University of Wisconsin - Stevens Point

College of
Letters & SCience
Presents

The 8th Annual

Undergraduate Research Symposium

Program

April 28, 2007

University of Wisconsin - Stevens Point
College of Letters & Science

8th Annual Undergraduate Research Symposium

Program

Saturday
April 28, 2007

Science Building
UWSP Campus

Program edited by: Whitney Medo

Dean's Welcome

Room A121, Science Building
8:45 AM

Oral Presentations

See Program for Individual Room Locations
Session I: 9:00 AM - 10:00 AM
Sessioni III: 11:00 AM - 12:00 AM

Poster Presentations

1st Floor, Wings A & B
Science Building
Session II: 10:00 AM - 11:00 AM

Dean Lance Grahn will welcome the participants and attendants at 8:45 AM in Room A121 of the Science Building. Please plan to attend this welcome and enjoy some pre-program refreshments in the east lobby of the Science Building.

Presentations will begin at the top of the hour, ending at 25 minutes past and beginning again at 35 minutes past, ending at the top of the next hour, i.e., 9:00 until 9:25 and 9:35 until 10:00 for Session I and 11:00 until 11:25 and 11:35 until 12:00 for Session II.

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

Oral Presentations
Session I: 9:00 - 10:00

Department of Biology

Science Building A201
Session Moderator: Professor Erik Wild

A temporal comparison of anuran biodiversity in the Peruvian Amazon
Sherri Doro
Faculty Mentor: Erik Wild

Global amphibian decline is a growing concern. Thirty-two and a half percent of 5743 described species are threatened. Nearly a quarter of the species are "data-deficient". The Amphibian Conservation Action Plan (ACAP) calls for ongoing documentation of amphibian diversity and how it is changing, and development and implementation of long-term conservations programs among other things (Amphibian Conservation Summit Declaration 2005). An anuran survey of Reserva Amazonica, Peru was preformed and compared to five previous filed seasons. The first surveys were conducted 18 years previous as part of BIOTROP (Neotropical Biological Diversity Program) which began in 1989. During 26 December 2006 to 16 January 2007, eight researchers surveyed anurans following the BIOTROP protocol, systematically sampling systems of trials and quadrates in two study zones. A total of 313 observations were recorded representing 37 species. The number of species recorded was similar to previous years; however, the species discovery curve was quite different. Relative abundances, locality and temporal data will be analyzed. Comparisons between filed seasons are limited by a number of confounding factors including sampling bias and other stochastic effects. Nonetheless, this research represents a unique opportunity to study long term changes in Amazonian anuran diversity.

Abundance of the microhylid frog *Chiasmocleis ventricumalata* in association with subterranean burrows of theraphosid spiders at Reserva Amazonica, Peru
Helen Cold
Faculty Mentor: Erik Wild

The microhylid frog *Chiasmocleis venrtimaculata* is known to have a commensalistic relationship with spiders from the family theraphosidae. Although several studies have been conducted investigating the possible chemosensory relationship between these two organisms, little is known as to the extent to which *Chiasmocleis* use spider burrows. 4 January and 13 January, 2007, twenty four burrows and their control plots were located and observed over a period of 5 nights and 5 days to determine if frogs were present. A 1 meter area around each burrow and control was searched using a headlamp and machete for a period of 1 minute. Care was taken to keep from disrupting

leaf litter and vegetation in the search area to avoid influencing future search efforts. Presence or absence of frogs was recorded, along with the number of spiders and frogs encountered at each burrow. Data were analyzed to determine the abundance of *Chiasmocleis* near spider burrows in relation to their control plots. Daytime and nighttime data were also compared to determine abundance of frogs during the 2 time periods. *Chiasmocleis* were found at 66% of the burrows during 35% of the nocturnal sample efforts, while none were found at the control plots. During the day *Chiasmocleis* were found at 8% of the burrows during 2% of the sample efforts. The data suggest that concentrations of *Chiasmocleis* are high around theraphosid spider burrows and low elsewhere, which indicates the importance of the commensalistic relationship to the frogs. They also show that *Chiasmocleis* are more active around tarantula burrows at night.

Science Building A202
Session Moderator: Professor Kama Almasi

Does temperature affect the ratio of sexual to asexual reproduction in *Antennaria parvifolia*?
Jenn Andringa
Faculty Mentor: Kama Almasi

Asexual versus sexual reproduction has been a controversial issue for scientists for hundreds of years. Most plants are able to reproduce both ways, but which one is more favored? Scientists have determined that asexual plants are able to grow in a wider niche than sexual species, but sexually reproducing plants have greater genetic variability. However, do natural stresses affect the fecundity rate of these plants? *Antennaria parvifolia*, (Small-leafed Pussytoes), is a species that is able to reproduce both sexually and apomictically; that is, with asexual seeds. It is a very small plant that is dioecious and can be found in the Rocky Mountains. The plants can be grown in a variety of different temperatures. Thus I decided to test how temperature affects the rate of sexual vs asexual reproduction in *Antennaria parvifolia*; it will show if one environment is more favorable than another for asexual reproduction. I grew 14 individuals each at three temperatures. The first chamber was set at 24˚C during the day and 16˚C during the night, the second chamber was set at 18˚C during the day and 10˚C during the night, and the last chamber was set at 12ºC during the day and 4˚C during the night. All of the plants had a 16-hour photoperiod. However, throughout the experiment the plants have had a high mortality rate, so reproduction might not occur. I discuss here the temperature-related mortality rates, proper rearing techniques, and how I was planning to count the seeds. This information can be used to improve the success of future experiments.

Aggressive behavior in northern grasshopper mice, *Onychomys leucogaster*
Julie Arnold and Rachel Tooker
Faculty Mentor: Isabelle Girard

Observations of female northern grasshopper mice (*Onychomys leucogaster*) in aggression trials were collected to test our hypothesis that captive *Onychomys* have a matriarchal social system characterized by high female aggression. Three types of observation trials were conducted.

In female-intruder trials (n = 6), a single novel adult female was used as an intruder to a solitary adult male resident. Both animals were observed continuously for 50 minutes. In four of the trials, the resident male was more aggressive than the intruder female, initiating one or more attacks on females. Subsequently, the intruder female and resident male were maintained as a pair in a single cage. In a second series of observations (n = 8), the resident male of the pair was removed, and a novel adult male was used as an intruder to the female resident. Behaviors were recorded continuously for 5 minutes. In the majority of these trials, females displayed high levels of aggression towards male intruder with an average of 2.5 attacks per trial, and in no trial was an intruder observed to attack the female. A third set of observations (n = 8) were made after the intruder was removed and the resident male was reintroduced to the resident female in their home cage. In a majority of these post-intruder observations, few aggressive attacks between the pair were noted and the animals displayed neutral dominance. Together with anecdotal evidence of high female aggression during feeding and low female aggression in novel social encounters, our data suggest that female dominance may be asserted in established social groups and may not be demonstrated as territoriality. Further research and other studies will incorporate these results with data from pup retrieval, mate-choice trials, and intruder-trials with pups present to develop a better understanding of *Onychomys leucogaster* social structure.

Science Building A203
Session Moderator: Professor Todd Huspeni

Infection of *Viviparus georgianus* snails with *Aspidogaster conchicola* worms from two sites in Portage County, WI

Sheena Gill, Dominique Freyre, and Ashley Freyre
Faculty Mentors: Todd Huspeni and Stephen Taft

Aspidogaster conchicola is a flatworm parasite found in the gonad and digestive gland of freshwater molluscs, including *Viviparus* spp. snails and many bivalves. We investigated patterns of distribution of *A. conchicola* infecting *Viviparus georgianus* snails collected from two sites in Portage County, WI. Snails were collected from McDill Pond (n = 25) and Collins Lake (n = 13) in the fall of 2006. Collected snails were returned to lab, measured, cracked, and assessed for *A. conchicola* infection. The total number of *A. conchicola* observed in each snail was recorded, and every individual worm was measured. Ten additional snails were also collected from McDill Pond for histopathological analysis. The mean sizes of *V. georgianus* collected from McDill Pond and Lake Collins did not differ significantly. Every snail examined was infected with *A. conchicola*, and worms per snail ranged from 3 to 23. Snail size was significantly positively correlated with number of worms per snail (i.e., intensity), but snail size only explained approximately 22% of the total variance in intensity. Similarly, in a model testing the effects of collection site, intensity, and snail size on the average size of worms infecting each snail, only snail size was a significant predictor. Here as well, snail size only explained approximately 28% of the total variance in the average size of worm. These results are generally consistent with a hypothesis of recruitment of *A. conchicola* stages to snails when the snail is young (i.e., small), followed by growth of the worms as the host snail grows. In terms of histopathology, sections of worms in situ demonstrate signifi-

cant localized erosion of the snail digestive gland and gonad, potentially impairing the function of these organs. Whether gonad and digestive gland pathology in high intensity infections leads to partial castration or even increased host mortality is currently being evaluated.

Rat (*Rattus spp.*)-bait influence on feeding strategies of exotic leopard slugs (*Limax maximus*) in mid-elevation rainforests near Hawaii Volcanoes National Park
Matthew Schuler
Faculty Mentor: Emmet Judziewicz

Rats (*Rattus spp.*) are highly invasive on the Big Island of Hawaii and cause a number of ecological problems. USGS biologists recently initiated a program to remove rats from the island's endangered native forest communities. This study focused on the impact that a commercial rat bait has on populations invasive leopard slugs (*Limax maximus*) in mid-elevation (ca. 1100 meters) rainforests near Hawaii Volcanoes National Park. In previous studies Ramik®, a carbohydrate-based rat poison was spread across a small forest tract where rats were prevalent, and could easily find the poison. Researchers noted an increase in leopard slug populations in the areas where rat bait was placed, and in the areas where rats were found dead. USGS researchers were interested in knowing whether the slugs were attracted to the bait, or to the rat carcasses. To gain insight into this issue, I placed eight traps along a trail in the forest near a compost pile where slugs were previously found. The traps were randomly placed approximately thirty meters apart, and out of sight to reduce human interactions. Four traps were baited with the rat bait, and four traps were baited with rat carcasses. Two traps, one of each sort, were placed within one meter of each other to offer a selection of food to the slugs. After one week of checking traps, I found one slug on the rat carcasses and three slugs on the rat bait. Although the sample size does not allow for a statistical significance, these results suggest that rat bait might be responsible for the increase in slug populations in the baited areas. This has direct implications for how biologists manage for rats in the future, because these invasive slugs are harmful to many plants in the area.

Science Building A207
Session Moderator: Professor Diane Caporale

Prevalence of the Lyme disease agent harbored by deer ticks from the Southern Kettle Moraine State Forest
Kala Rettler
Faculty Mentor: Diane Caporale

The tick-borne disease, Lyme disease, has been an increased risk for the outdoor enthusiast, for both humans and their pets alike. The first cases of this disease were documented in the 1970's in Old Lyme, Connecticut, and it is now the most common tick-borne disease in the United States. Lyme disease has also become the fastest growing infectious disease in the US, and is most prevalent in Northeastern and the upper Midwest states. Deer ticks are known to harbor Borrelia burgdorferi, the agent responsible for Lyme disease. The key to understanding infection rates (proportion of ticks carrying the pathogen) is to analyze for infection in multiple years. In fall

2006, I collected 48 adult deer ticks from a common recreational area in the southeastern part of Wisconsin, the Southern Kettle Moraine Forest. Part of each tick was placed in culture medium and incubated for 15 days, while the remaining part was placed in buffer for DNA isolation. PCR was performed on the DNA taken directly from the ticks, and none were found containing Borrelia burgdorferi. DNA was then isolated from cultures, and tested for Borrelia using PCR. Surprisingly, 12 out of 44 isolates tested positive for B. burgdorferi, an infection rate of 27%. Eight years ago, the Borrelia infection rate in the Southern Kettle Moraine Forest was only 4% (5/118 ticks). Since this time, the abundance of the Lyme disease pathogen has increased dramatically. Therefore, there is reason to be concerned when visiting the Southern Kettle Moraine State Forest. In previous studies, a highly mutated and possibly pathogenic strain of B. burgdorferi was discovered, which may be a new species causing Lyme disease. I am currently sequencing each of the 12 isolates to determine the abundance of this strain to help assess the health risks of visiting this state forest.

Effects of water hardness on the growth rates and survival of freshwater prawns

Brandon Spude
Faculty Mentor: Chris Hartleb

Freshwater prawns have been grown in the southern U.S. for many years due to their tropical origin and need for warm water, but have recently been farmed farther north because of a rising consumer demand. In this project, I looked at the function of water hardness in providing calcium to the growth and survival of the prawns and its role in increasing the efficiency of prawn farming. Prawns were raised in three different water hardnesses: soft (68 ppm CaCO3), hard (223 ppm CaCO3), and very hard (308 ppm CaCO3) water. Initially, post-larval prawns were raised in 38 gallon aquaria at a density of 60 prawns per tank. Since freshwater prawns are benthic dwellers, artificial substrate racks were placed into each aquarium to increase bottom surface area. Once prawns reached juvenile size, approximately two inches, they were transferred to 700 gallon recirculating aquaculture system (RAS) tanks to minimize crowding effects on growth and provide additional bottom surface area. Growth and survival of the prawns were monitored weekly at the post-larval stage and monthly as juveniles. Male to female ratios, feed consumption, and water quality were also monitored. Results showed that prawns raised under soft water hardness had slow growth rates and high mortality rates. One month after transfer to the RAS tanks, all prawns in the soft water system had perished. Prawns in the hard and very hard water showed greatly improved growth rates and survival compared to the soft water treatment. These results demonstrate that freshwater prawns not only require a source of calcium for exoskeletal development, growth and survival but it showed that they cannot acquire all the calcium they need from dietary sources. The prawns utilize calcium dissolved in water and, therefore, require minimum water hardness >68 ppm CaCO3 to undergo adequate molting, continued growth and increased survival.

Department of History; International Studies Program

Science Building A208
Session Moderator: Professor Susan Brewer

How the United States can learn from the United Kingdom's efforts to comply with the Kyoto Protocol
Leah Heier
Faculty Mentor: Susan Brewer

The British government has signed to comply with the Kyoto Protocol. The Kyoto Protocol was introduced on December 11, 1997 in Kyoto Japan. There are now, as of December 2006, 169 countries and other governmental entities that have signed along with Great Britain. The United States is one of the countries in the world that has not signed the Protocol for various reasons. One of the major reasons is economical. The British government is currently working to make changes in their political policies and everyday life that would help Great Britain comply with the Protocol. My research examines the efforts being put forward by the three main political parties: Labour, Conservative, and Liberal Democrat. The research also investigates the obstacles that the British government has had to deal with in order to make the necessary changes. My findings can help the United States work on obstacles that stand in the way of U.S. compliance with the Protocol. This presentation will also give suggestions and ideas of what citizens can change in their everyday lives to help combat the problems of climate change in the United States.

British caricature and satire during the American Revolution
Ashley Hall
Faculty Mentor: Nancy LoPatin-Lummis

Satires, caricatures and prints became popular in England in the mid-to-late Eighteenth century and the art continues today. These prints are invaluable as a historical source because they reflect the social attitudes of the times at a glance without having to do extensive research and digging through personal memoirs and records. Caricatures and satires, since they were drawn, were accessible to all social classes because one did not need to be able to read to be able to get the overall message of the piece. Political figures saw it as a compliment to be immortalized in caricature, even if the subject was derogatory to themselves. Caricatures and satires depicting the American Revolution reflected an overall British public opinion that was largely pro-American, backed by the fact that the British public did not see the colonies as Americans, but rather as fellow countrymen fighting against injustices done to them. British prints of the time completely ignore several important events of the Revolution, like the Declaration of Independence, but they do cover other events and those will be the ones discussed.

Departments of Philosophy and Sociology

Science Building A210

Session Moderator: Professor Ken Menningen

Rethinking responsibility: Bad faith and gender in Simone de Beauvoir's *Second Sex*
Aidan Arnold
Faculty Mentor: Karin Fry

In *The Second Sex*, Simone de Beauvoir explores gender as an existentialist with the existential concept of "bad faith" playing a role in the analysis. Due to the individualistic nature of existentialism and bad faith, some critics have charged Beauvoir as explaining women's oppression by blaming women for their individual choices.

This criticism appears to be unfounded, however, when one looks at how Beauvoir understands existentialism and bad faith and the way this is applied to the matter of gender in The Second Sex. By looking to the literary and philosophical writings that precede *The Second Sex*, I argue that Beauvoir's understanding of the human subject complicates an individual's agency in making choices and therefore makes pinning blame on the individual a suspect endeavor. As it relates to the issue of gender, I argue further that Beauvoir does not conclude that women's choices are to be blamed for their continued oppression, but rather that the institutions that maintain these limited choices are the significant problem. Seeing that Beauvoir is more concerned with the role of institutions than individuals in the perpetuation of women's oppression, one can better understand Beauvoir's existential philosophy and feminism.

Crossing the line between entertainment and reality: A sociological analysis of professional wrestling
David Haecker
Faculty Mentor: Robert Wolensky

This study will analyze three sociological aspects of professional wrestling: (1) social interactions between and among the wrestlers; (2) collective behaviors between the wrestler and the audience; and (3) the use of perceived violence as a form of entertainment, often crossing the line of accepted cultural values.

Departments of Physics & Astronomy and Philosophy, Religious Studies, and Anthropology

Allen F. Blocher Planetarium
Science Building
Session Moderator: Professor David Tamres

The Mayan sky
Darcy Beyer
Faculty Mentors: David Tamres and Barbara Butler

For the Mayan civilization, which flourished in the Yucatan Peninsula and elsewhere in Central America over a millennium ago, the sky was more than a home for the Sun, Moon, planets, and stars. The sky was their time keeper and calendar, their window to the realm of their gods, and an ever-present reminder of their origins and history. In this presentation at UWSP's Allen F. Blocher Planetarium, the night sky of the Maya people will unfold itself. The Milky Way will take on a new importance as the representation of the world's creation. The presentation will focus on the deep connection between the folklore and the astronomy of the Maya based on their creation story, the Popol Vuh. This presentation will help demonstrate the difference between our views of the night sky and the view of the Maya.

Poster Presentations
Session II: 10:00 - 11:00

Department of Biology

Genetic linkage mapping of a new gene involved in chromosome pairing in soybean
Kyle Curran and Lauren Muhr
Faculty Mentor: Devinder Sandhu

Microgametogenesis (formation of male reproductive cells) and megagametogenesis (formation of female reproductive cells) are two very important biological processes in life cycle of plants. During meiosis I two sets of chromosomes pair and then separate into separate cells. This process is highly regulated. Mutations in genes involved in this important process lead to male sterility and female sterility. Several male sterile female sterile mutants have previously been identified in soybean. A new male sterile female sterile mutant has recently been identified. Objectives of this study are i) to determine if this new mutant gene is at same location as already identified male sterile female sterile genes or it is a unique gene ii) to make genetic linkage map of the region where this new male sterile female sterile gene is located. To accomplish our objectives we used Bulk Segregant Analysis (BSA) technique, where we pooled 10 fertile F2 plants and 10 sterile F2 plants. These bulks were tested using 350 SSR markers from whole soybean genome. The BSA showed that this new male sterile female sterile mutant gene is a unique gene and closely associated with SSR marker Satt309, which is located on Molecular Linkage Group (MLG) G. A fine map of the region is being done using polymorphic SSR markers from MLG G on an F2 population. Updated progress will be presented in the poster.

Molecular identification of *Borrelia burgdorferi* Kettle Moraine isolate W97F51
Yihan Lin
Faculty Mentor: Diane Caporale

In 2003, D. Caporale and C. Johnson sequenced the genes of a new *Borrelia burgdorferi* strain, after discovering it in the Southern Kettle Moraine Forest. The sequences of this W97F51 isolate were compared with other *Borrelia* species, using various techniques such as Polymerase Chain Reaction and Randomly Amplified Polymorphic DNA fingerprinting. This was done in an effort to determine whether or not W97F51 was a novel species or simply a highly mutated strain of *Borrelia burgdorferi sensu stricto*. Results from past experiments have not been conclusive in determining the identity of this isolate. Some results show the isolate being more closely related to *B. burgdorferi*, while others show it being more closely related to *B. andersonii* or *B. bissettii*. In addition, there is some evidence showing the W97F51 strain to be a completely separate species. This project involves further sequencing of the W97F51 genome in order to compare the

isolate with *B. burgdorferi* sensu stricto, *B. andersonii*, and *B. bisettii*. So far, the p66 gene has been sequenced from several isolates representing each of the *Borrelia* species, and including the Kettle Moraine strain W97F51. A neighbor-joining phylogenetic tree was constructed using the PAUP program. The p66 gene was able to group the different *Borrelia* species in an informative way. The three *B. bissettii* isolates were grouped within their own clade. The three isolates of *B. burgdorferi* were also grouped within their own clade. Although *B. andersonii* isolates showed the most genetic variation, they were not within these clades and were most closely related to each other. Interestingly, isolate W97F51 was most closely related to *B. bissetti,* but was not within the *B. bissettii* clade; it lied between *B. bissetti*i and *B. burgdorferi*. This is further evidence to support that isolate W97F51 may be a separate *Borrelia* species found in the U.S.

Determination of the pathogenicity of *Borrelia* strain W97F51 in a mouse model

Josh Larson
Faculty Mentor: Diane Caporale

Genotypes play a key role in determining the pathogenicity of disease causing microorganisms. Caporale, et al. (2005) discovered unique strain of *Borrelia burgdorferi* (strain W97F51). The genetic variation of W97F51 could mean the strain is a novel etiological agent of Lyme disease. The goal of this project is to determine the pathogenicity of *Borrelia* strain W97F51 using a mouse model. As part of this ongoing study histopathological methods are being used to identify the presence of *Borrelia* strain W97F51 in mouse tissue and determine the severity of infection. Samples of joint, heart, brain, and bladder tissue from mice inoculated with *Borrelia* strain W97F51 (experimental group), *Borrelia* strain W97F56 (positive control with known pathogenicity) and PBS (negative control group) were sectioned and stained with hemotoxylin and esosin. So far, 20 of 100 prepared slides were reviewed and included samples 127D (joint tissue, week 12, experimental), 128A (heart tissue, week 12, experimental), 115D (joint tissue, week 12, positive control), and 116B (bladder tissue, week 6, positive control). Of these slides, none so far have indicated the presence of *Borrelia*. The remaining 80 slides are currently being reviewed for the presence of *Borrelia*. This study will help determine the level of pathogenicity of strain W97F51 in a mouse model.

The genus *Hildegardia* (Malvaceae) in Madagascar: How many taxa?

John Zaborsky
Faculty Mentor: Emmet Judziewicz

The genus *Hildegardia* (Malvaceae) is represented in Madagascar by three, or possibly four, species of trees. These range throughout the island and show considerable variation, which is reflected in many infraspecific taxa having been described for one species, *H. erythrosiphon*. The other two described species, *H. ankaranensis* and *H. perrieri* do not vary as much. In 2006 I visited major herbaria in Paris, France and London, England to study *Hildegardia* specimens. These herbaria house the world's best collections of Madagascan plants. I employed alpha taxonomic techniques in an attempt to bring some clarity to these taxa. The aforementioned species, *H. erythrosiphon*, has had many subspecies and varieties attributed to it over the years and I tried to determine whether these names reflected natural variation. A Paris specimen may represent a

new taxon. Very similar to *H. ankaranensis* and *H. perrieri*, it differs in having a distinctive hair structure on the flowers and leaves. It is known from only one collection and this site should be revisited to gather more material for a better understanding of it. Preliminary SEM photos taken of this taxon, and the other three species, will be used to clarify its relationship within the genus. The various infraspecific taxa of *H. erythrosiphon* were described using mainly hair types, sometimes from only one specimen. These criteria were not found to be very useful in delineating taxa. Analyzing the specimens, my conclusion was that only one of the subspecies described reflects a natural entity. Even within this subspecies (subsp. *eriocalyx*), there is much variation and I have chosen to subsume all names within subsp. *dolichocalyx* and subsp. *eriocalyx* into a broad concept of subsp. *eriocalyx*. Much more research needs to be done on this group.

Comparative analysis of commercial feeds for brook trout fingerlings
James Barron
Faculty Mentor: Chris Hartleb

Brook trout native to Lake Superior show significant growth in very cold water and represent a unique strain of a popular cultured fish that might be suitable for farming in northern regions. Growth of Lake Superior brook trout fingerlings was compared among three trials where each group was fed a commercial diet commonly used in trout culture. Brook trout were raised in 100 gallon flow-through circular culture tanks and trout in each tank was fed either Silver Cup Salmon, Silver Cup Steelhead, or Purina Aquamax for a six week period. Each feed has a different protein and fat content as well as cost so a comparison among the feeds could help producers decide the best diet for this newly cultured strain. To determine which feed provided optimal growth without compromising water quality, I measured weight and length gain, growth rate, & condition factor weekly for each tank of trout; total dissolved gases, temperature, pH, & dissolved oxygen in the culture tanks; and ammonia & nitrate in effluent. The Silver Cup Salmon diet provided the highest weight gain and growth rate. The Silver Cup Steelhead diet provided the highest length gain but only slightly greater than the Silver Cup Salmon diet. Trout fed Purina Aquamax produced the lowest nitrate and ammonia in the effluent, but resulted in the lowest gain in length and growth rate by length. Results from this study should help fish culturists when deciding optimum culture conditions and diet for the Lake Superior strain of brook trout.

Population biology of an endangered plant, Fassett's locoweed
Cody Demske
Faculty Mentor: Kama Almasi

Fassett's locoweed (*Oxytropis campestris var. chartacea*) is listed as endangered in the state of Wisconsin. It is a plant species that is endemic to the state, and is found only in three counties: Bayfield, Portage and Waushara. There is little known about the population and community ecology of Fassett's locoweed; this research reports basic population data that will ultimately be used in a population growth model. We also evaluate differences between the two largest populations, found at Plainfield and Pickerel lakes in Waushara and Portage counties, respectively. During the 2006 field season, we tagged approximately 500 plants at each lake. Their reproductive status, diameter, number of flowering stems, and location were recorded. Seeds were also collected

from 100 plants. Our results show that in 2006, there were fewer seedlings at Pickerel Lake while reproduction occurred more frequently at Plainfield Lake. Plant diameter was strongly related to reproductive output, so size classes will be used as a category for future population models. The larger plants in both lakes were located further away from the receding shoreline; however Pickerel had larger plants overall, based on diameter. There may be two reasons for these findings, one is that succession is farther along at Pickerel and Plainfield receded much more, leaving more open yet moist area for germination. This information will ultimately be used to create a matrix model of population growth for management purposes.

A study of the proposed chemosensory commensalistic relationship between theraphosid spiders and the microhylid frog *Chiasmocleis ventrimaculata*

Helen Cold and Jared Campbell
Faculty Mentor: Erik Wild

In previous studies, the microhylid frog *Chiasmocleis ventrimaculata* has been known to associate with large burrowing theraphosid spiders of the genus *Xenesthis*. The frogs use the burrow of the spider as a daytime refuge, and may gain some protective benefits from the spider's presence. It has been suggested that *Chiasmocleis* avoid predation by the resident spider with the use of chemical cues. We observed *Chiasmoclies* at 16 of 24 active spider burrows at Reserva Amazonica, and noted interactions between spiders and *Chiasmocleis* several times. During the nights of Jan. 14 and 15, 2007, experiments were conducted at 3 spider burrows where *Chiasmocleis* had often been found. The tips of cotton swabs were cut and tied to strings, which were tossed into burrow openings both clean and after swabbing the body of the resident *Chiasmocleis*. Observations of the reactions of the spiders were categorized as no reaction, slight reaction, grabbing with release and grabbing with fanging. In 2 cases after swab tests were performed, the *Chiasmocleis* itself was tossed into the burrow. Responses were elicited both times by the resident spiders but the frogs escaped unharmed. These results suggest that *Chiasmocleis* rely on more than just chemical cues in recognition by the spiders.

Optimization of 2-D proteomic techniques for analysis of Red Pine and Jack Pine proteomes

Nick Impellitteri
Faculty Mentor: Eric Singsaas

The purpose of this research project was to optimize the technique of extracting and separating Red Pine and Jack Pine proteomes, the complete set of proteins produced by an organism, for the later purpose of determining the underlying cause of Jack Pine Bud Worm (JPBW) herbivory. The JPBW is an herbivorous insect that feeds on Jack Pine tree foliage and, more recently, Red Pine tree foliage. Since Red Pine is an important tree in the lumber and paper industries in WI, MI, and MN, we find it imperative to determine the cause of JPBW herbivory on Red Pine to protect the economic strength and stability of these industries. Proteomics via 2-D gel electrophoresis allows us to view all proteins and their relative levels of expression in a given sample. To optimize the proteomic technique, we ran 2-D gel electrophoresis on Red Pine with three different detergents and used two different protein solublization techniques. We found that the detergent CHAPS (4%)

worked the best with a solublization/sonication technique. This Summer, we will then run 2-D gel electrophoresis for resistant and non-resistant samples of Jack Pine and Red Pine to determine how their respective proteomes vary . The proteins showing a marked difference between resistant and non-resistant gels can then be lifted from the gels and analyzed using mass spectroscopy. This will then give us insight into what gene products may be responsible for resistance or susceptibility to JPBW herbivory. This information can then be used to determine the genetic varieties of Red Pine conducive to growing at a low risk of loss to JPBW herbivory.

Liverworts of Portage and Waupaca Counties
Joseph Richards
Faculty Mentor: Virginia Freire

Bryophytes are non-vascular plants of small size divided in three groups: liverworts, mosses and hornworts. Few botanists study liverworts, therefore surveys and reports are limited. The object of this study was to add new reports to the existing list of liverworts (Phylum *Machantiophyta*) for central Wisconsin.

Liverworts have no cuticle or conductive tissues, therefore requiring abundant moisture to survive. In Wisconsin, liverworts are usually found in wet lowland forests, particularly areas such as bog edges. They grow on the ground, on rocks, on tree boles, stumps and/or fallen trees. Liverworts are hearty plants, withstanding freezing and desiccation, by going dormant for extended periods of time.

This research took place in Portage and Waupaca Counties. We surveyed and collected liverworts in lowland forests including a bog and a cedar swamp. For each find, a sample was taken to be identified in the lab. Once identified, each dried sample was placed in a paper packet, labeled, databased and accessed into the bryophyte collection of the UWSP herbarium. We also searched among the bryophyte specimens deposited in the UWSP herbarium finding a number of liverworts from the two counties that were never published.

We found a total of 17 species in 14 genera that constitute new reports for Portage and/or Waupaca Counties. These reports will be published in a Wisconsin journal and added to the herbarium web page (http://wisplants.uwsp.edu/bryophytes/index.html).

Bacteriophage isolation from human sources and soil samples
Brad Sherman and Adam St. Sauver
Faculty Mentor: Richard Crowther

Protocols were established for the effective isolation of bacteriophage utilizing *Escherichia coli 11303* and other bacterial strains. Coliphage T2 and T4 were used to verify that the isolation and enumeration techniques worked. It was discovered that the control phage had a heat sensitivity characteristic which was not known until the procedures were being developed. Test samples were taken from various body locations and multiple soil samples from different sites. Various techniques were used to isolate the phage from these areas. The presence of phage in and on the

human body would indicate a possible role in controlling the number of normal flora inhabiting individuals. The role of phage infecting soil bacteria could be one of lysogenic conversion; the influence of a prophage on the phenotype of the bacterial host. An additional component of the project is to view the isolated phage using the electron microscope and place them into the correct virus family or group.

Ultrastructure of fathead minnow caudal fin

Andrew Morton and Mike Hayes
Facutly Mentor: Robert Schmitz

The fathead minnow (*Pimephales promelas*) is a member of the teleost family of fish. Teleost fins are flexible two-dimensional sheets that undulate and bend to produce propulsive and stabilizing forces. In general all of the fins on the body of a teleost have a common trilaminar structure, consisting of two layers of epidermis sandwiching a layer of dermis reinforced with bony lepidotrichia. When caudal fin of a fathead minnow is examined with the electron microscope, the epidermis consists of several layers of squamate, interdigitating keratinocytes. The cytoplasm of these cells is densely packed with intermediate filaments. The plasma membranes of these cells are tightly linked by continuous junctional complexes similar to desmosomes. The middle dermal layer is made up of highly ordered layers of collagen that span between the epidermal layers and between and around the fin rays. Conventional histology suggests that the dermis and the periostium of the lepidotrichia have an extensive elastic component. The bony matrix of the fin rays is amorphous adjacent to the periostial cells on the sides of the lepidotrichia segments, but highly ordered near the lepidotrichal joints. The ends of the lepidotrich segments are rounded and form a fibrous joint with adjacent segments. An examination of the microstructure of the caudal fin suggests that all of the tissues in the fin are designed to play a mechanical role in the production of undulatory propulsive swimming forces.

Affect of tree falls on the tropical reptile and amphibian community of Reserva Amazonica, Peru

Jason Cotter and Abby Purdy
Faculty Mentor: Erik Wild

The Amazon rainforest experiences relatively little seasonal change throughout year. This stability has been believed to be the reason for the great species diversity in the region. More recently, the rainforest has been seen more as a mosaic of changing habitats. Tree falls are one example of a process of change in the Amazon rainforest. An excellent opportunity to study the affect of tree falls on species diversity was presented to us this past winter. To our knowledge there have not been any previous studies performed on the impact of tree falls on reptile and amphibian diversity. We tested the null hypothesis that there is no difference in reptile and amphibian richness and abundance between the tree fall variable and the adjacent forest control. We predicted that the forested areas adjacent to the tree falls would provide refuge for both reptiles and amphibians and would thus contain greater species richness and abundance. We mapped, cleared, sectioned, and marked standardized plots and transects. Day and night sampling was performed on an alternating basis for an interval of 14 days. Our data rejected the null hypothesis and contradicted our

prediction. Out of 39 observations we found 25 amphibians utilizing the tree fall areas with only 8 amphibians utilizing the forested areas. Likewise, we found more reptiles utilizing the tree fall areas over the forested areas. We suggest perhaps that tree fall areas offer habitat change that is favorable to reptile and amphibian species providing an example of greater species diversity due to changing habitat in the Amazon rainforest.

Agonistic Behavior and Territory Defense in Dart-Poison Frog, *Allobates femoralis*
Dan Madigan
Faculty Mentor: Erik R. Wild

This research project focused on many aspects of one central idea, interspecific (same species) competition amongst males in *Allobates femoralis*, which is dependent upon behavioral and territorial influences. Several studies on observed behavior and various levels of territory defense were completed using prerecorded vocalizations.

One of the main modes of mate attraction in anuran species is through their vocalization of mating calls which is produced by inflation and vibration of the vocal sac. This vocalization will more often than not illicit one of the following two responses: It may attract one or more conspecific (same species) females or it may attract conspecific resident males resulting in territory competition. Narins, et al. (2003) observed that dart-frog species *Allobates femoralis* will physically and vigorously defend its calling territory against conspecific intruders. Attacks on the intruding conspecific frogs are believed to be provoked by vocalization of mating calls by the intruder in the territory of the resident male. This project investigated initiation distances and conspecific male competition as was observed in Narins, et al. (2003).

Department of Chemistry

The preparation and spectroscopic characterization of trans-(4-OCH_3-Ph-NC)$_2$W($Ph_2PCH_2CH_2PPh_2$)$_2$
Jessica Westland
Faculty Mentor: James Brummer

Our focus during the 2006 Summer Research Internship was on the synthesis of different isonitrile ligands and their replacement of N_2 in the complex trans-(N_2)$_2$W($Ph_2PCH_2CH_2PPh_2$)$_2$. After attachment of the isonitrile ligands to the complex, the absorption and emission spectra were studied. These spectra will be compared to those of the parent dinitrogen complex to determine the nature of the low lying excited states. The isonitriles we focused on this summer were 4-fluorophenylisonitrile, prepared via the Hofmann Carbylamine Synthesis, and 4-methoxyphenylisonitrile, prepared via the Triphosgene Dehydration Method. There was a successful outcome with the isolation of the 4-methoxyphenylisonitrile and the preparation of (4-OCH_3-Ph-NC)$_2$W($Ph_2PCH_2CH_2PPh_2$)$_2$.

Emission and absorption properties of several Rhenium (I) complexes
Aaron Krueger
Faculty Mentor: James Brummer

We have synthesized and characterized the complexes trans-$(N_2)(Cl)Re(R_2PCH_2CH_2PR_2)_2$ where R = 4-H-Ph and 4-CF_3-Ph. We will present the absorption spectra (77K & 298K), emission spectra (77K), and emission lifetimes (77K) of these complexes. All measurements were performed on samples of the complexes dissolved in 2-MeTHF. The absorption and emission peak energies red-shift as R is changed from 4-H-Ph to the more electron withdrawing 4-CF_3-Ph substituent. We will present a simple model for the low-lying electronic excited states of the complexes.

Germanium (IV) coordination chemistry: In search of ligands for use in quantum dot synthesis
Andrew Zimmerman and Brendan Gifford
Faculty Mentor: Robin Tanke

Synthesis of new ligands that successfully complex with germanium has been one stepping stone in using those ligands as protecting groups in synthesis of nanoparticles. Additionally, the study of such reactions can yield new and interesting coordination complexes of germanium. For this project, the ligand O-(phenyliminomethyl)phenol(1) was first prepared from aniline and salicylaldehyde. The ligand (1) was then reacted with both germanium (IV) ethoxide and germanium (IV) chloride with triethylamine. The products of both reactions were characterized using IR, 1H and 13C NMR Spectroscopy.

Synthesis and characterization of Poly(propylene fumarate-co-L-lactic acid) for orthopedic applications
Daniel Fletcher and Jackie Krzykowski
Faculty Mentor: John Droske

Poly(propylene fumarate) (PPF) and poly(L-lactic acid) (PLLA) are desirable candidates for use as biodegradable orthopedic adhesives. PLLA has been used extensively in the biomedical field, while PPF has become attractive due to latent double bonds in the fumarate moiety. These latent double bonds can be cross-linked in vivo to provide additional strength to bone adhesive scaffolding. Recently, copolymers of poly(caprolactone fumarate) and poly(lactide ethylene oxide fumarate) were reported. Both copolymers showed enhanced properties and potential for orthopedic applications over the parent homopolymers. We have synthesized and characterized a series of copolymers of poly(propylene fumarate-co-L-lactic acid). These copolymers were prepared by zinc chloride-catalyzed transesterification and afforded copolymers with a range of desirable properties, including potential for use as injectable biodegradable adhesives. Differential scanning calorimetry (DSC) showed glass transition temperatures that were lower for all of the copolymers compared to the parent homopolymers. Efforts to improve the synthesis of the
polymers and copolymers also will be reported.

Synthesis of 4-Cyano-4'-Alkyl biphenyl liquid crystals
David Bell
Faculty Mentor: Paul Hladky

Liquid crystalline compounds are important substances in the displays of calculators, computers, and even the pumps at gasoline stations. In addition to their commercial importance, liquid crystals are also interesting because of the relationship between their structures and their chemical and physical properties. We will present our synthesis of 4-cyano-4'-pentyl biphenyl which is one compound in a homologous series of 4-cyano-4'-alkyl biphenyl liquid crystals that we plan to synthesize. This series of compounds will enable us to systematically study the effects of molecular structure on the types of liquid crystalline phases that form and the temperatures at which phase changes occur. We will also report on a synthesis scheme that we are developing so that it is amenable to an undergraduate student's schedule.

Department of Geology and Geography

Lava tree Research on the big island Hawai'i: Focused studies in Hawai'i Volcanoes National Park and Lava Tree State Park
Brook Bonack
Faculty Mentor: Neil Heywood

Little research exists about terrain associated with lava trees, which are delicate cylindrical formations that remain when lava flows inundate living forests. In July 2006, I examined various lava flows in Hawaii Volcanoes National Park and Lava Tree State Monument on the southeastern side of the big island of Hawai'i. Lava trees occurred in flows dated at 1790, 1840, 1965, and 1973. Measurements included location, height and width of individual trees, and slope configuration at each of the sites. The initial hypothesis was that any slope greater than 3 degrees would be unsuitable terrain for lava tree formation. I concluded that lava trees occur only in concave valley bottoms, and do not form on slopes of 3 degrees or greater.

Southern Royal Albatross recovery since 1958 on Campbell Island, New Zealand
Anna Hess
Faculty Mentor: Eric Larsen

This purpose of this project was to use Global Positioning System (GPS) and Geographic Information Systems (GIS) technology to develop a series of maps showing the location of Southern Royal Albatross nests on Campbell Island, New Zealand. This field research was conducted using data collected by Dr. Eric Larsen in conjunction with the New Zealand Department of Conservation Science and Research Unit, starting in 2004. The current data set was compared to previous albatross survey information collected by research groups since 1958. Data was collected by establishing base-line information regarding the population, health, and breeding success of the

Southern Royal Albatross, of which >99% of the world's population breeds on Campbell Island. Results have found that there have been significant changes in Southern Royal Albatross populations between 1958 and the present, including increases in nesting pairs and in the spatial location of nesting sites.

Krukowski Quarry: Early life on land
Bill Gillingham
Faculty Mentor: Kevin Hefferan

Primitive life forms in the ocean first appeared over 3.5 billion years ago. When did terrestrial life first appear? Answers to this tantalizing question have been pursued throughout the world. Terrestrial life forms have been known from the mid Paleozoic rocks (~ 300 million years ago). However, recent studies in Central Wisconsin suggest that terrestrial life forms may have existed in the Cambrian Period (~ 510 million years ago). This study examines Late Cambrian rocks from Krukowski Quarry, 8 miles southeast of Mosinee, WI. During deposition of these quartz sands, Central Wisconsin was part of a barrier island system located near the equator. Cambrian quartz sandstones from Krukowski Quarry contain a wealth of trace fossils including jellyfish, arthropod, climactichnites (slug-like creatures) and worm burrows. Subaerial exposure of these trackways and traces occur in the quarry in association with rain drop impressions, wind-rippled surfaces, desiccation cracking and fluvial channeling—all of which support an interpretation for terrestrial deposition. This study presents fossil and sedimentological data that I have collected from Krukowski Quarry. Analysis of these data indicates that the quarry represents part of a subaerial barrier island system during late Cambrian time. The trackway associations were created by animals crawling on land. Thus, Central Wisconsin is now recognized as a world renowned fossil locality for among the earliest known terrestrial life forms on Earth.

Department of Physics and Astronomy

Surface treatments to modify the band energies of $GaInP_2$ for use in photoelectrochemical water-splitting cells
Aaron Schaufenbuel
Faculty Mentor: Ken Menningen

The concerns over global warming and the recent increase in petroleum prices have renewed interest in alternative energy sources such as hydrogen. Although hydrogen can be used as a clean energy source, there are several technical obstacles that must be overcome before it can play a central role in the energy economy. Among those obstacles is the generation of hydrogen gas by sustainable, renewable, and economically feasible processes. Using $GaInP_2$, a semiconductor known for its photoactivity, we are attempting to create a stable photoelectrochemical cell capable of generating hydrogen and oxygen gases using only sunlight and water. The goal of this project is to shift the band energies of p-type $GaInP_2$ into proper position to split water by using an etch-

ing procedure that makes its surface porous. The effect of the nano-etching process is measured by electron microscopy, photoluminescence, photocurrent spectroscopy, and various methods of electrochemical analysis. We will present recent results from our measurements as well as some goals for future work.

Department of Psychology

Predator recognition in grasshopper mice, *Onchomys leucogaster*
Anna Hawley, Matthew Florence, Matthew Hamann, and Josh Kruger
Faculty Mentor: Jody Lewis

Animals held in captivity lose important learned behaviors such as how to find food, identify members of their own species, and avoid predators. Their inability to successfully complete these tasks leads to very low success rates of wildlife reintroduction and captive breeding programs. Using training techniques such as predator recognition the success rates of these programs have increased. With this method classical conditioning is used to teach an animal to recognize and avoid potential predators before being released into the wild (Griffin et al., 2000). The first step of this process is to find a stimulus which the animal has a natural fear response to. Lab rats and mice have been shown to elicit fear responses to natural predator odors however, not to a visual stimulus such as a stuffed cat (Blanchard et al., 2003). Grasshopper mice (*Onchomys leucogaster*) were tested with visual stimulus of a stuffed cat and natural predator odors placed on a block with a cloth covering inside the cage. The odors were cat fur, cat feces, and fox anal glands. Natural fear responses were then measured by time spent in contact with the stimuli. The results indicated that Onchomys leucogaster spent about 50% of their time in contact with each of the stimuli showing no evidence of fear. However, females spent 68% of the time in contact with the stimuli exhibiting nesting behaviors with the cloth, which could be attributed to differences in male and female nesting behavior.

Predator recognition in Swiss-Webster mice
Matthew Florence, Matthew Hamann, Anna Hawley, Josh Kruger, Josh Gruber, and Amy Ort
Faculty Mentor: Jody Lewis

Research has shown that captive-bred species may lack natural fear responses when confronted by their predatory species. Previous research has shown that laboratory mice and rats have an innate fear response to the odor of predators but not to the visual component of a predator. The current study sought to elicit a fear response in a captive line of Swiss-Webster mice (*Mus domesticus*) by classically conditioning cat odor (e.g., feces and fur) with the visual aspects of a predator (plush toy cat). Classical conditioning is conducted in two parts. In the first part, a neutral stimulus (e.g., a plush toy cat) is paired with a biologically-important event (e.g., an odor). In the second part, in order to test for conditioning, the stuffed cat was presented by itself. Fear was assessed by the avoidance of the stimuli. The cage was split into three sections (i.e., proximal, middle, and distal) and the time spent in each section was measured. Avoidance was determined by the amount of time spent in the distal portion compared to the proximal and middle portions. We expect that the

subjects will show more avoidance toward the plush toy cat in the conditions where it had previously been paired with either feces or fur odors versus the control (no odor). We hope that this research may be used in the reintroduction of captive endangered species into the wild by training animals to fear their natural predatory species.

Development of two scales for understanding choice of a psychology major

Cassie VanBerkel, Sheila Hoffman, Michelle Smith, Natalie Yoder, Anne Peaslee and Jennifer Wilcher
Faculty Mentors: Amy Herstein Gervasio and Craig Wendorf

Several theorists hypothesize that different majors fulfill different underlying values and goals, apart from interest in subject matter. Breen and Lindsay (2002) described six major goals involved in motivation for choosing majors in British universities: analytical academic; future career; social innovation; strategic study; self-esteem; and competitive achievement goals. Neither findings nor factors could be replicated in our 2005 American adaptation of their survey. Also, items did not tap the poles of psychology as a science and psychology as a helping profession which might underly the choice of major for our UWSP population.
The current poster describes the development of two new scales for assessing motivation for the psychology major: Learning Goals in Psychology (LGP), and Psychology as a Helping Profession. (PHP). In developing the LGP we reviewed Breen and Lindsay's original paper which outlined eight learning goals in addition to six above. We constructed a 32 item scale with four direct items each to capture goals. The small body of literature on motivations for choosing psychological careers suggests that introductory students view psychology as a helping profession rather than as a science. While Friedrich (1996) validated the Psychology as a Science Scale (PAS), there is no equivalent Psychology as a Helping Profession scale. Therefore, our 15-item survey focused on applied, practical, and helping aspects of psychology using the same format as the PAS. Survey items are presented in the poster.

We are collecting data from introductory psychology and upper division psychology students to ascertain the relationship of the three scales. We expect that majors endorsing goals of analytic analysis on LGP will be more likely to view psychology as a science, whereas students endorsing psychology as a helping profession will be more likely to be Human Services majors endorsing social innovation, self esteem, and career aspects of goals.

Parental involvement in UWSP students' academic activities

Ryan Frasch and Kristina Larsen
Faculty Mentor: Debbie Palmer

Increasing evidence demonstrates that parental involvement in college education during the emerging adulthood period continues to be important to achievement (Dornbusch, Ritter, Leiderman, Roberts, & Fraleigh, 1987; Ratelle, Guay, Larose, & Senecal, 2004). To date, however, little is known about the nature and form of parental involvement in educational activities during this emerging adulthood period. Using the Social-Contextual Model of Everyday Problem Solving (Berg, Meegan, & Deviney, 1998) we explored how 83 UWSP students (35 males, 45 females) ap-

praised their parents' roles, involvement in, and knowledge of their educational activities, and the connection to variables of interest, including gender, mood and depression levels, family cohesion and adaptability, and G.P.A.

More participants reported discussing academic activities with their mothers than with their fathers, $t(80) = -2.16$, $p < .01$. Female students were more likely to discuss academic activities with their mothers than were male students ($r = -.24$, $p = .03$). Academic activities were most often appraised as shared equally with their mothers (43.4%) and indirectly with fathers (40.2%). Most participants were satisfied with the amount of parental involvement in, and knowledge of, academic activities. Conflict with mothers (19.3%) and fathers (12%) over academic activities was relatively uncommon, and conflict with fathers happened more frequently with younger participants ($r = .44$, $p < .01$). Participants who appraised their academic activities as shared with their mothers were less likely to report conflict than participants who appraised their academic activities as their concern alone or indirectly affecting their mothers ($r = -.27$, $p = .01$). Conflict with both mothers and fathers over academic activities was linked with less frequent positive mood states in participants ($rs = -.25$ and $-.30$, $ps < .05$). Depression, family cohesion, and family adaptability did not significantly relate to appraised parental involvement or conflict over academic activitie.

Where is justice in the realm of values and politics?

Andrew Kastner and Steven Sworsky
Faculty Mentor: Craig Wendorf

Justice criteria (e.g., voice, equity, etc.) can be conceptualized as values. But where do notions of justice fit relative to other values as identified by others (cf. Schwartz, 1992)? Does the importance attached to these justice criteria vary according to political affiliation?

Students at a midwestern public university ($N = 130$) responded to a modified version of the Schwartz Value Survey that included listings for the five categories of ideological justice concerns as well as 15 specific justice criteria. Importantly, students also completed a brief demographic form that asked them, among other things, to self-identify their political affiliation.

Nonmetric, multidimensional scaling was utilized to recreate the two-dimensional layout consistently derived by Schwartz (1992). The categories of justice concerns were systematically related to Schwartz's value types. Both normative-distributive concerns and specialized-distributive concerns were most similar to Tradition values, interactional concerns were most similar to Universalism values, and both participatory and procedural concerns were most similar to Security values. Also, a MANOVA indicated that students with different political affiliations rated the justice concerns differently. On the separate justice categories, for example, Republicans rated procedural concerns as less important than did both Democrats and Independents; Republicans also rated normative-distributive concerns as less important than did Democrats and Independents.

This study supports Fischer's and Smith's (2004) findings that justice concerns are theoretically consistent with Schwartz's (1992) value types. Finally, this study adds to Caprara et al.'s findings (2006) by linking general values—and explicated justice values—to political affiliations.

Sex differences in, and relations among, parents' division of labor, future division of labor, and egalitarian attitudes

Ryan Laswell and Sara Rae
Faculty Mentor: Erica Weisgram

The traditionality of parents' division of labor can play an important role in students' attitudes and predicted behaviors. Our study explores the role of parental traditionality (e.g., the division of labor among the parents) and how it relates to males' and females' expectations of future family roles and egalitarian attitudes towards occupations. In addition, this study examines sex differences in these variables in order to explore group level trends.

Participants (N = 130) consisted of undergraduate college students (men = 60, women = 70), primarily made up of freshmen and sophomores who were enrolled in an introductory psychology class. Participants completed a survey that includes measures of Parent's Division of Labor ("Who Did What?"), Future Division of Labor ("Who Will Do What?"), and Egalitarian Attitudes ("Who Should be a Firefighter?").

Significant sex differences were found in students' egalitarian attitudes toward occupations and future traditionality of gender roles. Women had significantly higher levels of egalitarian attitudes toward occupations whereas men were significantly less traditional in their future division of labor. In addition, there were significant relations among variables. Among men, egalitarian attitudes were positively correlated with traditionality in their future division of labor and negatively correlated with traditionality in their parents' division of labor. Among women, traditionality of parents' division of labor was related to traditionality of future division of labor.

Fairness concerns and perceptions of accused terrorists

Gina Patovisti and Nicole Meyer
Faculty Mentor: Craig Wendorf

This study (which is nearing completion of data collection) is examining the relative importance ascribed to procedural, interactional, participatory, normative-distributive, and specialized-distributive fairness. Would participants differentially morally exclude (Opotow, 1990) terrorists from these standards of fairness depending on the terrorists' country of birth and admissions of guilt?

American-born college students are responding to mock online newspaper stories about a female terrorist act (a bombing of a federal building). Participants in the study are reading one version derived from a 2 (admission vs. accusation of guilt) x 2 (American-born vs. foreign-born) factorial design. Following the presentation of the story, participants are then rating (on Likert-type scales) the importance of the fairness criteria (e.g., trust, consistency, equity, etc.).

If the findings are consistent with previous work (Wendorf, Parker, Seefelt, Kosmalski, & Teo, 2006), it is expected that a 2 x 2 MANOVA should indicate that similarity between the respondents and the terrorist impacted procedural and interactional fairness concerns. We hypothesize, for example, that participants will likely rate fair trial procedures differentially important for

American-born and foreign-born perpetrators when the individual was only accused of the crime. However, when the individual admitted to the crime, fair trial procedures were rated significantly less important for foreign-born than for American-born terrorists. In contrast, distributive-oriented concerns were generally not affected by admission of guilt or country of birth.

These studies should demonstrate that the importance people attach to the different criteria of fairness is influenced by various characteristics of the attitudinal target. Whereas concerns about procedural and interactional justice may be primary (Tyler & Smith, 1998), they are not universally important.

False memory for schema-consistent and schema-inconsistent misinformation
Erin Papp
Faculty Mentor: Robert Nemeth

Throughout the past 30 years, significant research has been conducted on false memories and the misinformation effect. Loftus (2005) defines the misinformation effect as the impairment of memory after being exposed to misleading information. The current study was a partial replication of Nemeth & Belli (2006), who found a stronger misinformation effect for schema-inconsistent items. Schema-inconsistent items are objects that are not expected to be found in certain environments (e.g., a hockey stick in a living room). Our study consisted of three phases: First, participants were shown digital color photographs of common scenes containing both schema-consistent and schema inconsistent items. Second, participants read narratives describing various scenes that contained either additive or contradictory misinformation. Third, participants were asked to recall information through a 20-item cued recall test. Participants were also asked whether they "remembered" or simply "knew" the item was in the scene. If they could not recall the item, the participants were asked to respond, "do not remember." We replaced the "guess" response of Nemeth & Belli with the "do not remember" response in order to see whether the greater misinformation effect for schema-inconsistent items was driven by guessing. Our results indicated that we did not replicate Nemeth & Belli. We did not find a main effect of schema consistency, but we did find an interaction between the type of misinformation given and schema consistency such that the misinformation effect was greater for schema-inconsistent items but only when participants were given additive misinformation. When participants were given contradictory misinformation, schema-consistent items produced a stronger misinformation effect. The failure to replicate Nemeth and Belli will be discussed.

Outcomes for college students choosing team testing: A follow-up study
Chasidy Bol, Natasha Denk, Rhea Owens, and Catherine Sheehan
Faculty Mentor: Jeana Magyar-Moe

Past research indicates that when college students are allowed to test in two-person teams, learning is facilitated, course exam scores go up, and positive attitudes toward the team-testing experience are apparent. The current study was conducted in order to replicate and expand the findings of previous research whereby team testing was evaluated in terms of exam performance and course grades. Additionally, student decision methods regarding choice of partners, as well as the study-

ing and test taking methods used by those choosing the team format were assessed. Overall, the host of constructs evaluated in the study was used to facilitate understanding of the benefits and potential problems associated with team testing, the characteristics of students who prefer team-testing, and the characteristics of students who may profit most from a cooperative exam format.

What do Millennial students expect in the college classroom?
Colleen Aird and Autumn McKeel
Faculty Mentor: Craig Wendorf

Recent analyses of the popular media and business literature have suggested that the Millennials – individuals who were born after 1982 – may reflect a unique generation of students who bring with them unique talents, skills, and challenges relevant to the classroom. But do students of this generation really possess these implied characteristics, tendencies, and preferences?

Predominately freshman students at a Midwestern public university (N = 178) completed a 50-item survey that assessed attitudes toward seven broad "traits" of the Millennial generation (e.g., Sheltered, Confident, Team-Oriented, etc.) identified by Howe and Strauss (2000). For each item, students stated whether the statement is true of them (on a 5-point Likert-type scale) and whether they believe it is for others their age. For example, students were asked whether they preferred a "Team-Oriented" classroom environment with discussion and interaction. Additional qualitative data were gathered.

The results convey a profile of preferences of Millennial students. For example, students generally rated "Team-Oriented" elements of the classroom as important; students generally preferred classroom participation, interaction, and discussion. Similarly, they strongly preferred prompt feedback and communication from faculty, especially using modern technology. Interestingly, students did not always believe that other students their age held similar views. For example, they were significantly more likely to indicate that classroom interaction was more helpful for themselves than it appeared to be for others.

Overall, these data provide a richer portrayal of Millennial students' preferences. Perhaps past characterizations have been too simplistic. Certainly, the data indicate that applications of these "traits" to the classroom (as in Strauss & Howe, 2003) must be made with care.

Oral Presentations
Session III: 11:00 - 12:00

Department of Physics & Astronomy

Science Building A201
Session Moderator: Professor Hai Nguyen

Laser cooling and trapping of Rubidium atoms
Steve Lynam
Faculty Mentor: Hai Nguyen

The physics of laser cooling, magnetic trapping and manipulation of neutral atoms are used to develop applications to new kinds of physics measurements and processes such as high resolution spectroscopy, atomic clocks, atomic collisions, atom optics, bio-molecular interactions, and atomic-scale and nano-scale fabrication. All of these technologies are possible because laser cooling allows one to slow atoms to roughly the speed of a mosquito and to control their motions with unprecedented precision. In this talk, the details of laser cooling and trapping of Rubidium atoms will be presented.

Department of History

Science Building A202
Session Moderator: Professor Nancy LoPatin-Lummis

An invitation to the dance
Kathryn Stankivitz
Faculty Mentor: Nancy LoPatin-Lummis

The intent of this paper was to investigate the conception of the dance program at the University of Wisconsin–Stevens Point. Robert Cantrick, Dean of the School of Fine Arts from 1964-1969, played a pivotal role in establishing the dance program. In its early years the dance program grew very slowly. One of the major challenges besides lack of financial funding was the struggle of determining whether dance should be classified as part of the theatre or physical education department. By 1969, the College of Fine Arts became home to the dance program. From there it would continue to grow and is still thriving today. However, none of this would have been possible without Cantrick. He was responsible for convincing the academic council to approve the development of the dance program. Cantrick hired the faculty members necessary to make the program

blossom. He also publicized the program through the National Institute for Advanced Study in Dance Education, which was held at Stevens Point. Robert Cantrick played the essential role in the primary development of the dance program at the University of Wisconsin–Stevens Point.

Where did all the cookies go?: Girl Scouting and World War II
Shana Brey
Faculty Mentor: Nancy LoPatin-Lummis

When one thinks of Girl Scouting, the annual cookie sale is usually the first thing to come to mind. The cookie sale has always been a major factor in Girl Scouting, but during World War II, bakers seized production of cookies due to restrictions on the use of flour, sugar, and other baking supplies. The Girl Scouts needed a new fundraising item to raise money for council events, recruiting and training volunteers, and maintaining camps and activity sites. The Girl Scout Organization also developed a new program in 1942, Senior Service Scouts, for girls aged 15-18. Girls in this program were trained for messenger service, learned outdoor survival skills, and how to use common household and carpenter tools. Once a girl met the requirements to become a Senior Service Scout, she began work on a War Service Project. A total of eleven projects were available, and girls worked in groups to complete the project. The service projects encouraged girls to participate in their community. The work that Girl Scouts did during World War II resembles the work done by other women on the home front. Many women became volunteers for the Girl Scout Organization and participated in similar activities as the Girl Scouts. Many women could be found rolling bandages for the Red Cross, volunteering for the USO, or planting victory gardens. Preserving democracy was crucial during World War II and Girl Scouts did everything possible to keep democracy strong and the United States a safe and powerful nation. Research for this project included reviewing and researching original pamphlets sent out to Girl Scout volunteers encouraging them to help, books published by the Girl Scout organization with new program descriptions, books on how girls could help during wartime, and original Girl Scout Handbooks from the World War II time period.

Department of Mathematics & Computing

Science Building A203
Session Moderator: Professor Andy Felt

UWSP's Center for Athletic Scheduling
Brad Helf, Alexander Richter, and Lisa Schmidt
Faculty Mentor: Andy Felt

The Center for Athletic Scheduling (CAS) at UWSP is a student-run organization which creates schedules for NCAA Division III athletic conferences. Schedules are created using mixed-integer linear models that are customized to the conference's scheduling needs. We describe the birth of the CAS last summer, its growth through the academic year, and a sample model.

Web Parts at work: Healthcare Provider's Dashboard
Doug Forst and Josh Eide
Faculty Mentor: Robert Dollinger

Web application developers face new challenges in providing innovative features that insure an improved user experience. Customizable, dynamic, flexible and responsive Web pages become the norm for the modern applications. Two technological breakthroughs seem to get an edge in providing such features: the first one is the family of Web Parts controls, introduced by Microsoft with ASP.NET 2.0, and the second one consists of the set of technologies generally known as AJAX (Asynchronous JavaScript And XML). This first paper elaborates on the development experience related to the creation of a customizable and dynamic Healthcare Provider's Dashboard. This is a custom application used to display and manage important information and tasks associated with a healthcare provider. The main objective of the project was to fit as much information as possible into the interface, while making the pages customizable and dynamic such that each user would be able to customize the interface to his or her own liking. This means the user can move around and reconfigure items on the interface, dynamically add or remove items, and save these personal settings to be retrieved the next time the user logs in again. Web Parts, available in ASP.NET 2.0 within Visual Studio 2005, have been identified as the right tool to achieve this kind of functionality. A key Web Parts feature, known as personalization, lets one save user-specific settings for each page and reuse those settings in future browser sessions. Other features include drag-and-drop, connections between Web Parts, custom verbs (verbs are represented in the UI as buttons, links, or menu items), themes, and add-or-remove capabilities. The Web Parts are managed by a WebPartManager, and implement many different controls and classes. Each Web Part contains a Web User Control that can be personalized through an associated EditorZone, which has been specifically created and customized for that control.

Department of Biology

Science Building A207
Session Moderator: Professor Eric Singsaas

Demand controlled photosynthesis overrides elevated CO_2 feeding effects in Hybrid Poplar
Tyler Fuhrman
Faculty Mentor: Eric Singsaas

Experiments have shown increased plant productivity at elevated CO_2, others show either no effect or negative effects of increasing CO_2 on productivity. When plants grow slowly, they must change the rate of photosynthesis to match the need for photosynthate. Our goal was to analyze supply and demand control at 580ppm (elevated) CO_2 areas and 350ppm CO_2 (today's conditions) at the F.A.C.E. (Free Air CO_2 Enrichment) site; using a portable photosynthesis measurement system to measure rates of photosynthesis at differing light levels. In elevated CO_2 condi-

tions, photosynthesis became depressed in the afternoon verses the control (normal CO_2) areas of the F.A.C.E. site. The magnitude of decrease was greater in the elevated CO_2 ring then in the control ring. We calculated relative control of supply and demand and from these treatments it shows demand becomes the dominate factor controlling CO_2 uptake and hence plant productivity. In the four different treatments at the F.A.C.E. site, large differences were seen between them. Thus elevated CO_2 has a smaller effect on CO_2 uptake than the photosynthesis measurements would have predicated. The demand for light entering a plant verses the availability of open PSII (photosystem two; the first step in the electron movement pathway of photosynthesis) sites controls photosynthesis, not limiting resources like CO_2 in the environment.

Isolation of Methyl-butenol from Ponderosa Pine
Brent Rivard
Faculty Mentor: Eric Singsaas

Ethanol (C_2H_6O) has been promoted as an alternative to fossil fuels, but it has many undesirable qualities. A possible alternative, Methyl-butenol (2-methy-3buten-2-ol, "MBO", $C_5H_{10}O$), is a five-carbon alcohol emitted by many plants that is less soluble in water than ethanol and has a higher heat of combustion. MBO is synthesized by MBO synthetase. The goal of my research is to isolate and amplify MBO synthetase. If the gene for MBO synthetase were known, it could be spliced into plasmids and then into a microorganism with the proper substrates that would then be capable of producing MBO in quantity. To date, leaf proteins from two samples, MBO+ and MBO-, were separated by 2-D gel electrophoresis. Spots unique to the MBO+ were sent to the University of Minnesota Proteomics Center for amino-acid sequencing. These sequences where used to create degenerate primers for RT-PCR amplifying a part of MBO synthetase. This partial gene sequence was then completed by RACE-PCR. A complete MBO synthetase gene can now be inserted into E. coli to produce MBO.

Department of English

Science Building A208
Session Moderator: Professor Barbara Dixson

Faith and superiority in *A Lesson before Dying*
Peter Kruger
Faculty Mentor: Barbara Dixson

In the text *A Lesson before Dying*, by Ernest Gaines, there are some very interesting tensions presented by the author. The novel is about Grant, a teacher who is pressured by his family to counsel a death row convict, Jefferson. The text mostly illustrates racial tensions, but there are religious underpinnings, as well. These are more subtle, but nonetheless are quite intriguing. Grant feels as though, because of his education, he is above superstitious nonsense, and indeed marvels at his own superiority. Miss Emma and Tante Lou, in the novel, as well as Reverend

Ambrose, push Grant to work with Jefferson inside of a framework of Christianity, and to teach him about Christ. After a scene where he particularly denounces religion, he answers Jefferson's questions about Jesus Christ. Grant notices at one point that he can never believe in anything for very long. Later, Grant tells Jefferson to face death like Christ, and that he can redeem his people through his execution.

Recently, I have been able to study this text, through online discussion with Adams-Friendship High School in conjunction with UWSP, and have seen some fascinating insights with the high school students. The students in this literature circle project have also given some fascinating insights into the character of Grant and Jefferson. In response to a prompt about if Grant really believed anything, one of the students wrote, "He must believe in something if the only reason why he is going to see Jefferson is because of Vivian, so he believes in Vivian and what she wants." I intend to discuss these insights and views about the novel and the questions the novel brings up about faith and belief.

Tank Girl: Deconstructing the corporate hierarchy
Brian Kowalski
Faculty Mentor: John Coletta

The film "Tank Girl" (1995) has received much negative criticism, both from traditional and feminist critics. While traditional critics argue the film's technical shortcomings, feminist critics argue that the film positions itself as a postfeminist text, thus undermining the tenets of true feminism. This paper argues, through semiotic analysis, that "Tank Girl" does in fact espouse a feminist set of values. It examines the ways in which "Tank Girl" symbolizes an antithesis to the male corporate power structure and its trappings. It shows how the symbols of that structure may be shown systematically to deconstruct themselves. The paper then focuses on the tank as an ambivalent sign of male power—one that is simultaneously phallic and gynecological, one that is simultaneously representative of the desire for absolute power and dominion and, paradoxically, for absolute withdrawal and protection; the film, once establishing this sign, then undermines the facetious illusion whereby all genders are made to serve a masculinist deployment. Thus we see how "Tank Girl" rejects the male gaze's vision of woman and further undermines the environment that creates it. We then show that, through relationships with the Rippers (representing a new non-threatening, equal male presence) how feminist principles are reified in the film, creating a new signifying order.

Department of Philosophy, Religious Studies, and Anthropology

Science Building A210
Session Moderator: Professor Barbara Butler

Education among Yemeni women
Rachelle Fawcett
Faculty Mentor: Barbara Butler

My intention is to examine theories behind the lack of girls' enrollment in education in some Arab countries, therefore investigating whether the cause is cultural, religious, or economic. I will then compare these findings to my own research in Yemen and present possibilities of improving girls' education from within, rather than imposing foreign ideologies. Much of the work written on education in Arab societies comes from a very Western viewpoint, e.g., measuring advancement by economic success, which may not work given Arab values that, especially in the Arab tribe, tend to revolve around the family and not the economy to the extent of Western societies. In Yemen I observed that girls and their intelligence were highly valued but that parents distrusted an education system that lacked funding and resources. In this presentation, I use Microsoft Power Point to display pictures of schools and children, taken from UNICEF's annual reports on Yemen, for emphasis. My conclusion explains some of the ongoing efforts to improve girls' education and my intentions for further fieldwork in Yemen related to the issue.

Tourism, cultural preservation and shamanic practices among the Tsachila Indians of northwest Ecuador
Nicholas Igl
Faculty Mentor: Barbara Butler

Maintaining a cultural identity among indigenous populations is a challenging endeavor because both external, global pressures as well as internal desires to enter the mainstream are prevalent. The Tsachila Indians of Ecuador strive to cultivate their culture as it interacts with different forces and ideals. Last summer I had the opportunity to travel to Ecuador for a three week program, which included a two night stay with Tsachilas. I left the Tsachila reserve with not only vibrant pictures and memories, but also an understanding of efforts to save their identity through shamanic and language preservation.

While in Ecuador we had the opportunity to observe shamanic training and cleansing ceremonies that included the use of the hallucinogenic root ayahuasca. Yet I, as well as my 15 travel companions, was a tourist observing a rite of which we had very little knowledge. Does tourism in Tsachila and native communities pose a threat to the endurance of original practices insofar it presents Indians in a "museum" like manner, or can tourism work as a mechanism to sustain native identity? I will show that tourism helps the preservation of culture as it can exemplify the unique practices found within.

A shaman named Agustin taught us about numerous aspects of Tsachila culture. Agustin's knowledge stretched from medicinal uses of native Ecuadorian plants to shamanic training. Shamanic practice and training plays a vital role in cultural preservation because it unites people through belief and ritual systems as well as language. I found these shamanic customs to be a unifying force in their community because they acted out their beliefs together.

Division of Business & Economics

Science Building A212
Session Moderator: Professor Elizabeth Martin

A Stevens Point ethanol station: A market research study
Tara Scott, Chelsea Dobrzynski, Kimberly Stobbe, and Allison Cooper
Faculty Mentor: Elizabeth Martin

We called ourselves the Pure-Life Research team and our goal was to find a beneficial business for the Stevens Point area. We wanted to come up with a business that would benefit not only the City of Stevens Point, but the students of the University as well. We did not want to bring in any franchises or chains to the area, and wanted a new and unique business. This involved extensive research of Stevens Point, potential customers, and experts of the industry.

We used marketing research techniques in order to guarantee that we chose the most beneficial business. We started with exploratory research, then qualitative research and worked our way into quantitative research. We started with individual brainstorming and took that into a team collaboration. Pure-Life Research decided to bring an ethanol (E85) station to Stevens Point. We conducted personal interviews with potential customers and experts of business. We also formed focus groups, and put together surveys for the potential customers. All this information led us to a preliminary conclusion that yes, Stevens Point should have an ethanol station at the intersection of Interstate 39 and Highway 10.

The difficulties and opportunities for developing ethanol markets
Jack Gadamus
Faculty Mentor: Jason Davis

This research analyzes the renewable resource of ethanol, and how ethanol is a substitute for gasoline. The first goal of this research is to explore the barriers that have slowed the development of ethanol production. Despite the barriers to produce ethanol, the main point to this goal is to find out how ethanol firms have overcome the barriers. The second main goal is to explore the model of the government subsidies on ethanol, and how the subsidies aid in the research, development, and production of ethanol. Under this second main point, there will be a brief look at how the price of gasoline affects the subsidy and the market of ethanol. The last goal looks into exter-

nalities derived from the production of ethanol. The first externality will discuss reduced green house gas emissions, based on a theoretical model of social benefit derived from the reduction of green house gas. The second externality will look into the corn market, and the potential impacts of expanding the ethanol market. For both potential externalities, there are debates on whether the externalities are positive, negative, or neutral. The research will conclude with a discussion of the effectiveness of ethanol expansion on reduced dependence on fossil fuels. These three main points—ethanol barriers, government sbsidies, and externalities—are vital to understanding the current situation of ethanol production.

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

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