase the number of oocytes available for in vitro manipulation, new strategies to provide large numbers of fertilizable oocytes are needed. One promising approach is to isolate, culture, and mature oocytes in vitro. Thus, this research was conducted to develop a protocol for the in vitro culture of rat ovarian follicles. Ovaries were harvested from young rats and the follicles were mechanically removed and placed in 96-well round-bottom plates in 30µl of Minimum Essential Medium containing 5% bovine serum. Plates were inverted for optimal gas

exchange and placed in a 5% CO₂ incubator at 37°C for six days. Follicles were measured for growth and medium was replaced daily. In preliminary studies, approximately 40% of the follicles increased in size over the six-day period. Thus, it appears that the inverted-well *microti* as well as *Ba. odocoilei* (infectious only to deer), I am currently sequencing the fragments to identify their species. This information is very useful to our students here at UWSP and to those who live in the Tomahawk area. They need to be aware of the dangers deer ticks pose and could prevent infection rather than have to be treated for a tick borne illness.

P10. Molecular Analysis of a T-DNA Tagged Mutant in Soybeans

Rebecca Slattery, Mollie Schmidt, Reid Palmer, Madan Bhattacharyya

Mentor: Devinder Sandhu

Agrobacterium tumefaciens is a bacterium that infects wounded dicot plants and causes crown gall disease. It contains a tumor inducing (Ti) plasmid with transfer-DNA (T-DNA). Upon infection, T-DNA moves from the bacterium into the plant genome. This natural process is commonly used by researchers to integrate genes of interest into the plant genome by substituting them for the genes present on the T-DNA vector. However, insertion into the plant genome is random and can interrupt functional genes, creating a mutant plant. In a recent study, this process has created a male-sterile, female-sterile mutant. The objective of our study was to locate the male-sterile, female-sterile gene in the soybean genome. Heterozygous mutant plants were used for making crosses and segregating F₂ populations were developed. After DNA was extracted from each individual in the selected populations, bulk segregant analysis was done using 400 Simple Sequence Repeat (SSR) DNA markers. The gene was tentatively located on the D1a chromosome. Further investigation using fine mapping of the F₂ (second generation) will confirm this location and provide a genetic linkage map of the region containing the gene.

P11. A Field Survey of Potential Second Intermediate Hosts for the Invasive Trematode *Leyogonimus polyoon*

Heslyn Menadue and Nathan Vollmer

Mentors: Todd Huspeni and Pat Zellmer

Since 1996, Shawano Lake, WI, has experienced annual mortalities of migrating American coots (*Fulica americana*) and other waterfowl. These deaths were caused by the trematode, *Leyogonimus polyoon*, and cumulative mortality estimates exceed 31,600 coots and 2800 lesser scaup, most infected with thousands of worms each. *Leyogonimus polyoon* has a complex three host life cycle, using coots as final hosts, and the invasive faucet snail, *Bithynia tentaculata*, as 1st intermediate host. A coot is infected when it eats a second intermediate host containing a metacercaria. Each consumed metacercaria develops into a single adult worm in the coot. In a recent study, the isopod, *Caecidotea racovitzai*, was identified as a naturally-infected 2nd intermediate host for *L. polyoon*. The focus of our study was to determine whether any organisms may also be infected with *L. polyoon* metacercariae, and might also function as natural 2nd intermediate host for this parasite. During 2008, we collected various invertebrates by D-net and hand from Shawano Lake, WI. Invertebrates collected included aquatic insects (*Coleoptera*, *Diptera*, *Ephemeroptera*, *Odonata*, *Neuroptera*, *Plecoptera*, and *Trichoptera*), water mites, amphipods, leeches, zebra mussels, and snails. These were dissected to determine infection with *L. polyoon*. We found that other than isopods (*C. racovitzai*), no invertebrates collected were infected with *L. polyoon* metacercariae.

This strongly implies that the sole ecological significant 2nd intermediate host for *L. polyoon* is the isopod is *C. racovitzai*. Metacercarial intensities in infected isopods coupled with isopod densities are important host factors that influence coot mortality at Shawano Lake.

P12. Development of Undergraduate Laboratory Experiences in Cell Cycle Regulation and Apoptosis

Heather Jackson *Mentor: Ed Gasque*

The goal is to develop experiments dealing with cell cycle control and apoptosis for the undergraduate lab. Cultured HL-60 cells, promyeloblasts established from promyelocytic leukemia, provide a model system for studies of the cell cycle and apoptosis, and how these processes are regulated at multiple levels. Apoptosis, a programmed cascade of events that lead to cellular suicide through chromosomal breakdown, protein degradation, and cell fragmentation, was induced in HL-60 cells by exposure to etoposide or camptothecin, which prevent relaxation of supercoils during DNA replication, or to methyl-seleno-L-cysteine, an anticarcinogenic compound. Nuclear DNA was extracted from both exposed and unexposed cells, separated via electrophoresis and visualized in ethidium bromide-stained agarose gels. DNA from control cells remained intact, while DNA from induced cells separated as a ladder of fragments. On-going studies of cell cycle regulation involve treatment of HL-60 cells with the phytochemical esculetin, extraction of proteins from treated and untreated cells, separation of proteins by polyacrylamide gel electrophoresis, transfer of protein bands to PVDF membrane, and probing Western blots with antibodies in order to detect levels of two proteins involved in cell cycle regulation: CDK4 (a protein kinase) and pRb (phosphorylated retinoblastoma protein). Previous studies have shown that esculetin inhibits the growth of human leukemia cells by arresting the cell cycle at the G1 phase. Increased levels of pRb and decreased levels of CDK4 have been associated with esculetin-induced G1 arrest. Whether or not our results support these findings, HL-60 cells are a convenient model for investigations into cell cycle control and cell death via apoptosis.

P13. The Effects of Tourism on Neotropical Herpetofauna

Christopher G. Taylor *Mentor: Erik R. Wild*

Deforestation, habitat fragmentation, and species decline have become common and all too well known phenomena. Tourism is not often thought of as being a major contributor, but it is often tourism that first penetrates remote places by which development follows. Thus it is vital that exploration and analysis of these environments by scientists be done before they are corrupted. With this general objective, a research project was undertaken to determine the impacts, if any, of the tourism on the local reptile and amphibian populations at a tourist lodge in the Peruvian Amazon. The study examined three different types of areas: heavily traveled trails, lightly traveled trails, and, as a control, inner forest. Three transects were surveyed for each of the three types of habitats. A total of nine transects were included in the survey, each of which were fifty meters long and two meters wide. One transect from each type was sampled each night in a pre-determined, systematic order. The preliminary discoveries did turn up some valuable information. The trails did in fact impact the distribution of the local herp populations. The level of traffic on a given trail inversely relates to species abundance and diversity. The observed species count was 4:10:12 in heavily traveled, lightly traveled, and in inner forest transects respectively. The observed species diversity was 4:7:8 with respect to the same transects. Certain species did seem to be

affected more than others, especially the arboreal and more specialized species. Due to the short window of data collection (9 days represent 27 surveyed transects) these conclusions are by no means definite, however they do provide valuable insight into the impacts that tourism has on these unique and dwindling habitats.

P14. Comparison of Species Richness and Abundances of Frogs Among Aquatic Habitats in Amazonian Peru

Brooke L. Johnson *Mentor: Erik R. Wild*

The tropical rainforest of the Amazon Basin harbors an incredible amount of biodiversity. This is especially true for frogs. In this study I examined the species richness and abundance of frogs at various aquatic habitats and what characteristic of the aquatic habitats correlated with the species occurrence, richness and abundance. In the study, three 50 meter transects were prepared at each of the three different aquatic habitats totaling nine transects. The habitats included a stream that fluctuated greatly in water levels, a temporary flooded forest, and a permanent swamp. Over the course of 11 evenings, 27 observations were made. Myself and one other individual would proceed to walk one transect at each study site during the 2100 hour identifying and recording species of anurans observed on a data form. The results concluded that the study site with the greatest species richness of 5 was at Site B, the temporary flooded forest. Site A, the fluctuating stream had the highest species richness of 13. And lastly Site C, had the least species richness and abundance. In conclusion according to the null hypothesis that there is no difference in anuran species richness and abundance among aquatic habitats, this was rejected and the alternative hypothesis was accepted that there was a difference in anuran species richness and abundances among aquatic habitat types. The second null hypothesis is that there was no correlation between any of the measured variables and species occurrence, richness, and abundance. This hypothesis was also rejected because the three sites greatly varied in vegetation, canopy cover, and water depth.

P15. The Relationship between a Theraphosid Spider and a Microhylid Frog: What Kind of Symbiosis is it?

Angela Klish *Mentor: Erik R. Wild*

There is a relationship between the microhylid frog (*Chiasmocleis ventrimaculata*) and the burrowing theraphosid spider (*Xenethis immanis*) that is not yet understood. The microhylid frog occupies the same dwelling as the theraphosid spider, and is not viewed as a food source. It is thought that this behavior is due to chemical communication between the microhylid frog and the theraphosid spider. My general objective was to determine what factors play a role in their communication. Towards this aim, I wanted to see if the behavior towards this species was unique, or if it was directed towards other microhylid frogs. This study took place at Reserva Amazonica in Amazonian Peru from December 26th 2008 to January 12th 2009. Various burrows that the theraphosid spider inhabited were marked and three different treatments were administered to each burrow. I used a control swab, a swab of a *Chiasmocleis ventrimaculata*, and a swab of *Hamptophryne boliviana* on different nights. I would then document the reaction of the spider to each individual swab. I found the spider did react to each of the treatments in an aggressive manner, often taking the swab into the burrow. On the first night of treatments to the burrows the spider released the swab that had

been treated with the *C. ventrimaculata*, but the following night the spider responded to the swab the same way it had to the *H. boliviana*. I believe this is due to an error of keeping the two frogs in the same container. Ideally more burrows should be studied as I was only able to locate 11 burrows. Understanding this symbiosis may allow us to understand how one may affect the other in the event of this happening so that we can take conservation action accordingly.

P16. Identification of Common Indoor Molds from Knutzen Residence Hall, UW-Stevens Point

Melissa Yarrington

Mentor: Terese Barta

The goal of this project is to determine the levels and the most common genera of fungi isolated from indoor environments at UW-Stevens Point. Knutzen Hall is the initial focus of the project. Open plates of Sabouraud Dextrose Agar (SDA) were placed in rooms of the computer lab and private residence rooms. Plates were allowed to sit open for 30 minutes in the computer room, and 60 minutes in the residence hall rooms. After air exposure, plates were sealed with parafilm® to prevent contamination from other sources. The air samples were incubated at room temperature until colonies were observed. Individual colonies from the plates were purified by serial transfers of mycelium or spores. Each culture was transferred three times to insure that only one species was present per plate. To identify the molds, the molds were cultured in situ on sterile microscope slides containing blocks of agar medium. The microscope slides were examined for growth and type of spores in order to identify the genus of mold. Experiments are also underway to quantitatively determine mold spores present in rooms using a Millipore® sieve impaction air sampler.

P17. Survey of Almont Fossils from the Paleocene Era

Katie Heck and Joana Medina

Mentors: Ray Reser, Michael Bozek, Pat Zellmer

Currently UWSP houses the most extensive and comprehensive collection of Almont plant fossils collected to date from the Sentinel Butte Formation (Fort Union Group) in North Dakota. Collection 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, and early research suggests all or much of this deposit existed originally as an ox-bow type lake. Collected flora contains strata of mixed species including Ginkgo, and representatives of several families, including *Juglandaceae* (walnut), *Betulaceae* (birch), *Buxaceae*, *Taxodiaceae* (metasequoia), *Hippocastanaceae* (horse-chestnuts), and *Gentianaceae* (Gentian). Rare specimens of flowers and fossil seeds, including winged fruits and nuts, occur within the collection. The Almont fossil locale contains the only known Paleocene plants exhibiting clear anatomical structure comprised of 50 genera in 20 families. These are among the best preserved and most diverse late Paleocene plant fossils in the world. The oldest record of maples (*Acer*), dogwoods (*Cornus*), and the herbaceous buttercup family (*Ranunculaceae*) are found with these deposits, and are well-represented within our collections. 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 accessioning and identifying the prominent floral examples within the collections, with a photo-essay of diagnostic species.

P18. A Survey of Green River Formation Fossils

Joshua Green, Taran Shepard, Bradley Evraets

Mentors: Ray Reser, Michael Bozek, Pat Zellmer

About 55 million years ago, an inland sea covered a large area of what currently comprises the basin and range sections of Colorado, Utah, and Wyoming. Over millions of years these elevated lakes, whose formation was driven by the uplift of the proto-Rocky Mountain chain, shrank as precipitation decreased, and exist today as large formations of stratified Eocene deposits known as Lake Uinta, Lake Gosiute, and Fossil Lake. These water bodies produced a comprehensive fossil record of this region, known collectively as the Green River Formation. The diagnostic fossil record present here contains a staggering cross-section of plant, invertebrate, and vertebrate species, including many of the world's most complete articulated fish specimens. Paleontologists use these fossils as the bar by which other Eocene specimens are identified and ranked. Since 1996, Green River Formation fossils from multiple localities have been collected by UWSP. A primary project goal has been to involve students in the investigation and reconstruction of this region's Eocene ecosystems. A recent resumption of student research has focused on accessioning of this large collection, which includes a number of undescribed holotype specimens. The current project focuses on student identification of the most diagnostic type-specimens collected and held by UWSP. The project includes a diagnostic photo-essay, photographing and identifying each individual fossil, and acquisition of all associated metrical data. The information will be transferred to a museum collection's data base for eventual national and international research access to the collections.

P19. Study of the Liverwort *Frullania* from Central Wisconsin

Xavier Socha

Mentor: Virginia Freire

Liverworts belong to the phylum *Marchantiophyta*, a group of non vascular plants. This group is often overlooked when it comes to plant inventories and research in general. Their small size doesn't help in their collection and study. It is necessary to increase our floristic knowledge and understanding of the ecologic roles and environmental impacts of these plants. *Frullania* is an interesting and poorly researched/known leafy liverwort which is placed in the family *Jubulaceae*. The taxonomic study of this group is being conducted in an effort to expand the known species within Central Wisconsin. As part of this project, I am undertaking the study of this genus at the Schmeckle reserve and a location in Waupaca County. This study will help us understand the conditions of the environment in which species of *Frullania* can grow. Expanded identification of *Frullania* species may offer a lead for medicinal development as the oil bodies present in the liverwort may prove beneficial in future studies. The acquisition and identification of *Frullania* species is significant because it will be the first stepping stone that could open doorways to other fields of research.

P20. Microscopic features of Puerto Rican Bryophytes

Tanya Wayda

Mentor: Virginia Freire

Tropical forests are well known to have some of the richest levels of biodiversity in the world. However, despite conservation efforts, tropical rainforests continue to vanish at an alarming rate. Like many other groups of plants, bryophytes (i.e. mosses, liverworts, and hornworts) display their highest levels of diversity in tropical areas. Although an increasing amount of research is being done on tropical bryophytes, much remains to be learned about their biology, ecology, and taxonomy. Since we already know that bryophytes have a variety of important ecological roles, it is becoming increasingly important to better understand these roles so that appropriate conservation efforts can be made. Clearly, it is necessary to be able to identify bryophytes properly in order to carry out such efforts. However, this can prove to be difficult for non-bryologists (e.g. botanists, conservation biologists, and environmental educators) because knowledge of very fine morphological detail and cellular organization are often required for bryophyte identification. In order to facilitate this information to the general public, we are conducting an SEM (scanning electron microscope) investigation to describe some of these features in a collection of Puerto Rican bryophytes that are housed in the UW-Stevens Point herbarium. Since sporophyte and spore morphology are such useful diagnostic tools for bryophyte identification, we are taking micrographs of spores of a variety of bryophytes as well as the peristomes of several mosses. Although this is a preliminary study, the information obtained from this investigation will be posted on the UW-Stevens Point herbarium website and will eventually be used to produce an illustrative key to Puerto Rican bryophytes.

P21. A Scanning Electron Microscopic (SEM) Survey of Flatworm Parasites from Wisconsin Hosts

Abby Purdy

Mentors: Todd Huspeni and Patricia Zellmer

Adult flatworms possess fully developed reproductive structures (e.g., gonads, vitellaria, and genital atria) that are traditionally used for identification and taxonomic description, but these adult structures are frequently not fully developed or visible in larval stages of these helminths. However, parasitic flatworms also possess well-developed external structures to facilitate attachment, movement, feeding, and mating, and these structures can also provide useful characteristics for identification and systematic description. The size, number, and distribution of tegumental spines and acetabula (suckers) are particularly useful features for identification, and tegumental ultrastructural features can often be used to confirm the synonymy of larval stages (e.g., cercariae and metacercariae) with adult worms. The purpose of this study was twofold: to characterize with SEM the ultrastructural details of various flatworm parasites recovered from hosts in WI, and to confirm the postulated synonymy of a recently discovered larval stage with an adult worm. Using SEM, I examined the monogenean *Sphyranura* (retrieved from mudpuppy gills), and three digenean trematodes: *Leyogonimus polyoon*, *Sphaeridiotrema globulus*, and *Cyathocotyle bushiensis*. To confirm that metacercariae removed from isopods were those of *L. polyoon*, we excysted these stages and compared the ultrastructural details with adults removed from coots. All specimens were preserved, dehydrated, and visualized on a Hitachi Model S3400 scanning electron microscope, and we present the images here. SEM permits the relatively rapid observation and characterization of ultrastructural details, and these details can be more easily visualized and observed than with standard light microscopy.

Biochemistry

P22. Changes in Protein Expression During Induction of Methyl Butenol Emissions in Ponderosa Pine

Alicia Gerlach *Mentor: Eric Singasaas and Jim Lawrence*

Methyl butenol is a five carbon volatile organic compound that may be useful in the future as an alternative fuel source because it has high energy per mole and low water solubility. Methyl butenol is emitted by certain plants, such as ponderosa pine trees under heat stress. Biologically there must be different protein expression that causes certain plants to emit methyl butenol while under heat stress. We designed an experiment to determine what proteins are expressed when a ponderosa pine tree emits methyl butenol and not expressed when it does not emit methyl butenol. We collected pine needles from the same tree at two different times - when emitting and when not emitting - and compared the protein expression in the needles at both times. Protein expression differences can be seen by comparing a 2-dimensional (2-D) gel electrophoresis of each type of needle collected. Any protein expression differences found are likely to be due to the proteins that cause the emission of methyl butenol. We will obtain protein sequence information from these gels and use it to calculate DNA sequences that code for the protein. We can then place the DNA into a bacteria cell and make it generate the protein that produces methyl butenol. These experiments will provide us with the information needed to be able to artificially produce a fuel source in the future. In the future, we want to be able to copy the mechanism from these plants to artificially produce methyl butenol from yeast and use it as a fuel.

P23. Has a New [Lyme Disease] *Borrelia* Species been Identified? An rrs-rrlA Spacer DNA Sequence Phylogenetic Analysis

Maria Kuzynski *Mentor: Diane A. Caporale*

The bacterium *Borrelia burgdorferi* sensu stricto, has been the only *Borrelia* species in the United States known to cause Lyme disease in humans. In recent studies, a *Borrelia* isolate known as W97F51, taken from a deer tick from the Southern Kettle Moraine Forest, was found to contain a considerable amount of genetic variation within three out of four DNA loci studied, when compared with *B. burgdorferi*, *B. andersonii*, and *B. bissettii*; the two latter species are also from the U.S. but noninfectious to humans. In addition, a previous RAPD fingerprinting study helped to support the hypothesis that isolate W97F51 is a novel species and not merely a highly mutated strain of an already identified *Borrelia* species. To help strengthen this hypothesis, one additional locus is being tested, which is the rrs-rrlA intergenic spacer region located between two ribosomal RNA genes. This DNA region has been used successfully in the past as a way to identify different *Borrelia* species throughout the world. In a phylogenetic analysis, we predict each *Borrelia* species to cluster into their own separate clades. In other words, different isolates of *B. bissettii* should cluster as one grouping, as would the other isolates within each of their respective species. If isolate W97F51 continues to fall outside of each of their clades, then this would further support the notion that this isolate is a new *Borrelia* species.

Chemistry

P24. Chemical, Electrochemical, and Theoretical Investigations of [(Cp)Ru(CO)₃]⁺ and [(Ind)Ru(CO)₃]⁺

Benjamin C. Gamoke, Sang Bok Kim, Tracey A. Oudenhoven, Dwight A. Sweigart, Robin S. Tanke, and Brennan J. Walder

Mentors: Robert C. Badger, Jason S. D'Acchioli

The complexes [(Cp)Ru(CO)₃]⁺ and [(Ind)Ru(CO)₃]⁺ were subjected to chemical, electrochemical, and spectroelectrochemical investigations in an attempt to gauge their similarity to [(Cp)Fe(CO)₃]⁺ and [(Ind)Fe(CO)₃]⁺. While the Fe complexes exhibited reversible electrochemical behavior—the indene analogue exhibiting a so-called “inverse indenyl effect”—the Ru complexes exhibited limited electrochemical reversibility, even at -30°C and higher scan rates. The formation of the hydride complexes [(Cp)Ru(CO)₂H] and [(Ind)Ru(CO)₂H] were observed via ¹H-NMR and IR. The X-ray crystal structure of [(Ind)Ru(CO)₃]⁺ is presented here for the first time.

P25. Computation the energies of the gas phase model reactions for the West Nile Virus NS3 protease catalysis

Thanh Tam Nguyen *Mentor: Shuhua Ma*

The thermodynamic properties of the molecules involved in a series of model reactions for the West Nile Virus (WNV) NS3 protease catalysis have been calculated. These simulations were carried out at different quantum mechanical (QM) levels including semiempirical methods AM1, PM3, and higher level methods such as HF, B3LYP, MP2, G2 and G3. This work is to evaluate the performance of AM1 and PM3 methods by comparing their calculated results with those obtained from the higher level QM methods. The outcome of this evaluation will identify the semiempirical method that can be employed in the combined quantum mechanical and molecular mechanical simulations of the chemical reactions catalyzed by West Nile Virus NS3 protease.

P26. Molecular simulation the ligand binding of Human T-cell leukemia virus type I protease

Alyce J. Ruhoff, Keith B. Baehr *Mentor: Shuhua Ma*

Molecular simulation uses computer models to describe chemical or biochemical systems at the atomic level, in such simulations the individual positions and orientations of every atom or molecule need to be defined. Molecular simulation program SPARTAN, VMD and CHARMM have been employed in studying the ligand binding of human T cell leukemia virus type I (HTLV-I) protease. In this presentation, we will analyze the structural feature of the active site of HTLV-I protease, the hydrophilic and hydrophobic interactions between protein and inhibitor and those interactions between protein and substrate will be compared. These results provide the structural information for further in vestigating the catalytic mechanism of HTLV-I protease.

P27. Using Organic Molecules to Create More Economical Solar Cells

Cole Reedy

Mentor: Nathan Bowling

Solar cells have become one of the top options when looking for a renewable and environmentally friendly source of energy. Currently solar cells are made out of a thin layer of silicon that is able to convert the energy of the sun into energy that we can use for our everyday needs. The most efficient silicon solar cells are able to convert about 25% of the sun's energy into useable energy and are made of one large sheet of silicon, which is very costly. The more economical solar cells are made of a bunch of smaller silicon sheets that are pieced together; this reduces the efficiency to about 8 to 12%. We are looking to develop an organic material that will make solar cells cheaper to produce, lighter, and more flexible without losing efficiency. Currently the most promising organic solar cells only have an efficiency of about 5 to 7%. However they are much cheaper to produce than silicon solar cells. With our research we aim to make an organic material that will improve the efficiency of current organic solar cells. Due to the properties of organic molecules, it is unlikely that we will be able to match the efficiency of silicon solar cells. However, if we can make an organic solar cell that is only slightly less efficient, but costs much less to make, then it might be worth replacing silicon with our material for a more economic solar cell. In addition, the application of our material is not limited to just solar cells; it could potentially be used to create cheaper and more flexible thin-film transistors and light emitting diodes (LEDs).

P28. Organic Molecules for an Energy Efficient Future

Cassandra Chilcote

Mentor: Nathan Bowling

The goal of current research is to make an organic molecule that can serve as a more light-weight, flexible and less expensive material to be used for products such as LEDs, solar cells, and thin-film transistors. The problem with current organic molecules being used for these products is that they are no more efficient than the inorganic materials that are more widely used. Our research is focused on creating an organic molecule that would compete with the currently used materials in efficiency while still being much less expensive. In order for molecules to conduct electricity rapidly and efficiently, they must be stacked as closely together as possible. To make the molecules stack closely together they must lie in one flat plane. Our molecule alone would not be planar. Our intention is to introduce transition metals to the molecule. The metals would be attracted to the molecule only where the nitrogen atoms are which would cause a rigid and planar molecule to form. Once the molecules are planar, several of them can be placed on top of one another to yield desirable electronic properties.

P29. Analysis of Receptor-Ligand Interactions; Fe+3 Binding with Water Soluble Phenolic Compounds

Keith Baehr

Mentor: Thomas M. Zamis

Non-covalent, reversible binding interactions between proteins and small molecules are important in many biochemical processes such as catalysis of reactions, effect of hormones, and signal transmission such as nerve impulses. The proteins that bind are called receptors and the molecules they respond to are called ligands. Analysis of this binding in terms of chemical equilibrium is important to understand the factors that influence the physiological response. Many of these receptors are metalloproteins, which are proteins that contain metal ions at their binding site. Fe+3 was chosen as a model binding ion, and a number of

phenolic compounds were tested as ligands that gave a "response" when binding. The response desired was a colored complex that could be analyzed by spectrophotometry. Three appropriate ligands were identified. Binding affinity experiments were performed and the data analyzed by a reversible, equilibrium model and linear transformations of the free receptor, free ligand, and receptor-ligand equations as traditionally done with protein receptors. Results show Scatchard plots, Eadie-Hofstee plots and double-reciprocal plots of the data and how those compare to traditional protein receptor plots.

P30. Carbon Fiber Nanotips by Corona Discharge

T. Shogren

Mentor: Michael Zach

Nanotechnology requires the development of new methods and tools for manipulation of materials on the sub-micron scale. Advancements in biotechnology are also dependent upon the development of tools that will allow for the manipulation and the probing of electrochemical reactions that take place within individual cells. A new method has been developed for sharpening the ends of polyacrylonitrile (PAN) carbon fibers that are initially approximately 6 microns in diameter. Our results show that PAN fibers can be sharpened by generating corona discharge plasma at the tips of the fibers. Control over the tip shape has been achieved by modifying the voltage, pressure, and electrode distance. This project was supported by a UEI-New Faculty Grant 605590 from College of Letters and Sciences, UWSP.

P31. Effect of Pregnancy Associated Plasma Protein-A (PAPP-A) on Protein Expression

Ross Rortvedt

Mentor: Jim Lawrence

All cells in the human body communicate via signaling mechanisms to relay information. Our research examines a specific signalling pathway known as the Insulin-like growth factor (IGF) signaling network. IGFs are small peptides that serve as intercellular messengers that stimulate cells to grow and divide. The levels of circulating IGFs are regulated by a number of IGF-1 binding proteins (IGFBPs) that sequester IGFs, preventing them from binding to cells, and facilitating cellular division. A specific IGFBP protease, known as Pregnancy Associated Plasma Protein-A (PAPP-A), disables IGFBP's ability to sequester IGFs. My research project has been to analyze the effects of PAPP-A on protein expression in 18 day post-conception mice embryos. Embryos of wild-type and genetically identical, but lacking the PAPP-A gene (knock outs) were used as a model system. Embryos were homogenized and the proteins extracted by a sequential extraction strategy. An aliquot from each sample was taken and separated via 2-D gel electrophoresis. In 2-D gel electrophoresis, the sample proteins are denatured and separated by isoelectric focusing in a one-dimensional strip gel, then further denatured with SDS and finally run in the second dimension on a large-format sodium dodecyl sulfate polyacrylamide gel (SDS-PAGE). Each protein in the sample separates into a distinct spot. These proteins can be detected by staining with Cy3 and Cy5 dyes and imaged. The images from wild-type and knock out samples can be compared in order to identify protein expression differences. Our research has shown that the absence of the PAPP-A protein in mice embryos has led to an altered protein expression in the knock-out mice.

P32. Synthesis and MALDI Characterization of Bioresorbable Ester Copolymers for Biomedical Applications

Mark J. Juetten, Wayne A. Huberty

Mentor: John P. Droske

Synthetic polymers are being developed for use as scaffolds for promoting tissue growth. A major application is for the repair of damaged organs. Polymer scaffolds are promising materials for these bioartificial applications and scaffolds that will allow three-dimensional tissue growth are especially desired. Our group has reported the synthesis of new materials that show promise as tissue scaffolds (Droske, et al Polymer Preprints 2007, 48(1), 998). This procedure has been modified and shown to be useful for the synthesis of oligomers of poly (L-lactic acid) (PLLA), poly(propylene fumarate) (PPF), poly (propylene succinate) (PPS), and, importantly, co-polymers of PLLA and PPS. The synthesis of PPS was shown to be effective starting from either the acid or diester monomers. Characterization by HNMR, IR, and MALDI (in collaboration with Louisiana State University) was used to determine the monomer incorporation into poly(succinate-co-L-lactic acid). Current work is directed towards the incorporation of latent crosslinkable moieties into the polymer matrix.

P33. Electrodeposition Of Cobalt Microwires From Imidazolium Based Room Temperature Ionic Liquids

Eric Terrell, Daniel Dissing, David Seley, Ralu Divan, Anirudha Sumant, Orlando Auciello

Mentor: Michael Zach

As technology advances, the need for techniques to produce smaller and more controlled deposition of micro- and nanostructures is an ever more challenging goal. Past research in the electrodeposition of metals onto highly ordered pyrolytic graphite (HOPG) step edges has created nanowires(1) but the shapes and orientations of the wires are not reproducible. A new method has been developed for the electrodeposition of cobalt microwires on electrically conducting nitrogen doped ultrananocrystalline diamond (UNCD) electrodes from an ionic liquid. A lithographic process allows control over the shapes of the wires, by creating artificial step edge templates of UNCD on which metals can be electrochemically deposited. With this method, cobalt microwires have been electrodeposited in a variety of shapes and sizes. The diameter of the wires is controlled by varying the electrochemical potential and deposition time, allowing an easy way to deposit micro- or nanowires of cobalt and other materials of interest. Part of this work was carried out at the Center for Nanoscale Materials and the Materials Science Division, Argonne National Laboratory. Argonne is operated by UChicago Argonne, LLC, for the U.S. Department of Energy, Office of Science, Office of Basic Energy Sciences, under contract No. DE-AC02-06CH11357. Additional support was provided by UPDC Fund (UWSP), WiTAG and the University of Wisconsin-System.

P34. Electrodeposition Of Patterned Metal And Semiconductor Microwires On Ultrananocrystalline Diamond Electrodes

Daniel Dissing, Eric Terrell, David Seley, Anirudha Sumant, Ralu Divan, Orlando Auciello

Mentor: Michael Zach

A layered electrode composed of conductive and non-conductive ultrananocrystalline diamond (UNCD) has been fabricated at Argonne National Laboratory in the Center for Nanoscale Materials user facility. This new electrode allowed for consistent, patterned micro- and nanostructures to be electrodeposited with uniformity and from a wide variety

of materials out of aqueous and non-aqueous solutions using electrochemical step edge decoration. UNCD, being electrically conductive, works as an efficient electrode and at the same time provides a robust platform due to its chemically inert nature. This allows easy transfer of the resulting deposited micro- or nanostructures onto an adhesive polymer thus regenerating a clean electrode surface for repeated use. Duplicate copies of the original electrodeposited wires were deposited without needing to repeat the difficult lithography steps for each batch of wires made. The combination of unique electrical and chemical properties of UNCD is promising to allow mass production of uniform patterned nanostructures. Materials electrodeposited include: Pb, Au, Pd, Pt, Cu, Co (non-aqueous), Te, CdTe, and CdS. Part of this work was carried out at the Center for Nanoscale Materials and the Materials Science Division, Argonne National Laboratory. Argonne is operated by UChicago Argonne, LLC, for the U.S. Department of Energy, Office of Science, Office of Basic Energy Sciences, under contract No. DE-AC02-06CH11357. Additional support was provided by UPDC Fund (UWSP), WiTAG and the University of Wisconsin-System.

P35. Pyrolyzed Photoresist

Brandon Warner, Kasimier Wawrzaszek

Mentors: David Seley and Michael Zach

Pyrolyzed photoresist films (PPF) are promising substrates for the electrodeposition and chemical vapor deposition of nanostructured materials due to their conductivity, flatness, ability to be patterned, applicability to existing manufacturing processes and absolute control over the entire manufacturing process and resulting properties. PPF is formed by depositing very thin layers of photoresist (a type of light sensitive plastic) onto a solid surface and burning it in the absence of oxygen to leave pure carbon. The ability to make patterned PPF films in the UWSP Zach Nanolab has been achieved and such films are currently being used to deposit metal by electrodeposition. The ability to deposit a wide variety of metals and to pattern the surfaces will likely be very important for fundamental scientific advances in making new electronic devices. Primary support for this project was provided by a College of Letters and Sciences Undergraduate Education Initiative (UEI) Grant. Additional support was received from UPDC Funds (UWSP), WiTAG and University of Wisconsin-System.

Forestry

P36. Testing the Hydraulic Limitation Hypothesis by Stable Isotope Ratios of $^{13}\text{C}/^{12}\text{C}$ in *Pinus strobus* (L.)

Catherine Mueller *Mentors: Eric Singasaas and Les Werner*

The hydraulic limitation hypothesis (HLH) was developed in an effort to link patterns of stagnated growth, specifically tree height, with induced water stress due to increased water conducting path lengths and gravitational potential. The goal of our research was to test whether HLH limits the growth of white pine in our region. We measured soil moisture, xylem water potential and collected needle tissue samples in the Chequamegon-Nicolet National Forest near Eagle River Wisconsin during the last weekend of September, 2008. Relative Water Content (RWC), and water potential could then be calculated, and stable isotope ratios of $^{13}\text{C}/^{12}\text{C}$ could be determined through mass spectroscopy. As the HLH suggests, the taller trees had more negative water potential and lower RWC when compared

to shorter trees. However, the RWC at the top of the three tallest trees was not significantly lower than the RWC found at the middle of those same trees, which does not support the hypothesis. Therefore, these data do not unequivocally support the HLH for our region.

Geography

P37. Sprawl Comparison Along Two Wisconsin Interstate Highways

Nicole Michiels, Brad Slaney, Adam Shebelski *Mentor: Lisa Theo*

Sprawl and subsequent loss of farmland, forests, and wetlands have significant social and ecological implications. But, what are the implications in largely rural areas compared to already urbanizing areas? The infrastructure in any area can be a good indication of how sprawl can spread and how much sprawl can surface in a particular region. Streets, sewers, gas and electric service are all necessary before any sprawl can occur. Geographer John Borchert devised a model to model sprawl in his paper, "The Twin Cities Urbanized Area: Past, Present, Future", that was published in the *Geographical Review* in January 1961. Borchert's idea was that the development of infrastructure relies on roads so therefore if one can analyze the road pattern in any area, the sprawl in the area can also be predicted and analyzed. The same methodology used by Borchert in 1961 can still be used today. Using the model devised by Borchert, this project uses street intersection density to model sprawl. The study analyzes changes in density and growth from a fifteen year period between 1992 and 2006. The two areas of study are Madison, Wisconsin to Milwaukee, Wisconsin along the I94 corridor (predominantly urban) and the I39 corridor from Madison, Wisconsin to Wausau, Wisconsin (predominantly rural). US Census Tiger files from the two different years were used to determine the latitude/longitude for each street intersection in the study area and analyzed using GIS. The comparison between urban and rural sprawl patterns in the two study areas will highlight the issues specific to each region.

P38. More Than Race? Testing Segregation Measures in Milwaukee, Wisconsin

Jennifer Degenhardt, Holly Ehrhardt, Kevin Kapitan *Mentor: Lisa Theo*

Milwaukee, Wisconsin is often referred to as the most segregated city in the United States. This study investigates correlating variables such as income, education, wealth, and home ownership, that may also contribute to physical segregation within the city. Data was compiled from the US Census Bureau, statistically analyzed, and spatially analyzed using GIS. Using the dissimilarity index developed by Massey and Denton, we tested each variable for the degree of segregation within Milwaukee County in order to determine census tracts where variables other than race were more significant indicators of segregation.

P39. The Impact of Catfish Farming in the Mississippi Delta

Kevin Kapitan, Benny Rockweiler, Angie Klish, Michael Botwinski, Sam Roberts *Mentor: Lisa Theo*

Catfish farming has recently become a major industry in the Mississippi Delta region. The farms are the sole livelihood of many southerners and provide financial support to many of the residents of the delta. This project investigates the positive and negative impacts of catfish

farming in the Mississippi Delta region including: the history of the farms, environmental impacts of catfish farming, economic impacts to the communities, and the types of jobs that accompany the activity.

P40. Recognizing and Distinguishing Change in the Mississippi Delta: Long-Term Effects of Casinos in Tunica County

Michael E Baumann, Kia Shafaie, Nick Ellifson, Cassandra Hernandez

Mentor: Lisa Theo

This project explores four significant factors that are directly attributed to casinos in Tunica County, Mississippi. The first factor is a review of the developmental and zoning changes to the area at large. Using techniques such as aerial photo interpretation and analyzing growth and expansion in the areas surrounding the construction of the casinos, will we come to an understanding of their significance in the Delta. We will review EPA reports and government documents regarding environmental impacts of casinos in the region. Using financial reports from the Federal Reserve Bank and the United States Bureau of the Census: Economic Census, we will determine the growth of new jobs in the casinos and in related industries. Finally, we will look at race relations among these businesses by reviewing National Bureau of Labor Statistics and census data. Do the casinos merely serve as a microcosm of race relations in the Mississippi Delta or are they indicative of the culture at large? We will summarize the changes both positive and negative attributed to the growth of casinos in the Mississippi Delta.

P41. Population Dynamics, Race, and Economic Variables in the Mississippi Delta 1990-2000

Jacob DeGayner *Mentor: Lisa Theo*

The 1990's was a period of nearly universal population and economic growth in America. During this decade, the population of the United States increased approximately 13.2%. Mississippi lagged a little behind, growing about 10.6%. In stark contrast, the Mississippi Delta, a region famous and infamous for its cultural legacy, racial divides, and economic difficulties, actually shrank by significant margins in several counties. Adding to the complexity of this dynamic is the fact that the population decrease occurred in the midst of a rapid increase in the black population, and substantial but variable increase both in per capita income and unemployment rates. Their white counterparts, on the other hand, are leaving the area in large numbers, often more than compensating for the increase in black population. Meanwhile, the region's history of racial disparity continued. As of 2000, the white per capita income in these counties stood well below the national average and yet over twice as much as the per capita income among the black population. Even so, this represented a dramatic improvement from 1990, when the black per capita income stood at \$4,325 in this area and over 44% of blacks lived below the poverty level. This project uses data from the 1990 and 2000 U.S. Censuses to identify the specific region within the Mississippi Delta where these dynamics are most apparent. It then attempts to account for these demographic shifts by analyzing economic variables which could be attracting blacks to and repelling whites from the region.

P42. African American Folklore in the Mississippi Delta

Elizabeth Loomer, Mackenzie Kuklinski, Trevor Staubli, Jeralyn Klopotic,
Kyle Uhan, Holly Offerman *Mentor: Lisa Theo*

The cultural geography of the Mississippi Delta was not only shaped by the native people that lived there originally or the white settlers, but also the slaves that were brought to the delta. When brought to America the cultures and traditions of these slaves were not lost, but adapted to the new set of struggles that were imposed on these people. These cultures and traditions were eventually blended together to form the slave culture studied today. Folklore is not just the legends that one would think of. It is also the art, music, and literature of a culture which are the subjects that this project is going to be focusing on. The research data for this project was taken from multiple articles and books focusing on African American folklore. With regards to literature this project will be focusing on the journey of Anansi, the spider, from West Africa to his new home in America and his reinterpretation in the emerging slave culture. Secondly the music of these stolen peoples was a lifeline to their roots and the traditions of oral storytelling through music. The use of slave songs and chants helped slaves not only keep their culture but also to convey messages that their owners could not fully understand. Finally the art of a people reflects how they view the world or how they wish their world was. Many slaves were able to use everyday items such as quilts to express their African culture in the Delta. These items were important for they allowed the slaves to pass down something tangible to the next generation. African American Folklore - the stories, music, and art - added to and helped shape the rich culture of the Mississippi Delta.

P43. Land Where the Blues Began: The Geography of Mississippi Delta Blues Musicians

Joe Richards and Tony Piazza *Mentor: Lisa Theo*

The Mississippi Delta is known to many as the birthplace of the blues. Born on the cotton plantations from sharecroppers trying to make ends meet in the caste based society of the post-bellum south, the blues has since had an un-measurable influence on American culture. Pioneers of the blues such as Robert Johnson, Son House, and Muddy Waters created a way of playing their music that caught the attention of northern, white record executives. These executives mainstreamed the delta blues sound, and sold their records to millions. In this study, we will show that the Mississippi Yazoo Delta region of the early twentieth century is the cultural node of the blues, and that the influence of the musicians from that region radiated across the entire country. We will show this by interpreting chronological and spatial data of the birthplaces of the delta blues musicians. We will then show how their sound spread quickly across the country by interpreting record production data.

P44. Modern-Day Racial Segregation in the Mississippi Delta

Joe Jordan Hoepfner, Chris Stangler *Mentor: Lisa Theo*

After enduring a century of legal segregation, a series of legal precedents of the 1950s and 1960s officially expelled Jim Crow from public schools throughout the South. While the successes of the Civil Rights Movement were monumental, imprints of Jim Crow still remain today. Although "separate but equal" no longer exists, segregation still rears its ugly head in the form of de facto school segregation and through various other measures. There are few places where this is more conspicuous than in the school system found in the

Mississippi Delta region. After the 1969 Supreme Court case *Alexander v. Holmes County Board of Education* legally enforced desegregation in all counties of the Delta, this region witnessed a growing trend of white flight from public schools to newly erected private institutions. This study will take a twofold approach in exploring modern-day school segregation in the Delta region. First, using enrollment statistics from the Mississippi Department of Education and data from the U.S. Census Bureau, a juxtaposition of enrollments by race between private and public schools will reveal the prominence and spatial patterns of present-day racial segregation in the Delta. Next, by comparing school segregation in the Delta with segregation in other regions in Mississippi and surrounding states, this study will test the wide-held belief which holds that the Mississippi Delta is among America's most segregated regions in the country. All in all, through statistical evidence, this study will help elucidate this unfortunate system of glaring injustice which still tarnishes America's reputation as "the Land of the Free."

P45. Creating an Accurate Spectral Signature of a Forest Understory Invasive Species, *Rhamnus frangula*, by Collecting Raw Reflectance Data with a Field Spectroradiometer

Jeremy R. Jenkins *Mentor: N. C. Heywood*

Removing invasive species from environments, let alone monitoring the vast spread, is extremely difficult. Utilizing ground inspectors to repeatedly locate presence is very costly and could introduce confounding interpretations and data. Remotely sensed imagery can be used to effectively reduce research costs as well as a time, when obtaining systematic measurements. The goal of this study was to test a spectral detection process that could identify, with acceptable differentiation, glossy buckthorn (*Rhamnus frangula*) on current and archive imagery, with the use of high-resolution multi-spectral imagery analysis. Field spectroradiometer data provided raw reflectance data of *R. frangula*, dependent upon the final results, will portray distinction of *R. frangula*, from other species. The data analysis process converted raw data (total spectral radiance), to reflectance (absolute reflectance). This is done by comparing the total spectral radiance, spectral irradiance (white reference), and the sun zenith angle at the time of data collection. Further imagery analysis with image processing software could be used to select and portray similar pixels within the study area.

GeoScience

P46. The Paleopalynology of Eocene Lake Uinta in Northwestern Colorado, USA

Bradly Evraets *Mentor: Samantha Kaplan*

Lake Uinta, which formed in the Piceance Creek and Uinta Basins of northwestern Colorado, is part of the Eocene Green River Formation that extends over southwestern Wyoming, northwestern Colorado and northeastern Utah. Lake Uinta lasted from the Late Paleocene through the Middle Eocene (56 to 34 million years ago). The Parachute Creek Member of Lake Uinta is 45 million years old and is well known for its plant and insect fossils. However, at the Douglas Pass, CO locality, the Parachute Creek Member contains a distinct fissile layer with a substantial number of fish fossils. This layer is dark grey in color and is surrounded above and below by light tan layers. The presence of fish in this layer implies that the lake level must have risen, indicating an increase in precipitation or a diversion of

water into the basin by tectonic movements or a change in stream discharge. The objective of this project is to use fossilized pollen trapped in the lake sediments to determine if there was a change in vegetation, and therefore climate, at the time the lake formed. Many palynological studies have been performed on the numerous and well-known oil shales of Lake Uinta, but none could be found on other layers. A sample from the dark grey layer was dissolved using hydrochloric and hydrofluoric acid to liberate the fossilized pollen. The pollen was then identified to the most specific level possible. Using living relatives of these plants a reconstruction of the climate was made. Analysis thus far shows that the climate was humid subtropical, but further research will look at the layers above and below the fish bearing layer to determine if an increase in precipitation did occur causing the lake level to rise, or if some other factor was involved.

P47. Geologic Studies in Scotland

Sarah H. Carriger *Mentor: Kevin Hefferan*

During my semester abroad in England I travelled to Scotland March 6th thru the 13th of 2008 to study three classic geologic locales investigated by James Hutton 200 years ago. These geologic regions relate to the closure of the Iapetus Ocean and the resulting Caledonian mountain building episode. Field excursions consisted of a detailed analysis of each site including the collection of digital imagery and rock samples. A comparison of these regions revealed significant differences in geological processes, geological history of the areas, and resources. This indicates that while plate tectonics have played a substantial role in the development of Scotland's modern landscapes, individual regions have been molded according to other geologic factors.

Physics and Astronomy

P48. Electromagnetically Induced Transparency in Rubidium gas

Jacob Berg *Mentor: Hai Nguyen*

We are experimentally exploring Electromagnetically Induced Transparency (EIT) in rubidium. EIT is a method in which one is able to control photons. Being able to control these photons enables potential applications in quantum computing and optical telecommunications. EIT is normally accomplished by using two counter-propagating laser beams (with wavelengths 780.2 nm and 776 nm of infrared light) going through a rubidium gas cell. The lasers excite the rubidium atoms. The excitation causes the outermost electrons of the atoms to go into a higher energy state. When the electrons return to their ground state, the consequential result is photons being given off with a wavelength of 420.2 nm (which is visible blue light!). The experimental details will be presented.

P49. The Effect of Ag Substitution in the Mixed Conductor Cu_7PSe_6

Luke Wilson *Mentor: Bob Beeken*

The compound Cu_7PSe_6 belongs to the argyrodite family, named for the naturally occurring mineral Ag_8GeS_6 . Cu_7PSe_6 is a mixed electric/ionic conductor that crystallizes in the simple cubic structure at room temperature. It exhibits structural phase transitions both above and below room temperature. The research conducted in this investigation sought to determine the effects of the substitution of Ag^+ for

Cu⁺ on the structure, electrical conductivity, and phase transitions of Cu₇PSe₆. The research resulted in three significant findings. First, the introduction of small amounts of Ag⁺ to the Cu₇PSe₆ lattice causes a disproportionate drop in the electrical conductivity. Second, the introduction of Ag⁺ into Cu₇PSe₆ stabilizes the simple cubic structure over a wider temperature range. And finally, the low temperature phase change splits into two distinct phase changes when there is approximately a 20% silver substitution for the copper.

P50. Particle-Induced X-ray Emission Spectroscopy

Karen Chamberlain

Mentor: Katherine Jore

Several samples including dinosaur bones and teeth, coral, a turtle shell, and rocks were analyzed using the External Particle-Induced X-ray Emission technique (PIXE) at the Institute for Structure and Nuclear Astrophysics (ISNAP) at the University of Notre Dame in Notre Dame, Indiana in hopes to study the concentrations of certain trace elements including strontium, yttrium, and thorium. Several techniques of analysis of these samples were used including concentrations compared to the iron concentration, eigenvector analysis, and ternary graphs. Samples showed differences in elemental concentrations either from the surrounding rock or between different locations on the sample

P51. Testing Nature's Limits: Black Holes and the Large Hadron Collider

Michelle Stephens

Mentor: David Tamres

In a tongue-in-cheek op-ed that appeared in the New York Times (p. A-19) on August 23, 2008, writer Gail Collins mused on the possibility that the Large Hadron Collider, once it begins operation, might produce a small black hole that would devour our planet and end all life as we know it. Collins' essay inspired our investigation into the trajectories of a hypothetical black hole created at the LHC. We consider both an evaporating and a non-evaporating black hole and take into account the increase in the black hole's cross section as it plows through Earth's interior. We use classical Newtonian dynamics and a fourth-order Runge-Kutta algorithm for calculating trajectories. Results will be presented, along with reasons to feel reassured that the LHC will not produce a black hole that will swallow the earth.

Psychology

P52. Team-Testing: Does it Increase Positive Emotions Which Broaden and Build?

Katherine Becker, Lisa Rubow, Jenna Semling, and Debra Simmerman

Mentor: Jeana Magyar-Moe

Past research indicates that when college students are allowed to choose to test in two-person teams, learning is facilitated, course exam scores go up, and positive attitudes toward the team-testing experience are apparent (Zimbardo, Butler, and Wolfe, 2003; Magyar-Moe et al., 2004; Magyar-Moe et al., 2006). Research also suggests that even when team-testing is mandatory rather than optional, the many benefits of this testing approach hold up. In fact, 60% of students who thought they would prefer testing individually discovered that after

they were required to take the test with a partner, that they actually preferred the team-testing format and the remaining 40% were neutral about their testing format preference (Magyar-Moe, Owens, Schmitt, Sheehan, and Bol, 2007). Research from Positive Psychology may explain the beneficial outcomes of this previous research. More specifically, the broaden and build theory of positive emotions, as described by Fredrickson (2001, 2002, 2003), may serve as the foundation of why this testing format works so well. In general, the broaden and build theory of positive emotions states that when people experience positive emotions, that they are more likely to have broadened thought-action repertoires and to build intellectual and social resources. The current study was designed to test the hypothesis that positive outcomes of team-testing may be the result of social and intellectual broadening due to increases in positive emotions felt by students before exams completed with partners of their choice.

P53. Service-Learning in Positive Psychology: Learning and Personal Outcomes for Students.

Katherine Becker, Lisa Rubow, Jenna Semling, and Debra Simmerman

Mentor: Jeana Magyar-Moe

Positive psychology, the scientific study of optimal functioning, is a relatively new area of study within psychology. As such, college classes devoted specifically to the teaching of positive psychology are not extremely common, however, as a result of the rapidly growing empirical foundations of positive psychological concepts and theories and the development of positive psychology textbooks and teaching resources, courses are beginning to spring up across the United States at a quicker pace. Given this increase in popularity of positive psychology courses, research into the scholarship of teaching and learning specific to positive psychology is warranted. Students in an undergraduate positive psychology course at the University of Wisconsin – Stevens Point are required to participate in a service-learning project whereby they volunteer a minimum of 10 hours per semester at the Salvation Army Homeless Shelter or Habitat for Humanity. This course requirement is based on positive psychology research to date which suggests that helping others is the best way to increase positive emotions and levels of happiness and to experience more meaning in life (Meyers, 1991; Fredrickson, 2003; Seligman, 2002). Indeed, evaluation of the service-learning experience in this course was conducted through partial replication of the methodology used by Seligman, Steen, Park and Peterson (2005) to empirically examine positive psychology interventions designed to increase individual happiness. Additionally, service-learning is recommended as a useful teaching method to enhance student learning in college courses (Jacoby, 1996). In this poster, details about the implementation of service-learning in positive psychology courses and the empirical outcomes related to changes on measures of positive emotions, happiness, and understanding of course material for students who participate in such service-learning assignments are discussed. Finally, the impact of service-learning on community well-being is also addressed.

P54. How Therapists Do Therapy: A Discovery-Oriented Survey

Katherine Becker, Christina Burek, Amber McDougal, and Autumn McKeel

Mentor: Jeana Magyar-Moe

Research surrounding what makes psychotherapy effective is abundant. Results suggest that different therapies lead to similar outcomes in spite of differences in the techniques used and the underlying hypotheses regarding etiology of client problems. Thus, factors that are

responsible for client change and successful treatment outcomes appear to be common to all forms of therapy. Research on the working alliance over the past two decades has revealed that a large proportion of the final outcome variance in therapy can be predicted by the quality of the working alliance and counselor social influence has also been positively correlated with client satisfaction with counseling. Practitioners learn the basics of theory and application in their graduate training programs, however, there may be unspoken “tricks of the trade” that therapists have come to rely upon through experience, observation of peers, trial and error, or out of basic happenstance that may contribute to the building of a strong therapeutic alliance and positive social influence by the counselor. The current study was designed in order to explore and discover specific factors which have not been previously examined that may contribute to the establishment of a strong working alliance and counselor social influence. Using a discovery-oriented research approach, as described by Mahrer (1998), a survey was developed and disseminated to psychologists who are currently practicing or have served in a practitioner role in order to discover what unique (i.e., not traditionally included in training programs) techniques, activities, or procedures they may be using in therapy with clients and/or in relation to the environment in which therapy is conducted. The aim is to uncover previously unexamined variables related to the working alliance and counselor social influence. “To discover the discoverable in order to learn the secrets of psychotherapy” is the goal (Mahrer, 1988, p. 83). Indeed, according to Gelso and Carter (1985), “the relationship between a counselor and a client is an elusive, sometimes mystical, frequently debatable, and always interesting aspect of the psychotherapy enterprise” (p. 155).

P55. Defining Parental Involvement in Academics

Melissa Arves, Andrea Peiffer, Debra Simmerman, and Katara Tabaka

Mentor: Debbie Palmer

Parental involvement is important at all ages; the amount and type of parental involvement in their college students' academic activities may be influential. Twenty Psychology 110 students (5 males, 15 females), in two phases, provided demographic information, defined parental involvement, described connections between parental involvement and grades, completed measures of functioning (family and mood), and agreed for their Psychology 110 grades to be accessed. Students' definitions of parental involvement in academics included verbal discussions, providing specific assistance, knowledge, and curiosity. No students reported that their parents' involvement would have a negative effect on their grades; 58% believed their mothers' involvement would have a positive effect, whereas only 44% believed so about their fathers' involvement. Students who believed their fathers' involvement would have a positive effect on their grades had significantly higher exam 2 grades (76%) than students who believed their fathers' involvement would have a neutral effect (61%). Students who thought their mothers' involvement would have a positive effect on their grades had significantly higher family functioning (adaptability) at the second evaluation than students who thought their mothers' involvement would have a neutral effect. Students' depression levels were significantly higher at the first phase than at the second. The results suggest parental involvement in academics is multifaceted. Students' perceptions of the influence of such involvement may be connected to academic performance on specific exams and forms of family functioning. Currently, in a new study, we are investigating students' definitions of ideal parental involvement in academics.

P56. The Impact of Parents' Education on Intercultural Preparedness

Maya Miyanaka

Mentor: Craig A. Wendorf

Parents' education may have an impact on children. For example, Harhs-Vaughn (2004) found that less educated parents provided less academic support for first generation college students. However, little is known about how parents' education affects their children's attitudes toward other cultures (Davis-Kean, 2004), especially on ethnocentrism and intercultural competence. Students at UWSP (N=146) completed a survey of intercultural preparedness. The survey measured 2 components of ethnocentrism (Outgroup Derogation and Ingroup Favoritism), 4 components of intercultural competence (Awareness, Skills, Knowledge, and Attitudes), and parents' educational levels (among other things). Differences in mothers' education was not significantly related to the ethnocentrism measures, $F(4,284) = .813$, $p = .518$. Fathers' education was not significantly related to ingroup favoritism, $F(2,143) = .201$, $p = .818$. However, higher levels of fathers' education was significantly associated with lower levels of students' outgroup derogation, $F(2,143) = 4.634$, $p = .011$. Differences in mothers' education was not significantly related to the intercultural competence measures, $F(12,363) = 1.027$, $p = .423$. However, higher levels of fathers' education was significantly associated with higher levels of students' intercultural attitudes, $F(3,138) = 4.020$, $p = .009$, skills, $F(3,138) = 3.273$, $p = .023$, and knowledge, $F(3,138) = 2.900$, $p = .037$. Overall, fathers' education, but not mothers' education, was associated with intercultural preparedness among college students. These findings have important implications for diversity issues on campus and for students who may study abroad.

P57. Judgments about Web Based Rumors of College Instructors

Ryan Kalpinski and Alexis Gonzales-Martin *Mentor: Craig A. Wendorf*

Drawing on the social psychology of rumor (cf. Heath et al., 2001) and the educational psychology of student evaluations (cf. Marsh, 1991), this study investigated how statements about college instructors can impact students' judgments about these instructors. UWSP students (N=109) viewed 4 instructor profiles from a fictional web site similar to RateMyProfessor.com, each containing "student" comments regarding 4 aspects instructor quality: instructor rapport, difficulty, skill, or fairness. Each profile manipulated a different aspect to be either extremely positive or extremely negative. Students completed an evaluation of each instructor. Profiles describing less instructor rapport, less instructor skill, more course difficulty, and less fair grading produced significantly lower ratings of rapport, skill, workload appropriateness, and grading procedures respectively ($ps < .05$). Overall instructor evaluations were significantly lower when negative comments were made ($ps < .01$). Valence of the comments interacted with the manipulated aspects of the instructor, $F(9,96) = 3.219$, $p = .002$. Positive comments produced higher ratings of the comment reasonableness regardless of what aspect of the instructor was manipulated ($ps < .05$). Positive comments about the instructor's grading were judged as more useful ($p = .002$), while negative comments about course difficulty were more likely to be passed along ($p = .032$). Though the stimuli portrayed a fictitious website, students responded in ways generally consistent with the separate literatures on rumors and student evaluations. Negative comments produced lower evaluations. Comments about course difficulty and grading were judged most useful and most likely to be passed along respectively.

P58. Adults' Perceptions of Future Success of Teen Mothers

Kimberly Rosenthal, Miranda Yeskie, Kate Shortridge *Mentor: Erica Weisgram*

Adolescent pregnancy has been on the rise for generations, and the consequences for adolescent mothers involve poverty and health complications for both the mother and child (Coley and Chase-Lansdale, 1998). Studies have examined the perceptions of adolescent mothers' views on these consequences (Fergusson and Woodward, 1999), but studies have not examined the perspectives of pregnant adolescent's peers. These adolescents may face many hardships of early parenthood, but may also be stigmatized by others and expected to fail academically and otherwise. These expectations or perceptions of teen mothers can lead to self-fulfilling prophecies. The purpose of this study is to examine the perceptions of adolescent mothers among college students in terms of their future success and academics. Participants in this study include 59 attending the UWSP. Students range in age from 18 to 25. Students were asked to read a description of a target adolescent female and look at a picture of her then complete a questionnaire. Participants in one condition saw a typical adolescent girl and read about her academics and extracurriculars; a second condition read an identical description and saw a picture of the target appearing pregnant; the third condition saw a picture of the target appearing pregnant, read the same description, and was also told that the target would be receiving emotional and financial support for her and her child. Results indicated that individuals who saw the pregnant target (regardless of support of parents) perceived her to be: (a) less likely to graduate from college, (b) more likely to have financial trouble in the future, and (c) less likely to have high-self esteem. Implications of these perceptions for teen mothers will be discussed.

P59. The Interaction of Race and Gender in Children's Interest in and Judgments of Occupations

Kristen Sernett

Mentor: Erica Weisgram

Racial and gender segregation of occupations is prevalent in the U.S. workforce possibly due to the continuing prejudice and discrimination against minorities and women who seek and are denied high status positions. The purpose of this study is to investigate the interaction of race and gender on children's occupational interests and status ratings using the novel job paradigm. Participants included 24 children (9 boys, 15 girls) ages 5 - 10. Participants heard job descriptions and were shown color line drawings of 8 novel occupations depicting (a) African American men, (b) European American men, (c) African American women, or (d) European American women. They were assessed on their interest in occupations and status ratings of the novel jobs (e.g., importance, salary earned, level of education needed). Results indicated that there was a significant interaction between sex of participant and gender of worker depicted; boys were significantly more interested in jobs depicted with male workers than female workers and girls showed the opposite pattern. Also, in ratings of job importance, there was a significant interaction between race of worker and gender of worker depicted. When male workers were depicted, participants rated jobs depicting White workers as higher in importance than when African American Workers were depicted. When female workers were depicted, participant rated jobs depicting African American workers as higher in importance.

P60. Body Mass Index and Dating

Tsubasa Akanuma and Kim Polum

Mentor: Angela Lowery

Excess weight has been shown to negatively affect a variety of psychological and social factors. Landen, et al. (2004), states that social anxiety has been associated with waist to hip ratio. However, this relationship has not been extensively examined in areas that affect college students, such as dating anxiety. This study focuses on the relationship between body mass index (BMI) and dating anxiety. The participants included 110 students enrolled in psychology 110 at the University of Wisconsin Stevens Point. We collected each participant's height and weight, which was used to determine their body mass index. Of the 110 participants: 3 had a BMI of 0-18.5, 83 had a BMI of 18.6-24.9, 22 had a BMI of 25-29.9, and 4 had a BMI of 30+. We used the Dating Anxiety Survey to determine each participant's level of anxiety within each of three levels including passive contact with an attractive person, active intent to date an attractive person, and dating interaction. Our data revealed that there was no significant effect of BMI scores on dating anxiety; however, the results indicated that dating itself was associated with anxiety. Post hoc analyses revealed that participants reported the severity of dating anxiety differently depending on levels of dating. There was a significant difference between passive and active dating as well as between passive and interactive dating, whereas there was no significant difference between active intent and interactive dating. That is, regardless of how much participants weighed, they experienced more dating anxiety when dating would require more involvement (active) as well as with increased contact with another person (interactive), than when dating would not involve active contact with another person (passive).

P61. Evaluation of Collaborative Exercises to Enhance Learning in a Psychotherapy Course

Jenna Tomcek

Mentor: Amy Herstein Gervasio

While active learning supposedly helps students master material better than merely listening to lectures, students often resist class participation and they do not like group work. This research focused on student evaluations of different group exercises used to enhance learning of concepts in theories of psychotherapy. The design was a pre-post within subjects measure. Thirty-four students in Counseling and Psychotherapy classes anonymously evaluated their typical level of participation and their beliefs about the value of learning from the book, in groups, from videos, etc. at the beginning and end of the term. Students were assigned a code number in order to compare actual grades to expected grades. Research was approved by the IRB. The group exercise of Analytic Teams was adapted from Barkley et al. (2005). Students watched five 10-15 minute segments of video tapes of expert therapists. They worked in groups of 4-5 to discuss in depth 4 different groups of concepts on a work sheet, and to evaluate rate of participation. Students then presented information from their group to the entire class. There was a significant increase at post-test ($p < .007$) for students' ratings of how much they learned from other students in discussion. There were no significant changes in evaluation of learning from the book or from the professor, but a trend toward increased learning from videos. Students' expected grades at the end of the term correlated $r = .525$ with actual grades. This research suggests that working in groups using structured exercises changes student perceptions of how much they learn and enhances their participation in class. Limitations are that there was no control group. More data is currently being collected.

P62. The Effect of Videogaming on Visual Attention

Justin Durtschi and Andrew Schultz *Mentor: Patrick Conley*

The goal of our study was to determine if there are any effects of long and/or short term videogame playing on cognitive processes, with visual attention and visual search as our main focus. Visual search studies are usually based on the visual dimensions of targets, principally color, form and orientation. We used a series of tasks in which participants searched for letter targets among 4, 8, 16 or 32 letter distractors. The target letters were As among an array of distractors which were either all Hs or mixed Hs, Os, Us, or Ts. To study how videogame playing affects cognitive processes we created a questionnaire that asked specific questions relating to participants' current and previous video game habits. Along with set size and distractor type, we found that three of our questions significantly predicted reaction time (RT) in the visual search task. Specifically, the videogaming habits questions that predicted RT performance were the participant's estimate of hours of video games played per week at the time of their peak videogaming, the age at which the participant began playing videogames, and their self-rating of their own proficiency at playing videogames. The data support the conclusions that visual search is improved by videogaming, that starting videogames at an early age will increase this performance boost, and that individuals' self-knowledge of their own videogame prowess also translates to performance in a basic visual search task. This raises the intriguing possibility that even before the participant runs through a visual search task such as ours, they may already know how well they will do.

P63. What are the Important Cues? A Spatial Memory Study in Lab Mice.

Ethan H. Hodek, Kristen A. Sernett, Scott V. Asbach, John T. York, Emily R. Kurszewski *Mentor: Jody Lewis*

The current study was designed to investigate which cues, global position, landmarks, or smell, are most pertinent for remembering locations for Swiss Webster lab mice. We tested mice in a square apparatus with eight possible locations (sand-filled bottle cap) and with a visual/olfactory landmark in each corner. Each of the four landmarks was visually distinct and we made each landmark smell discrete by rolling them in either nutmeg, cinnamon, or peppermint mixtures, or no scent. The experiment consisted of a study phase where we presented one baited location with all other locations capped with plaster to each mouse. After a five minute retention interval each mouse was tested. Each animal was placed into the apparatus and allowed to choose the previously baited location from all eight possible locations. This procedure was continued until all mice performed statistically below chance error rates. Critical trials involved the same study phase as before, but we shifted the visual landmarks clockwise and the smells counterclockwise during the retention interval. This manipulation made the context such that the appropriate (previously baited) location was unique for which spatial strategy was being used: visual cues, olfactory cues, or global spatial position. No location was baited during the testing of critical trials to allow mice to freely display choice of location and retrieval strategy without rewarding any strategy. Preliminary results based on four critical tests suggest that lab mice rely most on olfactory cues while position in room and visual landmark are less preferred strategies respectively.

P64. The Effect of Prior Knowledge and Pace of Instruction on Teaching Classical Conditioning

Theresa L'Esperance, Amanda Baumann, and John Britanyak

Mentor: Jody Lewis

Previous research suggests that there is an interaction between the pace of instruction and the amount of prior knowledge a student has. The main question is whether instructors should give students more worked example problems, where students are shown a step by step process of how a problem is solved, or more practice problems, where students must solve problems independently. In one study, students with low prior knowledge scored higher on the post test when given a slow transition between worked examples and independent problem solving. However, high prior knowledge students learned better when the transitions were faster between worked example and practice problems. Since, much of this prior research has been conducted with engineering and math students, our goal was to examine whether the step by step process would have to be adapted to a conceptual learning method for teaching Classical Conditioning, a learning theory in Psychology. To determine prior knowledge we gave each student a pretest and then a study guide to review of terminology and basic classical conditioning concepts. Each student was then given one of three types of instruction; slow pace, fast pace, or direct pace with no transitions. Students were then given a posttest and an attitude survey. We expect that our results will replicate previous findings that students with low prior knowledge will benefit from a slower pace of learning and students with high prior knowledge will do best with a faster pace.

P65. Degree of Difference in the Isolation Effect Paradigm: Early-, Mid-, and Late-List Dissociations

Ashley Schlosser and Megan Hertrampf *Mentor: Robert J. Nemeth*

The Von Restorff effect, or the isolation effect, predicts that an item that is unusual is more likely to be remembered than items that are all the same (e.g., a number presented within a list of letters). In our experiments, we manipulated the serial position and degree of difference of one letter within a list of letters. We questioned if the manipulation of the font size and/or font color of the isolated item would have an additive effect on memory, and if these manipulations have similar effects at different serial positions. Only one other study has focused on degrees of difference in the isolation effect paradigm. Gumenik and Levitt (1968) found that memory was enhanced to the degree that the isolated item was made different by font size in the middle of the list. We extended this research by manipulating the degree of difference of the isolated item at the beginning, middle, and end of the list to determine if this effect generalizes anywhere within the serial position curve. We examined the effects of serial position and the degree of difference of the isolated item in three 4×9 within-subjects design experiments. When the isolated item was presented at the beginning of the list (Experiment 1), we did not find an isolation effect. When the isolated item was presented in the middle of the list (Experiment 2), the isolated items were better remembered than the control items, but varying the degree of difference of the isolated item had no additional effect on memory. At the end of the list (Experiment 3), we found that isolating a letter by font size and color produced an additive effect as compared to isolating a letter just by color. Our findings will be discussed in light of theories of distinctiveness and memory.

P66. Gory Details or Heinous Crimes: The Effects of Graphic Verbal Evidence of Violence on Juror Decision-Making

Kelsey S. Madsen, Ethan H. Hodek, and Ashley N. Jankiewicz

Mentor: Robert J. Nemeth

The judicial system assumes that criminal court jurors are able to make rational decisions despite the presentation of Graphic Evidence of Violence (GEV). Some legal commentators suggest that GEV may bias juror decision-making by swaying the emotional arousal of the jury. Previous research done by Bright and Goodman-Delahunty (2004), found that verbal GEV increased mock-juror convictions in a murder trial. They reported that gruesomeness was the influencing factor but we contend that their manipulation was actually of heinousness. We conceived gruesomeness as the gory details of the crime, whereas heinousness refers to the nature of the crime (i.e., mutilation and vile intent). The present experiment consisted of a 2 (sufficiency of evidence: high/low) \times 2 (heinousness: high/low) \times 2 (gruesomeness: high/low) between-subjects design. Two hundred and forty undergraduate students read one of eight versions of a murder trial transcript depending on experimental condition. The participants were then instructed to judge the guilt or innocence of a defendant and their confidence in their verdict. The results showed two main effects: Participants were more likely to convict when the case was strong against the defendant (i.e., high sufficiency of evidence) and when the murder was especially heinous. However, the gruesomeness manipulation did not affect verdict.

Oral Presentations

Session II

4:05 - 5:00

Science Building A106 *Moderator: Barbara Dixson*

O13. Media and Active-Learning Approaches to Teaching American Literature

Kelly Knudsen; English *Time: 4:05 Mentor: Barbara Dixson*

This presentation will examine lesson plans and activities used in 11th Grade American Literature: 1914 to the Present and designed for student engagement and critical thinking. The lesson plans, activities, and assessments will demonstrate the ups and downs of readers' journals and the ways in which they help students understand their reading and thinking. The PowerPoint will showcase student work from Literature Circles related to short stories from the Harlem Renaissance. Along with the Literature Circles, the presentation will show how hip hop culture and life stem from the Harlem Renaissance. This part of the presentation will illustrate how teachers can make the study of this time period relevant to their students' lives. There will also be lesson plans related to Japanese Internment which include music videos students created to a hip hop song that talks about this time in history. Finally, this presentation will give ideas for teaching and studying poetry from the 1950's and 60's. All of the information in this presentation will demonstrate to teachers the lessons that work to keep students engaged and also the activities and methods that help students understand the world around them.

O14. Using Strategic Management to Promote Academic and Behavioral Growth in the Classroom

Krista Moroder, English *Time: 4:35 Mentor: Barbara Dixson*

Three classes of 9th grade English students participated in a hands-on literary analysis project for the novel *To Kill a Mockingbird*. Marshfield Community Television (MCTV-10) collaborated on the project with resources, editing, and airtime, and the project took the form of a six-episode TV documentary that involved a text, text-to-self, or text-to-world analysis of the novel. Each class was responsible for ten minutes of each half-hour episode, which was envisioned, created, and filmed within five days. The project required students to apply for "management" positions, meet set deadlines, create a portfolio with state standard justifications, maintain daily logs, and utilize strategic management strategies: vision/mission/values, chain of command, SWOT analysis, conceptual and analytical thought processes, goals/objectives/targets (MBO), and assessment/reflection tied to the McKinsey 7S Framework (Strategy, Structure, Systems, Skills, Staff, Style, and Shared Values). Students who did not reach academic/behavioral expectations during an episode were given formal warnings or "fired" and given additional/alternate assignments. Goals of this project were for students to gain a better understanding of relevant work skills such as leadership, meeting deadlines, focus, respect/cooperation, and responsibility.

O15. The Rape of Nanking

Kaitlyn Kenealy, History *Time: 4:05* *Mentor: Valentina Peguero*

History gives us the chance and opportunity to look back and reflect on past experiences, it allows us the chance to learn and grow as a society. We must be willing to take the good with the bad because not all of history is respectable, although it is all valid and important. Denying history or a part of history is to pick and choose what you believe to be significant and worth knowing. However, only picking parts of history to share with the world does not give justification to the parts and the people that are left out. My paper provides the research I have compiled of the events that took place in Nanking, China. Here is a brief overview of my research on the events that occurred. The atrocities that took place in Nanking on Dec 13, 1937 when the Japanese Imperial army invaded and overthrew Nanking do not come as much of a surprise considering the Japanese and the Chinese were not on the greatest of terms. What's more is that the Japanese had a lot to gain from the invasion. For instance, the Chinese were there weakest point due to many civil wars, the Japanese wanted to expand, the Japanese army was much stronger than the Chinese army, and lastly, the Japanese always deemed themselves superior to the Chinese. The Rape of Nanking has been approximated at brutally killing over 300,000 people within six weeks! However, the most disturbing part of the massacre was that it wasn't about killing to gain something and then being over; instead, it was about humiliating another person and nation for absolutely no reason. My main objective in this research is to bring to life a terrible massacre that happened; I want to spread knowledge and awareness to everyone about the events that took place in Nanking. Also, I want to bring justification to the voices that haven't been able to be heard. Within the discussion of all that, my paper presents background information that surrounds the invasion. It then explores the lives of the victims and discusses what has happened to them since the massacre occurred. One significant finding in my research is that those Japanese soldiers that contributed to this massacre are the ones currently running the government and have never been punished for their crimes. I discovered many diaries that were written by missionaries while they were trying to save lives amidst the atrocities that were taking place, as well as various survival stories from others living in the area at that time. These resources provide valuable insight to the events surrounding the Nanking Massacre and prove this historical event did in fact occur. Overall, my research is to make sure people know about Nanking and to build awareness of the events that took place. Many high Japanese officials do not want anyone to know about the events that really transpired or unfolded at Nanking; but it is not fair to try and cover up a historical event that killed so many innocent people.

O16. The Influence of the AK-47

David Heimann, History *Time: 4:35* *Mentor: Valentina Peguero*

There are many technological inventions in history which have influenced the world immensely. Human technology such as the atomic bomb, the light bulb, the automobile, the airplane, and more recently the internet have made an impact on the majority of humans on this planet. When measured by its sheer impact on lives, events, and symbolism, I argue that the AK-47 assault rifle has impacted history and changed the way war is fought due to its ingenuity, wide spread use, and inexpensive yet effective means of devastation.

Science Building A109 *Moderator: Diane Caporale*

O17. Confirming *Sturnella* Meadowlark Sympatry with Molecular Biology, and Testing the Reliability of Song for Inter-specific Differentiation in a Sympatric Zone

Ben Kramlich; Biology *Time: 4:05* *Mentor: Diane A. Caporale*

We conducted standardized bird surveys to document the frequency and distribution of Eastern Meadowlark (*Sturnella magna*, hereafter EAME) and Western Meadowlark (*S. neglecta*, hereafter WEME) songs in the Nebraska Sandhills during the 2008 breeding season. The proposed breeding range for WEME includes the state of Nebraska, while the western extent of the EAME proposed breeding range is limited to the river valleys of Nebraska and Oklahoma. EAME and WEME are almost identical morphologically, thereby limiting field biologists to using primarily song for inter-specific differentiation during standard avian point counts. Bird song, however, is a learned behavior that may be inter-specifically shared in zones of sympatry (i.e., species range overlap), thereby potentially compromising the accuracy of our bird surveys. Therefore, we collected nestling feather samples from nests found in the two habitats that we suspect WEME and EAME are partitioning (based on the song frequency and distribution) to differentiate nesting distribution with molecular biology methods. We can then spatially correlate and predict the occurrence of WEME and EAME songs with nesting distribution, and potentially validate the reliability of using song to identify species in a sympatric zone. These questions will be answered using DNA sequencing comparisons and previously created nest site distribution maps. We isolated DNA from bird feathers taken from nestlings. We then amplified and sequenced the COI mitochondrial gene. In a phylogenetic analysis, we plan to demonstrate whether the Eastern and Western Meadowlark sequences cluster in their own separate clades. This will help to verify the reliability of song for inter-specific differentiation.

O18. The Citizen Bat Monitoring Project; a WDNR and UWSP Collaborative Effort

Alan VanDinter, Peter Duerkop, Jaimie Klemish; Biology
Time: 4:35 *Mentor: Christopher Yahnke*

In Spring 2008 the Wisconsin Department of Natural Resources loaned the UWSP Department of Biology a mobile bat detecting unit. This unit allows the user to record the echolocation calls of bats and collects a time stamp and GPS coordinate. After conducting a nightly census of bats, typically by walking a route with the detector, the user uploads the data to a central website where the call files can be analyzed, and a map of bat community composition can be generated. An Undergraduate Education Initiative grant will allow us to modify a bat detector in the biology department for this use, allowing more students to conduct bat surveys around the state. The grant will also allow us to purchase a canoe so that we can conduct water surveys. In this talk we will show you how the detection device works, what the data look like, how to interpret the data, and show examples of bat survey maps. We will also explain how we plan to modify the UWSP detector to collect georeferenced data in the field. These mobile units will compliment the stationary bat detecting unit that was deployed in Schmeckle Reserve in 2006 near the visitors center.

O19. AEQ - Ajax Enabled Query, Universal Query Tool and Classroom Support Software

Stephen Haase, Michael Hoppe, Mark Stenerson; Computing and New Media Technology *Time: 4:05 Mentor: Robert Dollinger*

The Web Based AJAX Enabled Query Tool (AEQ tool) is developed as an educational software application meant to enhance student activity and performance by addressing several difficulties they face in their work, particularly for the database classes that assume specialized access to campus located database servers. The AJAX technology plays a key role in the development of the AEQ tool due to the requirement to closely mimic the behavior of standard database client tools, traditionally developed as Windows applications: high level of interactivity, responsiveness, and flexible manipulation of data. In our teaching experience, several perspectives of the expected impact of a tool like AEQ on the instructional process have been identified: (1) Remote, on-line access to database servers via the Internet - currently, most students do their work in the on-campus labs; few are using some sort of remoting approach to get into the campus network for solving their assignments. The AEQ tool will allow direct, on-line, authenticated access to the databases. (2) Unified query tool - the tool will act as an SQL client for various types of off-campus databases (Microsoft SQL Server, Oracle, MySQL and others) by using one single, specifically tailored, Web based interface. (3) Course content provider and development tool - students will be able to test the pre-loaded classroom query examples against the databases used in class, as well as edit and test their own queries. (4) Collaborative learning tool - students will be able to login either into a private individual space or into a shared working environment, where they can engage in group activities, exchange messages, view live the queries issued by other users, as well as the response returned from the database.

O20. Making NCAA DIII Schedules at the UWSP Center for Athletic Scheduling

Eric Pahl; Mathematical Sciences *Time: 4:35 Mentor: Andy Felt*

The Center for Athletic Scheduling (CAS) at UWSP is a non-profit, student-run organization. The goal of the CAS is to provide athletic schedules that optimally meet specified constraints to intercollegiate athletic conferences across the country. We create schedules by writing a mathematical model which is then solved and interpreted. We discuss the basics of mathematical programming and how it allows us to accommodate a variety of needs of athletic conferences.

O21. Molecular Characterization of Two Genes Involved in Male-sterility in Soybeans

Ryan Frasch, Courtney Weigand, Alina Ott, Reid Palmer; Biology

Time: 4:05 Mentor: Devinder Sandhu

In soybean [*Glycine max* (L.) Merr.], manual cross-pollination to produce large quantities of hybrid seed is difficult and time consuming. In previous studies, a fully male sterile (ms8ms8) mutant and a partial male sterile (mspm) mutant were identified in soybean. The sterility in each mutant is controlled by single separate gene. Identification of an environmentally stable male-sterility system will enable production of large quantities of hybrid seeds and will be commercially valuable. The objectives of this project are to (i) confirm that msp and ms8 are independent genes, (ii) identify soybean chromosomes that contain the msp and the ms8 genes using bulk segregant analysis, and (iii) make a genetic linkage map of the region(s) containing these genes. We have isolated DNA from two F2 populations consisting of 176 and 134 plants that were generated from a cross between ms8ms8 x Minsoy (male fertile) and mspmsp x Minsoy (male fertile), respectively. Initial analysis showed that the msp gene is located on the Molecular Linkage Group (MLG) D1b. A genetic linkage map is being developed to find the exact location of the msp gene. The location of the ms8 gene is currently being investigated using the same methods.

O22. Effectiveness of Heat Treatments to Eradicate Infection of Russet Potatoes by *Phytophthora infestans*

Samuel Kutzler ; Biology

Time: 4:35

Mentor: Terese Barta

Phytophthora infestans is an oomycete fungus that infects the tuber and leaves of potatoes (*Solanum tuberosum*). It costs \$100 million a year in the United States to control this disease known as Late Blight. The goal of this project is to determine the ability of heat to eliminate *P. infestans* in infected tubers. Cultures of *P. infestans* were grown on Rye Medium for two weeks to induce sporulation. The cultures were flooded with 10 ml of sterilized distilled water to encourage sporangial release. The inoculum was examined with a hemacytometer and adjusted with sterilized distilled water to 30,000 sporangia per milliliter. The periderm of tuber was punctured two millimeters in depth and each wound was inoculated with a 20 µl drop of sporangia. The tubers were incubated for 72 hours at 20°C to allow the infection to take hold. The infected tubers were subjected to heat treatments of 50°C, 55°C, and 60°C for time periods of one to four hours. Experimental controls included mock inoculated and heat-treated tubers, inoculated tubers without heat applications, and non-wounded tubers subjected to heat treatments. Treated tubers were incubated for two weeks at 15°C, after which time the periderm of the potatoes was removed and the diameter and depth of the infection was measured. Preliminary data show that infection is eliminated by some of the heat treatments. Data is currently undergoing statistical analysis.

O23. Infection Rate of *Baylisascaris procyonis* in Rural and Urban Raccoons

Amanda Samson; Biology

Time: 4:05 Mentors: Shelli Dubay and Todd Huspeni


Raccoons (*Procyon lotor*) are the definitive host of *Baylisascaris procyonis*, a roundworm that causes neurological damage and/or death when humans accidentally ingest the eggs. *Baylisascaris procyonis* is a common parasite in Wisconsin raccoons, and thousands of eggs are shed each day in the feces of infected raccoons. High densities of raccoons facilitate the transmission of *B. procyonis*. Urban settings may support dense populations of raccoons, increasing the potential for interaction between humans and raccoons. Our goal was to determine if prevalence and relative intensity (number of eggs found in fecal samples) of *B. procyonis* infections in trapped raccoons differed between urban and rural habitats. From September 2008 to January 2009, Wisconsin trappers collected lower intestinal fecal samples from 45 legally trapped raccoons near Madison and Milwaukee. Trappers also provided habitat information for each raccoon. We processed fecal samples in the laboratory using a modified zinc sulfate centrifugal flotation technique to identify *B. procyonis* eggs. We sampled five 75 μ l subsamples from each flotation and counted the number of eggs observed. To date, we have positively identified *B. procyonis* eggs in 62.5% of the samples, with intensities ranging from 2 to 328 eggs per sample and an average count per subsample ranging from 0.4 to 63 eggs. We will compare prevalence and intensity of infection based upon trap location, specifically with respect to urban and rural habitats. Results can be used to determine where raccoons harbor the greatest parasite intensities, and if "hot spots" occur near large human populations.

O24. Testing the Hydraulic Limitation Hypothesis by Stable Isotope Ratios of $^{13}\text{C}/^{12}\text{C}$ in *Pinus strobus* (L.)

Catherine Mueller; Forestry

Time: 4:35 Mentors: Eric Singsaas and Les Werner

The hydraulic limitation hypothesis (HLH) was developed in an effort to link patterns of stagnated growth, specifically tree height, with induced water stress due to increased water conducting path lengths and gravitational potential. The goal of our research was to test whether HLH limits the growth of white pine in our region. We measured soil moisture, xylem water potential and collected needle tissue samples in the Chequamegon-Nicolet National Forest near Eagle River Wisconsin during the last weekend of September, 2008. Relative Water Content (RWC), and water potential could then be calculated, and stable isotope ratios of $^{13}\text{C}/^{12}\text{C}$ could be determined through mass spectroscopy. As the HLH suggests, the taller trees had more negative water potential and lower RWC when compared to shorter trees. However, the RWC at the top of the three tallest trees was not significantly lower than the RWC found at the middle of those same trees, which does not support the hypothesis. Therefore, these data do not unequivocally support the HLH for our region.



The College of Letters and Science wishes to thank the committee of faculty and staff that planned and coordinated this event:

Sandra Bauman

College of Letters and Science Information Technologist

Katie Carlson

Office of the Dean

Richard Crowther

Department of Biology

N. C. Heywood

Office of the Dean

Karen Lauters

Office of the Dean

James Lawrence

Department of Chemistry

Andrea Medo

Office of the Dean

Ismaila Odogba

Department of Geography and Geology

Sarah Pogell

Department of English

Shane Stricker

Office of the Dean

Craig Wendorf

Department of Psychology

Lee Willis

Department of History