



University of Wisconsin - Stevens Point

College of
Letters and Science

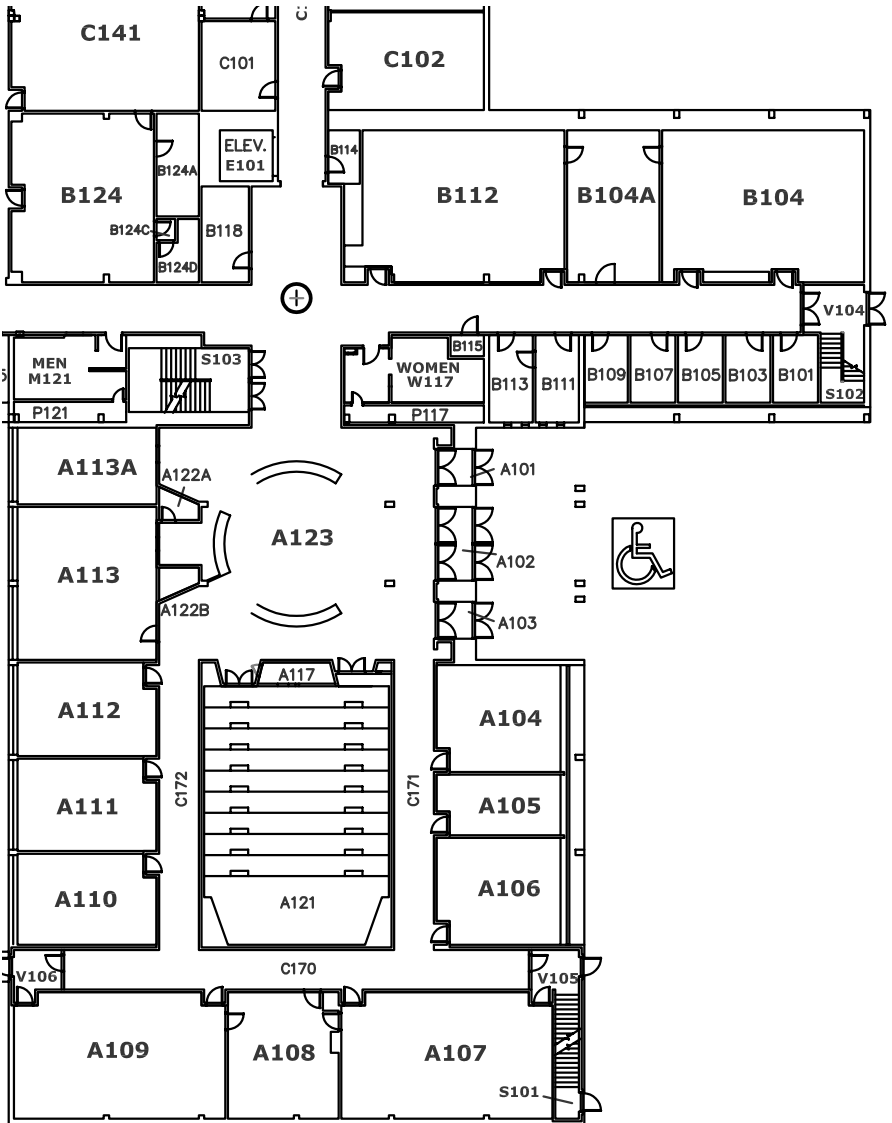
The Eleventh Annual

Undergraduate Research Symposium

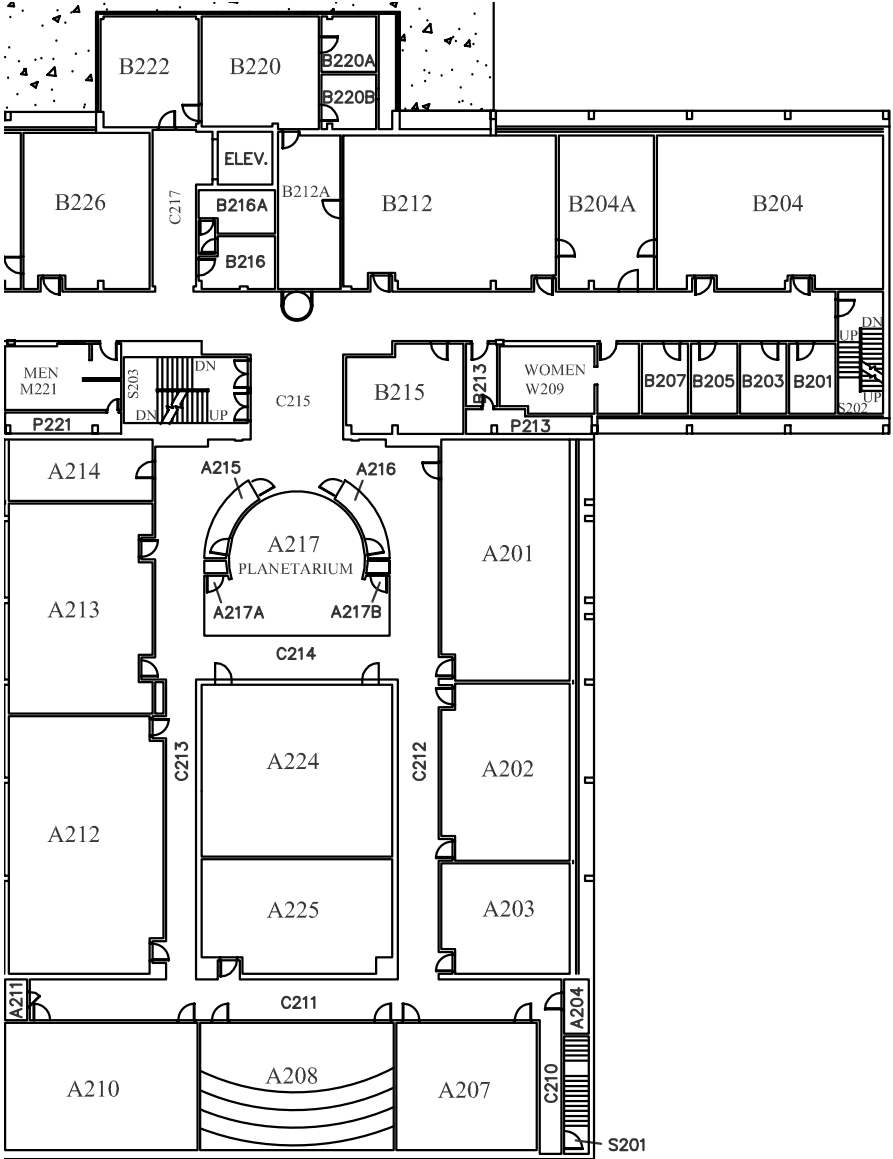
Friday, 30 April 2010

Science Building, A wing

Science Building - 1st Floor



Science Building - 2nd Floor



Dean's Welcome

Room A121, Science Building

2:00 PM

Oral Presentations

*See Program for Individual Room Locations
and Time Assignments*

2:20PM – 5:00PM

Poster Presentations

1st and 2nd Floor A Wing Corridors, Science Building

3:00 PM - 4:00 PM

Dean Christopher Cirimo 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 Hansen Lobby of the Science Building.

The first set of oral presentations will begin at 2:20, with two papers per session (with one exception), and each paper taking 25 minutes with a five minute break between papers. A 45 minute intermission will follow at 3:15, with the second set of oral presentations beginning at 4:00.

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

Thank you.

Oral Presentations

2:20 – 3:15

First & Second Floor Science Building

Group 1
Room A210

Moderator: Sarah Pogell

Roles of Yemeni Women in Syncretistic Religious Practice

Rachelle Fawcett

Faculty Mentor: Stephanie W. Aleman

Religiously active women in Yemen play different roles as scholars, witches, healers and teachers. These positions influence the overall status of women in society, literacy and health care either as productive religious leaders or as inherently weak and evil magicians. This workshop will examine the details of those roles and the ways they intertwine and react with society based on student fieldwork in 2006 and 2009 in the village of Dhamt and Yemen's capital, Sanaa.

The Myth of the Gypsy Fortuneteller in Reality and Literature

Kacie Otto

Faculty Mentor: Robert Sirabian

The Romany people, more commonly referred to as "Gypsies," have long fascinated gadje, or non-Romany people, who have been unable to live like the Romany. Scholars are not exactly sure of the origins of the Gypsy, but they are thought to be people of India's Untouchables caste who left India to escape persecution. Today, the Romany people still live a nomadic lifestyle, and the gadje still simultaneously despise and admire this way of life. One of the most popular stereotypes of the Gypsy is the Gypsy fortuneteller. When one pictures the Gypsy fortuneteller, one pictures the image depicted in film and in literature, such as Oliver Goldsmith's *Vicar of Wakefield* and Charlotte Brontë's *Jane Eyre*. The Romany people use the mythical image of their people to their advantage. By using people's desire

to live like the Gypsy, delve into the mystic, and know the future, they are able to turn their fortuneteller stereotype into a lucrative business endeavor in most major cities of the world. *Jane Eyre* and *The Vicar of Wakefield* both create a largely stereotypical image of a gypsy fortuneteller. However, characters in both works despise and desire to know what the fortuneteller has to say, as in real life. Romany people in turn use the romantic and fantasized image of their fortunetelling businesses to their benefit, effectively using people's desire to learn more about the mystic to increase profits. The way the Gypsy fortuneteller is depicted in popular culture and the actual life of a Romany fortuneteller often run parallel; the reality of the Gypsy fortuneteller enhances the myth of the Gypsy fortuneteller and vice versa.

Group 2

Room A106

Moderator: Todd Good

Wisconsin Soldiers in the Civil War: Motivations

Jeffrey A. Schinker

Faculty Mentor: Valentina Peguero

Room A106

In late fall and early winter of 1860-1861, southern states declared their secession from the United States and formed the Confederate States of America. This action represented an expression of individual states rights and was at the heart of the slavery issue. Wisconsin was a frontier western state at the time, and expressed its own stance of individual states rights in 1857 by passing legislation defying the Federal fugitive slave law. Thus, the core of this paper is an attempt to understand what initially motivated Wisconsinites to not only support the Union cause, but once engaged what motivations sustained them. The research unveils a clearer understanding of Wisconsin Soldiers staunch support of the Union army and undeniable loyalty to the Union cause. The central thesis points to three primary ideals at the onset of the Civil War: belief in God, devotion to country and love of their families. However, as time passed and the battles intensified, the injustices of slavery emerged as the main motivating factor for Wisconsin soldiers in the Civil War.

Women Soldiers of the Civil War

Tanya Bolchen

Faculty Mentor: Valentina Peguero

This paper looks at the role that female soldiers played during the United States Civil War. The paper goes over the different reasons that the women joined, how they entered the army, how they were discovered and what some of them did after the war. The key findings of this paper were that women soldiers played an important role in the Civil War. These women did the same work as men with the added difficulty of maintaining their disguises. These brave women would eventually return home to their normal lives without anyone knowing of what they had gone through. However, some women continued to maintain their manly deception in their post war lives to preserve the freedoms they experienced during the war. On top of all this, these women gained entry into the army and dealt with the conditions and challenges of the environment that they were exposed to, all the while keeping their secret.

Group 3

Room A202

Moderator: Lee Willis

“The ‘Waterwagon’ or ‘The Good Creature of God?’: The Battle for Temperance Reform in Stevens Point, WI, 1900-1919”

Dustin W. Clark

Faculty Mentor: Lee Willis

In the early twentieth century, Stevens Point, WI had many characteristics in common with places that adopted temperance legislation before the passage of the Eighteenth Amendment (Prohibition). The city had a strong, organized evangelical church base and the Republican Party, which had historically supported temperance, dominated city government. However, temperance reform failed in Stevens Point. Why was this? Using local church records, newspapers, and oral histories, this presentation will argue that because of the ethnic makeup of Stevens Point, religious diversity and economic considerations led to the failure of temperance reform.

A Selected Historiography of Lynching

David Turner

Faculty Mentor: Lee Willis

Despite claiming thousands of lives since Reconstruction, the historical study of lynching in the United States was neglected for decades. This historiographical study looks at the antecedents to historical inquiry into the subject, its eventual inception, and subsequent developments. The major contention of this work is one of parallel development between the historiography of lynching and that of African American history as a whole. Using the work of social reformers, early historians, sociologists, and modern historical scholars, this presentation will chart the development of these two bodies of work as they pass from obscurity to first treatment, from legitimization to proliferation.

Group 4

Room A109

Moderator: Charles Clark

An Exploratory Study of Psychological Factors Related to Implicit Intelligence Theory

Amanda Baumann and Kate Densing

Faculty Mentor: Jody Lewis

There are two theories of intelligence that students may assimilate: “entity” and “incremental”. Research suggests that those with incremental theory have an increased belief that intelligence is malleable and can be improved with practice; whereas, those with entity theory have an increased belief that intelligence is fixed and cannot be improved. A student’s beliefs about intelligence are important because it can influence motivation after an educational setback. Our study had an exploratory focus with the purpose to examine what psychological factors might be correlated with a student’s theory of intelligence. We administered a demographic and emotional self-report questionnaire to 103 college students. The results depict that students with an incremental theory tend to have high self efficacy, high internal locus of control, and high optimism.

Sorority Houses: An Indirect Prohibition

Scott A. Helgeson

Faculty Mentor: Kelly A. Roark

In 1932, the President of the Central State Teacher's College in Stevens Point, Wisconsin officially recognized Greek letter societies. Prior to this time, the men governing this institution saw social organizations, such as fraternities, as detrimental to academic progress and democratic principles. The men's fraternities, once recognized, quickly established their own housing adjacent to the campus grounds. The sororities, then called women's fraternities, did not establish their own housing, and lack officially recognized housing to this day. What could account for this discrepancy? Much of the scholarly research on Greek letter societies has dealt with social phenomena such as racism, alcohol consumption, drug use, and hazing. This paper will attempt to explain the lack of official sorority housing by examining the developments in Stevens Point from 1917 to the 1930s as they relate to housing and to the constraints placed upon female students. This explanation is set against the larger social fabric of the nation during this period and places the lack of sorority housing into the context of the social upheavals of the 1920s and 1930s. During these years, changes in family structure, sex roles, the availability of education, and other factors resulted in conflicts between the youth of this country and the older generations. This paper argues that it was the development of Nelson Hall, the regulations governing female students, and the Dean of Women that indirectly prohibited the establishment of sorority houses at Central State Teachers College.

Group 5

Room A107

Moderator: Cassandra Chilcote

Characterizing Two Redundant Genes Involved in Cotyledon Color in Soybean

Alina Ott, Reid Palmer, and Devinder Sandhu

Faculty Mentor: Devinder Sandhu

Cotyledon color is an important quality trait in soybeans that, once located, may be used to select other soybean traits for breeding without growing an F2 population. Preliminary studies of inheritance suggest the trait is controlled by multiple genes. The presence of one of these genes is enough

for the typical green phenotype. The objectives of this investigation were to i) identify the number genes involved in cotyledon color, and ii) to make genetic linkage maps of the regions containing these genes. Phenotypic evaluation of segregating F2 population consisting of 400 plants showed that 379 plants have yellow seeds and 21 plants had green seeds. Chi square test statistics confirmed that the trait is controlled by two redundant genes, where expected segregation is 15 yellow : 1 green. We used Bulk Segregant Analysis (BSA) to locate these genes to soybean chromosomes. D1 gene maps to chromosome Gm01 (MLG D1a) and D2 maps to Gm11 (MLG B1). Polymorphic Simple Sequence Repeat (SSR) markers were used on F2 population to make genetic linkage map of each of the chromosomes. Comparison between the genetic maps and recently generated sequence based physical maps may help us identifying putative candidates for the genes of interest.

Two New Bolivian Bamboo Species in the Genus Aulonemia

Eddie L. Shea and Tanya M. Wayda

Faculty Mentor: Emmet J. Judziewicz

Aulonemia austroviscosa and *A. bromoides*, two new bamboo species (in the grass family, Poaceae) collected from Madidi National Park, located in the upper Amazon River basin of Bolivia, are described and illustrated. *Aulonemia austroviscosa* and *A. bromoides* were both collected from forested habitats at elevations of 1960 meters and 1824 meters, respectively. We examined three spikelets from *A. austroviscosa* and five spikelets from *A. bromoides*. In each spikelet, we measured 64 different characters. Abaxial leaf surfaces of both species were examined using a Hitachi S3400 scanning electron microscope (SEM). *Aulonemia austroviscosa* is distinguishable from its congeners in *Aulonemia* by the presence of culms that are both viscous and hollow. In contrast, viscous *Aulonemia* species from Costa Rica have solid culms. Preliminary SEM analysis of this species reveals abundant prickles along the abaxial leaf surface. *Aulonemia bromoides* is characterized by its large leaves lacking fimbriate bristles with elongate (30-40 mm), foliaceous, papery inner ligules and robust spikelets with prominently nerved florets. Since only a single known collection of each species exists, we are recommending to the International Union for Conservation of Nature (IUCN) that they be assessed as Critically Endangered.

Group 6
Room A208
Moderator: John Droske

Synthesis and Characterization of Polyesters Containing Crosslinking Functionalities

Mark Juetten

Faculty Mentor: John Droske

Polymers are used in many biomedical applications, including bone cements, bioresorbable sutures, and as major components in joint and vessel replacement. Currently, there is much interest in the preparation of polymers that, like bioresorbable sutures, can undergo degradation after serving their purpose in the body. This would allow for the preparation of bioresorbable stents and joint components that could be used with fewer invasive medical procedures. In vivo studies of many existing bioresorbable polymers have shown either insufficient mechanical properties or undesirable degradation times. We have developed a straightforward, multi-step synthesis that allows for the introduction of a controlled number of crosslinkable functionalities in order to improve the mechanical properties of the resultant polymers and better regulate degradation times. A series of prepolymers were prepared from succinic acid analogs with a series of diols. The prepolymers were purified and then characterized by FT-IR and HNMR. The prepolymers were further polymerized with succinyl chloride. The resulting polymers were characterized by FT-IR and HNMR, and the molecular weight was determined by gel permeation chromatography. Preliminary crosslinking studies of these polymers also will be reported.

Proteomic Analysis of a Pregnancy Associated Plasma Protein-A Knockout Mouse Model

Ross Rortvedt

Faculty Mentor: Jim Lawrence

Our research examines 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), disable IGFBP-4'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 female wild-type and knock outs were used as a model system. Frozen embryos were ground, homogenized, and proteins were 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 were 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). The proteins can be detected by staining with Cy3 and Cy5 dyes and imaged. Three female wild-type/knock out pairs were examined. Three successful trials were run for each of the embryo samples resulting in significant, reproducible results for each. The images from the wild-type and knock out samples can be compared in order to identify protein expression differences. Comparison of the wild-type and knock out gels resulted in the identification of 6 protein spots that showed significant change in protein expression. We have identified the proteins found in each of these 6 spots.

Poster Presentations

3:00 – 4:00pm

First & Second Floor Science Building

Psychology

Autostereotyping and Heterostereotyping by American and German Students

Michael Berg

Faculty Mentor: Justin Rueb

Stereotypes affect people's beliefs about group, whether accurate or inaccurate, positive or negative (Jussim, McCauley, & Lee, 1995) and fall into two categories: autostereotyping and heterostereotyping. Auto-stereotypes are in-group generalizations; whereas, hetero-stereotypes are generalizations regarding out-group members (McAndrew et al., 2000). Inaccurate stereotypes can manifest damaging attitudes towards both in-groups and out-groups by biasing our perceptions of people, precipitating discrimination and harassment, and creating self-fulfilling prophecies (Madon et al., 2001). Jussim et al. noted that expanding cultural knowledge (e.g., changing inaccurate into accurate stereotypes) will decrease problems between groups and open the door to better interactions. Accordingly, this study investigated the autostereotypes of American college students, their heterostereotypes of the typical or average citizen of Germany, and German college students' heterostereotypes of the typical American. Significant differences resulted between American students and German students for most questions. Germans generally saw Americans more positively than Americans saw themselves. As hypothesized, Americans viewed themselves as less friendly, courteous, loving, culturally diverse, religious, industrious, and patriotic than how Germans viewed Americans.

Students' Views of Small-Group Learning in Psychotherapy Classes: Replication and Extension

Michael Berg and Kristi Conniff

Faculty Mentor: Amy Herstein Gervasio

While students like classes that include films, the ability to extract material from films merely by watching has not been established. This study extends previous research by Gervasio and Tomcek (2009) that focuses on student perceptions of the use of collaborative learning to understand concepts presented in psychotherapy films, and the carry over these groups might have for the class as a whole. At the beginning and end of the term, 80 students in five psychotherapy classes anonymously evaluated their typical level of participation and their beliefs about the value of different types of learning (e.g. from the book, in groups, from videos, etc.). Over the term students watched five 10-30 minute segments of video tapes of expert therapists, filling out worksheets that described concepts. Groups of 4-5 to discussed the concepts, and evaluated their group. Results showed that students thought that learning from the book was the least useful method while learning from the professor was best. There were several significant changes from beginning to end in the amount students felt they learned from other students and from watching videos. There were significant correlations between valuing professor's discussion and student discussion and between watching videos and learning from the professor, but not between the final grade and learning from other students. (Following IRB procedure, students were assigned a code number in order to compare expected grades to actual grades at the end of the term.) Research on a subset of data focusing on watching a video of Gestalt therapy indicated that students felt the small groups worked well, and that they could identify important concepts. Limitations to the study are that there were no control groups.

Developing Measurements to Study the Psychology of Dance

Courtney Fuller and Rebecca Levine

Faculty Mentor: Amy Herstein Gervasio

There is not a great deal of research on psychology of dance, yet dance performances evoke emotions that psychologists might find useful to study. Theorists have proposed that the neuropsychology of movement perception (Hagendoorn, 2004) and cognitive theories of visual form perception (Gervasio, 2007) can be applied to understanding how an audience attributes emotion to abstract dance. This pilot study was designed to see the extent to which students could agree on core emotions and relationships contained in abstract dances. We tested the utility of seven-

point scales of “core emotion/core relationships” to see whether they could differentiate types of dances. The study is a 2 (music/no music) x2 (gender of duets) design. Dance stimuli were two videos, one each of a male duet and female duet, found on Youtube. Although the dances were different, care was taken to have similar stimuli such as similar costuming, height, dancing in unison, lighting, and lack of definite story. Length of the videos were similar. Dependent measures relate to the perception of Ekman’s and Rosenberg’s (1997) six basic emotions (surprise, happiness, anger, disgust, sadness, fear) and relationships in same-sex duets. Participants were recruited from the introductory psychology subject pool. They received credit upon completion of participation. Participants took the Profile of Mood States (POMS), before and after viewing the dances and then completed the emotion and relationship measures. The relationships most endorsed for the male duet were rivalry, friendship and love (not sex) In contrast, with low endorsement of parental or other relationships. The research is ongoing.

Factors Underlying Political Views: Regulation, Compassion, and (not) Awareness of Death

Ryan Glaman and C. Joelle Groshek

Faculty Mentor: Craig A. Wendorf

Terror Management Theory purports that when people are made mortality salient (aware of their own inevitable deaths), they adhere to their cultural worldviews and political preferences (cf. Arndt & Vess, 2008; Cohen et al., 2004; Jost et al., 2007; Landau et al., 2004). Whereas previous research in this field has focused exclusively on physical death and has not taken people’s political orientation (conservative, moderate, and liberal) into account, the present study investigated the interactive effects of symbolic mortality salience (physical, economic, and social death) and political orientation on participants’ political attitudes. UWSP students (N = 158) initially completed surveys containing demographic questions (notably including political orientation) and wrote essays designed to make them salient to one of the three aforementioned types of symbolic death (or a control condition). Afterwards, participants completed a survey of their opinions regarding 27 different political issues (e.g., abortion, government spending, etc.); following work by Ashton et al. (2005), the political attitude responses were transformed into political compassion and moral regulation scores. Analyses indicated that there were no significant main or interaction effects of mortality salience on compassion or moral regulation. Thus, we were unable to demonstrate that mortality salience impacted global political orientation. However, analyses showed that conservatives were significantly more

morally regulative than moderates and liberals, and that liberals were significantly more compassionate than both moderates and conservatives. Thus, this study both replicated and extended Ashton et al.'s (2005) findings.

Social Transmission of Online Comments about Instructors

Phillip Potter and Ashley Windt

Faculty Mentor: Craig A. Wendorf

Multiple studies (e.g., Bartlett, 1932; Kashima, 2000; Mesoudi & Whiten, 2004) have examined how information is transmitted across individuals. However, research has not examined the transmission of students' opinions of instructors to their peers. The current study examined the transmission of information from a fictional internet site similar to RateMyProfessor.com. UWSP students, 16 communication chains of 3 students each, evaluated fictional professor profiles. Each profile contained four neutral comments (easiness/difficulty, fairness, rapport, and enthusiasm) and one slightly positive comment (knowledge). After completing an evaluation of the instructor and filler tasks, students reproduced the profile comments as accurately as possible. These responses then replaced the comments in the original profiles and were used as the stimuli for the next set of participants in the chain. Comments were recalled with unequal frequency. Course easiness was recalled by at least 80% of the chains throughout the study. However, instructor rapport was recalled by only 30% by the end of the study. Thus, students may deem specific qualities to be more important even if these qualities are not typically the focus of formal instructor evaluations (Wendorf & Alexander, 2005). Ratings of the reproduced comments showed that students generally wrote positive comments (despite initial neutrality) and this general positive bias remained throughout the communication chains. Therefore, students may have been influenced by the presence of the single positive comment and may have abstracted the information into a more general schema about the instructor (Mesoudi & Whiten, 2004).

Teaching Gratitude to Grade School Students: Well-being and Positive Emotion Outcomes

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

Faculty Mentor: Jeana Magyar-Moe

Positive Psychology is the scientific study of optimal human functioning. It is an area of psychology that has been growing rapidly in the past 10 years and has been applied to a variety of different life and work domains. One

construct within the literature on positive psychology that has been researched extensively is that of gratitude. Indeed, research shows that brief gratitude interventions result in a variety of positive psychological (i.e., increased positive affect, more alertness, more energy, enthusiasm, and attentiveness), physical (i.e., increased exercise, better sleep, fewer illness symptoms, faster recovery from illness/injury/surgery), and interpersonal (i.e. greater helpfulness and feelings of connectedness, less loneliness and isolation; less enviousness, less focus on material gains) outcomes (Emmons & McCullough, 2003). In addition, gratitude is one of five strengths (as measured by the Values in Action Inventory of Character Strengths) that is most highly correlated to subjective well-being and it is also a construct that has been empirically tested as a happiness intervention. More specifically, Seligman and colleagues (2005) found that writing and personally delivering a letter of gratitude to someone who had been especially kind to the research participants, but to whom the participants never properly thanked served to increase positive emotions for a full month. Furthermore, the act of keeping a gratitude journal in which participants wrote down three good things that happened to them each day for one week served to increase happiness and decrease symptoms of depression for a full six months. The gratitude studies previously noted were done primarily with adult participants. The current study was designed to evaluate a two-session psycho-educational program focused on teaching gratitude to elementary school students in grades 3-6.

Biology

Changes in Acetylcholine Esterase Levels Associated with Neuronal Differentiation

Dean Firkus

Faculty Mentor: Ed Gasque

Chemotaxis is the movement of cells relative to a chemical gradient. A human leukocyte-mouse macrophage cell line (WBC264-9C) is being used to study chemotactic responses to a variety of chemical and biological agents. WBC264-9C cells provide a convenient in vitro model for studying the chemotaxis of human white blood cells that fight infections in the body. Responses are evaluated on the basis of numbers or densities of cells that migrate through pores in filters in response to test agents or bacteria. A solution of the suspected chemotactic agent or a suspension of live bacteria is placed into the well of the lower half of a Neuro Probe chemotaxis device, and a filter with 5-micrometer pores is placed over it. The upper half of the

device is secured to the lower half, with the filter held tightly between and separating lower and upper wells. Cells are transferred into the upper well. The devices are placed in a humidified chamber and incubated at 37°C with 5% carbon dioxide for 2 hours. Filter surfaces are then washed with saline to remove non-migrating cells, and cells that are trapped in the pores of filters are fixed in methanol and stained with eosin-methylene blue. Stained filters are placed on slides, dried, treated with immersion oil, and examined under a bright-field microscope. The number of cells along a region at or near the center of a filter is counted for a 200X or 400X field. Stronger chemotactic responses yield greater cell counts; lower cell counts indicate weaker responses. Using this *in vitro* chemotaxis model, we are measuring responses to specific bacterial peptides, endotoxins isolated from *Salmonella enterica*, and live bacteria (e.g., *Salmonella enterica*, *Mycobacterium smegmatis*). Our results will be presented at the symposium.

Looking for Evidence of Climate Change Over the Past 45 years in Diatom Communities Preserved in Central Wisconsin Stoneroller (Cyprinidae: Actinopterygii) Gut Contents

John Grosch, Josh Wied

Faculty Mentor: Justin Sipiorski, Robert Bell

In ongoing research we are looking for the potential effects of climate change over the past 45 years on algal communities as preserved in stoneroller gut contents. Stonerollers, Family Cyprinidae, are small, benthic, stream-dwelling fishes of North America that feed on periphyton, the microscopic plant communities (mainly algae) covering most sunlit surfaces in aquatic ecosystems. Two species of stonerollers are native to Wisconsin--Largescale Stonerollers (*Campostoma anomalum*) and Central Stonerollers (*Campostoma oligolepis*). From the holdings of the Becker Memorial Ichthyological Collection (BMIC) we have identified several lots of stonerollers from the Plover River of Portage County collected over multiple time periods ranging from 1967 to the present day. These fishes have been preserved with their gut contents intact. Diatoms are single-celled algae that produce a siliceous test (shell) in which they reside. These nearly indigestible tests are well-represented in the guts of our stoneroller specimens. In pilot studies we are developing protocols perfecting skills necessary to taxonomically identify all groups present in Plover River diatom communities and to quantify any changes in the relative abundances of these groups over time. Because diatoms are single-celled, short-lived organisms capable of prolific reproduction, we hope that diatom communities have reacted relatively instantaneously to environmental perturbation over the past 45 years. As such, if global climate change is influencing the algal

communities in local, aquatic ecosystems, we hope to find that the constituency of diatoms, as assayed in stonerollers gut contents, can serve as a window to studying the effects of climactic shifts and other environmental disturbances.

Chemotactic Responses of Cultured Human Leukocyte-mouse Macrophage Hybrid Cells

Dean Firkus and Josh Coffey

Faculty Mentor: Ed Gasque

Chemotaxis is the movement of cells relative to a chemical gradient. A human leukocyte-mouse macrophage cell line (WBC264-9C) is being used to study chemotactic responses to a variety of chemical and biological agents. WBC264-9C cells provide a convenient in vitro model for studying the chemotaxis of human white blood cells that fight infections in the body. Responses are evaluated on the basis of numbers or densities of cells that migrate through pores in filters in response to test agents or bacteria. A solution of the suspected chemotactic agent or a suspension of live bacteria is placed into the well of the lower half of a Neuro Probe chemotaxis device, and a filter with 5-micrometer pores is placed over it. The upper half of the device is secured to the lower half, with the filter held tightly between and separating lower and upper wells. Cells are transferred into the upper well. The devices are placed in a humidified chamber and incubated at 37°C with 5% carbon dioxide for 2 hours. Filter surfaces are then washed with saline to remove non-migrating cells, and cells that are trapped in the pores of filters are fixed in methanol and stained with eosin-methylene blue. Stained filters are placed on slides, dried, treated with immersion oil, and examined under a bright-field microscope. The number of cells along a region at or near the center of a filter is counted for a 200X or 400X field. Stronger chemotactic responses yield greater cell counts; lower cell counts indicate weaker responses. Using this in vitro chemotaxis model, we are measuring responses to specific bacterial peptides, endotoxins isolated from *Salmonella enterica*, and live bacteria (e.g., *Salmonella enterica*, *Mycobacterium smegmatis*). Our results will be presented at the symposium.

What is Your Risk of Contracting Lyme Disease and Human Granulocytic Ehrlichiosis (HGE) concurrently when Bitten by a Deer Tick Residing near UWSP?

Britney Helling

Faculty Mentor: Diane A. Caporale

Human Granulocytic Ehrlichiosis, HGE, is a human infectious disease of the blood spread by a deer tick vector. It is caused by a bacterium (*Anaplasma phagocytophilum*) that causes a similar human response as Lyme disease, also caused by a tick-borne bacterium, which is found throughout Wisconsin. HGE was first discovered in our state in 1994. Within the last decade the spread of the Lyme disease pathogen has dramatically increased as well as deer tick abundance in Central Wisconsin. To test whether deer tick abundance correlates with *Anaplasma* abundance as well, the DNA from ticks collected in previous years were analyzed. Methods included amplifying a 16S-like gene using PCR and identifying the pathogen by gel electrophoresis. Out of 70 deer ticks collected in 2003 from Schmeeckle Reserve, only 2 harbored *Anaplasma*. In comparison, 5 out of 28 deer ticks collected in 2008 carried *Anaplasma*, which is a jump from 3% to 18% in just 5 years. Such a rise in prevalence suggests an increased risk for contracting both Lyme disease and HGE concurrently when bitten by a deer tick near campus. For more accurate risk assessment, all of the deer ticks harboring the Lyme disease agent from previous years are currently being tested for the HGE agent. Therefore, the co-occurrence rate will also be reported.

A Survey of Liver and Lung Parasites in Wisconsin White-Tailed Deer

Jenna Hulke, Brooke Rose, Sarah Wood, Shannon O'Brien, Michelle Frank

Faculty Mentor: Todd Huspeni & Shelli Dubay (CNR Wildlife)

White-tailed deer (*Odocoileus virginianus*) serve as hosts for several helminth parasites, including the giant liver fluke, *Fascioloides magna*, and tapeworm stages of *Echinococcus granulosus* and *Taenia hydatigena*. We assessed parasite levels in Wisconsin white-tailed deer harvested during the fall of 2009. We provided kits to hunters to procure lungs and livers. Kits were distributed to hunters in the UWSP community and youth hunters at Sandhill Wildlife Area (Wood County, WI). Returned kits were frozen at UWSP until the time of examination where the organs were cut into 5mm sections and observed parasites were recorded. We received a total of 102 sets of livers and lungs, including 30 from Sandhill. Of the 102 total samples,

there were 50 bucks, 35 does, and 17 samples where no sex was provided. Overall prevalence of the giant liver fluke, *F. magna*, was 13% (13/102), and the total worms per infected deer ranged from 1 to 7 (avg. = 2.77 ± 1.09). Prevalence of *F. magna* at Sandhill was 30% (9/30). There was a strong sex bias in overall infections of *F. magna* with prevalences of 18% (9/50) & 0% (0/35) respectively in recorded males and females. We did not observe *E. granulosus* in any sample. However, in livers and lungs we did observe cysticerci of *Taenia hydatigena* at a prevalence of 13% (13/102), and cysts per deer ranged from 1 to 4. Prevalence of *T. hydatigena* was 12% (6/50) in recorded males and 20% (7/35) in recorded females. None of the infections of *F. magna* we observed were associated with significant liver pathology. This was likely due to the relatively low intensities we observed in infected deer. The strong sex bias of *F. magna* toward males may be based on differential exposure to infective stages or differential resistance to infection, or a combination of both.

Batrachochytrium Dendrobatidis in Populations of Lithobates Picipiens (Northern Leopard Frog) and Lithobates Clamitans (Green Frog) in Wisconsin.

Brooke Johnson and Jaimie Klemish

Faculty Mentor: Erik Wild

One of the largest threats to amphibian survival is Chytridiomycosis, a contagious disease caused by the chytrid fungus *Batrachochytrium dendrobatidis*. *Batrachochytrium dendrobatidis* is known to occur on all continents where amphibians occur except Asia and is responsible for numerous mass amphibian die-offs around the world. Sampling of preserved specimens has shown that *B. dendrobatidis* was present in Wisconsin during 1969 and 1984 (Ouellet et al., 2005). The purpose of the study is to document the presence of *B. dendrobatidis* in populations of *Lithobates clamitans* (Green Frog) and *Lithobates picipiens* (Northern Leopard Frog) in the Water Management Units established by the Wisconsin Department of Natural Resources. During September of 2009, samples were taken from naturally occurring live specimens representing 19 populations from nine Water Management Units throughout the state. PCR assays were run to determine the presence of *B. dendrobatidis* in these susceptible anuran species. The occurrence and distribution of *B. dendrobatidis* among these Water Management Units and the conservation implications for Wisconsin amphibians will be discussed.

Development of Immunogold-Scanning Electron Microscopy for Identification of Cell Wall Polysaccharides in Grapevines

Kevin Juzenas, Kevin Thompson, Madigan Just and Hans Severson

Faculty Mentor: Qiang Sun

Pierce's disease (PD) symptom development on grapevines depends on the systemic spread of the bacterial pathogen *Xylella fastidiosa* (Xf) via the water-conducting system in infected vines. Thin cell wall regions called pit membranes within the water-conducting system are the barriers to the systemic spread that Xf must clear by using its cell wall degrading enzymes (CWDEs). Therefore, the presence/absence of the CWDEs' target polysaccharides in the pit membranes may determine the Xf's movement in the water-conducting system, contributing to PD susceptibility/resistance of the grapevine. This poster reports our development of a new method for detecting the presence, relative concentration and distribution of potential target polysaccharides of Xf's CWDEs. This method combines scanning electron microscopy and immunohistochemical technique and is proved effective in visualizing some pectic and hemicellulosic polysaccharides present in the pit membranes of the water-conducting system in grapevines.

Comparative Xylem Anatomy of Grapevine Varieties with Different Pierce's Disease Resistance

Lauren Krouth

Faculty Mentor: Qiang Sun

Grapevine Pierce's disease (PD) is caused by xylem-limited bacterium *Xylella fastidiosa*. Its symptom development depends largely on the pathogen's spread via the vessel system (xylem's water-conducting system) in infected vines and the subsequent vessel blockage by the vascular occlusions produced in response to the pathogen presence. Thus, we believe that xylem structure should affect the grapevine's resistance to PD. We recently investigated secondary xylem of five grapevine varieties with differential PD resistance. Our data have indicated that these varieties differed in some structural characteristics of secondary xylem. In Chardonnay (susceptible) and Riesling (less susceptible), vessels in the secondary xylem occur mostly singly and are more or less uniformly distributed. In Rotundifolia (highly tolerant), vessels are much larger than those in susceptible varieties and are less uniformly distributed. They are usually arranged in radial chains of 2-5 cells. The other two resistant varieties (89-0908 and 89-0917) have the smallest and most unevenly distributed

vessels, which usually form multiples of 3-8 cells. The size, distribution and grouping patterns of vessels affect water conductivity of xylem tissue. With the vessel blockage by vascular occlusions in infected grapevines taken into consideration, the xylem structural characteristics in the susceptible varieties may reduce water supply in the infected vines to a greater extent than those in more resistant varieties. Therefore, the differences in the xylem structure might contribute to the differences of these varieties in PD resistance.

The Becker Memorial Ichthyological Collection provides UWSP Students with many Opportunities to Conduct Fish-related Research and Learn Valuable Skills

Patrick Krueger, Jesse Schulz, Andrew Stevens, Amy Thrall
Faculty Mentor: Justin T. Sipiorski

The goal of the Becker Memorial Ichthyological Collection (BMIC) of the College of Letters and Science Museum of Natural History is multifaceted. Primarily the research collection serves to hold fishes that document the ichthyofauna of the State of Wisconsin, the Upper Midwest, North America and the Earth. Specimens housed in BMIC record an important portion of the spatiotemporal picture of the globally distributed fish communities from which they were collected. BMIC serves UWSP fish biology faculty, students and the greater Ichthyological community by providing specimens and data for myriad fish-centered research topics. The central research collection serves UWSP in three other crucial ways and our students are crucial to carry out all of these day-to-day functions. First, the collection fuels a substantial teaching collection (1,000 lots) used in our Ichthyology course, the Comparative Anatomy course, and several introductory biology courses. Second, with the help of two campus student groups, new collections of fishes from local and distant waters occur throughout the year. Third, captive, live, exotic and native, marine and freshwater fishes complement the preserved fishes to give Ichthyology students a taste of natural behaviors exhibited by a wide array of fishes and to give aquarium science students a taste of managing a live fish collection. Working in BMIC, UWSP students are currently involved in projects that teach proper curation techniques in maintaining a fluid vertebrate collection, fish identification skills, proper field collecting techniques, trends in fish community change over the past 50 years potentially indicative of climate change in Wisconsin, and skills involved in conducting numerous fish-centered public outreach programs.

A Survey of Adult Mosquitoes from Treehaven

Alecia Stewart-Malone, Taylor Christian

Faculty Mentor: Jamee Hubbard

Wisconsin's many diverse lakes, marshes, swamps, and bogs provide ideal habitat for a variety of mosquito species. There have been a few surveys for mosquitoes in Wisconsin, but most of these surveys focus only on certain species of public health concern or a certain region, such as a city or county, and most surveys were done in southern or south-central regions. A survey of mosquitoes of northern Wisconsin was published in 1968, but since then several changes have taken place in Wisconsin. Since that publication, a few species of non-native mosquitoes have been introduced into the United States, including the Asian tiger mosquito, *Aedes albopictus*, and the rock pool mosquito, *Ochlerotatus japonicus*; both of these species have been shown to be able to carry mosquito-borne viruses. *Ochlerotatus japonicus* was confirmed in Wisconsin in 2007, but it is unknown to what extent it can be found in Wisconsin. *Aedes albopictus* is currently a southern mosquito, but its range is expanding northward. The northward expansion of mosquito species can be due warmer winter temperatures, ultimately reducing mortality of overwintering insects. A recent examination of winter weather data collected from the National Oceanic Atmospheric Administration (NOAA) website for Milwaukee, Wisconsin showed that the number of days per year that exhibit temperatures below -5°F (a temperature that produces significant mortality in many southern-ranging insects) has been on a steady decline since 1950. Furthermore, even a small change in environmental temperature can result in large changes in habitat and insect populations that inhabit them, earlier seasonal mosquito activity that can extend the length of time biting mosquitoes are present, and reduction of water levels in ephemeral ponds and shallow waterways that will affect the organic matter (food for most mosquito species) concentration. The objective of this project was to determine the mosquito species present in various habitats at four environmental education centers that represent four different regions of northern Wisconsin. The four northern Wisconsin centers include Beaver Creek Reserve in the northwest region, Hunt Hill Audubon Sanctuary located in the far northwest region, Treehaven in the north central region, and Fallen Timbers Environmental Education Center in the northeast region. Four habitats were identified at each center, and at each center, mosquitoes were surveyed from a different habitat every two weeks. This gives us data on abundance of mosquitoes, species distribution, and seasonal activity for each habitat. Data will be presented for the Treehaven survey.

Highlights of the UWSP Natural History Museum Insect Collections

Courtney McKoy, Whitney Boehm

Faculty Mentor: Justin Rueb

The UWSP Natural History Museum is well known in the campus community and the city of Stevens Point by the incredible displays in the Learning Resources Center. However, it is increasingly becoming better known for its research and teaching collections. The insect collections are a component of the UWSP museum that has exceptional value to students, community members, and other research institutes. Specimens range from very old, dating back to the 1940's up to 2010 and includes pinned specimens, alcohol-preserved specimens, and glass-mounted specimens of insects and other arthropods from throughout Wisconsin and other regions of the world. These insect collections include both a research collection, specialty collections of butterflies donated by community members, and a recently developed teaching collection that can be used for the classroom or community education. The scope of these collections will be presented here.

Molecular Analysis of a Transposon-tagged Mutant in Soybeans

Jaydeep Raval, Jon-Paul Ciszewski, Reid Palmer, Madan Bhattacharyya, and Devinder Sandhu

Faculty Mentor: Devinder Sandhu

Transposons are jumping genes and are known to splice the genes they jump into. However in the somatic tissue, once the transposon leaves the gene, the plant retains its fertility. In soybean, in the progeny of this mutable line a male-sterile, female-sterile mutant plant was detected. In the subsequent progeny a branch in a sterile plant become fertile. We hypothesized that the gene controlling male and female fertility is interjected by a transposon that ultimately resulted into sterility. The objective of this study was to confirm if an active transposon is responsible for male-sterile, female-sterile mutant in soybean. We used this mutant and crossed with a fertile line to generate segregating F₂ generation. We grew F₂:3 families from 8 F₂ plants to identify fertile and sterile plants by using potassium iodide pollen staining. In addition, we grew these plants to maturity to check the seed set. The resulting sterile plants produced no seeds, whereas fertile did. Three out of eight families segregated for the trait; however, only one displayed 3:1 ratio for fertile to sterile. We will use DNA gel blot analysis to compare fertile and sterile plants. DNA was isolated from 26 plants and was blotted using

southern hybridization technique. Probe from transposon will be used to find association in banding pattern with phenotype in all plants. All sterile plants should have similar banding pattern. The finding of this association will suggest that fertility mutation is caused from the insertion of transposon in a fertility-regulating gene. Once this has been verified, the gene that is causing the dysfunction in fertility will be cloned. Cloning the gene will lead to further insights on hybrid seed development of soybeans.

Different Lighting Spectrums, Intensities, and Economics of Incandescent, Fluorescent, Halogen, and Light Emitting Diode (LEDs) Bulbs in Fish Culture

Bryan Rehwinkel

Faculty Mentor: Chris Hartleb

Many factors can impact the growth and stress of fish cultured in an artificial setting. One of these factors is lighting. Even small changes in light intensity and spectral composition can have significant effects on the feeding rate, survivorship, and growth of fish. Using different lighting methods we should be able to determine the most efficient and effective method of lighting for indoor cultured fish. We tested four types of commercially available lighting: incandescent, fluorescent, halogen, and light emitting diode (LED). Intensity was measured using a LI-COR 1000 Data Logger with an underwater quantum sensor and recorded as micromoles per second per meter². Spectral composition, in the form of wavelength of each type of light bulb, was measured at the water's surface with a UniSpec-SC Spectral Analysis System. Power consumption and cost were measured using a "Kill a Watt" meter that recorded wattage, cost to operate, and life expectancy for each lighting type. Based on previous studies, growth of certain fish such as rainbow trout (*Oncorhynchus mykiss*) and yellow perch (*Perca flavescens*), should be more sensitive to lights that primarily emit wavelengths in the red spectrum (635 – 700 nm). LED lighting covered more of the red spectrum than the other three lighting types. LED had an intensity of 2.2 micromoles s⁻¹ m⁻², had an initial purchase price of \$39.00 per bulb, a life expectancy of more than 50,000 hours, and cost \$7.35 to run for one year (at a rate of \$0.12 KW/hr). Incandescent light had an intensity of 4.4 micromoles s⁻¹ m⁻², cost \$1.03 per bulb, with a life expectancy of 3,000 hours, and cost \$39.94 to run for one year. Compact fluorescent lighting had an intensity of 2.827 micromole s⁻¹ m⁻², cost \$9.46 per bulb, had a life expectancy of 8,000 hours, and cost \$8.49 to run for one year. Halogen lighting had an intensity of 20.16 micromole s⁻¹ m⁻², cost \$8.49 per bulb, had a life expectancy of 2,000 hours, and cost \$42.04 to run for one year. Based on both spectral compositions,

intensity, and economics, LED lights may be the most beneficial lighting available for aquaculture applications.

The Herpetology Research Collection of the UWSP Museum of Natural History

Eric Roscoe

Faculty Mentor: Erik Wild

The scientific collection of preserved reptile and amphibian specimens (Herpetology) of the UWSP Museum of Natural History is one of several valuable resources that the Museum safeguards. The Herpetology Collection serves both research and teaching purposes and provides excellent opportunities for preparing undergraduates for graduate study and careers in herpetology. The UWSP Herpetology Collection houses over 4,000 preserved specimens of reptiles and amphibians. Historically, the most significant contributions to the collection were during the 1960-70's, yet no renewed efforts to document the state's reptiles and amphibians has resulted in a new period of growth. The catalogued collection is largely regional with 45% coming from Wisconsin and another 14% from Illinois, although there is material from 35 other states and 7 countries. The history of the collection, details of the holdings, future projects (e.g., electronic data-basing and web-based access), and student involvement will be presented.

The Bird Collection in the Museum of Natural History, UWSP

Jennifer Rothe

Faculty Mentor: Christopher J. Yahnke

The Vince A. Heig Bird collection is one of several excellent natural history collections housed at the University of Wisconsin Stevens Point. As of April 2010, there are approximately 2600 specimens on record, making it one of the largest bird collections in the state. Many of the specimens were donated in the early 1900s as part of the A. J. Schoenebeck collection, with the oldest dating from 1871. Many of the more recent acquisitions were patients that the Raptor Education Group, Inc. of Antigo were unable to save, while most other new acquisitions were birds that were found dead by students, professors, other university affiliates, or members of the community. Once they come in, birds are stored in special collection freezers until study skins can be prepared. Vince Heig and his students prepared the majority of specimens in the collection. More recently, biology and wildlife students like Ryan Stephens (Alumnus and current graduate student), Ginamaria Javurek (Alumnus), and Jennifer Rothe prepare most of the voucher specimens. The process involves removing soft tissues through an incision in the lower

abdomen, into which a wooden dowel wrapped with cotton or other non-absorbable fiber is inserted, resulting in a bird-on-a-stick: a convenient way to handle specimens without transferring oils from skin that could damage the specimen. The study skins are used heavily in ornithology and introductory zoology courses and can be loaned out for use in presentations by environmental education and wildlife students. They also provide a resource for scientists and community artists, and represent a record of species presence in space and time.

Comparison of Growth by Rainbow Trout Fed an Egg Protein and a Whey Protein Additive

James Wamboldt

Faculty Mentor: Chris Hartleb

Rainbow trout (*Oncorhynchus mykiss*) are a vital farm-raised species cultured for human consumption and stocking purposes. Fish farms strive to grow fish to a large size in the shortest time possible to increase production and profitability. This study was designed to compare a traditional commercial fish feed (Silver Cup trout diet), a commercially marketed fish food additive (AOVA Technologies Big Fish) and a human whey protein additive (Mullins Cheese Powder). The Big Fish formula is comprised of a chicken egg protein extract that contains vital and naturally occurring antibodies to help boost fish growth rates by reducing stress. The Mullins Cheese food additive is a less expensive commercial whey protein supplement marketed for human consumption. The six week study compared changes in growth of fish fed daily at 2 % body weight per day. Three treatment groups were assigned a feed type of either: 1) Silver Cup trout feed with no additive, 2) trout feed with Big Fish additive, or 3) trout feed with Mullins Cheese additive. Changes in percent body weight of the rainbow trout did not differ significantly among the three feed types for the first three weeks, with individual weight among all groups increasing by 0.4%. The rainbow trout fed the whey protein additive showed the least change in percent body weight for the remainder of the experiment and lost weight during the last week. Rainbow trout fed the Big Fish additive had significantly greater body weight gain, 1% over the remaining 3 weeks, compared to the control and whey protein additive groups. Besides the protein additive, Big Fish also contains enzyme-specific antibodies (phospholipase A2) designed to mitigate gut inflammation, thereby aiding fish growth and efficiency. These antibodies may play a more important role in fish growth while the protein additives serve as the delivery mechanism. This study showed that the protein additives themselves did not improve fish growth over the six weeks, but the antibodies in the Big Fish additive

did generate a slight improvement in rainbow trout growth for this short duration experiment.

Towards Cloning of a Male Sterility Gene in Soybean

Eric Wermedal, Joshua Rogers, Reid Palmer, and Devinder Sandhu

Faculty Mentor: Devinder Sandhu

Producing large amounts of hybrid soybean seeds is currently a difficult and prolonged process. Thankfully, the fully male-sterile mutant gene, *ms8*, holds promise for future hybrid soybean seed production by making the process environmentally stable and dramatically more cost-effective. Commercial exploitation requires isolation and characterization of this gene. Loss of function in the *ms8* mutant is believed to be due to presence of a transposable element in the gene. Previous research done by undergraduates in Dr. Sandhu's lab revealed that the *ms8* gene is present on chromosome Gm07 (MLG M). Fine mapping indicated that the gene is present between the telomere and Sat_389. Since the soybean genome has been fully sequenced, we know that there are 13 putative genes in that region and three of these genes (*Glyma07g00200*, *Glyma07g00230*, and *Glyma07g00280*) are of particular interest due to their roles in cell division. For this study, we are targeting these genes. We have used sequences of these genes to design several primers. If the amplified segment is larger in male-sterile plant as compared to the male-fertile plant that may suggest presence of transposon in male-sterile gene. Result will be confirmed by sequencing the entire region. Alternatively, DNA gel blot analysis will be used to confirm presence of transposon.

Almont Fossil Accessioning

Alexandria Palmer, Bryce Lindquist

Faculty Mentor: Pat Zellmer, Ray Reser

The Sentinel Butte Formation near Almont, North Dakota is known for its exceptionally well preserved late Paleocene flora. 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. At the present time the University of Wisconsin-Stevens Point (UWSP) houses the most extensive collection of Almont plant fossils collected to date. The small extent of the meander scar outcrop where these fossils have been found, coupled with intensive excavation by multiple institutions and private collectors has lead to the near exhaustion of this particular site. The rarity of

plant fossils from this era and a paucity of similar sites greatly enhance the research value of this unique UWSP collection. The current project being conducted by the Paleontology Lab staff focuses on accessioning and cataloging the numerous specimens collected. Relevant data extracted from these specimens to date has helped recreate a late Paleocene riparian environment and climate in the region now known as North Dakota. Research goals include scientific internet access to the UWSP fossils, and eventual accreditation of the UWSP Paleofossil Collection. The intent of this poster is to serve as a detailed guide for students working on the documentation and accessioning of specimens comprising the collection.

Green River Formations and Members

Victoria Kingstad, Stephanie Okray

Faculty Mentor: Pat Zellmer, Ray Reser

The UWSP Paleofossil Collection contains conservatively 8000 fossils, with roughly half from the Green River Formation. Collecting sites most often are described by geologic formation or by the primary member of the formation in which the fossils are embedded. Most students participating in fossil collection and accessioning are biology majors, with little or no background in geology. This deficit in physical geology and geomorphology creates a gap in their understanding of paleontological processes like stratigraphy and taphonomy. This poster is intended to illustrate central geologic processes and context associated with the formation and emplacement of the Green River fossils and stratigraphic principles. The Green River Formation is the largest lacustrine sedimentary deposit on earth, covering 25,000 square miles, in places up to 2,000 feet thick, and outcrops across a region spanning contiguous sections of Colorado, Wyoming, and Utah. It provides a continuous record of about six million years, covering late Paleocene through mid-Eocene Epochs. The Green River Formation is comprised of sediment deposited into three paleo intermontane lakes. Lake Uinta, Lake Gosiute, and Fossil Lake formed during tectonic uplift of the Rocky Mountains and fluctuated in volume, areal extent, and salinity because of climate change and tectonic activity. Sediments deposited as varves represent one year's deposition. Pronounced deposition cyclicity enables precise dating of the layers. Optimal taphonomic conditions and fine sediment deposition in Fossil Lake produced an Eocene Lagerstätte. The Green River Formation is composed the following Members: Wilkins Peak, Fossil Butte, Laney, Parachute Creek, Angelo, Road Hollow, Bullpen, Farson Sandstone, and Tipton Shale.

Fossil Fish Identification Key

Peter Congdon, Gwendolyn Schwanke

Faculty Mentor: Pat Zellmer, Ray Reser

Fossil Lake sediments, a portion of the Green River Formation, comprises an Eocene Lagerstätte. A Lagerstätte is a German term coined to describe either a rare deposit composed of an dense accumulation of diagnostic (unique) fossils or a layer of extremely well-preserved specimens. Fish fossils collected from the Fossil Lake area surrounding Kemmerer, Wyoming; typically come from two sedimentary layers within the Fossil Butte Member known within the discipline as the "split fish layer" and the "18 inch layer." These sedimentary layers represent approximately 4000 years of deposition. Composition of the limestone sediment indicates that the water was deep, cold, and anoxic at time of preservation. These conditions prevented scavenging and biological deterioration, and promoted excellent fossilization. Because the fossilization of an entire fish is rare, recovered specimens often consist of a disarticulated skeleton, or portions of the fish such as jaws, scales, tails, or fins. We have utilized three diagnostic features to distinguish separate recovered Green River Formation fish species in our key: jaw configuration, fin position and shape, and scale type. The jaw configuration dictates whether the mouth points up (example: tarpon), straight ahead (example: bass), or downturned (example: sucker). Fin identification is based primarily on position and shape of the caudal, dorsal, and pectoral fins. There are four scale types: cycloid, ganoid, ctenoid, and placoid. Our purpose is to provide a diagnostic fossil fish key for individuals working in the UWSP Paleofossil lab or during summer field collections to aid in identifying fossilized fish specimens from various Green River Formation sites.

Characterization of a Male-sterile Female Sterile Soybean Mutant Tagged by T-DNA

Jordan Baumbach, Rebecca Slattery, Reid Palmer, Madan Bhattacharyya, and Devinder Sandhu

Faculty Mentor: Devinder Sandhu

Agrobacterium tumefaciens is a tumor inducing bacterium that affects dicot plants. The bacterium enters wounded plants and transfers a portion of its bacterial transfer-DNA (T-DNA) from a tumor inducing (Ti) plasmid into the plant genome. This property of *Agrobacterium* is exploited to transform genes into plants. Target genes are substituted into the T-DNA and the plant is infected with the bacterium. The distribution of the T-DNA into the host genome is random and can interfere with functional genes. In a previous

study in our lab, while transforming a disease resistance gene in soybean, a male-sterile, female-sterile mutant plant was generated. The objectives of our study are to genetically map this male-sterility, female-sterility gene and to determine if the male-sterile, female-sterile mutant is result of interruption by the T-DNA. We mapped map this male-sterile, female-sterile to the chromosome Gm01(MLG D1a) using bulk segregation analysis. We have designed primers for the part of T-DNA that was transformed. We will use amplified fragment as a probe in a DNA gel blot analysis of homozygous sterile and homozygous fertile plants from segregating population to confirm if sterility is caused by introduction of T-DNA. This molecular characterization will set the stage for cloning of the male-sterility female-sterility gene.

The Effects of Viral Hemorrhagic Septicemia in Cell Culture

Elizabeth Caine & Danielle McLaughlin

Faculty Mentor: Richard Crowther

Viral Hemorrhagic Septicemia (VHS) is a single stranded RNA virus in the family Rhabdoviridae and is split into four groups based on its genotype. Type IVb has invaded the freshwaters of the United States and has been transported from Eastern Canadian Maritime Waters through the St. Lawrence River and into the Great Lakes via ballast water. VHS is now found in all five of the Great Lakes and in rivers and lakes around Wisconsin. It has a wide host range of fish, including at least 20 different species, and exhibits many different symptoms in most fish. If VHS continues to spread throughout Wisconsin, it could cause major damage to the aquaculture and tourist industry in the state. Currently, the testing procedure for VHS can take up to 14 to 28 days and there are few testing sites in Wisconsin. The purpose of our research has been to learn the procedure to test for VHS and identify cytopathic effect (CPE) in a cell culture of Fat Head Minnow (FHM) cells. Every two weeks, the cell culture was propagated. Two types of growth media were tested to see which one gave the best results for the cells. Our results showed that the DMEM/F12 provided for optimum growth. The cell line in DMEM/F12 was inoculated with VHS and CPE was seen within four days. This demonstrated that this is a highly virulent virus. The process was repeated and photographs were taken to document the pathogenesis of the virus in the cell line. Future research will consist of testing fish samples from around the state and eventually verifying the presence or absence of VHS in those samples using Polymerase Chain Reaction (PCR). VHS is a potential threat to all fish across the state and this project could lead to a better way to test for the virus in fish, or to set up a test lab at UWSP.

Chemistry

Comparison of Low Molecular Weight Proteins in a Pregnancy Associated Plasma Protein-A Knockout Mouse Model

Matthew Blodget

Faculty Mentor: Jim Lawrence

Our research focuses on studying Pregnancy Associated Plasma Protein-A (PAPP-A) and its role in the insulin-like growth factor (IGF) signaling network. IGFs are intercellular messengers that stimulate cellular growth and division. To regulate IGFs, IGF binding proteins (IGFBPs) sequester IGFs, decreasing cell proliferation and division. PAPP-A is an IGFBP protease that disables IGFBPs, increasing functional, circulating IGFs and hence cell proliferation. Wild-type and PAPP-A knock-out mice embryo pairs were used to examine PAPP-A's effect on protein expression. Each embryo was ground up, homogenized, and centrifuged to separate the proteins above 10 kD and those below 10 kD. My research project was to analyze the less than 10 kD proteins/protein fragments by use of High Performance Liquid Chromatography (HPLC). Each embryo sample was passed through our C18 column eluted with an acetonitrile gradient. The proteins were separated based on hydrophobicity. As the proteins passed through the detector, peaks were recorded in a chromatograph, which was used to compare each pair of knock-out/wild-type embryos. At least six reproducible runs were analyzed for each embryo, with the peak data being exported and examined using MicroSoft Excel. The peak areas of the wild-type vs. the knock-out embryos were analyzed to discover protein expression differences. The Excel peak data produced 19 male embryo differences and 13 female embryo differences.

Synthesis of Conjugated Bidentate Ligands

Alex Burazin, Lindsey Braun

Faculty Mentor: Nathan Bowling

Research has been carried out synthesizing large conjugated molecules. The conjugated molecules are of a specific geometry and are bidentate ligands. Due to the geometry and the complete conjugation of the ligands when a metal is present, the molecules will planarize aligning the pi orbitals and changing the electronic properties. Synthesis of these molecules was carried out using Sonogashira coupling reactions and deprotection reactions. The successfully synthesized molecules have a rhombus shape and a parallelogram shape, respectively. Current research is aimed at maintaining

these same geometries within much larger molecules, with more binding sites for metals. Metal studies were carried out on the synthesized molecules and showed a shift in the UV-visible spectrum when the metal is present. This shift is what was expected, due to the planarization of the molecule. Optimized electronic properties of these molecules could potentially lead to applications such as solar cells or transistors. When the larger molecules are synthesized, we expect to see a greater change in the electronic properties making the potential for applications even greater.

Germanium Complexes

Syngen T. Grede

Faculty Mentor: Robin S. Tanke

We are interested in studying germanium compounds because of the number of reported germanium compounds is less than other elements in the same period, which includes: carbon, silicon and tin. Also, the potential for germanium compounds to act as catalysts has only been explored recently. Finally, since germanium is a semiconductor, we are interested in using these compounds to prepare germanium nanoparticles or thin films. We have prepared a germanium (iv) complex in an air free environment. We reacted N-(2-hydroxysalicylidene)-2,4-dimethylaniline with germanium (iv) ethoxide. We detected the evidence for reaction of the ligand and germanium (iv) complexes by taking Gas Chromatography samples of the toluene we codistilled and we looked for ethanol peaks to determine when the reaction finished. We also took ^1H and ^{13}C NMR spectra of the new complex. The last thing we tried to do was take an IR spectra before the moisture in the air oxidized our complex. This also helped us see the air sensitivity our complex.

Generation of Molecules that may Inhibit Genetic Replication in Cancer Cells

Danielle Hamm

Faculty Mentor: Nathan Bowling

The objective of the proposed research is to design organic molecules, composed of nitrogen-containing aromatic rings, that can mimic the G-quadruplex region of DNA. G-quadruplex-forming series are found along the human genome at telomeric regions in gene promoters. Ultimately, research speculates that appropriately designed molecules possess abilities to biologically alter the functions and growth of cancer cells. Porphyrin structures, organic molecules composed of four linked aromatic rings, show potential to inhibit telomerase and reduce the expression of oncogens,

genetic cancer causing agents, by competitively binding to the G-quadruplex region of DNA. Our target molecule is comprised of a similar flat aromatic system with the structural ability for π - π stacking of the G-tetrads. To obtain hydrophilic and hydrophobic molecular properties, long solubilizing chains are constructed extending from the aromatic rings. Findings thus far indicate the potential for constructing a planar system in which all atoms are restricted to a common plane by complexation to a metal.

Modeling Diffusion Using Matrices

Jason Levendoski

Faculty Mentor: Paul Hladky

Diffusion is a time dependent process that arises from the random motion of particles. In simple cases, particles that are initially concentrated in a small region of space diffuse throughout the available space and eventually become uniformly distributed. More complex cases involve the partitioning of a solute species between two or more condensed phases, a situation that arises in devices that release drugs in a controlled or prescribed manner. Partial differential equations are often used to describe diffusion. While this approach is readily applied to simple cases, it can become unwieldy in complex cases. The work described in this poster starts by comparing the partial differential equation approach to a matrix-based technique and shows that the two methods yield similar results for simple cases. The rest of the poster shows how the matrix-based technique can be applied to situations in which a solute is partitioned between two or more condensed phases.

Gas Chromatographic Method for the Identification of Specific Carbohydrates in Mixtures

Amanda Nevins

Faculty Mentor: Thomas Zamis

An interest in the detection of the adulteration of foods arose as a means of quality control, but the adulteration of foods continues to be a problem. Adulteration is defined as the fraudulent modification of foods carried out by adding inert or hazardous material or substances of minor quality or subtracting those components that confer food properties or value (Ruiz-Matute et al 2007). The adulteration of foods with cheaper and more readily available materials has been going on for years, but carbohydrates (sugars) are especially hard to detect when in mixtures of other carbohydrates, as is the case with honey and apple juice. With the growing organic and natural

foods market the interest in verifying the authenticity of products has become even more important. The identification of an adulteration of a “natural” food with high fructose corn syrup or sugar beet syrup removes the ability for a company to advertise the said product as natural. Some steps have been taken towards identifying foreign carbohydrates in a substance but it is unknown whether or not monosaccharides, or disaccharides can be detected and identified in a mixture. Several different carbohydrates (glucose, fructose, arabinose, and sucrose) were derivatized using Tri-Sil Z and analyzed using gas chromatography in an effort to determine if distinct fingerprint regions for each carbohydrate could be identified both singly and in a mixture. The identification of the carbohydrate will be based upon whether or not the different number of carbons and the different location of the carbon oxygen double bonds are visible and readily distinguished.

An Investigation into the Triethylamine Triggered Formation of $(C_9H_7)Ru(CO)_2H$ from $(C_9H_7)Ru(CO)_3^+$

Robert C. Badger, Jason S. D'Acchioli, Tracey A. Oudenhoven and Brennan J. Walder

Faculty Mentor: Jason S. D'Acchioli

We investigate the formation of transition metal hydride species with the piano stool carbonyl complex $(Ind)Ru(CO)_3BF_4$ using NMR spectroscopy, utilizing isotopically labeled systems and carefully controlled reactions conditions to gauge the importance of two important mechanisms of formation: alpha-hydride abstraction from the Et_3N and a water-gas shift reaction, where the presence of Et_3N is required as a base. The formation of metal hydrides from metal carbonyls in the presence of triethylamine has been previously observed, but the mechanism by which the hydride species forms has never been investigated in great detail. It appears that the hydride formation is predominantly controlled by the latter mechanism; the appearance of unidentified products is likely due to reactive species formed from the decomposition of the hydride rather than salts from the iminium cation that would result from hydride abstraction.

The Development of Organic Solar Cells: Controlling Conformation on a Molecular Level

Cole Reedy, Cassandra Chilcote, Leah Doyle, Robert Wagie

Faculty Mentor: Nathan Bowling

Organic materials are being explored for potential application in solar cells. The advantage to these over current materials is they allow for cheaper, more durable, and lighter weight solar cells to be constructed. What is preventing these from becoming the new standard is the low solar energy to electricity conversion efficiency that these materials display. This research is focused on designing and synthesizing new organic molecules that could improve this solar energy to electricity conversion efficiency. Three different molecular structures are currently being explored for their potential use in next generation solar cells. All of these structures share one common theme; taking previously made molecules and making changes on the atomic level in order to allow for control of the physical conformation of the molecule. By replacing key carbon atoms with nitrogen atoms, we have been able to create electron rich sites that bind to metal ions. The presence of metal ions aligns the electron rich sites and creates a more rigid and planar conformation, which is more desirable for electronic properties. This method allows for control of physical conformation based on the presence of metal ions and allows for new molecules to be explored for solar cell application.

Solvation and Equilibration the Complex of Human T-cell Leukemia Virus Type-I Protease and Its Substrate

Alyce J. Ruhoff

Faculty Mentor: Shuhua Ma

In the investigation of developing inhibitors for the treatment of Human T-cell Leukemia Virus type I protease (HTLV-I) related infections, the study of catalytic mechanism of HTLV-I protease can provide very important structural information during the course of catalysis. In this work, the enzyme-substrate complex has been fully dissolved by a box ($80\text{\AA} \times 60\text{\AA} \times 60\text{\AA}$) of water molecules. In the dissolution process, the water molecules that were within 2.5\AA of any heavy atoms of the system were deleted, and all the crystal water molecules were kept. In addition, the chloride counter ions have been added to neutralize the positive charges of the enzyme-substrate complex. Molecular dynamics simulations have been carried out to equilibrate the solvated system.

Random Walk Polymers On A Simple Cubic Lattice - A Matrix Approach

Steven Sill

Faculty Mentor: Paul Hladky

Linear polymers are long molecules that may contain hundreds of atoms in the backbone portion of the molecule. Despite the term linear, these molecules are not shaped like straight lines but are better pictured as three-dimensional random coils that constantly change shape. Many practical applications of polymers, such as elastic materials and viscosity modifiers, depend more on the average sizes of the molecules and their flexibility than on their detailed chemical composition. Thus, models of polymer molecules that ignore the chemical nature of the molecules while retaining the connectivity of the backbone chain complement experimental studies. A well-known model of polymer molecules is based on the idea of three-dimensional random walks on a simple cubic lattice. The orientation of a backbone segment corresponds to a step in one of six directions and each possible shape of an n -segment molecule corresponds to one of the possible paths of an n -step random walk. Unbiased random-walks, in which each step direction is equally probable, have been described mathematically using vectors, partial differential equations, the multinomial theorem, and matrices. For biased random-walks, the multinomial theorem can still be implemented without additional difficulty. In this poster, we present a matrix-based method that is equivalent to the multinomial theorem approach for six-direction random-walks on a cubic lattice and then generalize it to describe random walks consisting of steps that always make 90 degree turns, a situation that the multinomial theorem cannot describe. The 90 degree turn feature corresponds to 90 degree bond angles and is a more realistic model of polymer molecules than the six-direction model consisting of 0, 90, and 180 degree bond angles.

Synthesis of o-Pyrazinylene Ethynylenes

Joshua Wieting

Faculty Mentor: Nathan Bowling

o-Pyrazinylene ethynylenes can be synthesized by utilizing the Sonogashira coupling reaction. Employing the Sonogashira coupling is a straightforward process in which terminal alkynes can be coupled favorably to aryl pyridines and aryl pyrazines. The target molecule, which contains three sets of opposing nitrogen atoms, serves as the smallest oligomer in a series of oligomers containing binding pockets in which positively charged metal ions will become ensnared. The introduction of these metal ions should result in

a rearrangement of the oligomer, taking the previously helical or randomly orientated molecule and locking it into a planar formation. This step is necessary for the oligomer to be able to gain conductive or semi-conductive properties. Once metal ions are introduced in stoichiometric amounts, a maximum shift can be observed spectroscopically by UV-visible spectroscopy. Once these experiments are conducted, we will be able to confirm projections made about the properties of our base oligomer. After the base oligomer is constructed and examined, longer oligomers (containing more metal pockets) will be synthesized.

Use of the DCC Coupling Reaction as a Possible Alternative Route for the Preparation of Polyesters for Biomedical Applications

Marcus R. Mueller

Faculty Mentor: John Droske

Polymers, especially those that are bioresorbable, have been used extensively in biomedical applications. Examples of these applications include the use of bioresorbable sutures and drug delivery systems, and their use in bone replacement surgeries, such as total hip and knee replacements. Our research group has synthesized a number of polymers and copolymers that are potential candidates for use in the human body. The goal of this research is to develop materials that can temporarily provide the required properties and then breakdown and bioresorb after new material has grown into place. To date, the polymers and copolymers have been prepared by esterification involving zinc or tin catalysts. While this has proved useful, we also are interested in developing alternative approaches for the synthesis of these materials. An attractive reaction for the preparation of esters under mild conditions involves the use of the dicyclohexylcarbodiimide (DCC) coupling reaction. This reaction is particularly desirable because it occurs at or below room temperature, while other routes we have used required temperatures of about 150 C. This poster will present the results we obtained in DCC coupling reactions that were model reactions for our polymerization reactions.

Geography

Community Structure and Wisconsin K-12 School Quality, School Funding, and School Consolidations

Kylie Betzler, Rebecca Braunschweig, Nicole Michiels, and Elizabeth Roden

Faculty Mentor: Lisa Theo

Despite Wisconsin's reputation for high quality K-12 education, discrepancies exist in performance and funding throughout the state. Previous research supports the correlation between unequal school funding and poor student performance. However, when holding constant for other factors such as higher socio-economic status in the home or community, numerous researchers have found that school funding is not as significant an indicator of student performance as previously thought. Using student achievement data from the Wisconsin Department of Public Instruction, school rating data from Great Schools, Incorporated, and socio-economic data from the United States Census Bureau, this project investigates the role of community or 'sense of community' plays in student achievement.

Paleolimnological Reconstruction of Drought Conditions from Max Lake, Vilas County, Wisconsin

Angela Eichler – Department of Geography and Geology

Faculty Advisor – Samantha Kaplan (Geog/Geol)

The Wisconsin Department of Natural Resources in conjunction with the University of Wisconsin Stevens Point is using the sedimentary record from Max Lake in Vilas County, Wisconsin to establish a correlation between drought and changes in the pH of northern kettle lakes. A 536cm core collected from Max Lake in the spring of 2009 is being used to reconstruct Holocene changes in alkalinity, cycles of drought, and fire history. Previous experiments indicate that during prolonged drought, lake pH changes as the relative contributions of precipitation and groundwater move away from equilibrium. As the water table lowers, seepage lakes such as Max Lake may experience a decrease in groundwater derived cations and a decrease in alkalinity that may be observed in sediment chemistry and diatom assemblages. Likewise, drought conditions create an environment prone to wildfires which should be represented by escalated charcoal counts. We use LOI to measure changes in sedimentary carbonates and charcoal isolation methods to infer past fire frequency. In addition to charcoal counts, charcoal morphology is used to signal vegetation type and suggests predominance of

canopy or ground fires and their associated fire intensity; while charcoal size class is used to signify fire proximity. Initial findings indicate patterns of increased charcoal abundance as well as independent periods with amplified carbonates in the upper part of the core, demonstrating variations in climate within Max Lake. Separate analysis of diatom assemblages will be used to confirm these droughts induced changes and infer lake pH.

Identifying the Top 100 Small Cities in America: A Critique

Kylie Betzler, Rebecca Braunschweig, Nicole Michiels, and Elizabeth Roden

Faculty Mentor: Lisa Theo

Money Magazine and CNN News released their rankings of the Top 100 Small Cities in America in August, 2009. Cities were ranked according to economic and social factors including good jobs, low crime rates, affordable homes, and good schools. Of the ten top cities identified, the average distance to a major metropolitan area was 24 miles: none was further than 41 miles, and one was only 7 miles. Such close proximity to a major metropolitan area hardly fits the definition of 'small city'. Using similar criteria as the Money Magazine analysis, this study will identify the top 100 truly small cities in the United States, by excluding any city within 70 miles of a major metropolitan area. United States Census Bureau, Great Schools, Inc., Realtor.com, and Uniform Crime Reports from the Federal Bureau of Investigation will serve as data sources for a spatial and statistical database for this project.

Wisconsin Dells: Past, Present, and Future

Rebecca Braunschweig

Faculty Mentor: Lisa Theo

The Wisconsin Dells region has served as a recreation venue for over 100 years. Initially wealthy patrons from the Chicago area were enticed by the unique geology and pristine waters, and their visits to the area primarily focused on nature. Later in the 1900s, there was a transition to attractions that appealed to the middle class. The focus was no longer just 'nature' - The Wisconsin Dells now had tourist venues such as Fort Dells, Storybook Gardens, the Tommy Bartlett Show, the Wonder Spot, The Original Ducks, the Indian Ceremonial. All of these venues had something in common - an entrance fee was charged or items were sold. Currently, the Dells offers the largest concentration of waterparks in the world - a statistic proclaimed proudly on the Visitor and Convention Bureau's webpage and numerous radio and television commercials. This project will investigate the change in

types of commercial establishments over time and will answer the following questions: when did the shift to year-round tourism occur? What types of businesses accompanied that shift? Which businesses still choose to close during the 'off-season'? Data will come from archival library sources, The Wisconsin Dells Visitor and Convention Bureau, personal interviews with long-time residents, and field observations. Both statistical and spatial analysis will help to determine the time and location of changes in types of businesses present in the Wisconsin Dells region.

The North Gate Area of Downtown Stevens Point: Redevelopment and Community Building

Nick R. Ellifson, Maria G. Holl, Kyle M. Lange, Jeremy J. Lebrick,
Winton H. Miller, and Christopher J. Stangler

Faculty Mentor: Ismaila Odogba

Most communities that engage in revitalization projects tend to take a corporate center approach, i.e., efforts to renew the city center (downtown areas) and restore them as the center of civic pride, community activity, and economic prosperity. The North Gate Area (NGA) of Downtown Stevens Point comprises of parcels that lie north of center point and serves as a transition zone between downtown and adjacent residential areas. The parcels that comprise the NGA currently lie underutilized and vacant, and do not enhance community tax base nor community well-being. In order to restore the downtown area to its prominent position as the center of community activity, revitalization efforts will need to link neighborhoods in a web of socio-economic projects that improve local character and long-term prosperity. However, three major issues pose challenges to the successful redevelopment of the NGA. First, considering the unsuitability of the soil for most types of uses, the development potential of the parcels is quite low. Second, stakeholders are likely to undermine any redevelopment efforts contradictory to their own interests. Third, the formulation of an appropriate redevelopment strategy must mesh exchange value and use value; a difficult proposition given the structural constraints of the city. This study addresses the issue of revitalization by using the planning process to create a feasible redevelopment plan for the NGA which overcomes the challenges identified. The revitalization approach adopted is influenced by public input, city's economic needs, and stakeholder concerns in order to enhance and strengthen the overall quality of life in the community.

Spatial Interactions of Wolves and Moose in Isle Royale National Park, Michigan

Ben Overholt

Faculty Mentor: Eric Larsen

Winter movements of Gray wolves (*Canis lupus*) on Isle Royale have been tracked since 1958, most recently by researchers John Vucetich and Rolf Peterson. This study uses a Geographic Information System (GIS) to convert their archive of maps to digital form to help quantify wolf terrain use on Isle Royale during the winter months. Vucetich and Peterson's paper maps are based on observations taken during aerial flights over Isle Royale every year during the months of January to March. By digitizing the maps from the last five years containing the observed locations of wolves and adding attribute data including number of wolves, the pack affiliation, a location description, and observed behavior we are creating a digital spatial database of wolf movement patterns over time. Within the GIS, this wolf movement data will be combined with field collected vegetation survey information as well as moose (*Alces alces*) observations and scat analysis to study potential trophic cascade interactions of wolves, moose, and vegetation. Our goal is to determine how the presence of wolves affects the spatial pattern of foraging by Isle Royale's moose population.

Wolf Reintroduction Effects on Aspen Regeneration in Yellowstone National Park, Wyoming

Justin Sonnentag

Faculty Mentor: Eric Larsen

Gray wolves (*Canis lupus*) were reintroduced to Yellowstone National Park in 1995–1996, after an absence of 60 years. Little is known about how the reintroduction of top level predators affects lower trophic level organisms, such as elk (*Cervus elaphus*) and ultimately plant communities. In addition to direct predation on elk, wolves may also change elk movement and browsing patterns. Wolves may therefore indirectly affect aspen (*Populus tremuloides*) regeneration by altering elk foraging behaviors and browsing pressure. Data collected from recently established aspen plots on Yellowstone National Park's northern range can help determine if the reintroduced wolves are influencing elk browsing patterns and aspen regeneration through a trophic cascades interaction. Data analyzed from 2002–2009 suggests a trophic cascade involving wolves, elk, and aspen in Yellowstone's northern range. Results show reduced elk browsing pressure of aspen suckers and increased heights of young aspen during the last 8 years. Results provide insight for understanding trophic dynamics and

spatially variable plant community growth patterns resulting from the reintroduction of the wolf to this ecosystem.

Geoscience

Tree Ring Dating of a Menominee Dugout Canoe

Nicholas Borski; Anna Courtney

Faculty Mentor: Samantha Kaplan; Ray Reser

Dugout canoes are very rare in Wisconsin and other Midwest locations. Only about 90 have been found in Wisconsin and the majority of those are just fragments of whole boats. The Central Wisconsin Archaeology Center/ UWSP Museum of Natural History is fortunate enough to have recently acquired one of the few complete dugouts ever discovered in the state. The UWSP dugout may have been in continuous use until early last century when it was subsequently stored or displayed indoors on the Menominee Reservation (and later at UW-Oshkosh), thus preventing decay of the wood. In order to place the canoe in its proper cultural and historical context, a correct age for the boat must be established. There are no historical records available to date the dugout canoe. Dugout styles in the Great Lakes region varied widely, and since other complete boats from the immediate area are almost impossible to find, the style cannot be compared to others for dating purposes. Therefore, in order to date the canoe, we are using radiocarbon and dendrochronological (tree ring) techniques. A radiocarbon date taken on wood from the pith of the tree used to construct the dugout tells us the tree began to grow in the late 1600's or early 1700's. Based on the rings visible, the tree was about 200 years old when it died, suggesting it was cut down and the canoe built in the late 1800's or early 1900's. The dugout is constructed from a single hemlock log, so we are comparing the tree ring pattern in the boat to the pattern of rings from old growth hemlocks in northern Wisconsin to hopefully match, or "cross date" the canoe. When the measuring and crossdating of the tree rings is complete we should have an almost exact date for the death of the tree used to construct the dugout.

Roche A Cri Petroglyphs: A Study in Rock Art Weathering

Sarah Carriger, Janell Wehr, Jesus Rehwinkel

Faculty Mentor: Ray Reser, Kevin Hefferan, Neil Heywood

Roche-A-Cri State Park, a prehistoric cultural site located in rural Adams County, is home to Wisconsin's only rock art site located on public lands.

The Cambrian sandstone bluffs, into which the petroglyphs were carved, formed on an equatorial sandy beach ~500 million years ago. These sandstone bluffs are the erosional remnants of much more extensive outcrops worn down through the ages. In Quaternary time, these bedrock outcrops were essentially islands within Glacial Lake Wisconsin. Carved into porous quartz arenite sandstone, the petroglyphs provide insights into Native American culture, and subsequent Anglo-American influences. These precious petroglyphs are deteriorating due to a combination of biotic and abiotic processes. This study seeks to describe and assess deterioration processes, which will lead to better management and protection of this site.

Foreign Language

Exile and Emigration: Character Identities in World Literature

Matthew Dykstra, Erin Keniry, Rachel Konkol, Giselle Sankey

Faculty Mentor: Michelle Slater

In our poster we will discuss the problems that individual characters have while coming to terms with their identities as a result of exile and emigration. We will be analyzing conflicts faced by the protagonists of Jhumpa Lahiri's *The Namesake*, Milan Kundera's *Ignorance*, Andrei Makine's *Dreams of my Russian Summers*, and Orhan Pamuk's *Snow*, which we have studied this semester. We will also draw from Homer's *The Odyssey* as a historical reference. In each of these novels, the main characters face struggles dealing with multiple cultures, languages, and homelands. The characters are confronted by others' expectations – those of family, fellow émigrés, residents of their host country, etc. – and perceive a sense of conflict as they try to adapt. We conclude that eventually, in these novels, the characters adopt identities that encompass all facets of their experiences, or they continue to live in conflict. Our poster will include a map illustrating the regions that play a role in each novel.

Current Issues in Germany

Abram Towle, Aaron Sedgwick, Elizabeth Horton, Nicole DiNardis, Hunter Gosda, Kimberley Kuber, Jessie Lambert, Shelly Langreck, Nathaniel Schultz

Faculty Mentor: Tobias Barske

Most commonly, the study of 'culture' in university classrooms consists of reading and analyzing canonical pieces of literature. As an alternative, this

set of 5 posters utilizes a critical analysis of more mainstream sources to help us understand Germans on a level relevant to everyday life in Germany. Based on a semester long survey of current events covered in various German newspapers and online news casts, the individual posters each offer a discussion of a different aspect of German everyday life. The topics of the individual posters span topics such as the impact of unions ("Fighting for a 35 Hour Work-Week"), cutting-edge research in the area of environmental technology ("Leading the Way: Germany's Green Industries"), the overlap of sports and nationalism ("Sports and Nationalism: The Role of Soccer in Germany after World War II"), tensions of a multi-ethnic society ("Turks in Germany: Inviting More Than Just Cheap Labor"), and the restructuring of a social wealth fare state ("Hartz IV: Why Work if they pay you to be Unemployed?"). On the one hand, each poster presents one issue currently discussed in Germany in great detail. On the other hand, these poster presentations highlight how questions such as 'How do we deal with immigrants?,' 'How important are sports to who we are?,' and 'How can we solve our energy demands?' represent global phenomena. We hope to foster a dialogue that helps to appreciate differences between Germany and the US, but also reinforces similarities between people from both countries. Depending on the language ability of visitors, poster presentations will be either in German or in English.

Astronomy

Spiral Arm Pitch Angle as an Indicator of the Black Hole Mass in Isolated Galaxies

Jason Ladwig

Faculty Mentor: Adriana Durbala

Starting from the Catalog of Isolated Galaxies (Karachentseva 1973) we selected a sample of $N=44$ face-on spiral galaxies using Sloan Digital Sky Survey. We visually classified these galaxies and assigned them a morphological type in the range Sa-Sd. We adopted a simple mathematical description of the spiral arms by assuming that they follow a logarithmic law described by a constant pitch angle. This was motivated by two reasons: 1) by and large this approach provides a reasonable modeling of the spiral arms morphology and 2) logarithmic spirals occur in a wide variety of objects and natural phenomena: hurricanes, shells, pine cones, rose petals, etc. Recently it has been suggested that the pitch angle of galactic spiral structures is strongly tied to the mass of the central (putative) supermassive black hole and an empirical correlation between the two quantities has been calibrated

(Seigar et al. 2008). Thus, by quantifying and measuring how tightly wound the spiral arms are (i.e., pitch angle) one can make predictions about the mass of the central black hole. These indirect mass estimates should be further tested via other empirically calibrated correlations (e.g., between the steepness of the bulge light profile or the bulge light concentration and the black hole mass – Graham & Driver 2007; Graham et al. 2001). Although our sample is far from complete it is a suitable choice for pitch angle measures because: a) the selected galaxies are face-on and, most importantly, 2) the galaxies are isolated, i.e., no significant intergalactic tidal interactions affected the spiral arm morphology within the last few billion years. Our project aimed at outlying a simple method of predicting black hole masses whenever direct kinematic data are lacking or hard to obtain.

Studies of Neutral Hydrogen in Poor Clusters of Galaxies

Liza Wernicke and Yia Xiong

Faculty Mentor: Katherine Jore

Cold, neutral hydrogen (HI) clouds are potential indications of star formation. Yet, galaxies are sometimes stripped of HI due to collisions or close proximity with neighboring galaxies. This stripping can cause an HI deficiency within the galaxies involved. This research intends to calculate cluster membership and the HI deficiencies of galaxies located within two poor clusters of galaxies – WBL 404 and WBL 408. Data from the Arecibo Radio Telescope, taken as part of the ALFALFA HI survey, were used to derive the HI deficiencies of all galaxies concerned. The comparison of optical and radio data was important in determining different aspects of the galaxies; including HI mass, galaxy diameter, distance from Earth, and morphological type; which relates to the calculation of HI deficiency. The position in Right Ascension, Declination, and velocity space of all galaxies were plotted during the determination of cluster membership. Membership within a cluster was determined by noting the galaxies that fall within two Abell radii of the cluster center, and are relatively near to the cluster center in velocity space. The results of this experiment display HI deficiencies, and abundances, in varying degrees. Further research will be necessary to relate HI deficiency to galaxy cluster membership, and to distance from the cluster center.

History

The Clandestine Slave Trade in the United States

Rebecca Simpson, Dustin Clark, David Turner, Scott Helgeson

Faculty Mentor: Lee Willis

In 1808, Congress forbade the importation of foreign slaves into the United States and the interstate (or domestic) slave trade became the only legal method of buying and selling human chattel before the Civil War. Yet historians believe that slave traders continually violated the international ban in a clandestine trade. Conservative estimates hold that smugglers introduced approximately 54,000 enslaved people into the United States, roughly 1,000 people per year, between 1808 and 1865. Though the interstate slave trade has been researched extensively and deservedly so, the details of the U.S. clandestine slave trade are largely unknown. As a result, important questions about the international trade remain unanswered. Caribbean and African historians, on the other hand, have been investigating the impact of the nineteenth-century international trade on racial and ethnic constructs around the Atlantic Rim. Exciting new research has revealed that the nineteenth-century slave trade continued to destabilize power relationships and shape social categories of African ethnicity and blackness in the Atlantic World. The ways in which the clandestine slave trade operated in the United States, however, is still a mystery. This poster presents an overview of ongoing research on the clandestine trade and what we have learned about the termini of the trade through federal censuses, Works Progress Administration Slave Narratives, and newspapers.

Oral Presentations

4:00 – 5:00

First & Second Floor Science Building

Group 7
Room A208
Moderator: Jim Lawrence

GIS Maximizes Volunteer Contributions in Science and Community Planning

Corinna Neeb

Faculty Mentor: Douglas Miskowiak

Amateur scientists and citizen planners volunteer information that provides significant contributions to society. Budget reductions at state and local government agencies necessitate imaginative solutions that engage and maximize the contributions from such volunteers. Much information can be linked to geographic locations on Earth. Geographic Information Systems (GIS) not only provide a practical way to organize, store, view, and analyze place-based, volunteered information, but also help to elicit volunteer participation with powerful, yet user-friendly tools. Many volunteers use GIS freeware, such as Google Earth or Arc Explorer, to post and share their contributions. Agencies can customize GIS tools and user interfaces to glean only the information they need in a format useful for analysis. Doing so maximizes the efficiency and effectiveness of volunteer and professional workflows. Research from the UW-Stevens Point - GIS Center, focuses on the skills required by volunteers to engage their interest and maximize the effectiveness of their contributions. These skills include: the ability to read and orient one's self on a map, specialized knowledge about a particular subject area (e.g. inventory of aquatic macrophytes), the ability to utilize GIS applications to contribute information, and the ability to articulate subject matter using hardcopy and digital maps. The result: equipped with GIS, ordinary citizens become influential partners of scientists and professional planners.

Dual Photoactive Electrodes for Unassisted Water Splitting

Zong Cha Vang and Andrew L Weekes

Faculty Mentor: Kenneth L Menningen

Photoelectrochemical cells can be used to harness sunlight to split water and extract hydrogen for use as a clean fuel. In this effort, InP and GaAs photoelectrodes are treated with a protective coating and immersed in an alkaline electrolyte. When these are illuminated with a bright light, the generated electron-hole pairs drive the water splitting reactions and produce hydrogen and oxygen gases. In this work the cell electrodes were constructed, a surface treatment was applied to each, and the efficiency of hydrogen production was measured.

Group 8

Room A106

Moderator: Tracy S. Feldman

Batrachochytrium Dendrobatidis in Populations of Lithobates Picipiens (Northern Leopard Frog) and Lithobates Clamitans (Green Frog) in Wisconsin

Jaimie Klemish and Brooke Johnson

Faculty Mentor: Erik Wild

One of the largest threats to amphibian survival is Chytridiomycosis, a contagious disease caused by the chytrid fungus *Batrachochytrium dendrobatidis*. *Batrachochytrium dendrobatidis* is known to occur on all continents where amphibians occur except Asia and is responsible for numerous mass amphibian die-offs around the world. Sampling of preserved specimens has shown that *B. dendrobatidis* was present in Wisconsin during 1969 and 1984 (Ouellet et al., 2005). The purpose of the study is to document the presence of *B. dendrobatidis* in populations of *Lithobates clamitans* (Green Frog) and *Lithobates picipiens* (Northern Leopard Frog) in the Water Management Units established by the Wisconsin Department of Natural Resources. During September of 2009, samples were taken from naturally occurring live specimens representing 19 populations from nine Water Management Units throughout the state. PCR assays were run to determine the presence of *B. dendrobatidis* in these susceptible anuran species. The occurrence and distribution of *B. dendrobatidis* among these Water Management Units and the conservation implications for Wisconsin amphibians will be discussed.

Effect of Deer Exclosures and Canopy Gaps on Size and Reproductive Effort of Herbaceous Perennials Native to Northern Hardwood Forests

Tamara M. Baker

Faculty Mentor: Tracy S. Feldman

White-tailed deer, *Odocoileus virginianus*, are keystone herbivores that are documented to reduce the vital rates of plants. Chronic herbivory reduces the performance of perennials by removing photosynthetic organs that capture energy used for future growth. Deer, as edge species, are attracted to forest openings for forage. For these reasons we choose to study the effects of deer exclosures and canopy gaps on the size and reproductive effort of four perennial herbs: *Hydrophyllum virginianum*, *Viola pubescens*, *Trillium grandiflorum* and *Uvularia grandiflora*. Gaps (200 m² and 380 m²) and exclosures (6,400 m²) were created, respectively, in February and September 2007. During the summer of 2009, we observed the maximum height and reproductive effort of plants randomly located in experiment plots. To test the significance (Bonferroni-adjusted $\alpha = 0.005$) of treatment effects we used an ANOVA comparing general linear mixed models to models with one fixed effect removed. *H. virginianum* and *T. grandiflorum* were significantly taller in exclosures while *V. pubescens* was taller with marginal significance. Within exclosures increases in flower number was significant for *H. virginianum* and *V. pubescens*. Rate of flowering increased significantly in exclosures for *H. virginianum* and with marginal significance for *V. pubescens*. The only significant effect of gaps was an increased height in *H. virginianum*. Our results support the hypothesis that herbaceous perennials are capable of recovery once deer are excluded. Variation in the rate of recovery among plants may be reflective of varying metabolic rates among taxa. Two hypotheses might explain the effect of gaps. Increased light penetration may outweigh the negative effect of deer herbivory or canopies may not affect these herbs.

Group 9

Room A107

Moderator: Cassandra Chilcote

Acoustic Identification of Wintering Bats in Big Bend National Park Texas

Alexandra M. Anderson

Faculty Mentor: Christopher J. Yahnke

Little is known about the wintering habits of bats in the southwestern United States. In the Trans-Pecos region of New Mexico and western Texas, some species migrate, some hibernate, and some remain active throughout the winter. The difficulty tracking these small, volant, nocturnal animals, has resulted in limited published data on their winter habits. The purpose of this study was to expand available knowledge on active wintering bat species in Big Bend National Park, Texas, and assess the benefits and costs of using acoustic monitoring to identify bat species. I recorded acoustic bat calls over four nights near the Rio Grande River using a mobile Anabat II bat detector. Ambient temperature, weather conditions, and GPS data were also collected. I used Anabat software to convert calls into visual sonograms and audible wave files, and identified species using qualitative analyses to compare the slope, frequency range, duration, and overall pattern of recorded calls with reference sonograms available in bat call libraries. I identified 4-5 species of bats recorded in temperatures ranging from -0.3°C to 9.8°C . The total number of individual bats recorded decreased as temperatures declined. The lower critical temperature for activity of individual species could not be determined. While acoustic identification was helpful in identifying high intensity calls, low intensity calls that are characteristic of certain species were difficult to identify. The potential benefit of citizen acoustic monitoring and the limited availability of reference sonograms suggest a need for additional acoustic studies and improved bat call libraries.

Shift in Timing of Autumnal Migrating Sharp-shinned Hawks; a Climate Change Effect?

Jenna A. Cava

Faculty Mentor: Robert N. Rosenfield

We show that greater proportions of Sharp-shinned Hawks (*Accipiter striatus*) migrated later in autumn at the Hawk Ridge Bird Observatory, Duluth, Minnesota, during 1974–2009. The migration averaged about 4

days later over 35 years since 1974, and about 8 days later during late September through October in the last 16 years of the study. Our results augment previous findings demonstrating recent shifts in phenological events for birds and other animals and we speculate that climate change is influencing the timing of Sharp-shinned Hawk migration in northcentral North America. The proximate causes and potential consequences of this later timing of migration should be investigated.

Group 10

Room A210

Moderator: Charles Clark

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

Maria Kuzynski

Faculty 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. Previously, one region of *rrs-rrlA* intergenic spacer was used to compare isolates of different *Borrelia* species, but the primer pair used was incapable of amplifying the DNA region from all of the *B. bissettii* isolates. In this study, a different region of the *rrs-rrlA* spacer was selected using a new

primer set. So far, I have successfully amplified the spacer region from all of the isolates, including those of *B. bissettii*. Their DNA sequences are currently being generated and a phylogenetic analysis will be reported.

Molecular Ecology of Southern Flying Squirrels in Schmeckle Reserve

Kelly VanBeek

Faculty Mentor: Diane A. Caporale

Southern flying squirrels (*Glaucomys volans*) exhibit communal nesting behavior in the fall of each year. The reasons for this behavior are still unclear, but flying squirrels must balance its potential advantages and disadvantages. Genetic relationships between nest-mates have been examined in captive populations but have been understudied in wild populations. New techniques in molecular biology allow us to extract DNA from hair samples and use DNA Fingerprints to determine kinship of individuals nesting together. In fall of 2009, hair samples were collected from southern flying squirrels nesting in pre-existing nest boxes in Schmeckle Reserve. DNA fingerprints were generated by amplifying a highly polymorphic microsatellite region of their DNA. A molecular distance tree will be constructed to assess the genetic relatedness among the squirrels within and among the nest boxes. Because these animals are used as ecological indicators of forest health, understanding their social relationships can aid in wildlife management.

Group 11

Room A109

Moderator: Todd Good

Pullman versus Pullman: The Strike of 1894

Ryan Jeffers

Faculty Mentor: Valentina Peguero

The Pullman Strike of 1894 was the result of a clash between railroad car manufacturer George Pullman and his employees in the town of Pullman. The strike finally ended by the hand of the federal government, but not before it shut down entire railroad lines west of Chicago for nearly three months. The central question that this paper seeks to answer is whether Pullman act as an entrepreneur trying to keep his business from going under or a selfish businessman who was only looking out for his own interests.

Juxtaposing the “cutthroat” business tactics of the day with the fact that George Pullman had created the town of Pullman as a utopia for his workers makes it hard to say exactly what motives he had. I argue that both sides had multiple opportunities to end the ordeal and prevent a conflict that affected people across the nation, but ultimately the responsibility lay with Pullman himself.

Cass, West Virginia: A Legacy in Lumber

Timothy Martin

Faculty Mentor: Valentina Peguero

The state’s motto of “Almost Heaven” does little to describe the geographic region in the vicinity of Cass, West Virginia. A bustling logging company town in its heyday and now a prominent State Park, Cass is rich in history. Cass Scenic Railroad’s tourist train of today has beginnings that stem back to the turn of the twentieth century when the primary commodity was fresh-cut timber. My research focuses on how with the aid of steep logging railroads and gear-driven locomotives, the valuable timber holdings were harvested in and around Cass, West Virginia for over half a century. From distant logging camps to a riverside sawmill, the company employed the use of huge machinery, but an entire host of jobs was vital to the operation. Although hundreds of logging operations coexisted in the early 1900s, the Cass Scenic Railroad, the company town and operating steam-powered railroad still remain to this day, a time capsule of history.

Why Don't You Fine Me a Cheeseburger?

Joseph Kiley

Faculty Mentor: David Williams

The most outstanding aspect of Plato’s *Apology* is Socrates’s cavalier response to the threat of a death sentence after being convicted of impiety and corrupting the young: “He [Meletus] assesses the penalty at death. So be it.” The jury affirms Meletus’s assessment and sentences Socrates to death. There are two basic ways of interpreting the fittingness of Socrates’s death sentence. Most contemporary readers are appalled by what they perceive to be the unjust conviction and execution of Socrates. Yet noted Greek history scholar H. D. F. Kitto has remarked that this “was far from being an act of brutal stupidity.” In defense of Kitto’s proposition, I argue that Socrates is a hostile insurrectionist that deserves the death penalty. By practicing philosophy he corrupts the youth; an intolerable threat to the Athenians. First I give a brief history of Athens before Socrates’s trial. This demonstrates that Athens emerges from a chaotic past. In the mind of many Athenians peace and stability are overdue, which is a crucial factor in their

decision to execute Socrates. Second, I clarify Socrates's arguments at trial. This proves his innocence; yet, the jury is not swayed because Socrates is insistent on being disloyal. He is disgusted with the Athenians. Classicist G .M .A Grube writes, "if he questioned the basic principles of democracy and adopted towards it anything like the attitude Plato attributes to him, it is no wonder that the restored democracy should consider him a bad influence on the young." Lastly, I argue that Socrates's innocence does not exonerate him because it is clear his religiously motivated practice of philosophy would demolish the Athenian democracy. This establishes that Socrates is irrevocably disobedient to the Athenians and must be annihilated.



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

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