Dimensional Abstraction: Generating Novel Potential Inhibitors of Malarial Plasmepsin IV Using Computational Methodologies

Abdul-Wahid, Christopher; Fabry-Asztalos, Levente; Abdul-Wahid, Sarah; Andonie, Razvan

Faculty Mentor(s): Levente Fabry-Asztalos, Chemistry; Razvan Andonie, Computer Science

Session: 19 (Oral Session 3:20-5:00 in 135)

The malarial parasite *Plasmodium falciparum*. is endemic to 50% of the world's population, killing three million people a year, most of whom are children under five years of age. Due in part to the development of malarial resistance to current drug therapies, novel drug targets are being sought. The malarial hemolytic aspartic protease Plasmepsins are such targets of rational drug design. We have developed a methodology to rapidly generate combinatorial libraries of chemical structures using a one-dimensional representation (Simplified molecular input line entry specification (SMILES)) of a molecule, to automatically generate a minimized three-dimensional representation (SYBYL MOL2), and to screen this library for potential drug candidates using virtual molecular docking software (Molegro Virtual Docker) and a Fuzzy Neural Network (FNN).

Analysis of Cascadia Slow-Slip Events on Plate Boundary Observatory GPS and Borehole Seismometers

Aguiar, Ana Cristina; Melbourne, Timothy; Scrivner, Craig

Faculty Mentor(s): Timothy Melbourne, Geological Sciences

Session: 25 (Posters in Ballroom C & D)

Reanalysis of GPS time series from the Cascadia subduction zone have revealed at least 30 resolvable slow slip events since 1997. Smaller events, barely detectable with GPS, are clear as tremor sequences on band-pass filtered seismic data. Assuming that tremor and transient deformation are two manifestations of the same process, tremor offers higher resolution for studying moment release through time. To assess if a fixed frequency-magnitude relationship applies to tremor, and to quantify the relative contribution of moment release during GPS-detectable events vs. other times, we quantify the frequency vs. tremor-duration relationships for events that correlate across multiple instruments. We consolidate daily seismic files from the northern Puget Basin in Washington State and SW British Columbia, remove instrument gain, decimate the data to 10 sps, rectify it, compute its envelope using a Hilbert transform, and average envelopes from regionally adjacent stations to provide a single metric indicative of tremor activity. This is effective in quantifying small tremor bursts and accurately identifies timing and duration of known events. We then convert tremor duration to equivalent moment slip inversions of corresponding GPS-derived deformation. Applying this to data from 2005 on, we find that tremor follows a distinctive log-linear frequency-magnitude relationship for all tremor sequences observed to date. Also,

roughly half of all tremors occur outside of known events.

The Ethnography of Cougar Bar, Hells Canyon, Idaho

Arthur, Marie; Beavert, Tia; Swan, Kathleen

Faculty Mentor(s): Morris Uebelacker, Geography and Land Studies

Session: 10 (Oral Session 10:00-11:40 in 140)

Cougar Bar is a known winter village site located on the Idaho side of the Snake River in Hells Canyon. This area was included in the aboriginal homeland of the Nez Perce, along with the Salmon River. The band occupying this region was led by Chief White Bird and was accustomed to utilizing the resources of the area according to the seasonal cycles. This paper evaluates the seasonal resource cycle of the White Bird band of Nez Perce as it relates to Cougar Bar and other similar locations.

Synthesis and Characterization of $SrY_2O_4:Eu^{3+}$

Atkins, Ryan

Faculty Mentor(s): Anthony Diaz, Chemistry

Session: 1 (Oral Session 8:00-9:40 in 135)

Current research is on the synthesis and analysis of the SrY_2O_4 compound doped with Eu^{3+}. $SrY_2O_4:Eu^{3+}$ was synthesized from Y_2O_3, Eu_2O_3, and $SrCO_3$; the mixture was fired at 1000 $^{\circ}$C for 12 hrs in air twice with a 5% excess $SrCO_3$ by weight; structure identification was confirmed with X-ray diffraction. Once identification was confirmed, UV spectroscopy was performed at room temperature. Two different sites for the Eu^{3+} were observed. Future work will focus on energy transfer studies on the $SrY_2O_4:Eu^{3+}$ compound.

Calcutta's Edifice: The Buildings of an Great City

Bach, Brian

Department: Library

Session: 26 (Posters in Ballroom C & D)

Calcutta, the Star of the East, is a great city, a city of palaces, of people, and of “joy.” Calcutta’s buildings command attention in a compelling sense - akin to a great epic drama. When their serious pictorial sense is also considered, they become a grand display gallery. Because of its political and economic history, the city and its background have been lavishly documented. As a matter of record, it has considerable awareness of its own architectural heritage. Yet, *Calcutta's Edifice* allows these

buildings to “speak for themselves.” Illustrated by the author, the book strives to achieve a point of view not of a judge, but of an appreciator. With notes on the past and seductive speculations on the future, it examines the architectural and associated apparatuses of Calcutta, the great city, as it is. At the 2006 Calcutta Book Fair, the first copy of the book was presented to the Chief Minister of West Bengal state, Sri Buddhadeb Bhattacharjee. Bikas Basu, in *The Statesman* of Calcutta says: “It’s a monumental work and not only in terms of size. The amount of labour, energy and perseverance that has gone into this book is awe-inspiring.” (May 16, 2006)

Mother Ireland and the Multifold Revolution

Bator, Jeanine

Faculty Mentor(s): Jason Knirck, History

Session: 17 (Oral Session 1:20-3:00 in 201)

The dichotomy between land and woman, woman and country is one that spans the ages. In Ireland this link can be tracked through the early use of Shan Van Vocht, Dark Rosaleen, in the Bardic era to the propaganda use of Erin, or Hibernia, in revolutionary posters in the eighteenth through twentieth centuries. While these feminine images were used by Irish poets and artists as a representative device, the images were also used by the British to show that the feminine Irish needed a strong protector. Therefore, the purpose of this paper is multi-fold; it will examine feminized Ireland, through the propaganda, both Irish and British. The paper will use the works of W.B. Yeats and Rita Ann Higgins to examine how use of these feminized images changed over the course of the twentieth century. Although the Hibernia image was used by the British to show cause for the continued colonization of Ireland, the image was more importantly used by the Irish as an ideal worth fighting for—the embodiment of fertile land—and while Hibernia was employed as a positive image by Irish artisans, so too the image served an alternative purpose, the suppression of Irish women. Thus, when Yeats adopts Hibernia—Mother Ireland—in *Cathleen Ni Houlihan*, he uses her to showcase the object of his affection, Maud Gonne. In doing so, he gives Irish women a voice that, at once, calls for freedom while keeping women in a subordinate position. Whereas in *Face Licker Come Home*, Rita Ann Higgins presents a Mother Ireland in flux, a woman questioning what is left for her after the revolution.

Biofuels, Foreign Energy Dependence, and What You Can Do About It

Beardsley, Roger

Department: Industrial & Engineering Technology

Session: 11 (Oral Session 10:00-11:40 in 201)

Biofuels are gaining increasing attention as alternatives to increasingly expensive petroleum products. This presentation will define energy content of fuels, compare

common biofuel properties to the petroleum products they replace, and compare current production rates of common biofuels to petroleum demand. Solutions for reducing foreign oil dependence will be outlined, including courses of action available to individuals with little or no capital investment.

In Search of Sgt. Ordway

Beckley, Eric; Dombert, Casey; Snider, Todd; Volker, Gretchen

Faculty Mentor(s): Morris Uebelacker, Resource Management

Session: 10 (Oral Session 10:00-11:40 in 140)

In the spring of 1806, Sergeant Ordway of the Lewis and Clark expedition, along with two privates, were sent to obtain salmon from a traditional Nez Perce, Snake River fishery. Their week-long expedition through the rugged topography of the Hell's Canyon vicinity has been the subject of previous studies. These past studies, however, are of broad scope with relatively low levels of detail regarding specific sections of the expedition. This study is a close scrutinization and ground-truthing of the section closest to the Snake River terminus of their journey. This twelve mile (one way) section was the most topographically-rugged leg of their seventy mile jaunt. Emphasis is placed on a description of the landscape they encountered, rather than focusing mainly on historical documentation and the mere location of route sections. This will serve to provide a context through which we can further speculate on general character of the journey as the Ordway party experienced it, as well as how they negotiated the extreme terrain with horses and what lines they might have taken down the ridge system approaching the Snake. By utilizing GIS and topographical maps, an outline of the trail as well as certain associated points will be drawn to provide a visual concept of the journey. Additionally, the study looks at the group's encounters with the Nez Perce at the Snake River fishery.

Henna: A Mysterious Art

Beers, Kathryn

Faculty Mentor(s): Lene Pederson, Anthropology & Museum Studies

Session: 9 (Oral Session 10:00-11:40 in 137B)

Follow Rachel, a writer/poet, during an entire day of beauty as she prepares an intoxicating mixture of lavender and rosemary, which are essential ingredients for the re-creation of the ancient art of henna. Before the invention of chemical hair dies, henna was the preferred method for coloring hair. Although henna is still widely used around the world, it is shrouded in an element of mystery. Many women of the past and present, have passed down knowledge of the traditional use of henna with the intention of keeping it just as secret from men as the hair hidden under their veils. Rachel was taught how to prepare henna while living in Egypt and throughout the film she provides

a step-by- step instruction and cultural insight on this seductive woman's art.

Contemporary Cultural and Economic Sustainability for the Suquamish Tribe of Washington State

Beers, Kathryn

Faculty Mentor(s): Tracy Andrews, Anthropology & Museum Studies

Session: 26 (Posters in Ballroom C & D)

The Suquamish Tribe operates the Clearwater Casino and Resort on the Port Madison Reservation, located along southwestern Puget Sound in Washington State. Due to its close proximity to Seattle, the Clearwater Casino and Resort has become one of the most popular regional tourist destinations and provokes considerable controversy that reflects national debates about Native American self-determination and economic development. This project focuses on the Suquamish tribe's efforts to replace the loss of traditional natural resources with contemporary options for economic and cultural sustainability, which includes the operation of the Clearwater Casino. For example, since its development casino revenues have helped the Suquamish support various social and educational programs on their reservation. In order to conduct the most potentially profitable types of casino gaming, however, federally mandated compliance with state gaming compacts has forced the tribe to compromise certain aspects of its tribal sovereignty. Analysis of contemporary issues that impact Suquamish resource management options and the working relationship among the tribe, county and state is informed by personal interviews with members of the Suquamish tribal government and a local Washington state government representative. Academic experts on Native American gaming, and secondary literature and archival resources, provide historical background regarding treaty rights, tribal sovereignty and gaming regulations. The emergence of gaming as a successful resource development option for a FEW Native American groups has resulted in many myths and considerable misinformation. In part this is because so little information is available from contemporary case studies that address these issues.

Emilio's Dream

Beers, Kathryn

Faculty Mentor(s): Lene Pederson, Anthropology & Museum Studies

Session: 9 (Oral Session 10:00-11:40 in 137B)

My great-grandfather Emilio Gasparroli came to America at the turn of the 20th century with nothing but a dream in his heart for a better life in America. In the 1930s, Emilio purchased a motion picture camera and captured via film the life that he had built in upstate New York. Although an amateur cameraman, Emilio intuitively captured the unique character of the people and the places of Lattintown, NY. This film

contains footage from 1933 to 1956 and was developed into a documentary that follows the lives of my Italian family and their realization of the “American Dream.”

Ein Unbekannter Film: A Collection of Nazi News Reels

Beers, Kathryn

Faculty Mentor(s): Lene Pedersen, Anthropology & Museum Studies

Session: 9 (Oral Session 10:00-11:40 in 137B)

This is a presentation of my work-in-progress incorporating found footage from Nazi Germany into a short documentary film. My grandfather returned from WWII with a collection of 8 Nazi News Reels on 8 mm film, which for over 60 years, have been gathering dust in my grandmother’s closet. As a visual anthropology student, I had them transferred onto digital media in order to preserve and study this historic footage. This footage appears to have been assembled out of several news reel receptions of the Internationale Funkausstellung (Radio Show) of Berlin which was well known for its daily reporting via radio. The silent film footage follows the Nazi army on its path of destruction and conquests of Greece, Western Czechoslovakia, and Belgium. Adolph Hitler appears several times throughout the film, greeting his soldiers after a military parade and also socializing with Nazi officers and elites. By far the most disturbing footage I’ve discovered shows dozens of young German boys engaged in military training exercises. Because of the historical significance of the footage, I am consulting with WWII experts in the CWU history department in order to provide much needed context to this silent footage.

Death and Pestilence: A Deadly Fungus in a Natural Population of Treefrogs

Belmont, Susan

Faculty Mentor(s): Steven Wagner, Jim Johnson, Biological Sciences; Tim Englund, Mathematics

Session: 8 (Oral Session 10:00-11:40 in 137A)

Chytrid fungus *Batrachochytrium dendrobatidis* (Bd) has been implicated in mass mortalities and declines of amphibian species world-wide, including Washington State. However, there have been few long-term studies on the incidence and impact of infection on a natural population. The demographic changes in abundance have been estimated in a population of *Hyla regilla* at Engelhorn Pond (Kittitas Co., WA) since 2002 using mark-recapture methods. During the spring of 2006, *Batrachochytrium dendrobatidis* was detected in the population using PCR analyses. Consequently, we implemented a swabbing/PCR procedure for all captured/recaptured individuals to measure pathogen prevalence. Initial prevalence of the disease was approximately 43% and mark-recapture results suggest a decline in the number of recaptured individuals compared to previous mark-recapture years. In addition, no individuals testing positive

for Bd were recaptured. The results of this study suggest that Bd is responsible for a significant decline in abundance of *H. regilla* at this site which may have widespread implications for persistence of other Northwest amphibians.

Archaeological Applications of GIS at La Loma, Michoacan

Bertolani, Jennifer; Hackenberger, Steven; Fairbanks, Marc

Faculty Mentor(s): Steven Hackenberger, Anthropology & Museum Studies

Session: 26 (Posters in Ballroom C & D)

Ongoing archaeological investigations, in partnership with a Purépecha comunidad indígena, are exploring the origins of highland culture in Michoacán. Most recently our interdisciplinary team has uncovered occupations of an “elite residence” within a Postclassic settlement (AD 700 to 1450) located outside of Parangaricutiro (San Juan Nuevo). In July of 2005 and 2006 we mapped and collected artifacts in plowed fields: ceramic vessels and pipes, obsidian blades and tools, and house rubble. In 2005 we located the outline of a possible structure, and in 2006 we cleared and tested the residence area as outlined by stone rubble and pavement. Based on associated artifacts we ascribe elite status to the house occupants. We also offer inferences regarding the nature of the structure, compound, and activity areas based on historic comparisons. The results of our field work are represented with GIS maps and 3-D images. We are continuing our collaboration with the Purépecha to help better understand their cultural heritage.

Dancing *Cubanidad*: Reconfiguring National Identity through Fidel Castro's Cultural Project, 1959-1973

Birks, Rachael

Faculty Mentor(s): Michael Ervin, Jason Knirck, History

Session: 17 (Oral Session 1:20-3:00 in 201)

Following the Cuban Revolution in 1959, Fidel Castro endeavored to sever the island’s economic, political, and cultural bonds of dependency with the United States and erect a sovereign nation with socialist principles as its foundation. To transform the Cuban population from simply mimickers of North American culture into examples of the socialist “New Man,” Castro believed that not only did capitalism need to be eradicated but the essence of Cuban national identity, or *cubanidad*, needed active reconstruction. Castro’s funding of various dance programs as part of his larger cultural project demonstrated the government’s attempt to use the arts to transform artists into a vanguard that would disseminate the new revolutionary identity through their artistic productions. Domestically, proletarianizing the arts acted as a method to turn a bourgeois art into the culture of the masses and through this process uplift the lower echelons of society to make them examples of the new revolutionary identity, while

simultaneously turning foreign, bourgeois art forms into representations of Cubanness. Internationally, the cultural project projected a reconfigured version of *cubanidad* to the world that both challenged pre-revolutionary perceptions of backwardness and otherness and asserted Cuban success.

NHL Lockout and its Effects on Player Salary Distributions

Bjorkqvist, Jeanette; Bunnell, Dean

Faculty Mentor(s): Yvonne Chueh, Mathematics

Session: 25 (Posters in Ballroom C & D)

In 2005 the NHL enacted sweeping reforms by limiting the collective player salaries for each team as a consequence of a year-long player-management conflict during which time no professional games were played. This period is referred to as “the lockout”. While the teams can still pay their individual players whatever they wish, the total of all player salaries is now restricted under a salary cap. We will utilize multiple regression to model the relationships between player statistics and their compensation during the years before and after the lockout. Once these models are determined, we will analyze the differences between them to determine if the characteristics (skills) most valued by management have shifted. It may be reasonable to look upon this as a natural economic experiment where we consider the funds directed towards players’ salaries as a finite resource which suddenly became less abundant.

How Fair Is the Pro-football (NFL) Overtime Rule?

Bonallo, Ian; Turner, Brandon; Thompson, Benny

Faculty Mentor(s): Yvonne Cheuh, Mathematics

Session: 25 (Posters in Ballroom C & D)

Every football fan must have asked this question, “Why hasn’t the National football League (NFL) changed their overtime rule? The current overtime rule states that a coin flip at the beginning of overtime will determine which team receives the ball first. From there, it is a sudden death overtime since the first team to score any type of point wins. Many think it is ridiculous to put the fate of victory on an NFL team largely on a coin flip. Obviously, it seems that whoever wins the coin flip has an advantage to win. Should the NFL create an equal chance for each team to win by granting each an offensive possession? We want to argue that winning the coin flip gives small probability advantage to win the game. We are going to test this hypothesis and quantify this probability advantage. We also want to compare the NFL overtime results to those of college football. College football overtime rule are diplomatic by giving equal amount of possessions, thus, an equal chance, to score for both teams. So if one team scores first, the other team has a chance to match their score before the game is

over. We will also compare overtime wins vs. home field wins to rank these two advantages

Community-Based Inquiry Improves Critical Thinking in General Education Biology

Braun, Celia

Faculty Mentor(s): Ian Quitadamo, James Johnson, Biological Sciences; Martha Kurtz, Chemistry

Session: 6 (Oral Session 8:00-9:40 in 202)

Over the past decade, government, business, and education stakeholders have become increasingly concerned about the ability of college graduates to solve problems and think critically. Prior research indicates that, while both faculty and students deem critical thinking essential, only 6% of college graduates are able to demonstrate the thinking skills necessary for academic and professional success and engaged citizenship. As an instructional tool, inquiry-based teaching has rapidly become the preferred method for teaching science because it more closely aligns with the process of doing investigative science. The purpose of this study was to test whether an investigative research teaching method called community-based inquiry (CBI) would elicit greater critical thinking than traditional lecture-laboratory teaching in general education biology. A quasi-experimental pretest/posttest control group research design was used in conjunction with the valid and reliable California Critical Thinking Skills Test (CCTST) to assess critical thinking performance in the CBI and control groups. Multiple co-variables including gender, ethnicity, class standing, time of day, prior critical thinking skill, and instructor were concurrently evaluated to increase the accuracy and precision of the study. Results showed that CBI students increased their average critical thinking skill 7 percentile (44th to 51st national percentile rank) whereas the control group showed no significant change (56th to 52nd national percentile rank). By determining which teaching methods best increase students' critical thinking skill, educators will better prepare students to think critically about global, national, and local issues, increase problem solving ability, and help them to become engaged members of society.

Undergraduate Research: A Model Based on 10+ Years Experience Mentoring Projects in the CWU Physics Department

Braunstein, Michael

Department: Physics

Session: 7 (Oral Session 10:00-11:40 in 135)

Over the past 10 years the author has directed undergraduate research projects at an average rate of greater than one per year. During this period such projects were required of physics majors at CWU and contributed important components toward

meeting the objectives of the undergraduate programs delivered by the Physics Department. These objectives include: demonstrate ability to use content/skills associated with CWU Basic/Breadth outcomes; demonstrate ability to apply content/skills associated with physics major curriculum outcomes; demonstrate ability to communicate scientific ideas; demonstrate ability to apply appropriate technologies; demonstrate ability to apply the process of science; demonstrate ability to work and learn independently; and, demonstrate ability to apply appropriate resources. We will present details of the model, which we have developed and applied to achieve the Physics program objectives, as well as our observations of some of the costs and benefits of this model. The primary components of the model include resources, project identification, selection and management, student and faculty commitment, and assessment. Considering the practices of colleagues with whose work directing undergraduate research projects we are familiar, we have concluded that some components of our model are uncommon (e.g., project identification and selection) or perhaps even unique (e.g., assessment). Feedback from external department review, results from the department form faculty use to assess the undergraduate research experience, results of student external (to the physics department) presentations of their research, and anecdotal feedback from colleagues and students, qualitatively suggest that this model has been effective at meeting the Physics program objectives for the undergraduate research requirement.

Preferred Qualifications for an Assistant Strength and Conditioning Coach at a NCAA Division I University

Brennan, Mark; McGowan, Robert; Frederick, Gary; Briggs, Ken

Faculty Mentor(s): Robert McGowan, Health, Human Performance & Nutrition

Session: 25 (Posters in Ballroom C & D)

The purpose of this study was to determine the appropriate educational and work experiences the aspiring strength and conditioning coach should attain in pursuit of an assistant position at the intercollegiate Division I level. Data was collected from NCAA Division I head strength and conditioning coaches on the preferred qualifications for an assistant strength and conditioning coach in the following areas; demographic characteristics, educational background, competitive experiences and coaching experiences. This data were used to determine if differences occurred among Division I-A, I-AA, and I-AAA universities for the coaches preferred qualifications. A total of 193 out of 326 (59.0%) coaches returned the questionnaire with descriptive statistics. The results indicated that differences occurred between the three Division I subclassifications.

Trombonage No. 3 in F minor, Opus 6 (World Premiere)

Brown, Sean

Faculty Mentor(s): Mark Babbitt, Music

Session: 27 (Music Session 10:00-11:40 in Theater)

The CWU Trombone Choir will perform the world premiere of Sean Brown's "Trombonage No.3 in F minor, Opus 6." This work is the third in a series written for trombone ensemble. The composition pays stylistic tribute to the grand musical gestures of Anton Bruckner (1824-1896) and Gustav Mahler (1860-1911).

Inhibition of Mitochondrial Electron Transport Due to Atmospheric Ultrafine Particle Iron

Bryner, Stephanie; Bullock, Eric; Johansen, Anne; Johnston, Justin; Thomas, Carin; Wells, Josie

Faculty Mentor(s): Carin Thomas, Chemistry

Session: 1 (Oral Session 8:00-9:40 in 135)

Atmospheric ultrafine particles (UFPs, <0.1 μm diameter) have been shown to induce oxidative stress in murine macrophages and bronchial epithelial cells and to disrupt mitochondrial membrane ultrastructure. To understand the underlying mechanisms that control UFP toxicity, bovine heart mitochondria were exposed to atmospheric UFPs collected in rural Washington State and electron transport chain function was measured. Results indicate that the extent of mitochondrial electron transport chain inhibition correlates with ferrous ion concentrations in UFPs, with the highest inhibition at 80%. The UFPs that caused the highest inhibition were collected during the Lick Creek fire. The data also indicate a correlation between seasons and electron transport chain inhibition. UFPs collected during the winter caused greater inhibition than those collected during the spring or summer.

Search by Clustering

Bucse, Sorin

Faculty Mentor(s): Razvan Andonie, Computer Science

Session: 5 (Oral Session 8:00-9:40 in 201)

The internet contains a vast variety of information in numerous documents formats. This fact poses a barrier for the ability to attain relevant information with limited amount of work. Not all the information available on the internet is explored when using a traditional search engine. XML documents are one of the most practical and popular data containers. XML was created to structure, store, and send information. It is critical to automate the search of XML documents in order to obtain relevant information. The most typical approach for efficient searches is to use a clustering algorithm. Such an algorithm finds similar documents based on similarity criteria. Due to the vast variety of information contained in XML format, clustering algorithms are

usually trained unsupervised. To test the principle of XML document clustering, we used Kohonen's Self-Organizing Map on very large sets of documents. We generated an N dimensional string of real values corresponding to the number of times a given tag occurs within the XML document. This allowed us to fulfill the Kohonen Self-Organizing Map's requirement of having a uniform length for its description input vectors. This algorithm has shown a remarkable 90% accuracy throughout the tests we performed. This clearly shows a great benefit in using such a strategy for searching information containers such as XML.

The Complete Chloroplast Genome of *Zamia integrifolia*: An Ancient Lineage with a Highly Conserved Genome

Bunnell, Cristy

Faculty Mentor(s): Linda Raubeson, Biological Sciences

Session: 2 (Oral Session 8:00-9:40 in 137A)

Sequencing chloroplast genomes is a useful tool for studying evolutionary relationships—such as those among the seed-bearing plants—because chloroplast DNA is relatively simple (compared to the nuclear genome) and abundant in plant cells, rates of nucleotide substitution are relatively slow, and chloroplast genes have been extensively studied and characterized. I am currently working on completing the chloroplast genome sequence for *Zamia integrifolia*, a representative species of cycads, one of the four main groups of gymnosperms. In my research thus far, I have looked at gene order and content and found that *Z. integrifolia* represents the ancestral condition for seed plants. In addition, I have found an unusually low number of short dispersed repeats within the genome, but a relatively high number of simple sequence repeats with larger than average maximum lengths. I have also found that this genome is highly conserved with low rates of evolution. The completed chloroplast genome of *Z. integrifolia* is important because the evolutionary relationships among the seed-bearing plants are still controversial, and this genome, being ancestral, will provide pivotal information for addressing the issue. In addition, the genomics of these ancient plants are important because all species of cycads are endangered due to habitat destruction and over collecting.

Aerobic Exercise Decreases Depression and Anxiety in Breast Cancer Survivors

Burnham, Tim

Department: Health, Human Performance & Nutrition

Session: 4 (Oral Session 8:00-9:40 in 140)

Breast cancer has a profound impact on women’s health. Depression and anxiety are common symptoms of survivors living with cancer and can adversely affect wellbeing

and rehabilitation. PURPOSE: The purpose of this study was to test the effect of low to moderate intensity aerobic exercise on depression and anxiety in women who have completed treatment for breast cancer. METHODS: 22 survivors of breast cancer (43-79 years of age) were randomly assigned to either an exercise group (n=12) or a control group (n= 10). The exercise group participated in a low to moderate intensity (30-50% heart rate reserve) aerobic exercise program three times a week for ten weeks. The control group did not participate in the exercise program. The Linear Analogue Self-Assessment (LASA) Scale was administered to subjects prior to the onset and at the conclusion of the ten weeks of exercise. This scale provides a measure of emotional distress and specifically includes measures of anxiety, confusion, depression, energy, and anger. RESULTS: Statistical analysis revealed a significant improvement depression ($p = .005$), anxiety ($p = .03$), confusion ($p = .04$), and anger ($p = .02$) in the exercise group compared to the control group ($p = .001$). More specifically, depression decreased in the exercise group (23.0 + 5.4 to 2.5 + 1.1) and increased in the control group (7.6 + 2.5) to 13.2 + 6.1), anxiety decreased in the exercise group (31.5 + 7.5 to 4.25 + 1.6) and stayed the same in the control group (15.9 + 6.8), confusion decreased in the exercise group (21.0 + 5.1 to 6.3 + 4.0) and increased in the control group (6.7 + 2.0 to 10.7 + 6.2), anger decreased in the exercise group (14.3+ 6.2 to 4.0 + 2.5) and increased in the control group (4.6 + 1.4 to 13.8 + 7.3). CONCLUSION: This aerobic exercise program was effective in reducing depression, anxiety, confusion, and anger in this group of breast cancer survivors. Guidelines for an exercise intervention are already in place for chronic diseases such as diabetes and cardiovascular disease but no guidelines are in place for cancer survivors. Low to moderate intensity exercise is a safe, beneficial, efficient, and cost-effective tool for improving depression and anxiety in breast cancer survivors.

Music Therapy for Mild Depression

Bush, Elizabeth

Faculty Mentor(s): Robert Sorrells, Psychology

Session: 16 (Oral Session 1:20-3:00 in 140)

This study explored the effects of music therapy on mild depression in college students. The hypothesis of interest was that students will report benefits from music therapy and receive psychological benefits from the music as measured by a standardized depression inventory (BDI-II). Music therapy has been explored extensively in recent years, but ironically, not among college campuses. Music therapy can alleviate pain, improve communication skills, enhance memory and promote wellness by lowering stress levels. College students are predominantly recognized as an over-loaded stressed and fatigued group of individuals. The American Psychological Association reported that, “one out of four young adults will experience a depressive episode by age 24.” Many college students who become too depressed seek other forms of relief such as self-medication or even suicide (the second leading cause of death among college students; American Psychological Association). Participants in this study were first screened for depression levels, and then given instruction to keep a provided log that

recorded daily depression and responses to listening to one of four levels of the independent variable. At the end of the study, the BDI-II was re-administered. Results of the within-subject analyses are reported.

Relative Age and Characteristics of Landslides on Mt. Solo: Longview, WA

Byman, Emma

Faculty Mentor(s): Dr. Lisa Ely, Geological Sciences

Session: 25 (Posters in Ballroom C & D)

Landslides are a potential hazard worldwide. In Cowlitz County, WA, the 1998 Aldercrest landslide displaced 138 homes causing economic setbacks for local residents and city. My initial objectives for this project were 1) to determine whether landslides on Mt. Solo date back to the Missoula Floods, and 2) to determine whether landslides below 133 meters (approximate Missoula Flood discharge level) in Cowlitz County were substantially older, fewer in number, composed of different geologic units, and smaller than those above 133 meters. I conducted field studies of four landslides on an increasingly populated hill, Mt Solo. As the only hill located centrally in the Longview valley, Mt. Solo is composed of two geologic units, Columbia River Basalt overlying the Cowlitz Formation. All four slides on Mt. Solo are in the Cowlitz Formation; this unit is comprised of sandstone, siltstone, mudstone, shale, basalts, and pyroclastic rocks. For each landslide, I described the type of slide, scarp exposure, lateral flanks, presence of seeps/streams/springs, sag ponds, vegetation type and age, and overall topography. These characteristics were compared to determine the relative ages of the landslides. Through radiocarbon dating, a minimum age of 2,360 years +/- 40 BP was determined for the oldest slide which is much younger than the Missoula Floods. No consistent relations were found between the elevation and the frequency, size or geological unit associated with the landslides.

Morphometric and Age Analysis of Mammoth Molars from the Pratum-Rutschman/Qualey Site, Marion County, Oregon

Cearley, Stacie; Barton, Bax

Faculty Mentor(s): Lisa Ely, Geological Sciences; Steve Hackenberger, Bax Barton, Anthropology & Museum Studies

Session: 21 (Oral Session 3:20-5:00 in 137B)

On Friday, August 25, 1967, remains of a mammoth were discovered in a peat bog in Pratum, a small farming community near Salem, Oregon. Two molars were found in conjunction with a tusk, femur, and partial pelvis. The finders report that the post-cranial material and tusk have since disintegrated; however, the molars remain mostly intact. While mammoth finds are fairly common in the area, detailed palaeontological analysis has rarely been attempted on such finds. The presence of two relatively

complete molars has allowed us to diagnose this mammoth to both species and age. Both molars were analyzed for the following qualitative and quantitative attributes: position in the mouth (hemisphere and side), plate count, overall length, width, height, weight, enamel thickness, and lamellar frequency, molar number, species and age. The teeth were also analyzed for length/lamellae ratio, and hypsodonty ratio. By comparing the attribute scores from the Pratum molars with known data for four species of North American mammoths, analysis indicates that the two molars from Pratum are the left and right upper 5th molars of a late Columbian mammoth (Mammuthus columbi). Based on the number of plates in wear on the occlusal surface of these molars, when compared to comparable data for modern elephants, the Pratum mammoth was roughly 22 ± 3 years of age at death. In terms of modern elephants' social structure, this would classify the Pratum mammoth's social age group as "early prime adult."

Taylor Ditch/Side Channel: Water Quality Study and Analysis for Salmonid Suitability in the Yakima River, Selah Floodplain, Washington, USA

Child, David

Faculty Mentor(s): Allen Sullivan, Morris Uebelacker, James Huckabay, Resource Management

Session: 15 (Oral Session 1:20-3:00 in 137B)

Formerly a remnant side channel Taylor Ditch is currently a four mile long, gravity irrigation diversion from the Yakima River, near Selah, Washington. Stakeholders are considering the option of engineering the ditch to have continuous diverted flow to meet irrigation needs, along with removal of fish screens to provide access to rearing habitat for salmonids. Before any actions are undertaken, a water quality assessment and analysis was needed to determine if Taylor Ditch provides suitable water-quality habitat for summer steelhead and rainbow trout, spring chinook, and coho juveniles. Water quality samples were collected for comparison to Washington Department of Ecology standards, and to samples taken in the Yakima River. Continuous water temperature monitoring and twice monthly grab-sampling for assessing eight additional parameters were conducted for one year (January 2006- January 2007). This thesis will supply resource managers the necessary information to seek funding for habitat improvements and diversion modifications.

Psychometric Properties of the Job Search Self-Efficacy Scale

Christianson, Jeffrey; Ingram, Jonathan; Foster, Cody; Neighbors, Daniel

Faculty Mentor(s): Susan Lonborg, Psychology

Session: 16 (Oral Session 1:20-3:00 in 140)

The purpose of this study was to examine the psychometric properties of the Job Search Self-Efficacy Scale (JSSES). Social cognitive theory, of which self-efficacy is an

important part, is now considered a prominent model of career development. The JSSES was designed to measure respondents' self-reported confidence in their ability to successfully completed 50 specific tasks related to the job search process. In order to examine the psychometric properties of this new instrument, a sample of undergraduate college students completed a total of five instruments: (1) a demographic information form, (2) the JSSES, (3) the Occupational Self-Efficacy Scale, (4) the Career Decision-Making Self-Efficacy Scale, and (5) the Career Decision Scale. Results of the study as well as implications for future research and practice will be discussed.

Physical Activity and Physical Fitness Levels in 6th Grade Students

Compton, Alissa

Faculty Mentor(s): Kirk Mathias, Health, Human Performance & Nutrition

Session: 25 (Posters in Ballroom C & D)

It is becoming increasingly common for school administrators to assess the effectiveness of Physical Education teachers with student fitness scores. However, according to the Surgeon General (1996, 2000) fitness is not the best measure of overall health. This study examines the appropriateness of measures in relation to student health. Therefore the purpose of this study was to determine whether there was a relationship between physical activity levels and fitness scores. Subjects were 6th grade students in a rural community (n=62). Physical fitness levels were assessed using the FitnessGram test battery (push-up, curl-up, pacer, and body mass index) administered by trained testers. Test administrators were tested for reliability (r=.90) prior to test administration. Physical activity levels were measured using Bouchard's physical activity three day self-report (r=.91). The self-reports were collected by the researcher in person so that any questions that the students might have could be answered. All incomplete self-reports were not included in the analysis. Correlation analysis was used to determine whether there were any significant relationships between physical activity measures and fitness scores. Numerous significant positive and negative correlations were found at the .05 level on a two tailed test. It was concluded that, regardless of fitness measure examined, there was a significant amount of unexplained variance.

Critical Thinking Grudge Match: Biology vs. Chemistry

Cornell, Caitlyn; Kurtz, Martha; Quitadamo, Ian; Holstad, Julie; Brown, Lindsay; Hunter, Brandi

Faculty Mentor(s): Martha Kurtz, Chemistry

Session: 26 (Posters in Ballroom C & D)

Higher education faculty, business employers, and government agencies have become increasingly concerned over the inability of college graduates to think critically using analysis, inference, and evaluation skills. Prior research shows that these students are

entering the workforce at a comparative disadvantage in our globalized society. This research study compares critical thinking levels among undergraduate science students, and shows that chemistry students bring significantly higher skill to their non-majors introductory course than biology students. The critical thinking skills of students were assessed at the beginning of their respective course using the California Critical Thinking Skills Test (CCTST). An ANCOVA statistical analysis was then performed using SPSS to determine the relative contribution of all study factors to differences between biology and chemistry critical thinking. An investigation of the factors which are commonly thought to appreciably impact students' critical thinking showed that whether or not students took high school physics was the only statistically significant factor in explaining the difference between chemistry and biology students' initial critical thinking. Other factors considered included what science classes students took during high school and the number of years of high school science they took, as well as their cumulative high school grade point average, native language, parent education, and household income.

Waking Up Wasps, "Oh My": Interspecific Differences in Awakening from Hibernation

Corrigan, Shawn; Jason, Irwin

Faculty Mentor(s): Irwin Jason, Lixing Sun, Biological Sciences

Session: 14 (Oral Session 1:20-3:00 in 137A)

Two invasive pest species, the German Yellowjacket, *Vespula germanica* and the European Paper Wasp, *Polistes dominulus*, have rapidly established themselves across much of North America, including parts of Washington State. All evidence to date indicates that the two are now the most common wasps in Kittitas Valley. While conducting research into the physiology of their hibernation cold-tolerance, we encountered noticeable differences in the behavior of these two types of wasps at cold temperatures; we repeatedly observed *P. dominulus*, to be active at 2^{o}C, and even at O^{o}C, temperatures at which most wasps, and indeed most insects, are comatose. Curiously, in the Spring of 2006 and 2007, the first wasps seen flying, and the first netted in Ellensburg, were all *P. dominulus*. We concluded that if they alone can be active at zero and near zero temperatures, it stands to reason that they might be the first to "wake" in the spring. We hypothesized that paper wasps (at least *P. dominulus*) should thus be able to arouse more quickly than other wasps after being subjected to sub-zero temperatures. To test our hypothesis we subjected hibernating yellowjackets (16) and paper wasps (32) to –5^{o}C for 24 hours and then recorded the time it took for each wasp to awaken from its torpid state. Based upon our results, we postulate that a significant difference exists in these species, both in their activity patterns at cold temperatures, and in their time of recovery from cold temperatures.

Chillin' Out in the Northwest: How Hibernating Wasps Survive Sub-zero

Temperatures

Corrigan, Shawn; Irwin, Jason

Faculty Mentor(s): Jason Irwin, Lixing Sun, Biological Sciences

Session: 14 (Oral Session 1:20-3:00 in 137A)

Adaptations to cold temperatures are of known importance to the success of invasive species and may become even more important in light of global climate change scenarios. Because freezing of intracellular fluids invariably causes damage to cell membranes, it is usually lethal to the organism. Hibernating insects survive sub-zero temperatures by one of two strategies. Freeze-tolerant organisms avoid damage by dehydrating their cells and allowing only their intercellular fluids to freeze. In Washington, overwintering queens of some vespid wasps, the yellowjackets and paper wasps, have evolved an alternative strategy: freeze-avoidance. By secreting polyols and sugars into their hemolymph in molar concentrations, they are able to substantially depress the freezing point of their blood, while dehydrating their cells. Synthesis of antifreeze proteins further depresses the freezing point while leaving the melting point virtually unchanged. This "thermal hysteresis" contributes to the wasps' ability to survive low temperatures. We measured the lower lethal limits of 6 species of locally occurring wasps, including two invasive pest species. Our results indicate a seasonal progression of tolerance to low temperatures by hibernating queens. Some local wasps have suvived temperatures below -25^{o}C. We also documented the occurrence of multiple freezing events, which we postulate are produced when one body segment of the insect freezes separately from another.

Certain Features of a "Japanese Accent" in English

Cutler, Robert

Faculty Mentor(s): Charles Li, English

Session: 18 (Oral Session 1:20-3:00 in 202)

Japanese learners of English encounter problems in pronunciation that arise from the difference between the phonologies of the two languages. This study deals with certain of those difficulties as experienced by one Japan-native graduate student at Central. As an attempt to make her pronunciation closer to that of a native speaker of North American English, she and I have been meeting weekly. Using a simple text (L. Frank Baum's *The Wizard of Oz*) and related conversations, we analyzed the problems in a minutely detailed manner. In the course of these meetings, we have developed some techniques that have assisted her in capturing a more exact sound. Specifically, we have discovered that some of her interlanguage forms of pronunciation result from the passage of the sound stream from one place and manner of articulation to another, creating an intermediary phoneme that replaces the intended one. By interrupting this movement, she has had success in producing the combination of sounds she wished to

make.

Running Economy is Not a Key Discriminator of Talent Level Among Trained Collegiate Male Runners

DAcquisto, Leo; Matanane, Ken; Schaefer, Tracy; Hovey, Greg; Nethery, Vince; Dickeinson, Jared; Bergman, Ethan

Department: Health, Human Performance & Nutrition

Session: 4 (Oral Session 8:00-9:40 in 140)

The purpose of this study was to examine physiological responses to running in a group of runners differing in talent level. Collegiate male runners were categorized as top (T, n= 7) and non-top performers (NT, n=8) based on an 8 km race. Participants performed a treadmill run for 20 min at 14.4 km/hr (TR 20) followed by a run to exhaustion. Oxygen uptake (indirect calorimetry) and heart rate (HR, telemetry) were monitored throughout the run. Maximal oxygen uptake was greater in T (65.2+1.9) vs NT (58.6+0.4 ml/min/kg) with both groups achieving a HR max of ~192 bpm. Oxygen uptake was similar between groups during TR20; however, T ran at 68% while NT ran at 79% of maximal oxygen uptake ($p<0.05$). Regardless of group, HR increased throughout TR20 ($p<0.05$). An increase in grade during the run to exhaustion resulted in great variability among the runners in their ability to sustain running velocity with the T group reaching a greater time to exhaustion (683+62 vs 472+109 sec, $p<0.05$). In conclusion, a similar oxygen uptake between groups during the fixed submaximal 20 min run suggests that running economy was not a key discriminator of talent level. Instead, the top runners were highlighted by their ability to run at a lower relative physiological load during the 20 min submaximal run, and capacity to sustain a greater metabolic power output during the incremental run to exhaustion.

New Synthetic Techniques For SrB4O7:Eu2+ and Sr3B2O6:Eu2+

Davis, Ryan

Faculty Mentor(s): Anthony Diaz, Chemistry

Session: 1 (Oral Session 8:00-9:40 in 135)

Luminescent materials known as phosphors are used in many new display and lighting technologies; these include plasma display panels and mercury free lighting. Due to an ever increasing need for the development of new luminescent materials, new and innovative synthetic techniques are being developed. Different techniques including multiple fires, firing under inert and reducing atmospheres, and using acidic washes to remove unwanted byproducts; using these techniques a completely novel synthetic method has been developed for two materials in the strontium borate phase system, SrB4O7:Eu2+ and Sr3B2O6:Eu2+. SrB4O7:Eu2+ is prepared by firing under air at 700°C to remove excess carbonate, firing under nitrogen at 800°C to prevent oxidation,

washing with dilute acid, and then firing under hydrogen to reduce the Eu. To produce Sr3B2O6:Eu2+ there is an additional firing after a stoichimetric amount of SrCO3 is added.

Nietzsche's Blind Spot: An Appeal Toward Less Sexualized Discourse

Dickinson, KathyMae

Faculty Mentor(s): Cynthia Coe, Philosophy

Session: 23 (Oral Session 3:20-5:00 in 201)

Women are passive and emotional; men are aggressive and logical. These stereotypes have contributed to the oppression of women. Although Nietzsche has been seen as a misogynist, we will look past even his own prejudices and discover that his work actually contains a foundation for sexual equality.

Where is the Beef? Food, Wealth and Culture in the Landscapes of the Columbia Basin, Washington

Dombert, Casey

Faculty Mentor(s): Morris Uebelacker, Craig Revels, Geography and Land Studies

Session: 21 (Oral Session 3:20-5:00 in 137B)

The patterns of cattle use in the Columbia Basin landscape of Washington, along with cultural meaning associated with cattle have evolved significantly since their introduction in the nineteenth century. Through time, a transition has taken place from a production system based upon individual ownership and relatively simple commodity chains to an immensely complex system of industrialized beef production. These networks are comprised of highly specialized facilities for each stage of production and involve transport over long distances. These changes in patterns of production and distribution on the landscape have been accompanied by a shift in the cultural meaning of cattle. Historically, cattle have been perceived as symbols of rugged individualism and the wide-open West. This perception is still widely held but is today complemented by more diverse perspectives that reflect the increasing detachment of society from its food chain. This study examines the various stages in the evolution of cattle systems and associated cultural phenomena in the Columbia Basin.

Haunted Histories: How the Gothic Influenced Modernist Literature

Ducken, Seanse

Faculty Mentor(s): Christine Sutphin, English

Session: 24 (Oral Session 3:20-5:00 in 202)

This paper discusses the similarities of Gothic and Modernist literature by analyzing two Modernist texts and relating them to Gothic traditions. By examining E.M. Forster's *Howards End* and Virginia Woolf's *To The Lighthouse*, I hope to exhibit how each may be read as a Gothic Modernist text. It becomes necessary, when comparing these literary traditions, to focus on the conventions of both Gothic writing and Modernist writing. The Gothic novel, for example, may employ such conventions as violence and spectrality while Modernist literature employs such constructs as stream of consciousness, which helps the writers of Modernist fiction explore the inner lives of their characters. Also, within these traditions, gender plays an important role. In her book *Subjects of Slavery, Agents of Change*, author Kari Winter states, "male Gothic novelists from the 1790s to the 1860s lingered over horrible spectacles of sexual violence, gore, and death, locating evil in the 'other' – women, Catholics, Jews, and ultimately the devil. In contrast, female Gothic novelists uncovered the terror of the familiar: the routine brutality and injustice of the patriarchal family, conventional religion, and classist social structures" (21). Support for the differences between male and female Gothic novelists is strong, but demonstrating such a difference between male and female Modernists will be more difficult. Overall, the issues which connect the Modernist writer to the Gothic are nuanced. Rather than attempting to find overwhelming evidence that the Modernists used Gothic conventions, I want to demonstrate that the Modernists shifted those conventions to serve their purposes and that Modernists, like Gothic writers, wanted to unsettle the reader, even if through slightly different means.

Completed Chloroplast Genome of Dioon edule

Dutton, Ashley

Faculty Mentor(s): Linda Raubeson, Rhiannon Peery, Biological Sciences

Session: 2 (Oral Session 8:00-9:40 in 137A)

The chloroplast genome of *Dioon edule*, a gymnospermous seed plant in the Cycad phylum, is currently under investigation. The chloroplast genome of this plant, found within the chloroplast and separate from the nuclear DNA, has been completely sequenced. In seed plants, the chloroplast genome is circular, approximately 150,000 base pairs (bp) in length, and usually contains two large inverted repeats (IR) with the IR copies separated by the small single copy (SSC) and large single copy (LSC) regions. My work on the *Dioon* genome has included "finishing" the genome. Finishing consisted of primer design, PCR amplification, sequence analysis and establishing the extent of the inverted repeat (IR). The gene order and content of the *D. edule* chloroplast genome is almost identical to that of the first published Cycad genome of *Cycas taitungensis*, which exhibits the conventional four region structure (LSC, SSC and 2 IR). However, the *D. edule* genome becomes interesting with its extensive loss of one copy of the IR, with approximately 20,000-25,000 bp being lost, leaving only a small remnant IR with the genes *trnH* and part of *ycf2* being repeated. Losses can mostly be attributed to mutations resulting from a deletion, and such an extensive loss

of the IR would require multiple deletions or one large event. This extensive loss has not been found in any other Cycad and is very rare among other seed plants.

Loss of Innocence

Ellis, Stephen John

Faculty Mentor(s): Michael Sherwin, Art

Session: 28 (Film and Art Session 1:20-3:00 in Theater)

In the spring of 2006, I received a C. Farell Merit Scholarship in order to undertake a creative art project in photography. The project became known as Loss of Innocence and is a documentary photo essay that explores the lives of teen parents and their children. Using a digital SLR camera, I spent several hours photographing and interacting with each of these families. The end result was a series of twenty-four 16”x20” framed images that went on exhibition at the Sarah Spurgeon Gallery in December, 2006, and again at the Eveleth Green Gallery in March, 2007. This project documents the lives of six families; five of which reside in Washington and the sixth in North Carolina. Through these images, I examine the love and humanity that drives young parents to care for each other and their children. Each photograph is an investigation into the intimate and sometimes enigmatic relationships that exist between members of a young family. Too often our society portrays these individuals as a minority of failures and drain on its financial wealth. Their situation, however, is not unique. Countless numbers of teenagers, who have not matured emotionally or financially enough to raise and support a child, frequently find themselves socially ostracized and struggling to survive. Yet in spite of the challenges, many are successful in raising their children with an intense level of love and commitment. Their perseverance, in spite of all the hardships, demands a certain level of respect few are ever granted. As a direct result of my personal experience with these circumstances, I too was the child of a young mother, my work aims to cast off the biased lens through which we view these families and let them, instead, illustrate their own stories.

Washington State: A Model for Voting Restoration?

Eshghi, Breanna; Elerson, Sarah

Faculty Mentor(s): Teresa Francis, Law & Justice

Session: 11 (Oral Session 10:00-11:40 in 201)

Historically, the right to vote did not extend to those convicted of felonies. Presently, there is a movement in some states toward restoring voting rights. The Washington State Legislature provided that a felon’s civil rights, including the right to vote, may be restored by a governor’s pardon or upon the issuance of a certificate of discharge. The certificate of discharge may be issued only when the felon has completed all requirements of his or her sentence, including fulfilling financial obligations associated

with the crime. In 2006, a case was brought before the Superior Court of the State of Washington to address the state's disenfranchisement laws. The plaintiffs contended that the statute impermissibly discriminated against citizens, specifically among those convicted of felony offenses, on the basis of wealth. For example: two felons are released from prison and both must pay a monetary fine before they can register to vote. One has the means to pay the entire fine upon their release from prison, while the other is only able to make small monthly payments. Is it fair that one of the parolees will be immediately re-enfranchised while the other may be denied the right to vote for months or years? The court found that the statute did violate the Equal Protection Clause of the Fourteenth Amendment to the Federal Constitution, and therefore ruled for the plaintiffs, allowing them to register to vote. Our research focuses on the movement towards restoration and why the right to vote is so crucial. We explore the history of voting, including poll taxes, and the constitutional amendments that brought about our current laws. We also explore the negative effects disenfranchisement has on communities of color.

Hells Canyon Cultural Resources: From Dry Gulch to the Devil's Farm

Evans, Lowell; Kennelly, Heather; Volkenand, Todd; Kosters, Kolten

Faculty Mentor(s): Morris Uebelacker, Resource Management

Session: 10 (Oral Session 10:00-11:40 in 140)

Four students relate their experiences in exploring and discovering cultural resources in Hells Canyon. The group spent four days observing, monitoring, mapping, and recording cultural resources by our camp at Dry Gulch, up two miles to Granite Creek. A pit-house village was observed and recorded; its features included probable pit-house and cache pit depressions. We mapped the landform that our camp was situated upon; as well as a rock shelter in the back of the campsite. The rock shelter appears to have been looted- approximately 6 square meters of sediment had been removed and rock art panels had been chipped off the rock face. Further up the canyon, we monitored several archaeological sites near the mouth of Granite Creek. These consisted mainly of pictographs, petroglyphs, amorphous pigment stains, and rock features. We headed up Granite Creek for approximately one mile, where we found the Devil's Farm. We were greeted by cherry trees, daffodils, and lilac bushes scattered around the homestead of Mr. Hibbs, who first came in 1884. The site was mapped and photographs were taken of historic artifacts. Our presentation will be a summation of our field adventures and ongoing historical research.

Geoarchaeology of the Yakima Training Center

Evans, Lowell; Kennelly, Heather; Trosper, Tabitha

Faculty Mentor(s): Steven Hackenberger, Anthropology & Museum Studies

Session: 26 (Posters in Ballroom C & D)

Stratigraphic profiles at two archaeological sites on the Yakima Training Center (YTC) are analyzed to understand environmental change during the Late Holocene. Profiles at the Bishop's Hollow site (45KT1975) and the Lucile Locality (45KT344) are analyzed to interpret stratigraphic evidence of climactic change. In 2000, Eastern Washington University conducted extensive geoarchaeological excavations on the YTC. Our results are compared to the results of this previous investigation and contribute to a greater understanding of the environmental and cultural history of the YTC. The stratigraphic sequences record climactic and geomorphological events from 3000 to 100 years ago. At least two major periods of aggradations and erosion are well represented at the two sites.

Use-Wear Analysis of the Beech Creek Site (45LE415) Formed Stone Tool Assemblage.

Evans, Lowell

Faculty Mentor(s): Patrick Lubinski, Resource Management

Session: 21 (Oral Session 3:20-5:00 in 137B)

The Beech Creek Site (45LE415) exhibits a record of human land use that spans thousands of years back into the Holocene. The only remaining material culture is stone tools and the debitage associated with their manufacture. The stone tool assemblage exhibits tools, such as the Cascade projectile point, cobble choppers, and spall scrapers, that define a culture historical unit referred to as Olcott. To date, Olcott assemblages and phenomena have been poorly described, and require reexamination with new analytical techniques. A use-wear analysis is offered to understand variation in tool function and activities performed across the site. My analysis will be a test of artifact names that seem to imply function, such as a "cobble chopper." Does the wear on these artifacts exhibit evidence of chopping use? Information gained from the use-wear analysis will be used in conjunction with evidence from experimental archaeology and the ethnographic record to suggest possible tool uses. The role of the Beech Creek site in the regional settlement/subsistence pattern will be discussed.

Dietary Behavior and Anthropometric Measures of Mexican Women and Second-Generation Mexican American Women

Fernyhough, Liane; Wiseley, Laura; Bennett, Virginia; Bergman, Ethan; Gee, David

Faculty Mentor(s): David Gee, Virginia Bennett; Health, Human Performance & Nutrition

Session: 13 (Oral Session 1:20-3:00 in 135)

Risk for chronic disease has been reported to be higher among Mexican-Americans than the general American population. A westernized lifestyle has been suggested to be a risk factor for those of Mexican descent. A high percentage of Mexican-Americans

living in central Washington State immigrated from the state of Michoacan, Mexico. Research Outcome: The purpose of this study was to determine if dietary behaviors differ between women living in Michoacan and central Washington and if these differences were associated with any physiological differences in the populations. Methods: Sixty-one women living in Michoacan and 26 second-generation Mexican-American women living in central Washington participated (ages 18-50). Results: BMI tended to be higher in the Mexican-American women (32+7 vs. 29+6, p=0.06) as was waist circumference (39+7 vs. 36+5 inches, p=0.06). The women surveyed in both populations tended to be overweight or obese. No differences were seen in resting heart rate or blood pressure. Mexican women reported using low- or non-fat dairy products, ate potatoes without fat, trimmed fat from red meat, and consumed fruit juices more frequently than Mexican-American women. No significant differences were found in consumption of fruit, fat in beans, tortillas, or potatoes, or skin of chicken, draining fat from ground beef, or eating vegetables as a snack. Conclusions: Differences in dietary behaviors may contribute to differences observed in BMI and waist circumference.

Analyzing Vegetation Regeneration on Mount St. Helens Using Remote Sensing Techniques

Finne, Sarah

Faculty Mentor(s): Jennifer Lipton, Geography and Land Studies

Session: 26 (Posters in Ballroom C & D)

Mount St. Helens offers a considerable amount of information about ecosystem disturbance and recovery. Remote sensing provides the capability of understanding the extent and rate of vegetation regeneration within Mount St. Helens' "blast-zone." This study analyzes the amount of vegetation growth during a time period after the May 18, 1980, eruption. Multispectral satellite imagery was obtained from 1990 (Landsat 5) and 1999 (Landsat 7) in order to analyze the amount of vegetation growth between the two years. Two methods of analyzing the amount and extent of vegetation regeneration were completed and include a Normalized Difference Vegetation Index (NDVI) as well as an unsupervised classification. From the NDVI, a model was constructed using the Model Maker component of Leica Geosystems' ERDAS Imagine 9.1 to extract the amount of pixels that represent healthy vegetation. The classified images created for 1990 and 1999 also reasonably approximate the total amount of vegetated landcover within the "blast-zone." Both of these methods show a significant amount of vegetation regeneration in the area surrounding Mount St. Helens between the years 1990 and 1999.

Lady Macbeth: Downfall Through Devotion

Flaherty, Fiona

Faculty Mentor(s): Laila Abdalla, English

Session: 12 (Oral Session 10:00-11:40 in 202)

Shakespeare's *Macbeth* depicts a man driven to betray his king and his own moral sensibilities. Macbeth rises to the exalted position of king, but ultimately fails and falls due to his insatiable ambition. Despite his ill-fated aspirations, Macbeth could never have initiated the chain of events that brought him to his ephemeral rule without the support of his wife, Lady Macbeth. She never seeks power on her own behalf; instead she facilitates her husband's fulfillment of his own desires. Lady Macbeth encourages and enables her husband to commit horrific acts of violence in pursuit of power. In the process, however, she sacrifices her own sanity, and ultimately, her life. Her tragic flaw, her hamartia, is her unfailing devotion to her role as "helpmeet" to her husband. The role of helpmeet, a construct of masculine medieval society, was concerned solely with women's attendance to, and assistance of, their husbands. Lady Macbeth expresses this same devotion. A strong woman, Lady Macbeth is restrained in her responsibility to act as her husband's aide, and in a struggle to escape that oppressive role, she becomes a perverted version of it. Although Lady Macbeth places herself in the unconventional role as alpha female, she attempts to remain devoted to her main cause as a supportive force to her husband. The two roles are contradictory in nature and cannot coexist. Thus, Lady Macbeth unintentionally acts as the catalyst that ultimately destroys herself and the very husband she seeks to help.

Ecological Impact of Wilson Creek Stream Diversion

Gain, Jonathan

Faculty Mentor(s): Paul James, Biological Sciences

Session: 20 (Oral Session 3:20-5:00 in 137A)

Prior to the building of the Ellensburg Fred Meyer store, Wilson Creek ran through the area where the store now resides. Throughout construction, 400 meters of the creek was rerouted to create a new stream channel in order to provide a suitable area for the store foundation. The primary goal of this research is to assess the environmental impact of this stream diversion. Diversity changes with respect to aquatic insect and fish species are being compared to pre-Fred Meyer surveys. A backpack electrofisher, dipnets, and surver samplers were used to sample the fish and aquatic insects inhabiting the new stream channel. Thus far, it is apparent that the diversity of the stream has in fact changed with respect to species composition and abundance. The presence of juvenile chinook salmon in the sample reach is an indication that the habitat quality is relatively good. Furthermore, aquatic insect samples indicate that more diversity exists now as compared to pre-construction samples.

Effects of the Herbicide Roundup® on the Growth of Pathogenic Strains of *Saprolegnia*.

Gain, Jonathan

Faculty Mentor(s): James Johnson, Steve Wagner, Biological Sciences

Session: 20 (Oral Session 3:20-5:00 in 137A)

Several species of *Saprolegnia* are known to increase embryo mortality of amphibian and fish species. Previous studies have shown a synergistic interaction, resulting in increased mortality, between *Saprolegnia* spp. and the common herbicide Roundup® in two frog species, the Cascade frog (*Rana cascadae*) and the Yellow-legged frog (*Rana aurora*). The mechanism for this synergistic effect is unknown but might be due to differences between the effects of Roundup® on the growth of the embryos and the pathogen. Previous studies have provided mixed results for the effects of Roundup® on microorganisms, showing growth inhibition in some species and enhancement in others, however no aquatic microorganisms have yet been tested. This study investigated the effects of Roundup® on the growth in vitro of various pathogenic strains of *Saprolegnia*. Strains were individually exposed to a range of concentrations of Roundup® (0.0, 0.12, 0.25, 0.50 1.0, 2.0, and 4.0 mg ai/L), and growth of the colonies was measured. Results indicate that higher concentrations of Roundup® are inhibitory for *Saprolegnia* spp. and lower concentrations had little effect on growth.

Patient or Prisoner: Barriers to Effective Mental Health Care

Garrtner, Erica

Faculty Mentor(s): Teresa Francis, Law & Justice

Session: 11 (Oral Session 10:00-11:40 in 201)

Involuntary civil commitment is the process by which a person, without their express consent, is put under state mental health supervision. The process is initiated by a concerned family member, doctor or other close individual. Initially, this type of civil commitment allowed a person merely suspected of having some sort of mental health issue to be committed based solely upon opinion or personal whim and resulted in many people wrongly held in mental hospitals and asylums. The law was slowly revamped to prevent this sort of abuse and Washington state statutes outlining the criteria for involuntary civil commitment have remained largely unchanged since the seventies. Presently, the process and elements demanding fulfillment of civil commitment are complex enough that those in serious and legitimate need of mental services are passed over simply because they do not meet each and every requirement. Tragedies occur when a mentally unstable person commits a criminal act and the question of why no effort was made to prevent such an incident is raised. Although the advent of mental health courts has improved the efficiency of delivering treatment to those in need of psychological or psychiatric treatment, the criteria for involuntary civil commitment poses a barrier for those seeking aid before their behavior turns criminal. This research focuses on what has been done in Washington regarding health services to the mentally ill within the criminal justice system, analyzes these practices and offers suggestions for future alternatives and advancements. Emphasis is placed on treatment

before the individual commits a criminal act and the need to breakdown the barriers posed by current involuntary civil commitment laws. Involuntary civil commitment is the process by which a person, without their express consent, is put under state mental health supervision. The process is initiated by a concerned family member, doctor or other close individual. Initially, this type of civil commitment allowed a person merely suspected of having some sort of mental health issue to be committed based solely upon opinion or personal whim and resulted in many people wrongly held in mental hospitals and asylums. The law was slowly revamped to prevent this sort of abuse and Washington state statutes outlining the criteria for involuntary civil commitment have remained largely unchanged since the seventies. Presently, the process and elements demanding fulfillment of civil commitment are complex enough that those in serious and legitimate need of mental services are passed over simply because they do not meet each and every requirement. Tragedies occur when a mentally unstable person commits a criminal act and the question of why no effort was made to prevent such an incident is raised. Although the advent of mental health courts has improved the efficiency of delivering treatment to those in need of psychological or psychiatric treatment, the criteria for involuntary civil commitment poses a barrier for those seeking aid before their behavior turns criminal. This research focuses on what has been done in Washington regarding health services to the mentally ill within the criminal justice system, analyzes these practices and offers suggestions for future alternatives and advancements. Emphasis is placed on treatment before the individual commits a criminal act and the need to breakdown the barriers posed by current involuntary civil commitment laws.

Mechanisms of Mortality of *Batrachochytrium dendrobatidis* in Amphibians

Gaulke, Christopher; Irwin, Jason; Johnson, Jim; Wagner, Steven

Faculty Mentor(s): Jason Irwin, Biological Sciences

Session: 14 (Oral Session 1:20-3:00 in 137A)

The fungus *Batrachochytrium dendrobatidis* has been linked to the decline of amphibians worldwide. Research has been devoted to examining the range of *B. dendrobatidis* and various physiological aspects of the fungus; however, little is known about how it causes mortality in individuals. Therefore, we investigated the potential mechanisms of mortality by examining the pathogen's effect on metabolic rate and osmotic balance. The northern leopard frog (*Rana pipiens*, n =14) and the pacific treefrog (*Hyla regilla*,n =14) were screened for *B. dendrobatidis* using PCR and microscopy, and housed separately to avoid cross-contamination. Every three days individuals were monitored for symptoms of illness, weighed, and had urine samples taken (*R. pipiens* only). Preliminary results suggest infected individuals do not always display symptoms. Metabolic rates of all animals declined over the course of the experiment. In addition, data collected suggests that animals can survive infection much longer than previously believed. Finally, mail ordered *Rana pipiens* may be a source of the spread of *B. dendrobatidis* and we urge containment of potentially

infected individuals.

Distributed Databases and Security Over the Internet

Gay, Bradford; Gnanarajah, Raj

Faculty Mentor(s): Carol Sullivan, Accounting

Session: 11 (Oral Session 10:00-11:40 in 201)

As distributed database structure becomes the norm, there is a growing need for e-commerce and multinational organizations to access data across the globe. This need to access disparate data while adhering to the basic tenets of information management becomes even more critical for organizations, whether it is for servicing their customers or for collaborating on research. The Critical Characteristics of Information Management are: (1) Availability, (2) Accuracy, (3) Authenticity, (4) Confidentiality, (5) Integrity, (6) Utility, (7) Possession, and (8) Security. To maximize the security of the information an organization possesses, the organization must employ preventative security measures and access control measures. Organizations take a multi-layered preventative approach by using such technologies as firewalls, VPN, and cryptography tools. At the same time, they use access control technologies such as multilayer password verification and biometrics to verify the authenticity of the user. The challenge an organization faces in designing a vigilant security system is that the system must protect critical information, but also be user friendly and not impede the flow of information critical to the organization's success.

Solving the Rubik's Cube Using Evolutionary Computing

Giese, Joel; Erkul, Berk

Faculty Mentor(s): Razvan Andonie, Computer Science

Session: 5 (Oral Session 8:00-9:40 in 201)

We experimented in utilizing an evolutionary approach to solving the puzzle commonly known as the Rubik's Cube. Our genetic algorithm is initialized with a population of 100 individuals. Each individual is randomly assigned 100 moves. The 24 ending states of the Rubik's cube are utilized in determining the fitness of each individual in the population. We subject the individuals to random mutation. The individuals are paired based on their fitness and crossed utilizing a tri-nary numbering system. Currently, using this method, we are able to solve a Rubik's cube problem in a reasonable amount of time with a complexity depth of four levels.

A Visualization of Rigid Body Motion

Goodrich, Amber; Thompson, Melissa

Faculty Mentor(s): Dan Curtis, Mathematics

Session: 5 (Oral Session 8:00-9:40 in 201)

Our project was motivated by a simple observation: When a book is rotated around its long or short axis, the book spins as expected, but when a book is rotated around its intermediate axis, the book flips numerous times in the air. Thus, the usual inquisitive, age-old question arose: Why? To explain this, first we will note that we are dealing with torque-free, force-free motion of a rigid body consisting of a fixed center of mass, which will be taken as the origin. We will then be able to formulate the Euler equations for motion which allows us to describe the inertia tensor—the linear relationship between the angular momentum and the angular velocity which incorporates the nature of the body. Through the notion of body-axes, we will describe the kinetic energy ellipsoid and the momentum ellipsoid, which intersect to yield a path along which the angular velocity vector must travel. By use of computer simulations, we will simulate the motion of the body under a variety of conditions, namely, by changing the initial angular velocity vector to be near the long, short, intermediate axes and on the heteroclinic solution, all of which relate to stable and unstable motion. The computer simulations will show the motion within two different reference frames, the body reference frame, that is, the perspective with the axes fixed in the body, and the spatial reference frame, that is, the perspective that is witnessed as the book is tossed into the air. We will relate the varying solutions to real world situations such as tossing a book into the air or throwing a football.

Birds in the Valley of Wind

Gray, Naomi

Faculty Mentor(s): Donna Stack, Art

Session: 28 (Film and Art Session 1:20-3:00 in Theater)

My project, *Birds in the Valley of Wind*, features a series of paintings of selected species that can be seen in Kittitas County, such as the Canada Goose, Bald Eagle, American White Pelican, Steller's Jay, House Sparrow, and California Quail. I use these avian characters as the metaphor in a narrative based on my personal experience of migration. One objective of this project is to investigate the potential of spatial art beyond the distinction between two and three dimensions, by addressing the fourth dimension to incorporate space and a depiction of time within the framework of installation art. The work presented was exhibited at the Sarah Spurgeon Gallery from May 5-11, 2007.

This is Poppy

Grimes, Ashley

Faculty Mentor(s): Lene Pedersen, Anthropology & Museum Studies

Session: 9 (Oral Session 10:00-11:40 in 137B)

This is a short film that explores the world of a British exchange student by the name of Poppy Melzack. She is a current student at Central Washington University in Ellensburg. The film follows her through a series of interviews on a range of topics such as her studies, bodily functions, travel dreams, and general experiences in America. A common theme is Ms. Melzack's personality—not least her humor—in cross-cultural perspective.

Laughter, Number of Play Partners, Age & Play Bout Duration in Chimpanzees (*Pan troglodytes*) Living in an African Sanctuary

Halberg, Rachel; Sheeran, Lori.; Jensvold, Mary Lee

Faculty Mentor(s): Lori Sheeran, Anthropology & Museum Studies

Session: 26 (Posters in Ballroom C & D)

Behaviors associated with play, such as biting and wrestling, can be found in other contexts. Play signals, such as laughter and play faces, are hypothesized to have evolved to indicate an individual's playful intention. In a study of chimpanzees, laughter has also been shown to maintain the play bout—bouts with laughter are longer than are bouts without this signal (Jensvold, et al., 2005). Mefou National Park, Cameroon, is home to 19 chimpanzees rescued from the illegal bushmeat and pet trades. Digital videotapes of these chimpanzees were analyzed to explore the possible impact of laughter on play bout durations in this population. The number of play partners and the ages of the individuals involved in play bouts were also assessed to determine their affects, if any, on play bout duration. For each play bout, we recorded presence/absence of laughter, mean group size, ages (adult, non-adult, or both) of individuals involved in the play bout, and play bout duration. A Kruskal-Wallis H test showed no significant difference in play bout length between the three age groups ($H=3.4933$, $n1=80$, $n2=15$, $n3=79$, $p=0.1744$). A hierarchical regression analysis showed that laughter, but not average group size, was a significant predictor of longer play bout duration ($R=0.501$, $p<0.05$). Our results from this population support the hypothesis that laughter is a signal that maintains playful interactions, as indicated in longer play bouts.

Orchestral Excerpts for Flute

Hamilton, Thomas

Faculty Mentor(s): Hal Ott, Music

Session: 27 (Music Session 10:00-11:40 in Theater)

In both educational and professional music settings, there is one tool that is drastically overlooked: the orchestral excerpt. An excerpt is a portion of an orchestral work played isolated from the whole, for the purpose of auditioning or general study. Because these applications are quite important to a musician, it is a wonder that more pedagogical research and general time has not been devoted to orchestral excerpts. However, it is the intent of this project to not only remedy this lack of attention but to provide a more comprehensive excerpt resource for flutists than exists in circulation today. This will be accomplished by providing recordings, a written flute part, and the entire score for each excerpt. By including all three of these aspects, this project is providing the music the excerpt is to be played from, the context in the orchestra, and an audio sample to hear what it is supposed to sound like. This information compiled all into a single location will prove to be an invaluable resource for flutists.

Using Stable Isotopes to Characterize the Soil Water Budget Across a Climate Gradient

Hammond, Travis; Howarth, Katherine

Faculty Mentor(s): Carey Gazis, Geological Sciences

Session: 25 (Posters in Ballroom C & D)

Climate is complexly linked to the soil water budget in that it controls water and heat fluxes to the soil as well as influencing soil formation and soil properties. In this research, we are investigating how the soil water budget and styles of soil water movement vary across a climate gradient. The hypothesis underlying this research is that the style in which water percolates through the soil, the rates of evaporation versus transpiration, and the timing of groundwater recharge varies predictably during different hydrologic seasons across this climate gradient. Precipitation, snow melt and soil water are monitored at various sites from Snoqualmie Pass to Ellensburg, where annual precipitation ranges from 136 cm to 23 cm. Stable isotope measurements of the waters are combined with climatic measurements and soil physics monitoring to determine amounts and residence times of soil water and to quantify evaporation rates, transpiration rates, and downward percolation fluxes. These parameters are in turn related to site characteristics such as precipitation, soil properties, and vegetation type/density. This research explores how the soil water budget is influenced by climate and fills a gap in our understanding of the detailed dynamics of water movement in the critical upper soil region. The information gained will have significant broader implications in areas such as contaminant transport, biogeochemical cycling, agricultural and forestry practices, water management, etc.

Anthropology Field Notes

Haney, Faith

Faculty Mentor(s): Lene Pedersen, Anthropology & Museum Studies

Session: 26 (Posters in Ballroom C & D)

Anthropology Field Notes is an educational television program exploring exciting endeavors in Anthropology. The program focuses on current field research in Cultural Anthropology, Archaeology, Visual Anthropology, and Primatology in the Pacific Northwest – and beyond! The program highlights science-based, real world field projects. No fedoras or whips here! This monthly program's benefits are far-reaching, from educating the local public about the importance of cultural resources, to giving Central Washington University students and professors a venue to discuss their research, to offering "outside" researchers a chance to talk about their projects. Guests include: Karl Heider, famed visual and cultural anthropologist; Trent de Boer, Dept. of Transportation Archaeologist and creator of *Shovel Bum* comic 'zine; Jean-Michel Cousteau, ocean explorer and filmmaker; Robert Ballard, ocean explorer, shipwreck archaeologist, and discoverer of the shipwreck *Titanic*; Biruté Galdikas, the world's foremost expert on orangutans; and many more. Most episodes will also present current graduate research, lots of "fun facts" to ponder, and clips from the field. Episodes air on KCWU-TV, Ellensburg (cable channel 15). Podcasts and other venues are in the works to take *Anthropology Field Notes* global.

The Shipwreck Austria: An Historical and Archaeological Investigation At The Olympic Coast National Marine Sanctuary

Haney, Faith

Faculty Mentor(s): Patrick Lubinski, Resource Management

Session: 26 (Posters in Ballroom C & D)

The shipwreck *Austria* is a mid-19th century wooden ship that foundered on Washington's outer coast during a blustery gale on January 29, 1887. Located on the tumultuous intertidal zone of Cape Alava in the Olympic Coast National Marine Sanctuary (OCNMS), wreckage remains lie scattered in tidepools and beach sand. Though a brief survey was conducted at the site area in 1997, new mapping techniques utilizing GPS technology will fill a data gap of the mapped locations of shipwreck remains in OCNMS. The primary objectives of this study are to identify, map, and interpret the remains of the *Austria*. Through a comparative analysis of current remains of the Austria to those recorded in 1997, the aim of this project is to determine the general degradation and movement of materials over time, as well as provide a GIS data layer to the National Oceanic Atmospheric Administration (NOAA) for use in monitoring the shipwreck. Additionally, a field school is proposed at the site location to gather data, educate up-and-coming heritage resource managers, and compile the data for use in an interactive web-page geared towards public outreach and education. This inquiry will benefit the scientific community by addressing a research data gap, contributing to an understanding of site dynamics, and providing a useful source of information for education and public outreach.

Beyond Average Comprehension

Harder, Erika

Faculty Mentor(s): Laila Abdalla, Douglas Honors College

Session: 23 (Oral Session 3:20-5:00 in 201)

Over the course of the human life journey, the individual is confronted with situations and experiences which give rise to questions about the nature of existence. These lines of inquiry range from ascertaining the most basic functions of the observable world to understanding the more difficult concepts of whether or not there is an afterlife. Humankind is a curious species whose inquisitiveness has resulted in centuries of ideological development intended to derive order from the chaos of life. This presentation will explore how the non-specificity of philosophical exploration produces a deeper spiritual awakening in the individual than the precision of religiously-institutionalized ideology. The ceding of the former approach to the latter within world religions can be perceived in a continuum that runs the gamut of Taoism, Buddhism, Christianity, and Judaism. The presentation will demonstrate that the ways by which these creeds address first, human existence, second, political activism, and third, evangelism, discover that the strictness defining the institution is a tool for power acquisition, and that only the creativity of the individual can transcend the material world. A meticulously structured guideline, whether moral or political, blinds the individual to the big picture. It is in fact the process by which one lives and interacts with others that truly fulfills the individual.

Synthesis Towards Novel Straight Chain Borinic Acid Potential HIV-1 Protease Inhibitors

Heer, Tajinder; Fabry-Asztalos, Levente

Faculty Mentor(s): Levente Fabry-Asztalos, Chemistry

Session: 19 (Oral Session 3:20-5:00 in 135)

Although current HIV-1 protease inhibitors on the market show high specificity, a number of side effects can result from their administration. Furthermore, quick drug resistance is developed due, in large part, to low affinity for the mutant forms of HIV-1 protease. Consequently, there exists a great and urgent need for the development of novel HIV-1 protease inhibitors that have less toxicity, greater bioavailability, and exhibit distinct resistance profiles. Recent studies have shown that borinic acid HIV-1 protease inhibitors, which can act both associatively and competitively, have a higher affinity for HIV-1 protease variants than compounds that are strictly transition state analogs. Furthermore, such inhibitors were found to be potent at lower concentrations than non-boronated protease inhibitors. A library of straight chain borinic acid potential HIV-1 protease inhibitors were designed, the synthesis of some of which is presented.

Christianity as a Justification for Slavery in the Antebellum South

Heintz, Taryn

Faculty Mentor(s): Daniel Herman, History

Session: 23 (Oral Session 3:20-5:00 in 201)

My paper concerns exegetical justifications for slavery. I plan to discuss biblical passages that pro-slavery ideologues used to justify slaveholding, as well as speeches and books written by ministers who condoned slavery. I will also comment on historian's interpretations of the relationship between Christian thought and slavery in the South. My paper is significant because it shows how Southerners created a religious ideology to sustain slavery at a time when Northern Christians used the Bible to condemn it.

Mexican-Influenced School Lunch Entrees Result in Increased Plate Waste and Decreased Caloric Consumption When Compared to Non-Mexican Entrees

Herrington, Stefanie; Kelley, Emily; Halverson, Tyra

Faculty Mentor(s): Ethan Bergman, Cashman Linda, Health, Human Performance & Nutrition; Timothy Englund, Mathematics

Session: 25 (Posters in Ballroom C & D)

The National School Lunch Program (NSLP) plays an important role in meeting the nutrient needs of many school-aged children. For some students, meals received at school are the only balanced meals they receive. However, plate waste is a significant problem in the NSLP and the variety of foods offered on a school lunch menu may relate directly to plate waste quantity. The purpose of this study was to determine the difference in plate waste quantity between Mexican-influenced entrees, like burritos and taco soup, (possibly created to appeal to a large Hispanic population) and non-Mexican entrees, such as chicken burgers and corndogs, for second, third, fourth and fifth graders. Plate waste data were collected in one school for ten days for a total of 1,361 plates studied to determine the amount of food consumed and wasted. Differences in nutrient intake and plate waste related to entree type were analyzed using ANOVA, resulting in significant differences ($p<.01$). Because Mexican-influenced entrées were generally larger than the non-Mexican-influenced entrées, students ate more grams (124±54 vs. 105±45, mean ± standard deviation), but also wasted more grams (61±54 vs. 29±41). In addition, students consumed fewer total calories (235±122 vs. 256±114), more milligrams of sodium (695±292 vs. 558±257), more milligrams of cholesterol (37±25 vs. 27±13) and more grams of fat (10±6 vs. 9±5).

Maori Language and Maori Identity

Hiramatsu, Kenjiro

Faculty Mentor(s): Penglin Wang, Anthropology & Museum Studies

Session: 26 (Posters in Ballroom C & D)

The Maori are the indigenous people of New Zealand. Today, the Maori have a population of about 600,000, presenting 14.6% of the total population of New Zealand. This presentation deals with the Maori language and Maori cultural identity by focusing on how the Maori people strive to maintain and revive their native language in the context of their increasing participation in the process of modernization and interaction with the other people in the country. My research findings show that the Maori language performs a fundamental act of cultural construction and ethnic identity for their speakers. For the Maori activists, their native language is the life force of their Maori culture and mana – a native term for "spiritual power." For this reason the Maori people exert great effort in using and developing their language as far as they can. Moreover, they are lucky enough to have strong support from the New Zealand government. Maori have secured a place for their Language in the public educational sector with the adapted alphabets with macrons. 1 in 4 Maori could speak Maori language and 30,000 non-Maori could speak Maori. In addition, nearly half of those who speak Maori were under 25 years old, which is the result of Te Puni Kokiri – "moving forward together" to revise the National Maori Language Strategy. Furthermore, media such as Maori Television on channel 19 also plays an important role for revitalizing Maori language and culture through broadcasting. There are many kinds of Maori related classes are available in schools such as identity, cultural, feminist movement, politics, and history. The governments and the organization of Maori activists are working hard for the future of Maori.

Inhabiting Space

Hogrefe, Melissa

Faculty Mentor(s): Lene Pederson, Anthropology & Museum Studies; Michael Sherwin, Art

Session: 9 (Oral Session 10:00-11:40 in 137B)

In my recent work I document spaces that need to be taken in as a whole, not with merely one, but with multiple perspectives. Photographing in both horizontal and vertical panoramas, the entire environment is captured, each area with its own picture plane in which to exist. In addition to this panoramic quality, I use time lapse photography to capture not only the essence of the place, but a quality of time passing, with people moving about within these environments. I am interested in the daily rituals that people do, often without even realizing that is what they are doing: Opening the shades, making tea, putting another log on the fire; the types of behavior that are repeated day in and day out. With long exposures for each picture, the background, or environment remains stable and is constant, while the persons moving within become

mere ghosts and blurs. This power-point presentation of my photographs will take the viewer through the processes of how my research has changed and developed over time. I will explain the reasoning behind my methods, illustrated with my photographs and in dialogue with references from some of the key founders in Visual Anthropology.

War Without Quarter: The Plan of San Diego and the South Texas Race War, 1915-1916

Holly, William

Faculty Mentor(s): Michael Ervin, History

Session: 17 (Oral Session 1:20-3:00 in 201)

The Plan of San Diego appeared in the United States during a period of intense nationalism and paranoia. The Mexican Revolution had been raging along the United States border for five years, causing uneasiness among residents of Texas, New Mexico, Arizona, and California. The plan called for a Liberating Army for Races and Peoples to create an independent republic for Mexican-Americans out of the American states of Texas, New Mexico, Arizona, Colorado, and California. This was to be followed by a creation of a buffer zone of Border States that would be given to African-American and American Indian plan participants. When the Plan of San Diego was issued in February 1915, Americans had different interpretations of the manifesto. Some felt it was a far-fetched idea that bordered on lunacy. Others felt it was a deliberate attempt by Mexican president Venustiano Carranza to manipulate the U.S. government for his own political aims. Although the Plan of San Diego appeared to be a political manifesto aimed at pressuring the U.S. to recognize Carranza as the legitimate ruler of Mexico and not to intervene militarily in the Revolution, in its essence the document was intended to incite a race war with the aim of destroying the Anglo power structure in South Texas.

A Brief Analysis of the Anti-English Rhetoric of the Irish Language Revival

Humphrey, Marisa

Faculty Mentor(s): Jason Knirck, History

Session: 17 (Oral Session 1:20-3:00 in 201)

After the death of Charles Stewart Parnell in 1891, the cultural revivalists came to the forefront of Irish nationalism. One of the foremost priorities of the newly-founded Gaelic League was to revive the Irish language, the use of which had rapidly declined in the late nineteenth century in favor of English. Speeches and articles by the movement's advocates cover a broad array of topics, arguments, and themes, but one particular theme appears frequently: a strong anti-English sentiment. Obviously, the Irish language advocates had an aversion to the English language itself, since it was

overtaking Irish; however, they generally also expressed a strong aversion to anything English, linguistic or otherwise. This anti-English attitude served as a tool to allow the revivalists to define Irish identity. Rather than promoting the Irish language and a distinct Irish identity on their own merits, the Irish language advocates frequently promoted Irish language and identity only in opposition to the English language and identity. However, because English identity, or at least what the Irish language advocates perceived as English identity, was so closely tied to their definition of Irish identity, the anti-English rhetoric of the language movement actually served to deconstruct the Irish identity that they were attempting to define and preserve. This paper will examine that anti-English rhetoric with some scrutiny to illustrate how the Irish and English identities form a binary opposition which consequently deconstructs itself.

Resource Management, Sovereignty and the Future: The Port Gamble S'Klallam of Washington State

Huntington, Sarah; Russell, Jennifer; Cearley, Stacie

Faculty Mentor(s): Tracy Andrews, Anthropology & Museum Studies

Session: 26 (Posters in Ballroom C & D)

The Port Gamble S'Klallam tribal land is located along the Hood Canal, near Puget Sound, in the Northwestern corner of Washington State. While tribal work to manage natural and cultural resources has received little research attention, the challenges faced by the Port Gamble S'Klallam and its recent approaches to meeting them provide important information about contemporary Native American sovereignty issues. In the U.S., recognized treaty tribes may have established rights to actively participate in and develop resource management policies, rather than simply being recipients of them. The resulting potential impacts on the power and goals of other state government entities are often a source of confusion, at best, and controversy. This project focuses on S'Klallam fishing and forestry issues, and tribal approaches to protecting the availability of key cultural and natural resources. Personal interviews with S'Klallam tribal government members highlight their own experiences, perspectives, and plans for the future. In addition, interviews with other knowledgeable individuals, and secondary literature and archival resources provide historical information regarding treaty rights, reservation programs, and changes in resource availability. Analysis of factors leading to recent oil spills in waters that support S'Klallam fisheries, and the efforts to cleanup of these disasters, reveal the uncertainty in where responsibility lies among tribal, state, and county governments.

The Myth that Iraq was Involved in the 9/11 Attacks

Ikeda, Ami

Faculty Mentor(s): Charles Reasons, Law & Justice

Session: 26 (Posters in Ballroom C & D)

There are so many misunderstandings about Iraq. People in the United States have the wrong perspective about Iraq from media, rumors, and so on. People believe that Iraq caused the 9/11 terrorism attacks. According to Clerk, Iraq had been an enemy of the United States for 11 years. However, as a matter of fact, Iraq did not cause terrorism. Iraq was not involved in terrorism at all. There was no evidence of mass destruction weapons in Iraq. There was no connection between al-Qaeda and the Iraqi Intelligence Service. Moreover, the case for links between Iraq and al-Qaeda was weak, and Bin Ladin was resentful of the secularism of Saddam Hussein's regime. The myth is only a myth. It can not be concluded that Iraq encouraged terrorism.

Species-Typical Behaviors Promote Positive Interactions with Chimpanzees

Jensvold, Mary Lee

Department: Chimpanzee and Human Communication Institute

Session: 22 (Oral Session 3:20-5:00 in 140)

The relationships between captive non-human primates and their caregivers are critical ones and can affect animal welfare. Friendly relationships can improve quality of life; adversely, agonistic relationships can decrease quality of life. One method to promote positive relationships is for caregivers to employ species-specific behaviors in their interactions with their charges. The current study tested the effect of caregivers' use of chimpanzee behaviors in interactions with chimpanzees at The Zoo Northwest Florida (ZNWF) in Gulf Breeze, FL. The participants were three male chimpanzees and four human caregivers. The investigator trained the three NWZF staff in the meaning of chimpanzee behaviors and how to use these behaviors. Data collection occurred during typical interactions between the human participants and the chimpanzees. In Chimpanzee Behavior Condition (CBC) the human participant presented chimpanzee behaviors and vocalizations in data collection interactions with the chimpanzees. In the Human Behavior Condition (HBC) the human participant presented human behaviors and used speech. The interactions were videotaped. Data coders recorded the behavioral context and the time that it began as it occurred on the videotape for each chimpanzee. There was 1 hr 18 min more data in the HBC than in the CBC. The investigator created a new sample of the first 5 min from each data collection interaction for an equal comparison of conditions. The chimpanzees engaged in significantly more play and grooming in the CBC than in HBC. They were significantly less interactive in the HBC. The implications of this research are that caregivers should employ species-specific behaviors with chimpanzees to promote friendly relationships.

Correlation of Atmospheric Ultrafine Particle Iron and Mitochondrial

Toxicity

Johnston, Justin; Thomas, Carin; Bullock, Eric; Johansen, Anne; Bryner, Stephanie; Wells, Josie

Faculty Mentor(s): Carin Thomas, Chemistry

Session: 25 (Posters in Ballroom C & D)

Atmospheric ultrafine particles (UFPs, <0.1 μm diameter) have been shown to induce oxidative stress in murine macrophages and bronchial epithelial cells and to disrupt mitochondrial membrane ultrastructure. To further our understanding of the underlying mechanisms that control UFP toxicity, bovine heart mitochondria were exposed to atmospheric UFPs collected in rural Washington state and tested for reactive oxygen species production, lipid peroxidation and electron transport chain function. Particular focus was on the effect of UFP ferrous ion as determined spectrophotometrically and on surface chemical composition analyzed by time of flight secondary ion mass spectroscopy (TOFSIMS) and x-ray photoelectron spectroscopy (XPS). Results indicate that the extent of mitochondrial electron transport chain inhibition correlates with ferrous ion concentrations in UFPs even in the absence of detectable hydrogen peroxide production.

Preparation of Imprinted Silica Gel Surfaces Through Reversible Covalent Attachment of Template

Jorgensen, Ryan; McNeal, Julie; Wilkerson, Debra; DeLuca, JoAnn

Faculty Mentor(s): JoAnn DeLuca, Chemistry

Session: 25 (Posters in Ballroom C & D)

Covalent attachment of a template via a phosphonic acid group was the first step in the preparation of imprinted silica gel surfaces. Organotrialkoxysilanes with complementary binding groups were then attached, followed by template removal by treatment with aqueous HCl. Model template and binding molecule attachment to the surface was confirmed by infrared spectroscopy, solid-state ^{31}P NMR spectroscopy, and thermogravimetric analysis. Subsequent removal of the template was confirmed by infrared spectroscopy.

Effects of Soap Lake Water on Biofilms

Justus, David

Faculty Mentor(s): Holly Pinkart, Biological Sciences

Session: 20 (Oral Session 3:20-5:00 in 137A)

Soap Lake (Grant Co., WA) is a saline, alkaline lake formed by the Missoula Flood events which shaped much of the Pacific Northwest geography. Following its

formation 13,000 – 15,000 years ago, periods of evaporation have resulted in its high mineral content. Like other mineral waters such as the Dead Sea, Soap Lake has long been touted as a "healing lake." However, only one limited scientific study has been conducted to investigate the claims of "healing waters." In the current study, the effect of exposure to Soap Lake water on biofilm populations was investigated. Biofilms of 3 common skin pathogens, *Staphylococcus aureus*, *Pseudomonas aeruginosa*, and *Candida albicans*, were grown on glass cover slips placed in nutrient broth cultures on a rocker to ensure confluent biofilm development. Biofilms were incubated for 24 hours at 35 ° C, then rinsed with a phosphate buffer to remove the growth medium. The biofilms were then exposed to 3 different conditions: nutrient broth, sterile deionized water, and filter-sterilized Soap Lake water. Biofilm populations were quantitated by performing traditional plate counts. After exposure to Soap Lake water, the numbers of microorganisms associated with the biofilms decreased as compared to an initial biofilm population plate count. Soap Lake water appears to have biocidal activity on common skin pathogens in biofilm form. Future work will include repeating this work with biofilms grown on artificial skin.

Laser Induced Bubble Formation in Salt Solutions

Kangas, Eric

Faculty Mentor(s): David Laman, Physics

Session: 25 (Posters in Ballroom C & D)

A Nd:YAG laser pulsing at 1064 nm is focused into a cell containing a salt solution causing hot plasma to form at the focal point creating a bubble of hot gas. The gas cools, and the bubble collapses causing the plasma to heat up again sending out energy in the form of a luminescence. Hypothesis: The time between the arrival of the laser pulse and the luminescence is related to the hydrogen bonding in the solution. Different salts and concentrations will disrupt the hydrogen bonding to a different degree, causing a change in the time between the arrival of the laser pulse and the luminescence. Quantifying this change provides a probe of the degree of hydrogen bonding in a liquid. So far data for three different salts, NaBr, NaCl, and NaI have been obtained in the concentration range of zero to one molar. Physical modeling of the data will happen later.

Blackbody Matching with a RGB LED for Star Classification

Kendall, Taylor

Faculty Mentor(s): Michael Braunstein, Physics

Session: 7 (Oral Session 10:00-11:40 in 135)

We have developed a virtual star which can qualitatively measure the temperatures of observed stars. We began by using the International Commission on Illumination (CIE)

color matching functions to represent the human eye's response to different wavelengths of light numerically. Using this CIE color matching system and Mathematica we defined functions that computed the chromaticity coordinates of a Planck Blackbody as a function of its temperature. We then defined functions that computed the chromaticity coordinates of a RGB LED as a function of relative LED intensity. Using these results we can solve for the relative intensities for a RGB LED which will appear to be a blackbody of a given temperature. By using optics to make the RGB LED appear as a small star-like object in a telescope it can be used for color matching to a star, thus as a qualitative measure of the stars temperature and classification.

Designing and Constructing a Research Grade Scanning Tunneling Microscope System for Imaging Individual Molecules in Surface Self-Assembly

Klein, William

Faculty Mentor(s): Eric Bullock, Chemistry

Session: 19 (Oral Session 3:20-5:00 in 135)

The invention of the scanning tunneling microscope (STM) 25 years ago gave researchers the ability to peer directly inside the fascinating world of molecular structures. Since that time the design of STMs has been refined allowing researchers to custom build their own STMs to meet their specific needs. A research grade STM was designed and constructed along with a very stable two stage extension spring vibration isolation system. This STM was specifically designed to image molecular self-assembly at surfaces at a fraction of the cost of comparable research grade STMs currently available. The STM was constructed out of a machinable ceramic with an extremely small coefficient of thermal expansion ensuring that all of the components expand and contract at the same rate, thereby increasing stability and image clarity. Results using this novel all ceramic design show high mechanical and electrical stability. Molecular resolved images obtained from a self-assembled monolayer on graphite using this new home built STM will be presented.

An Instrument Pilot Study of Attitudes and Perceptions of Radio Frequency Identifiers as a Means of Monitoring Students in Student Leadership Organizations

Klemin, Wayne; Rawlinson, David; Lupton, Robert

Department: Information Technology & Administrative Management

Session: 25 (Posters in Ballroom C & D)

Radio Frequency Identification (RFID) passive technology is currently being used by

major retail stores to monitor product distribution and sales by embedding an electronic RFID chip in the product or product package. Public schools across the nation, too, are beginning to adopt this technology to monitor students' activities such as attendance, school bus entry and exit, and admittance to school-sponsored functions. The purpose of this study was to develop and pilot test a survey instrument to collect data from student leadership organizations regarding attitudes toward RFID passive technology for subsequent research with an expanded population. A ten-question Likert-type scale survey was developed to determine their attitudes regarding the use of Radio Frequency Identification chip as a means of monitoring Future Business Leaders of America (FBLA) students. The 25 members of the Washington State Future Business Leaders of America Board of Directors and Regional Advisors 2006-2007 were surveyed using Survey Monkey. Thirteen responses were returned. Simple percentages were used to analyze the data and a review of the question responses was done to determine if the questions were clear and elicited useable responses. The pilot test found that the questions were clear, not ambiguous, and elicited usable responses. Further, it found that additional questions needed to be added to provide cross-tabulation, statistical analysis, and additional findings. Based on the pilot test, this instrument with additional questions and stronger statistical analysis can and will be used to study an expanded student leadership population. The next step in this study is to administer the revised instrument to all state of Washington FBLA advisors to determine their attitudes toward RFID technology.

Native Life in Hells Canyon

Knott, Richard

Faculty Mentor(s): Morris Uebelacker, Geography and Land Studies

Session: 26 (Posters in Ballroom C & D)

Prior to the settlement of the land in the 19th century, native groups of people who lived within Hells Canyon depended upon the Snake River to provide them with adequate supplies of food to supplement what they were able to gather and carry with hem in their yearly migrations between the river and the camas prairies atop of the canyon. These migrations were based upon climate, salmon runs, and growing seasons of edible plants, all of which limited the way these people were able to adapt to the landscape. I will be looking at the groups of people who lived in this region of the Snake River, what types of houses they lived in, the food that they were able to acquire, how these aspects of daily life changed as these groups made their yearly migrations between the river and the camas prairie, and why they would make this migration.

Frederick Douglass: An Absurd Hero, Feeling Abject, and Contemplating Suicide

Lane, Jeff

Faculty Mentor(s): Christine Sutphin, English

Session: 24 (Oral Session 3:20-5:00 in 202)

In the slave narrative genre, many of the texts written during the period of Southern subjugation share similar qualities: their being constructed for white audiences, the use of prescriptive grammar rather than a more naturally descriptive black vernacular, religious overtones, a direct plea to abolish slavery, and information concerning the escape of the protagonist. Most all of the narratives in this genre are very moving in their depictions of cruelty and perseverance, but what separates *Narrative of the Life of Frederick Douglass, an American Slave* from the normative dialogue of other narratives is a touch of consciousness and a realization of what Albert Camus termed, in *The Myth of Sisyphus*, the "absurd." Through Julia Kristeva's theory on the abject and the concept of dualism, Douglass, with acquired knowledge from furtive lucubrations, is able to articulate and define himself in relation to what he is not. Like Camus's insights into the actual myth of Sisyphus, Douglass recognizes and triumphs over the meaninglessness of a life condemned to futile toil.

Characterizing Processes Driving Magmatic Evolution of Castle Creek Eruption Period Basalts, Mount St. Helens, Washington

Lantau, Aaron

Faculty Mentor(s): Wendy Bohrson, Geological Sciences

Session: 25 (Posters in Ballroom C & D)

Mt. St. Helens is a well-studied analogue to numerous arc volcanoes world wide, thus making it an ideal place to study the complex processes that form potentially explosive magmas. The volcano has predominantly erupted silica-rich magma over its 40,000 year history. However, during the Castle Creek eruptive period (2500-1700 yrs before present), relatively magnesium-rich magmas, basalts, were erupted to form 3 distinct units called Cave, Precave and North Flank. Mattos (2006) recognizes the potential importance of complex processes, occurring in the subvolcanic magma chamber, that led to compositional variation. The present effort attempts to characterize two of these processes: magma mixing and separation of solids (crystals) from liquid (melt). If crystal-melt separation occurred, then plagioclase crystal compositions should record a systematic decrease in [Ca/(Ca+K+Na)]100 (anorthite) content from cores to rims. Conversely, if mixing occurred, then the crystals should not express a systematic decrease in anorthite content. Electron microprobe analyses reveal that anorthite compositions of Cave and Precave crystal cores are higher than crystal rims, which is consistent with crystal-melt separation. In contrast, core to rim anorthite compositions overlap in one North Flank sample, strongly suggesting that mixing is dominant. Lessons from Mt. St. Helens can serve as a model to further elucidate the processes driving compositional diversity of magmatic arc volcanoes worldwide.

Ectomycorrhizal Communities Found on *Pinus ponderosa* in Two Moisture Regimes

Lau, Helen

Faculty Mentor(s): James Johnson, Tom Cottrell, Mary Poulson, Biological Sciences

Session: 3 (Oral Session 8:00-9:40 in 137B)

Ectomycorrhizae are a type of mutualistic symbiotic association between the roots of forest trees and a fungus. This association benefits both participants, and trees such as pines, grow poorly in their absence. Few ectomycorrhizal communities are well characterized and how ectomycorrhizal communities change along environmental gradients is unknown. This research utilizes both molecular methods and fruiting structures identification to characterize the biodiversity, species composition, and relative abundance of ectomycorrhizal fungi associated with ponderosa pine (*Pinus ponderosa* Lawson) growing in moist and arid environments. This research represents the first attempt to characterize the community of ectomycorrhizal fungi associated with natural stands of ponderosa pine and the diversity of ectomycorrhizal fungi along an environmental gradient. This study is building the foundation needed in order to answer other ecological questions about the effects and functions of these mycorrhizae on plant health and biogeographical distribution.

Investigating Personality: Do Gamers Differ from Non-Gamers?

Leinweber, Rachel

Faculty Mentor(s): Susan Lonborg, Psychology

Session: 16 (Oral Session 1:20-3:00 in 140)

The purpose of the present study was to examine hypothesized personality differences in Gamers and Non-Gamers, particularly in light of the paucity of published research on this population. For this study, Gamers were operationally defined as those college students who played Dungeons and Dragons for more then 40 hours in any given calendar year. Students who did not meet the criterion for Gamers were assigned to the Non-Gamer group. Gamers were recruited through a number of sources, including the Central Washington University club known as G.E.E.C. (Gamers enjoying Each others' Company). Non-Gamers were recruited through the Psychology Department undergraduate research participation board. All participants completed a demographic information questionnaire and the NEO-PI-r, a personality test based on the five-factor model of personality. Results of the study as well as implications for future research will be discussed.

Polistes *dominulus*, the Fair Weather Fiend: Metabolic Rates at Low Temperature

Lessig, Zach

Faculty Mentor(s): Jason Irwin, Biological Sciences

Session: 14 (Oral Session 1:20-3:00 in 137A)

All animals consume food and oxygen for energy and give off carbon dioxide as a byproduct; this is known as metabolism. Metabolic rate is measured by the amount of CO_2 released by an organism; if you measure the amount of carbon dioxide an animal is giving off then you can know its metabolic rate. To survive the winter when food is scarce, many wasp species go into hibernation or more specifically diapause, where their metabolic rate is suppressed. Unlike other wasps, the paper wasp Polistes *dominulus* may not go into diapause. When temperatures are cold they are inactive, however they become active almost immediately when the temperature rises. After measuring the carbon dioxide given off by several P. *dominulus* taken from hibernacula, it seems conclusive that their metabolic rate is directly related to temperature but not necessarily as might be expected. The mean value for the wasps tested at 5^oC was 13.02µL CO_2/g/h and then at 0^oC it dropped to 7.02 as would be expected from most ectotherms but when the temperature dropped to -5^oC, the metabolic rate rose to 19.52µL CO_2/g/h. This metabolic increase may be due to the wasps' physiological attempts to increase their temperature to keep from freezing. Having a metabolic rate depending strongly on temperature and a lack of diapause may be an advantage by allowing these wasps to be one of the first species to start foraging and building nests when the weather warms up.

Green Cascade Frog, *Rana livida*, Detection in the Valley of the Wild Monkeys, Mt Huangshan, China

Lester, Jack; McCarthy, Maureen; Matheson, Megan; Sheeran, Lori; Wagner, Steven; Li, Jin-Hua

Faculty Mentor(s):Steven Wagner, Biological Sciences

Session: 25 (Posters in Ballroom C & D)

Little information is currently known about the abundance, distribution, habitat, and life history of the Green Cascade frog, *Rana livida*. Data on the only confirmed population of this species were collected in 1887 by M.L. Fea in a remote village located in the southwestern foothills of Mt. Mooleyit, in the Dawna mountain range of Myanmar. Sightings of individuals in countries including Vietnam and China have been reported, but no other populations have been confirmed. The IUCN red list describes this species' status as data deficient with population trends unknown. In August 2006, the Biodiversity Conservation Field School confirmed the presence of two adults and one juvenile, ranging from 2cm to 7.5 cm (snout vent length), and made several additional observations within the mixed deciduous hill forests adjacent to a high gradient mountain stream in the Valley of the Wild Monkeys in Mount Huangshan, China. This suggests the presence of a previously undescribed population. Individuals were observed or collected during night surveys and following heavy rains

on tree trunks, on wooden supports beneath the stairs leading up to the YA1 tourist feeding platforms, and in the mainstream of the park. This population of *R. livida* lives sympatrically with several other ranid species. Future research needs to focus on identifying the ecological characteristics and life history of this rare species.

Demography of Chinese Paddle-Tailed Salamanders (*Pachytriton brevipes*) Using Spot Pattern Recognition

Lester, Michelle

Faculty Mentor(s): Steven Wagner, Biological Sciences; Lori Sheeran, Anthropology & Museum Studies; Megan Matheson, Psychology; Jinhua Li, School of Biological Sciences, Anhui University, China

Session: 8 (Oral Session 10:00-11:40 in 137A)

An abundance and demography survey was conducted on Chinese Paddle-tail salamanders, *Pachytriton brevipes*, found within the Valley of the Wild Monkeys Park in Huangshan, China, during the summer of 2006. Recapture sampling techniques were used to investigate population size within the park's streams. Digital photographs were taken of the unique ventral pattern of all individuals encountered to identify recaptures non-invasively. During twenty survey sessions of three 60m plots, there were 56 adult individuals encountered with six later recaptured. Individuals were predominately found in the higher elevation plots with 27 encountered in the middle plot and 22 in the uppermost plot. Snout-vent-lengths (SVL) ranged from 40.1-96.0mm and were used to construct three separate age class cohorts. Given the small number of recaptures, due to fluctuating stream flow and volume, estimating population size is problematic. Therefore, the total population size for the surveyed stream during the study period was estimated to be ~500 using the Lincoln-Peterson model. However, the calculated population estimates were consistent with estimates made in 2005. The combined results suggest that population sizes are stable from year-to-year. Further, individuals are aggressively territorial and appear to have small home ranges and low mobility which may make them susceptible to management activities that fragment their populations.

Aristotelian and Confucian Rhetorical Traditions in Four Modern Political Texts

Li, Charles

Department: English

Session: 18 (Oral Session 1:20-3:00 in 202)

This presentation analyzes four political texts of two different genres, including two memorial speeches -- "The Gettysburg Address" (1863) by Abraham Lincoln and "Serve the People" (1944) by Mao Zedong, and two patriotic songs -- "American

soldier" and the Chinese lyric "In the Place where the Peach Trees Bloom." Findings show more different than similar rhetorical features in the texts. At the macro level, the American texts advocate winning whereas the Chinese texts advocate harmonious social relationship; while the former favors logical and essay-initial enthymemes, the latter favors essay-final ones; while the former appeals to ethos, pathos, logos, the latter appeals to the authority of tradition and subordination. At the micro level, "The Gettysburg Address" employs syntactic subordination much more frequently than does "Serve the People." Though both songs make heavy use of parallelisms, the language in the American song is colloquial, even slangy, whereas the language in the Chinese lyric is poetic. These features, macro-level ones in particular, may be considered manifestations of some differences in the ancient Aristotelian and Confucian rhetorical traditions.

Archaeological Investigation of Upland Ridgelines above Cougar Bar, Hells Canyon, Idaho

Lieb, Jeremy; Jankowski, Steven; Mohamed, Hamza; O'Brien, Meghan

Faculty Mentor(s): Morris Uebelacker, Resource Management

Session: 10 (Oral Session 10:00-11:40 in 140)

An archaeological survey was conducted between March 16-17, 2007, for several ridgelines leading upslope from Cougar Bar on the Idaho side of the Snake River in Hells Canyon upriver from Lewiston, Idaho. Cougar Bar is a known location of prehistoric and historic occupation with a multitude of documented archaeological sites. However, there has been little documentation of sites in the upland areas surrounding Cougar Bar, that were undoubtedly used by the people living there at various times. This survey includes two main ridges leading up from Cougar Bar between 820 ft and 3610 ft elevation. Several sites were recorded including three likely burial sites, as well as other rock features including one particularly large stacked rock feature of prehistoric or historic origin. Other evidence recorded on the survey route, including the presence of edible plants known to have been used by the Nez Perce people who inhabited Cougar Bar and the abundance of game animals, suggests that much of the upland area could have been a source of valuable resources for the people living at Cougar Bar, and thus that the area may have been extensively utilized by them. A map was created showing the survey route and site locations, and site reports were created for each site for the benefit of the Idaho State Historic Preservation Office and the Nez Perce Tribe.

The Lower Pitched Members of the Flute Family

Logan, Brooke

Faculty Mentor(s): Hal Ott, Music

Session: 27 (Music Session 10:00-11:40 in Theater)

The alto and bass flute are cousins to the C flute while simultaneously being separate instruments, each with their own strengths and weaknesses. My project focuses on gaining performance skills with the instruments. Having started the project with a degree of knowledge concerning the C flute, I was able to delve into the minute details of determining the differences between alto, bass, and C flute performance. During the three months I devoted to each instrument, I studied a contrasting range of musical styles, from Baroque to modern, for the bass and alto flute. This has allowed me to explore certain limits of the instruments that include looking at the extremes in dynamics for each register and extended techniques, such as multiphonics. I found that playing music dating before the 1900s facilitated a greater understanding of the technique and immediate skill necessary to play the instruments while modern music helped me understand subtle nuances in tone and sound, such as how to control and change tone production. The immediate goal of the project was to produce recordings that showcase contrasting styles of works for both the bass and alto flute. The long term goal was to achieve a better understanding of the components involved in playing the flute, thereby enhancing my own performance practices for the future.

Strategic Ethics Management for Effective Corporate Governance of Multinational Enterprises: Strategic Policies, Concepts, and Frameworks

Lupton, Robert; Rawlinson, David; Takei, Hideki

Department: Information Technology & Administrative Management

Session: 25 (Posters in Ballroom C & D)

When managers talk about the value of ethical business practices, the pictures they draw are quite idealistic. When societies value ethical business practices, companies that practice business ethics tend to be overwhelmingly praised. However, this situation implies practical difficulties for profit-oriented organizations that want to emphasize ethical operations but are concerned about bottom-line impact. This research focuses on the application of a construct called Strategic Ethics Management as applied to Multinational Enterprises (MNEs). First, the authors build a conceptual framework for Strategic Ethics Management. Second, the authors discuss approaches to ethics management by using contemporary concepts, including a generic business strategy (Porter, 1985), strategic philanthropy (Porter and Kramer, 2002), ethical relativism (Donaldson and Werhane, 1979), path dependence and lock-in effects (Arthur, 1994; Leibowitz and Margolis, 1999 and 2002), and applications of a concept of adjusted present value (APV) (Luehrman, 1994 and 1997). Third, the authors conclude, based upon the literature, that the application of ethical business practices to MNEs can provide a competitive advantage in global operations. However, economic and ethics objectives often compete in operational contexts. Strategic Ethics Management can be a cost-effective method of allowing managers to assess these economic and ethics objectives within the context of financial cash flows, and estimate cost-benefit ratios for both business operations and business ethics accurately. The authors conclude that Strategic Ethics Management can provide a positive correlation between ethical

business conduct and long-term financial performance Therefore, managers can use business ethics to generate a competitive advantage in global operations, leading to an increase in long-term profitability for their enterprises.

Fuzzy ARTMAP with Relevances with Genetic Algorithm Optimization for Predicting Properties of HIV-1 Protease Inhibitors

Magill, Luke

Faculty Mentor(s): Razvan Andonie, Computer Science; Levente Fabry-Asztalos, Chemistry

Session: 5 (Oral Session 8:00-9:40 in 201)

We present a new Fuzzy ARTMAP with Relevances with Genetic Algorithm optimization used to predict the biological properties of HIV-1 protease inhibitor compounds. The Fuzzy ARTMAP with Relevances assumes that some data within the data set may be more useful (relevant) than others, and as such should be weighted more strongly. It is impossible to know these weights before hand, and so they are optimized using a Genetic Algorithm. This optimization has shown improvements over previous experimental results. The Fuzzy ARTMAP itself is a fuzzy neural network based on Adaptive Resonance Theory and presented by Carpenter et. al. It is a useful neural network in that it solves the so-called “stability-plasticity” dilemma. This is a neural network’s tendency to forget old information when it learns. This feature allows the Fuzzy ARTMAP to learn on-line, while other neural networks must be taught only after data has been obtained.

Chloroplast Genomes from Two Different Species of Acorus almost Identical

Margheim, Stephanie; Peery, Rhiannon

Faculty Mentor(s): Linda Raubeson, Biological Sciences

Session: 2 (Oral Session 8:00-9:40 in 137A)

The chloroplast genome of plants is a small (about 160,000 base pairs) but important DNA molecule containing about 120 genes essential to photosynthesis. Sixty-six land plant chloroplast genomes have been completely sequenced. Most known genomes are not from closely related plant species, so detailed comparisons of genomes are rare. One of the published genomes is from *Acorus*, the most ancient living lineage of monocots within the flowering plants. *Acorus* is a group of perennial, aromatic herbs found around ponds and in marshes. The iris-like plants have horizontal rhizomes that have been used for medicines to treat different ailments for thousands of years. We have completely sequenced the chloroplast genome of *Acorus americanus* allowing me the rare and important opportunity to compare our genome to the one published from the closely related *Acorus calamus*. Preliminary analyses show that there are only 21 mismatches and 15 insertions within the 153,489 base pair genome. Conducting similarity analyses for closely related species identifies mutations to use for species

level evolutionary analyses and helps us to understand evolutionary processes of the chloroplast genome.

Use of Gesture Sequences in Captive Chimpanzee Play

McCarthy, Maureen; Jensvold, Mary Lee; Fouts, Deborah; Fouts, Roger

Faculty Mentor(s): Mary Lee Jensvold, Chimpanzee and Human Communication Institute

Session: 22 (Oral Session 3:20-5:00 in 140)

This study examined gesture sequences during play in captive chimpanzees. The authors hypothesized that chimpanzees would use visual gestures primarily toward attentive recipients and auditory/tactile gestures toward inattentive recipients. They also hypothesized that gesture sequences would be more prevalent toward unresponsive rather than responsive recipients. Data collectors coded video to record play gesture type, actor, recipient, gesture modality, vocalizations, recipient attention, recipient responsiveness, and whether or not gestures occurred in sequences. The chimpanzees were significantly more likely to use auditory/tactile rather than visual gestures first in sequences regardless of a recipient's initial attentiveness. They rarely used visual gestures first when a recipient was initially inattentive. Visual gestures are effective only with attentive recipients, but auditory/tactile gestures are effective with both attentive and inattentive recipients. Recipients responded significantly more to single gestures than to first gestures in sequences. Sequences indicated that a recipient did not initially respond to a gesture. When single gestures were effective, more gestures were unnecessary. The chimpanzees thus used gesture sequences appropriately relative to both recipient attentional states and responsiveness. These findings offer support that chimpanzees are highly competent gestural communicators and modify their interactions according to contextual social cues.

Behavioral Sequences between Tibetan Macaques (*Macaca thibetana*) and Tourists at Mt. Huangshan, China

McCarthy, Maureen; Matheson, Megan; Sheeran, Lori; Lester, Jack; Li, Jin-Hua; Wagner, Steven

Faculty Mentor(s): Megan Matheson, Psychology

Session: 22 (Oral Session 3:20-5:00 in 140)

Previous research on Tibetan macaques at Mt. Huangshan, China suggests ecotourism can have detrimental consequences. This study identified sequences of behaviors that typically occur in monkey-tourist interactions to examine whether specific tourist behaviors precipitate monkey responses. It was hypothesized that in monkey-tourist interactions certain behaviors often precede others, and these behavioral sequences were more likely initiated by tourists than monkeys. Focal sampling was used to record behaviors from tourists and 10 macaques over a one-month period with 28 data collection sessions. The actor, recipient, location, and whether or not behaviors

occurred in sequences were recorded. Of 3,129 behaviors, researchers recorded 2,534 (81%) from tourists and 595 (19%) from monkeys. Tourists initiated significantly more sequences than monkeys (412, 84.6% versus 75, 15.4%, binomial test, $p<0.005$). Tourist *pointing, rail slapping, fleeing*, and *rock showing* occurred significantly more in tourist-monkey sequences than tourist-only sequences (binomial tests, $p<0.05$ for each). *Points* and *railing slaps* were also among the most common tourist behaviors preceding monkey threats. By discouraging tourists from engaging in these behaviors, monkey threats could be reduced, thus improving monkey-tourist interactions. Moreover, these results may aid in the management of other ecotourist sites to minimize stress-inducing interactions.

Evidence of Rapid Divergence in the Plastid Genome of *Welwitschia mirabilis*

McCoy, Skip; Kuehl, Jennifer; Boore, Jeffrey

Faculty Mentor(s): Linda Raubeson, Biological Sciences

Session: 2 (Oral Session 8:00-9:40 in 137A)

The gnetales are a small enigmatic group of gymnospermous seed plants that have been very difficult to place evolutionarily. Workers have speculated that this difficulty is partly due to the lack of genetic data available and partly due to a high rate of change in the DNA of gnetales. However this latter inference is based on relatively few genes as, to date, there have been no complete gnetalean chloroplast genomes published. We are reporting on the first completely sequenced gnetalean chloroplast genome, from *Welwitschia mirabilis*. Analyses have been performed comparing the rates of divergence of 57 protein-coding genes from *Welwitschia* relative to ten taxa representing the other extant seed plant lineages. In all cases, genes from the *Welwitschia* chloroplast genome showed a higher rate of evolution (nearly three times higher in some cases), thus demonstrating that, across the entire genome, the DNA of gnetales evolves faster. Interestingly, the genome shows evolutionary distinctiveness in aspects other than nucleotide mutation rate. We also report on the compactness of the chloroplast genome, and levels of genome rearrangement, and how these rearrangements may account for some instances of gene loss.

An Abundance Survey of Paa spinosa in the Huangshan Scenic District, China

McCoy, Cheri; Wagner, Steven

Faculty Mentor(s): Cheri McCoy, Biological Sciences; Lori Sheeran, Anthropology & Museum Studies; Megan Matheson, Psychology

Session: 8 (Oral Session 10:00-11:40 in 137A)

Long term demography and abundance studies are important to assess the conservation

status of amphibian species. A mark-recapture study was conducted of Paa spinosa in the Scenic District of Mount Huangshan in the Anhui Province of China. The survey took place between July 30 and August 28, 2006. Specific stream locations where selected by water feature, and then were systematically surveyed. However, due to the lack of anuran captures in these marked locations, additional surveys took place at various locations within the park, which yielded further captures. A total of eighteen capture dates where recorded. 386 total individuals were captured with 52 recaptures. Of the 52 recaptures, 2 were recaptures from 2005. The Jolly-Seber method was used to estimate the population abundance at 550 individuals. The snout-vent length ranged from 13.10mm - 59.00mm with the average being 47.90mm. Unfortunately, there was no feature that could easily be used to distinguish males and females, so it was impossible to analyze population demography. This was the second year an abundance study has taken place in this area and data were compared with data collected in 2005. The 2006 data indicates a population increase from 2005. However, further conservation and studies must be conducted in consecutive years to determine accurate population abundance.

Human Suffering as Understood From a Buddhist Perspective

Mecham, Christian

Faculty Mentor(s): Chenyang Li, Philosophy

Session: 23 (Oral Session 3:20-5:00 in 201)

Humanity, from its earliest days, has attempted to reconcile seemingly disparate forces: a hostile world which brings suffering, often through our own actions and a benevolent world that surprises us with its grace and beauty. How do we define suffering, how is it affected by our desires and attachments, and how do we end suffering to bring about peace? These questions are at the core of Buddhist teachings: that of the Four Noble Truths, which defines suffering as existence, locates its source as selfish desire, shows that the end of suffering stems from ending the source, and that the way to accomplish the end of selfish desire is by following the Noble Eightfold Path. The presentation will explain in detail each of the Four Noble Truths; including an exploration of Buddhist terms associated with the Four Noble Truths (such as *trishna, dukkha,* etc), an examination of the Noble Eightfold Path, and how we might apply these philosophical and religious beliefs to a modern context.

Bridging the Gap: Using Bridge Texts to Facilitate Reading Comprehension in the College Composition Classroom

Meeks, Lacy

Faculty Mentor(s): Patsy Callaghan, English

Session: 6 (Oral Session 8:00-9:40 in 202)

Given the rise in the number of incoming college freshmen requiring remedial reading and writing classes, an examination of the connections between literary and composition studies is necessary. This presentation examines the connection between reading and writing, focusing on how reading comprehension deficiencies translate into writing deficiencies in the college composition classroom. Research suggests that reading and writing coexist in a symbiotic relationship that is under-acknowledged because of the divide between literature and composition. This divide can be crossed through the pairing of literary texts with non-fiction articles in first-year composition classes. This presentation suggests the use of children's literature as bridge texts to help students approach the more advanced non-fiction texts often assigned in first-year composition summary assignments. The term bridge text is a broad term and can refer to any non-traditional, non-threatening text used to draw out literacy skills in students. Such texts have long been successful in drawing out literacy competencies in the literature classroom, but, because of the political divide between literature and composition, such approaches have not been used in composition studies. This presentation provides practical examples of how to incorporate bridge texts in the composition classroom and suggests potential benefits of such incorporation. These benefits may include eliminating the need for remedial courses in reading or writing for students with borderline deficiencies in either area and general improvement in the quality of student summaries.

Creatine Supplementation Impairs Jumping Performance in Female Athletes.

Melvin, Neil; Clem, Aimee; Nethery, Vincent; Gee, David

Faculty Mentor(s): David Gee, Health, Human Performance & Nutrition

Session: 25 (Posters in Ballroom C & D)

Oral supplementation with creatine monohydrate is widely practiced by competitive athletes. However, there is very little research available on the effect of creatine supplementation on female athletes. PURPOSE: To investigate the effects of creatine supplementation on jumping and shuttle sprint performance in female athletes. METHODS: Eight female university varsity track and field jumpers participated in a double-blind placebo trial. Athletes consumed either creatine monohydrate supplementation (20g/day) dissolved in a commercial sport drink or the sport drink alone (placebo) for five days. Vertical jump tests and shuttle run tests were conducted with an electronic jump pad. These tests were done prior to supplementation and day following completion of the five-day supplementation period. RESULTS: Vertical jump performance decreased by 5.1% following creatine supplementation compared to a 2% increase in the placebo group ($p=0.02$). In a repeated four vertical jump test, no significant difference in pre- vs. post-supplementation period were seen between the creatine or placebo group for average vertical jump height, average ground time, or the explosive leg power factor (ELPF). The ELPF is the ratio of the average vertical jump height and the average ground time. The decline in the ELPF in the creatine group compared to the placebo group approached significance ($p=0.063$). There was no

significant change in running performance time in a 4 x 10m shuttle run following supplementation with either the creatine or placebo. The mean body weight significantly increased by 2.5% following creatine supplementation compared to no change in body weight in the placebo group ($p<0.01$). Total body water, as estimated by bioelectrical impedance analysis, increased by 2.4% following creatine supplementation ($p<0.001$). CONCLUSIONS: The increase in body weight due to increases in total body water may have contributed to the impairment in jumping performance following creatine supplementation.

Aspects of British Identity as Exhibited in Accounts of Russia by British Visitors

Miller, Albert

Faculty Mentor(s): Roxanne Easley, History

Session: 17 (Oral Session 1:20-3:00 in 201)

This paper focuses on British travelers' accounts and what they reveal about the British national identity, primarily towards the end of the eighteenth century. The eighteenth century saw a significant shift in British society, culture, and ideals. This was also a period in which Russia emerged as a significant European power rather than a generally misunderstood phantom within the European imagination. When attempting to classify this new European power, Britons were faced with evaluating a state that had rarely been considered, and when it was it was usually in a textual sense. In Enlightenment fashion, the Britons who did go into Russia attempted to provide an objective interpretation of the Russian people and their culture. However, by trying to construct an evaluation of the Russian identity that could be understood within a British context, the British visitors inadvertently exhibited aspects that defined, in their minds, what it was to be a Briton.

Forensic Osteology of the Boiling Rock Burials, Barbuda, West Indies

Miskar, Dawn; Wilson, Gregg; Farley, Cristin; Rebmann, Cory

Faculty Mentor(s): Steven Hackenberger, John Alsoszatai-Petheo, Anthropology & Museum Studies

Session: 26 (Posters in Ballroom C & D)

In July, 2001 a Central Washington University archaeological field program rescued human burials from an eroding beach on the Boiling Rock Site, Barbuda, West Indies. A XAD-Gelatin (KOH-collagen) fraction from a tooth (BRQ2-1) yields a 14C age of 3,265+/-35 RC years BP (SR-6186). Follow-up investigations of the site and burials confirm Archaic Age occupation of shorelines with relatively lower sea levels, and provide new data on the osteology and mortuary behaviors of Pre-ceramic Period populations. At least two individuals (# 1 and #2) were placed in primary burials. Only partial remains were found of a third individual. These individuals probably died

between the ages of 15-35. The crania were not well preserved but most sutures did not appear fused. A total of 18 teeth were identified. Most teeth are chipped and pitted, and many exhibit caries and/or heavy wear, but do not suggest advanced age. The crania, mandibles, and os coxae are fragmentary; however, Individual #1 appears to belong to a robust male and Individual #3 might have been a finer featured female. Robust femurs indicate that Individual #2 was probably male. A grooved stone shaped and hourglass was found positioned under the crania of Individual #1. The stone is probably an amulet and was discovered with the atlas.

Triplet Decay Rates in Poly(3-octylthiophene)

Mullen, James

Faculty Mentor(s): David Laman, Physics

Session: 19 (Oral Session 3:20-5:00 in 135)

Due to high intersystem crossing efficiencies in poly(3-octylthiophene), photoinduced absorption can be used to generate high triplet populations on isolated polymer chains. These large isolated triplet populations along with the long triplet lifetime in poly(3-octylthiophene), allow for the study of the intrachain triplet-triplet annihilation via photoinduced absorption. In this study, transient absorption spectroscopy was used to investigate the intrachain triplet-triplet annihilation decay rate in regioregular and regiorandom poly(3-octylthiophene), an electrically conductive polymer. The intrachain triplet-triplet annihilation decay rate constants of both types of polymer were measured by fitting the transient absorption waveforms to a mixed first and second order decay model. These decay constants were compared to see the effect of polymer chain structure on intrachain triplet-triplet annihilation rates.

Analysis of Historic Glass from Three Kittitas Valley Sites

Muramoto, Minori

Faculty Mentor(s): Patrick Lubinski, Anthropology & Museum Studies

Session: 26 (Posters in Ballroom C & D)

This research project examined the historic glass artifacts from three excavated sites in the Kittitas Valley: the Grissom Site (45KT301), the Robber's Roost Site (45KT800), and the Sorenson Site. The undergraduate research project goals are to analyze a sample of the historic glass in order to determine: 1) the minimum number of vessels, 2) what functional types of glass artifacts were found, 3) what technology was used, 4) where and when the glass was made and how it was transported to Ellensburg, and 5) the date of the historic component of each site. The vessel functions were medicine, alcohol, beverage, and condiment bottles, as well as tableware (such as dishes, bowls and tumblers, unknown jars), and household bottles, such as toiletry and ink-bottles. The glass was made by mold-blown technology in use from the 1840s to the 1920s or

machine-made in use since 1904. The glass manufacturing companies were identified from embossing. The Grissom Site and the Sorenson Site glass was made only by eastern U.S. glass companies, such as New Jersey and Illinois, but the Robber's Roost Site glass was made by both eastern and western U.S. glass companies, such as California and Washington. The glass transportation was probably connected with United States intercontinental railroad systems, such as the Northern Pacific Railroad and the Chicago, Milwaukee, St. Paul and Pacific Railroad. The historic component of these three sites dates between the 1840s and 1970.

A Reference Collection for the Paleontologist: Characteristic Eastern Washington Riparian Pollen Grains

Murphy, Nicole

Faculty Mentor(s): Linda Raubeson, Biological Sciences

Session: 2 (Oral Session 8:00-9:40 in 137A)

Paleo-studies use pollen deposits for reconstruction of past climate and vegetation patterns. Pollen grains move by wind and rain, falling onto nearby soils and water. Samples taken from bogs and lake sediments contain layers of accumulated pollen; these core samples are like historical records waiting to be uncovered. However, in such studies, each pollen grain found in the core sample must be identified. There exists a need for a reference collection of slides and images of pollen grains characteristic of Eastern Washington riparian habitats to support such work. To prepare such a collection, pollen grains were collected from naturally occurring riparian habitats of the Yakima River watershed in Kittitas Valley and from existing specimens in the Central Washington University Herbarium. Voucher specimens were created for each sample collected in the field. The pollen was then subjected to acetolysis to remove all pollen components except for the sporopollenin, making the identifying pollen surface features more distinct. Each sample was mounted on a slide and sealed with clear nail polish, making a permanent slide to be housed in the herbarium. Images, to be made available on the web, of light micrographs were prepared under a 100x oil immersion lens. This reference collection of slides and images will support pollen identification for paleo-studies in Eastern Washington.

The History of the English Verb "To Be": Irregularity in Common Usage

Nelson, Jessica

Faculty Mentor(s): Xingzhong Li, English

Session: 18 (Oral Session 1:20-3:00 in 202)

Why does the commonly-used verb "to be" remain the most irregular verb in standard contemporary English? Several etymological resources were used and compared in order to trace the usage of "to be" through fifteen centuries of English. Four distinct

Indo-European root stems collided and mingled throughout the Old English and early Middle English periods to form the beginnings of the verb “to be.” Because of the inherent differences in each stem, the verb “am – was – be” combined to sustain a malleable functionality. While one verb stem lent itself to the perfect aspect, another assigned itself the progressive aspect and future tense, a third took on the substantive and infinitive, and a fourth, often overlooked, stem became the first-person present tense plural form. Where one verb form was lacking, such as the inability of the stem “es-” to indicate future tense, another verb stem either combined with or replaced it. Meanwhile, everyday usage kept the verb from collapsing into fewer forms; thus, standard contemporary English retains the verb’s marked irregularity.

Auditory and Visual Mediators of Rate of Perceived Exertion and Power Output During Exercise: A Response-Production Protocol Produces Counterintuitive Results

Nethery, Vincent; Nielsen, Leland; Hovey, Greg; D Acquisto, Leo; Burnham, Tim

Department: Health, Human Performance & Nutrition

Session: 4 (Oral Session 8:00-9:40 in 140)

Listening to music or watching videos are recognized as viable practices to reduce the perception of strain and effort during exercise and lower perceived exertion is reported when exercise is undertaken under such conditions. However, no studies have attempted to validate these observations by using perceived exertion as the exercise prescription tool with the measured variable being work output. **PURPOSE**: This project investigated music and video induced dissociation from exercise effort during low through moderate power output cycling. A second work bout then used the perceptual values reported in the aforementioned as the prescribing tool with power output as the measured variable. **METHODS**: Subjects (n=11) completed 15 minutes of cycling (3x5-min at 40%, 55%, 70% of aerobic capacity) under music, video, and normal conditions (counter balanced design). Perceptions of work effort and heart rate were recorded at the end of each 5-min stage. In the subsequent protocol, subjects cycled at the level of perceptual efforts reported during the first protocol with power output and heart rate recorded. Two-factor repeated-measures ANOVAs and regression analyses (coefficients, slopes, intercepts) were used to assess the significance of the data. **RESULTS**: In the first protocol, exercising to music generated lower perceptions of effort than exercising in the video and normal conditions despite equivalent physiologic loads (heart rates) (P=0.01). Clearly, the level of effort was perceived as lower per unit work suggesting that a higher workload would be necessary to generate an equivalent perceptual effort. However, this result was not realized when the exercise load was governed by perceptual effort with lower power outputs and heart rates being generated during the music and visual conditions compared to the normal condition (p=0.05). Discrepancies in power between the “perceptual response” and subsequent “perceptual production” protocols ranged from -2.8% to -5.9% (normal), 0.4% to -10.2% (video), and -2.7% to -11.4% (music). **CONCLUSIONS**: Listening to music

and to a lesser extent watching a video clearly interfered with decisions being made while exercising. Subjects reported lower perceptual efforts for a given power output under music conditions. They then failed to generate to same level of power when asked to work at a prescribed perceptual level. This observation suggests a limited ability to process information and make consistent decisions when competition exists in central processing of sensory information for attentional focus.

Synthesis Towards 1,3-Azaborine Heterocycles as Potential HIV-1 Protease Inhibitors

Nguyen, David; O'Connell, Tracy; Chen, Pei-Mien; Blackmore, Amanda

Faculty Mentor(s): Levente Fabry-Asztalos, Chemistry

Session: 25 (Posters in Ballroom C & D)

Current HIV-1 protease inhibitors, for the therapy of HIV/AIDS, show high affinity and specificity for the protease, but have a number of side effects. Drug resistance arises due to the development of mutant forms of the HIV-1 protease enzyme. Therefore, there exists an urgent need for the development of novel inhibitors that have better toxicity, bioavailability, and resistance profiles. Straight chain borinic acid HIV-1 protease inhibitors, which can act as both associative and competitive inhibitors, have shown a higher affinity for HIV-1 protease variants than compounds that are strictly transition state analogs. A library of novel 1,3-azaborine heterocycles were designed, many of which are in the process of being synthesized. Due to their structural rigidity they are expected to be better inhibitors than their straight chain counterparts.

Photochemical Reduction of Iron(oxy)hydroxides in the Presence of Dimethyl Sulfide Derived Electron Donors

Nieber, Annika; Johansen, Anne; Affholter, Brittany; Paulk, Nicole; Key, Jennifer

Faculty Mentor(s): Anne Johansen, Chemistry

Session: 25 (Posters in Ballroom C & D)

Iron contained in crustal aerosol particles deposited into remote oceans is an essential micronutrient for phytoplankton, which modulate global climate through photosynthesis and the uptake and release of climate forcing gases. Thus, elucidating chemical mechanisms that control iron bioavailability, i.e., its speciation, is crucial for global climate predictions. The photo-reduction of atmospherically representative iron(oxy)hydroxide phases is investigated in the presence of phytoplankton derived dimethyl sulfide (DMS), dimethyl sulfoxide (DMSO), dimethyl sulfone (DMSO2), methane sulfinic acid (MSIA), and methane sulfonic acid (MSA). Aqueous reaction suspensions were analyzed with UV-Vis absorption spectroscopy, ion chromatography, and a hydrogen peroxide sensitive electrode. Results show that MSIA enhances the photo-reductive dissolution of iron in a species specific ligand-to-metal-charge-transfer

reaction that depends on the amount of adsorbed MSIA, also a function of solution pH and iron(oxy)hydroxide phase. This mechanism constitutes a biogeochemical feedback and may explain current discrepancies in marine atmospheric iron and sulfur chemistry models.

Which Popular Online Retailer Offers Better Prices on Electronic Products?

Norman, Nicole; Elias, Paramo

Faculty Mentor(s): Yvonne Chueh, Mathematics

Session: 25 (Posters in Ballroom C & D)

This project compares prices of products offered from four well-known companies: Wal-Mart, Sears, Circuit City and Best Buy. The products to be compared consist of popular electronics. These four companies claim to offer great products at very reasonable prices. Therefore, the purpose of this study is to test whether or not these claims are true through an analysis of variance (ANOVA). From each store, we will choose specific product items with matching brand and model for comparison. We will take into consideration shipping and handling fees, the time it takes for a product to arrive, and any special promotions.

Chloroplast Genome Evolution in the Parsley Family

Peery, Rhiannon; Raubeson, Linda

Department: Biological Sciences

Session: 3 (Oral Session 8:00-9:40 in 137B)

Plants have chloroplasts for photosynthesis and those chloroplasts have their own genomes. In flowering plants, the chloroplast genome is circular, about 160,000 base pairs in length, and contains about 120 genes. By completely sequencing a chloroplast genome we have the opportunity to learn about the relationship of the plant to other flowering plants and the evolution of the chloroplast genome. As part of our comparative genomics project, we have sequenced the chloroplast genomes of three members of the parsley family. In two of these genomes, we have found DNA sequence that is unlike any other sequence found in any other known chloroplast genome; instead this novel sequence shows similarity to the mitochondrial genome. There are several documented cases of chloroplast genes being transferred to the nuclear or mitochondrial genomes, but no documented cases of the chloroplast accepting DNA from any other genome. We may have found the first case in one lineage of the parsley family. Through several methods of comparison we have found that there are 125 nucleotides of the novel chloroplast sequence that match intergenic spacer (the non-coding nucleotides between genes) within the carrot mitochondrial genome. A smaller fragment of the novel sequence is located in several other flowering

plant mitochondrial genomes. Documenting a new type of evolution in the chloroplast genome will help researchers understand more about the process of evolution in plastids.

Development, Debris Torrents and Dendrogeomorphology

Perkins, Andrew

Faculty Mentor(s): Karl Lillquist, Geography and Land Studies

Session: 15 (Oral Session 1:20-3:00 in 137B)

Mass wasting often conflicts with human development. This is especially true in southwestern British Columbia where expanding urban populations force development onto steep slopes. The population of Abbotsford, British Columbia is projected to double from 1991 levels by 2021. Surrounded by Agricultural Land Reserve on the north, south and west, residential expansion is forced east onto the slopes of Sumas Mountain, a large tract of land currently outside the city boundary. This study addresses where residential development is spatially suited on Sumas Mountain given existing mass wasting features. Preliminary results show that several dominant forms of mass wasting are occurring in different areas on the mountain. Debris torrents seem to be concentrated in deeply incised river valleys. Rotational slumps occur mainly in glacial sediments and translational slides were mapped in areas of high relief and minorly jointed bedrock. High frequency, low magnitude rockfall is common to most slopes, but especially prevalent on the steep, south facing flank. Dating methods suggest that two major periods of activity exist, the first, encompassing inactive-mature events, probably occurring soon after deglaciation and debuttressing of slopes. The second is active, annual retreat of weak substrates during periods of high precipitation and temperature. Statistical analyses of rockfall frequency suggest a link to the climate pattern PDO. Further analysis shows the expected relationship between type of substrate and associated mass wasting features. Future residential development should be restricted to areas with a low probability of future mass wasting events as dictated by the produced terrain stability map.

Timothy McSweeney's Long Arms Want to Embrace You: Dave Eggers's Independent Publishing Community

Peters, Lucas

Faculty Mentor(s): Christopher Schedler, English

Session: 24 (Oral Session 3:20-5:00 in 202)

Dave Eggers, best known for his memoir, *A Heartbreaking Work of Staggering Genius*, has begun a new trend in publication with his *McSweeney's* label of books. For those unfamiliar with *McSweeney's*, it began as a small, quarterly literary magazine in 1998 and quickly became synonymous with hip, avant-garde short stories. However,

McSweeney's has transformed from a magazine with a print run of 2,500 to a full-fledged independent publication house. *McSweeney's* now prints full books (fiction, non-fiction, and poetry), a monthly magazine (*The Believer*), a DVD quarterly (*Wholphin*), and provides financial support for the 826 Project (a non-profit tutoring center benefiting adolescents in urban areas). This presentation will explore the political and social ramifications of Dave Eggers's independent publishing company. It will argue that *McSweeney's* socially conscientious business model is reflective of the current cultural mentality — a mentality that opposes the coldness of post-modern relativism and cynicism in its desire to seek and maintain nurturing communities.

Phylogeography of the North Pacific Bobtail Squid (Rossia pacifica)

Peterson, Luke

Faculty Mentor(s): Steven Wagner, James Johnson, Biological Sciences

Session: 8 (Oral Session 10:00-11:40 in 137A)

North Pacific Bobtail squid or Stubby squid (*Rossia pacifica*) is one of the most abundant cephalopods along the west coast of North America. *R. pacifica* was originally described as two subspecies: *R. pacifica pacifica* and *R. pacifica diegensis*. However, the validity of *R. pacifica diegensis* has never been resolved. In addition, the taxonomic status of *R. pacifica pacifica* in Alaskan and Russian waters is also being questioned because of morphological differences between individuals in northern waters and individuals in southern waters. Individuals from the North Pacific are much larger than their southern counterparts. I used mitochondrial sequence data from cytochrome b (305bp), cytochrome oxidase I (700bp) and cytochrome oxidase III (641bp) to compare the phylogeographic and evolutionary relationships of the different Rossia sp. across the Pacific shelf. Results suggest differentiation of a monophyletic southern group from *R. pacifica* in the Bering Sea. As a consequence, the subspecific designation of R. pacifica pacifica is polyphyletic.

Pollination of *Erigeron Basalticus* (Basalt Daisy)

Petrina, Diedra

Faculty Mentor(s): Tom Cottrell, Biological Sciences

Session: 3 (Oral Session 8:00-9:40 in 137B)

The basalt daisy is a rare flowering plant belonging to the family Asteraceae. Its geographical range is approximately 10 x 2 miles2 in Yakima and Kittitas counties of Washington. Within the 10 x 2 miles2 the population has been divided into eight sub-populations. Very little is known about the natural history of this plant including the reproductive biology. The focus of this study is on the pollination of the basalt daisy. The two main questions are: What are the potential pollinators and is self-pollination occurring? This study was carried out over two seasons between June and September in

2005 and 2006 along the Selah Ridge sub-population. During this time observations of potential pollinators were recorded and self-pollination tests were conducted.

The Science Behind an Art: A Sociological Perspective of the Tattooing Phenomenon

Pinter, Rachel; Cronin, Sarah

Faculty Mentor(s): Delores Cleary, Sociology

Session: 26 (Posters in Ballroom C & D)

The art of tattooing is a significant aspect of human behavior that occurs in countless societies around the world. This research explores the history and ideology of tattooing in a cross-cultural and American context, seeking to fully summarize the available literature. Furthermore, the presentation examines the transformation of and existing trends in the United States, particularly regarding tattoo components such as location selection, membership indication, and various foundational principles engendering tattoo acquisition. Our main hypothesis is that the practice and display of tattoos has increased in popularity and acceptance in the United States within the last two decades. We also hypothesize increasing popularity has been accompanied by an ideological shift. The overall purpose of this research is to gain a better understanding of the nature of tattooing through literature review of its history and ideology.

The Use of *It* in English Discourse

Powell, Alina

Faculty Mentor(s): Xingzhong Li, English

Session: 18 (Oral Session 1:20-3:00 in 202)

This paper examines various ways in which *it* is used, misused, and overused in spoken and written discourse in English. Beginning with a brief etymology of *it*, the paper proceeds to touch on a number of peculiarities and applications relating to *it*, including situations such as using *it* with regard to babies or animals, the omission of the antecedent for *it*, and *it* as a benign replacement for overt statements or as an immortalized cliche, among other usages. In addition, the paper brings to light various ways in which *it* is often used carelessly and excessively—even in professional writing—and prone to cause undue ambiguity. As such, the paper expresses potential revisions and closes with a strong recommendation that care, and particularly limitations, be considered with regard to using *it*.

Microhabitat Use by an Eastern Cascades Stream Fish Community

Puls, Andrew

Faculty Mentor(s): Paul James, Dan Beck, Dave Darda, Biological Sciences

Session: 3 (Oral Session 8:00-9:40 in 137B)

The focus of my research is to examine microhabitat use by an eastern Cascades stream fish community. Microhabitat variables, including total stream depth, stream velocity, substrate type, cover present, distance to nearest cover, and distance to shore were measured at the focal point of all fish observed in both day and night snorkeling surveys on the American River, Yakima County, WA. Observed measurements were compared to available microhabitat measurements to determine preferred microhabitat types of a particular species. Day and night microhabitat measurements were compared to determine if daily shifts in microhabitat use occurred. Differential use of microhabitat was identified by comparing utilized microhabitat of different species. Preliminary results suggest that individual species do select focal points with specific microhabitat characteristics, utilized microhabitat changes from day to night, and that different species select different types of microhabitats. The results of this research will be useful in identifying critical microhabitat types of individual species as well as restoring and enhancing fish habitat.

Using Geospatial Data and Techniques to Identify Potential Wetland Restoration Sites

Rhoades, Janet

Faculty Mentor(s): Anthony Gabriel, Karl Lillquist, Resource Management

Session: 15 (Oral Session 1:20-3:00 in 137B)

Wetlands provide numerous benefits to nature and society, from wildlife habitat to flood control. As wetlands continue to be impacted by urban development, tools that make identifying potential wetland restoration sites a more ecologically effective and economically efficient process are becoming increasingly important. I have developed a hierarchical methodology for using Geographic Information Systems (GIS) to create a customized, user-friendly, scientifically-valid, and policy-compliant process for identifying potential wetland restoration sites. Site selection is based on prioritized, user-driven, function-specific management objectives. Potential mitigation sites are initially screened based on general factors (hydric soils, water source, minimal slope, and compatible land use), and further refined by prioritizing a combination of wetland functions (wildlife habitat, water quality, flood control, and public recreation) based on the user's needs. This methodology was applied to King County, WA and Yakima County, WA to demonstrate its customizability and transferability to two very different case studies.

Controlling Surface Properties by Exploiting the Natural Process of Molecular Self-Assembly

Rivard, James; Bullock, Eric; Klein, William

Faculty Mentor(s): Eric Bullock, Chemistry

Session: 7 (Oral Session 10:00-11:40 in 135)

Controlling surface properties at the atomic level is of high interest in molecular electronics, sensors, biocompatible materials, and many other fields in nanotechnology. One route to such surface control is to exploit a natural process call self-assembly in which molecular building blocks come together on a surface and create complex two-dimensional structures. In order for these systems to be used for specific applications, however, an understanding of the structure and molecular interactions of these self-assembled monolayers (SAMs) is essential. In this work, SAMs consisting of two slightly different molecules called biphenylthiols were deposited on gold films and the structure and phase behavior of the mixed systems studied using two complementary techniques: reflection-absorption infrared spectroscopy (RAIRS) and scanning tunneling microscopy (STM). The RAIRS data provides information on mixing and molecular orientation and the STM provides direct imaging of the surface structures. The results indicate that the mixing behavior and equilibrium structure vary in unexpected ways depending on the relative concentrations of the two components.

The Effects of Buckminster Fullerenes C_{60} on Cellular Respiration

Rosario, Sara; Bryner, Stephanie; Thomas, Carin; Bullock, Eric

Faculty Mentor(s): Carin Thomas, Chemistry

Session: 25 (Posters in Ballroom C & D)

In the years since the discovery of Buckminster Fullerenes (C_{60}), countless hours have been devoted to the study and application of the carbon allotrope. C_{60} and its derivatives have been investigated in such applications as photodynamic therapy of cancer, photovoltaic cells, semiconductors, and as an inhibitor of the enzyme HIV-1 protease. Despite two decades of research and widespread interest, the biological effects of C_{60} remain to some extent a mystery. The intention of this study was to examine the effects of Buckminster Fullerenes on cellular respiration and to determine the concentration of C_{60} as well as the time frame of exposure that causes the maximum inhibition of cellular respiration. Bovine heart mitochondria were exposed to C_{60} and tested for the ability to respire by measuring rates of oxygen consumption in the presence of the physiological substrate succinate. UV-visible spectra were also collected to ensure the integrity of the C_{60} solution. The results show 27% inhibition of mitochondrial respiration after fifteen minutes of exposure to C_{60} as compared to controls.

Christianity in the Deconstruction of White Paternalism in *Incidents in the Life of a Slave Girl*

Rose, Christopher

Faculty Mentor(s): Christine Sutphin, English

Session: 24 (Oral Session 3:20-5:00 in 202)

This paper examines the use of Christianity in Harriet Jacobs' *Incidents in the Life of a Slave Girl*. Manning Marable's "The Meaning of Faith in the Black Mind in Slavery" observes Christianity's effect on the Black social consciousness, particularly how Blacks adopt Christianity as a tool of survival under the institution of slavery. Jacobs reinforces some of these notions, but she employs the strategy that is used by many abolitionist writers, using Christianity as a means to deconstruct White paternalism by demonstrating the hypocrisy found in the institution of slavery. She is aware of Christian doctrine and postulates that slavery was given to Blacks as part of their subjugation. Jacobs further examines the effect of Christianity on slave masters, particularly in her relationship with the character of Mr. Flint, who inadvertently supports SallyAnn H. Ferguson's idea that the slave master psychologically desires to be like God in "Christian Violence and the Slave Narrative." Finally, Jacobs also undermines Marable's argument because she differs from other Blacks and abolitionist writers in that she does not adhere to the tenets of Christianity and is only personally concerned with Christian doctrine for its consequences on her social relationships.

How to Unlock a Locking Carabiner

Ruud, Blaze

Faculty Mentor(s): David Laman, Physics

Session: 25 (Posters in Ballroom C & D)

A common rescue equipment failure that occurs is the unlocking of a locking carabiner. Under certain circumstances locking carabiners have been observed to unlock themselves; this becomes a problem very quickly because once a carabiner is unlocked it will be much more prone to fail, which in turn increases the risk of injury and death. There is a certain myth pertaining to carabiners that needs to be examined. This myth is that the locking sleeve of a carabiner is more prone to unlock itself if the sleeve is threaded so that it will spin down towards the ground. The idea behind this myth is that gravity biases the motion of the locking sleeve. In order to analyze what may be causing these carabiners to unlock themselves, one must analyze what is physically happening to them when they are being used. Almost everything in the rope/carabiner system is stationary, the anchor and the carabiner are not moving; what is moving is the tensioned rope. Looking closer at the standard rescue rope you can see that there are pixels on the surface of the rope. These pixels vibrate the carabiner as they pass through the system, and it is believed that these vibrations are responsible for making the locking sleeve move. To investigate what is causing the carabiners to unlock themselves, the vibration due to the tensioned rope must be simulated. Using a mechanical vibrator and a mechanical advantage system, the simulation of vibration due to the tensioned rope can be achieved. In order to determine if gravity is a relevant

biasing force, the test must be performed for different orientations of the carabiner. The data being gathered will be in the form of video data, which shows how the carabiner behaves for certain orientations, frequencies, and amplitudes of vibration.

Sophisticated Sophistry: The Mystical and Paradoxical Balance of Free Will and Determinism in *Everyman*

Sander, Dustin

Faculty Mentor(s): Laila Abdalla, English

Session: 12 (Oral Session 10:00-11:40 in 202)

In many ways, *Everyman* is the quintessential morality play. It is an allegorical tale with a didactic, religious purpose. But *Everyman* exceeds the boundaries of its genre. It is also a fine medieval tragedy, and it is from this vantage point that the play becomes most intriguing and exhibits its complex philosophical underpinnings. This paper is an exploration of *Everyman's* seemingly paradoxical confluence of Boethian concepts of fate, God's grace, and human free will as a necessity in achieving salvation. At the time *Everyman* was written (c. 1485), most people understood the Aristotelian and Ptolemaic universe as a place strictly controlled by forces greater than themselves. Despite this fact, one of the most important philosophical and theological discussions of the Middle Ages treated the subject of *liberum arbitrium*, or freedom of decision. But freedom of choice is a knotty concept in the context of most medieval thought, both secular and religious. As such, this religious drama reveals a delicate, albeit precarious, balance between the forces of determinism and free will. *Everyman* reflects prevalent societal and contemporary philosophical concepts of fate and the role of free will in the late Middle Ages; the play enacts the belief that the human faculty of free will, although limited in its influence, is nevertheless crucial in the pursuit of salvation.

Discovery of a Three Chambered Human Heart

Schlafer, Teresa

Faculty Mentor(s): Leo D'Acquisto, Health, Human Performance & Nutrition

Session: 25 (Posters in Ballroom C & D)

The purpose of this project was to dissect and identify the anatomical structures associated with the human heart and lungs. One male cadaver (age, early 50s), who died of cerebral anoxia, was employed. An incision along the clavicular border, the subcostal angle, and from the jugular notch to the xiphoid process was made. The skin was reflected and the ribs, clavicle and sternum were cut; subsequently, the anterior thoracic wall was removed. The heart, aorta, and major arteries off the aortic arch appeared underdeveloped. The heart was missing a right ventricle making the heart only three chambered instead of the normal four. The pulmonary trunk appeared somewhat distended. Four valves (bicuspid*, tricuspid, aortic*, pulmonary) were

associated with the left ventricle instead of the normal two*. The aortic valve was much smaller than the pulmonary valve with both valves appearing underdeveloped. The inner thoracic wall appeared bruised with dried blood found in the inter-pleural space. In addition, staples were found on the anterior surface of the left lung. The lungs appeared large with little give upon palpation. The superior and inferior vena cavas, pulmonary arteries and veins appeared normal. The discovered morphology suggests that the left ventricle received both deoxygenated and oxygenated blood from the right and left atria, respectfully, and pumped this mixture simultaneously into the pulmonary and systemic circulatory systems. The consequences of such circulation for this individual would have been chronic hypoxia. This is further substantiated with the discovery of clubbed digits suggestive of capillary expansion in response to chronically low blood oxygen levels. Most likely, this individual had a low fatigue threshold which may of compromised his ability to perform daily work tasks and exercise.

Analysis of Open-Ocean Aerosols: Do Phytoplankton Affect Iron Bioavailability in the Marine Atmosphere?

Shank, Lindsey; Johansen, Anne

Faculty Mentor(s): Anne Johansen, Chemistry

Session: 7 (Oral Session 10:00-11:40 in 135)

Iron availability limits open-ocean phytoplankton growth, and because phytoplankton account for half of the Earth's photosynthesis, they are key players in modulating global climate. The present study pertains to investigating the mechanisms that control one of the most prevalent avenues by which this iron is supplied to the remote oceans: the deposition of atmospherically processed dust particles. Chemical reactions on the dust particles are believed to be responsible for transforming aerosol iron into the soluble forms available for phytoplankton metabolism. During a 60-day research cruise in Fall 2006 I collected aerosols over the Equatorial Pacific Ocean between Hawaii and Papua New Guinea to prove that dimethyl sulfide (DMS), a gas emitted by iron starved phytoplankton, is a key player in solubilizing iron. Preliminary analyses of these samples show that we successfully detected methanesulfinic acid (MSIA), a key DMS oxidation product which we have shown to dissolve iron in photochemical laboratory simulation experiments. This finding constitutes a first step in supporting our hypothesis for the *in-situ* chemical mechanism between sulfur compounds released from phytoplankton and iron solubility. Our results will be interpreted in the context of air mass back trajectories and other supporting chemical analyses.

State Sponsored Terrorism

Shattuck, Carly

Faculty Mentor(s): Charles Reasons, Law & Justice

Session: 26 (Posters in Ballroom C & D)

State-sponsored terrorism (SST) is a political term used to refer to finance, bounties, equipment and intelligence material given across international boundaries to terrorist organizations and the families of deceased militants for the purpose of conducting or rewarding attacks on civilians. States that sponsor terrorism may also provide a "safe-haven" for persons accused of terrorism and refuse to extradite them. As with any form of terrorism, SST is used because it is believed to produce strategic results where the use of conventional armed forces is not practical or effective.

Investigating Classroom Interaction

Shriner, Sylvia; Cutler, Bob; Holbrook, Marc; Allen, Yoko; Behler, Andrew; de los Angeles, Gabe

Faculty Mentor(s): Loretta Gray, English

Session: 6 (Oral Session 8:00-9:40 in 202)

Studies of classroom interaction are problematic for a number of reasons, ranging from lack of replication to an uncritical application of results. The present study is a response to research conducted five years ago on teacher talk. By challenging several claims and assumptions made by Steve Walsh in “Construction or Obstruction: Teacher Talk and Learner Involvement in the EFL Classroom,” we hope to alert future researchers to the possible pitfalls in investigations of teacher-student interaction. Our presentation will consist of an introduction to Walsh’s research, a description of the methodology we used to test his claims and assumptions, and possible answers to the following research questions: (1) Does Conversational Analysis provide an effective methodology for studying classroom discourse and prescribing pedagogical practices? (2) Does teacher echo really hinder classroom interaction? (3) How do interview data support or contradict the findings of Steve Walsh? (4) Do students have to interact verbally in order to acquire a foreign language?

Historical Archaeology of the Overseas Chinese of City Block 24 Ellensburg, Washington

Simmons, Stephanie

Faculty Mentor(s): Patrick Lubinski, Anthropology & Museum Studies

Session: 26 (Posters in Ballroom C & D)

The city of Ellensburg, like many other western towns had an important but poorly documented Overseas Chinese population circa 1900. During the summer of 1989 Central Washington University’s Anthropology department excavated a portion of city block 24, which according to Sanborn Fire Insurance Maps was once the location of several Chinese businesses and residences around the turn of the century. The artifacts from this excavation were never studied, and over the last year an analysis was undertaken to document which if any artifacts could be associated with the Overseas

Chinese. This study included conducting historical research into local records, as well as refitting ceramics into minimum vessel counts, and analyzing a sample of bottle glass for function and date. During the course of the study it was determined that the site was heavily disturbed, making it impossible to associate deposits with one particular time period or group. Even so, within the assemblage there were artifacts which are usually diagnostic of a Chinese presence. These included Chinese import ceramic tablewares and food containers, opium paraphernalia, as well as medical vials. These artifacts along with historical records indicate that there was a strong Chinese presence within this city block from about 1889 to around 1909.

The Relationship between Childcare and Non-Traditional Students Academic and Social Integration

Snyder, Tabitha

Faculty Mentor(s): Patricia Gross, Family & Consumer Sciences

Session: 26 (Posters in Ballroom C & D)

Universities across the nation are experiencing an increase in non-traditional students, many of whom are student parents. Research on non-traditional student parents has established many barriers that are specific to the non-traditional student parents group. The biggest obstacle for non-traditional student parents is to achieve academic and social integration while balancing work and family commitments off campus (Austin & McDermott, 2003/2004; Astin, 1984; Tinto, n.d.). Encouraging colleges to increase support through onsite childcare centers may decrease low academic and social integration among non-traditional students. The purpose of this research is to examine the relationship between childcare and the academic success through social and academic integration of non-traditional college students at CWU. This research is based on Vincent Tinto's theoretical model of dropout behavior. A survey was distributed to student parents regarding social and academic integration and type of child care (off site and onsite). It is hypothesized that parents who use university child care services will experience greater integration, both academically and socially, than parents who use other child care options. Data analysis is in process.

The Cognition of Abstract Art

Sorrells, Robert; Guckel, Ashlee; Bennett, Allison

Department: Psychology

Session: 26 (Posters in Ballroom C & D)

Five studies examined the development of art appreciation. Manipulations included the effects of providing information, the emotionality of the art, the frame of reference for the viewer, the experience of the art viewer, and whether the stimulus material was a photograph of the original or the original art. Results specify significant differences in

the way experienced and naïve art viewers rated the stimuli. Students with varying art experience viewed images of abstract art and responded to forced- and open-choice questions. Manipulations included the type of information presented with the painting, and the emotionality of the painting (low and high; as determined by pilot studies). Participants rated each stimulus for creativity, meaningfulness, and liking, and indicated their frame of reference for viewing the art. All viewers rated the emotional paintings as more aesthetically pleasing, and the advanced art students rated the paintings as more enjoyable, creative, and meaningful than the novices. The information provided to the participants systematically affected their judgments of aesthetic value. The novices were more likely than those with experience to rate the aesthetic value of a painting in reference to their own experience. Additionally, for the art novice, judgments of creativity, liking, and meaningfulness were significantly less correlated than those judgments made by the experienced art viewer, suggesting that the development of art appreciation coincides with the merging of these constructs in the mind of the art viewer.

Electronic Realization of Chaotic Systems

SPS (CWU Society Of Physics Students): Kendall, Taylor; Petersen, Travis; Parker, Chris; Kangas, Eric; Cross, David; Mullen, James; Morton, Colin; Abdul-Wahid, Sami; Bakke, Erick

Faculty Mentor(s): Michael Braunstein, Sharon Rosell, Physics

Session: 25 (Posters in Ballroom C & D)

The CWU chapter of the Society of Physics Students is experimentally investigating electronic realizations of chaotic systems. J.C. Sprott has reported on a class of chaotic differential equations that can, in principle, be simply realized using discrete electronic components. [1] These circuits can be used to easily investigate chaotic behavior in a simple system. We will present both computer modeling and experimental data for a simple chaotic circuit. This circuit has been constructed to follow one of the differential equations given but not experimentally investigated in the Sprott paper. The data we are gathering consists of output voltages at different points in the circuit representing the phase space behavior of the system. We will provide a comparison of our experimental data to our model.

[1] Sprott, J.C.(2000), “Simple Chaotic Systems and Circuits,” American Journal of Physics 68(8): 758-763

Modeling Civil Violence Using Computational Intelligence

Stahl, Charles

Faculty Mentor(s): Razvan Andonie, Computer Science

Session: 5 (Oral Session 8:00-9:40 in 201)

Simulating intelligence, using the processing power of today's technology, is a technique for better understanding the nature of interaction. In this project, work is presented on an approach for modeling human interaction within a hypothetical instance of civil violence. Intelligent agents, simulated individuals with a rudimentary intellect, are used in place of human subjects. Trends and behaviors defined by current sociological knowledge are employed to shape the tendencies of these agents.

Seasonal Changes in Groundwater Chemistry due to Irrigation in the Kittitas Valley, Washington

Taylor, Sarah; Gazis, Carey

Faculty Mentor(s): Carey Gazis, Geological Sciences

Session: 25 (Posters in Ballroom C & D)

During the May to October irrigation season, as surface water is drawn from the Yakima River and applied to fields, shallow aquifers are recharged and undergo changes in groundwater chemistry. Knowledge of surface/groundwater interactions is an important component of water resource management in the Kittitas Valley, especially when domestic water use depends on shallow wells. In this study, bimonthly groundwater samples were collected from April 2005 through June 2006 from 20 domestic and municipal wells located along a transect perpendicular to the Yakima River. Major ion analyses were performed on each sample to investigate seasonal changes with particular attention paid to nitrate values, which can be elevated due to agricultural practices. Our results show that nitrate concentrations varied over time with pre-irrigation values as high as 6 ppm, increasing to 19 ppm once irrigation began. These seasonal changes suggest a cyclic pattern in shallow wells with a concentration increase directly after irrigation began, followed by another increase around November coinciding with a heavy rainfall event, and a final decrease in spring with winter snowmelt. In contrast, the deep municipal and basalt wells do not show these seasonal trends. Even though all groundwater nitrate concentrations meet EPA standards for drinking water, this study demonstrates the need to characterize seasonal changes in groundwater chemistry when assessing groundwater quality in an irrigated area.

Trace Element Distribution in Agate: Open Versus Closed System Formation

Tebbe, Michelle L.

Faculty Mentor(s): Paul W. O. Hoskin, Geological Sciences, University of Calgary

Session: 13 (Oral Session 1:20-3:00 in 135)

The intricate patterns of agate are striking examples of naturally occurring beauty. Agate preserves a record of ancient hydrology and water/rock interaction and also records a wealth of information on how minerals grow from solutions, where crustal

fluids come from, and on how natural systems self-organize to produce regular and ordered structures and textures. Despite their clear utility to geologic research there is little consensus on how agate forms. Two end-member formation models exist: (i) a high-temperature, syn-volcanic emplacement mechanism and (ii) a low-temperature, post lava-emplacement process. These two models are tested for samples from Brazil, Germany, and Washington, USA. Trace element abundance patterns were analyzed by laser ablation ICP-MS and indicate crystallization in a closed system, at least on the scale of analysis in thin-section. Supporting data from field observations, X-ray diffraction analysis and stable isotope analyses indicate that the ca. 50 million-year-old agate from central Washington formed from heated meteoric water. This conclusion, as well as published results for occurrences elsewhere, indicates that that basalt-hosted agates form in geologically cool (50 to 60 deg. C), meteoric-water dominated systems where crystallizing fluids precipitate silica which self-organizes in more-or-less closed systems to produce intricate patterns and textures.

Novel Synthesis and Optical Characterization of Sr3Y2(BO3)4:Eu3+ and Sr3Y(BO3)3:Eu3+

Telecky, Alan

Faculty Mentor(s): Anthony Diaz, Chemistry

Session: 1 (Oral Session 8:00-9:40 in 135)

Novel methods have been developed for the synthesis of the complex borates Sr3Y2(BO3)4 and Sr3Y(BO3)3 both doped with Eu3+. The reactants, firing temperature and the effect of particle size are discussed and compared with the traditional synthetic methods in current literature. Optical characterization of both compounds through UV and VUV spectroscopy has also been conducted. Red-orange emission in both compounds at wavelengths 592 nm and 617 nm has been observed. Early results suggest two different crystallographic dopant sites with preference of host-lattice excitation to one site over the other in Sr3Y2(BO3)4:Eu3+. Additionally two broad emission peaks in Sr3Y(BO3)3:Eu3+ in addition to europium emission will also be discussed.

“In Friendship, Love, and Truth”: The Independent Order of Odd Fellows and the Degree of Rebekah

Thayer, Sadie

Faculty Mentor(s): Daniel Herman, History

Session: 23 (Oral Session 3:20-5:00 in 201)

During the 1800s, fraternal organizations were at their height. The Independent Order of Odd Fellows (IOOF) was one in particular which was growing by leaps and bounds. In 1851, the IOOF chartered the Degree of Rebekah and allowed women to join. That

marked the first time ever that a fraternal organization had permitted women into its ranks. The question I ask in my presentation is whether the Degree of Rebekah was an acknowledgement of the growing women's rights movement or merely an attempt to increase membership by permitting husbands to enroll wives and family members.

Implications of Climate Change and Tephra Accumulation on the Lacustrine Environment in a Volcanic Caldera Michoacan, Mexico

Trosper, Tabitha; Ely, Lisa; Hackenberger, Steven; Newton, Anthony; Gabany-Guerrero, Tricia

Faculty Mentor(s): Lisa Ely, Geological Sciences

Session: 13 (Oral Session 1:20-3:00 in 135)

La Alberca, a volcanic caldera in the active Michoacan-Guanajuato volcanic field of central Mexico, is a site of ancient occupation. The oldest known burial (~5000 yrs BP) in the state of Michoacan was discovered immediately beneath prehispanic cliff paintings on the caldera wall. The stratigraphy of fluvial and lacustrine sediments exposed in trenches in the caldera floor indicates variations in the geomorphic environment of the caldera, which could have implications for the type of human use of the site. La Alberca is a closed system with a large alluvial fan that extends from the northeastern wall and drains into the lowest southern corner of the caldera floor. Stratigraphic descriptions in pits up the alluvial fan gradient indicate that since the nearby Paricutin eruption in 1943-52, coarse sand-sized tephra has washed into the lowest part of the caldera at least every 2 years, but the pools rarely reach 1 meter in depth. Over the last ~3000 years, the periods inbetween volcanic eruptions are characterized by finer sediment accumulating in frequent, shallow pools. This change in the sedimentation pattern is driven by either the extensive tephra blanketing the watershed after volcanic eruptions or by regional changes in climate. Paricutin volcano is the source of some or all of the upper tephra layers. Geochemical analyses currently underway will help differentiate these tephras. The zone of fine-grained, laminated sediments in the central section of the stratigraphy corresponds in time with a period of wetter climatic conditions in the surrounding region of central Mexico. This increase in the frequency or persistence of ephemeral pools in the lowest portion of the caldera basin would not have been suitable for permanent occupation. During periods with a greater influx of coarse tephra into the basin, the permeability of the surface substrate increased, likely decreasing the occurrence of sustained periods of standing water.

Mapping Techniques as Educational Tools to Preserve the Hidden Landscapes of Cougar Bar

Turner, Katharyne; Gould, Ian; Kosters, Colton

Faculty Mentor(s): Morris Uebelacker, Craig Revels, Geography and Land Studies

Session: 21 (Oral Session 3:20-5:00 in 137B)

The distinctive physical landscapes of Hells Canyon have been extensively used by humans, creating multiple anthropogenic features. The canyon, more specifically Cougar Bar, was shaped by a multi-sequenced human occupation, beginning with Native Americans, then miners of multiple ethnicities, and finally Euro-American homesteaders. Remnants of each group's occupation of Cougar Bar and its surrounding terrain and tributaries remain undiscovered and untouched. This talk focuses on the mapping of the remains of domiciles and associated features of the Native American period of occupation. The specific techniques used in mapping the village sites included the use of a Total Station and remote sensing equipment. The identification and mapping of these features is essential in developing public awareness of the distinctive human history of Hells Canyon, as well as ensuring the management and maintenance of these valuable resources, as public use of the Snake River Corridor increases. The goal of our project is to present the processes involved in mapping past Native American occupancy sites at Cougar Bar.

Future Child Advocate Needs In Kittitas County

Valdez, Rudy

Faculty Mentor(s): Charles Reasons, Law & Justice

Session: 26 (Posters in Ballroom C & D)

Court Advocates For Children for Kittitas County play a significant role in helping youth who are caught up in dependency court actions. This poster presentation presents a needs assessment of the agency for the future ten years, including the projected case population and the agency staffing and fiscal needs. The projection is based upon an analysis of past caseloads/agency size and budget and the projection of future county growth, including projected cases.

Virtual Excavations at Tyron Creek Site

VanTine, Launi; Soltz, Andrew

Faculty Mentor(s): Steven Hackenberger, Anthropology & Museum Studies

Session: 26 (Posters in Ballroom C & D)

The Tyron Creek Archaeological Site, Hells Canyon, was investigated by students in ANTH320, Archaeology Laboratory. Three groups of students completed virtual excavations of House Feature 2; each group excavated two sequential strata. Artifact distributions and activity areas in strata three through eight were analyzed. A GIS program was used to map the distribution of artifacts throughout the house feature, and results were compared to original excavation forms and artifact collections. Each group compared distributions of fire-cracked rock (FCR), shell, bone and stone tools. Results suggested that strata three, five, and seven represented periods of heavier house occupation. A food processing area was identified in the north-east section of the site

where large concentrations of tools, FCR, and shell are associated with a hearth feature.

A Guatemalan Model of Ecotourism and Participatory Wildlife Management

Vasereno, Amy

Faculty Mentor(s): Lene Pedersen, Resource Management

Session: 15 (Oral Session 1:20-3:00 in 137B)

Because Guatemala's ecotourism industry is still in its early stages, it has the opportunity to proactively plan for sustainable development. ARCAS (Asociación de Rescate y Conservación de Vida Silvestre) is a Guatemalan nonprofit non-governmental organization dedicated to conserving wildlife resources. There are two main sites which ARCAS operates: one in the Petén, and the other on the Pacific Coast at Hawaii. The Rescue Center in the Petén aims to rehabilitate animals confiscated from the pet trade. Parque Hawaii is primarily a sea turtle hatchery that utilizes foreign volunteers as the main source of labor. It is important to evaluate these programs according to the criteria of ecotourism that promotes sustainability, to determine if: 1) the experience is focused on the natural environment, 2) the local people are involved, 3) the environmental impacts are mitigated, 4) the volunteers are educated, and 5) the program is making a contribution to the conservation of wildlife. In order to assess ARCAS, I have conducted fieldwork at the two field sites, participated in the volunteer activities, and interviewed the staff and paying volunteers. Based on the analysis of my observations, interviews, and questionnaires, I will discuss the strengths and weaknesses of the ARCAS program. I propose that the ARCAS model could be used as an example of community involvement, appropriate scale in ecotourism, and the effective use of volunteer labor to procure wildlife conservation.

Culture and Characterization of Aerobic Bacteria from Soap Lake, WA

Vashist, Radha

Faculty Mentor(s): Holly Pinkart, Biological Sciences

Session: 20 (Oral Session 3:20-5:00 in 137A)

Soap Lake is a saline, alkaline lake located in Central Washington, USA. It is home to a diverse group of halo-alkaliphilic microbial populations, most of whose members have not yet been identified. The lake is composed of two layers of water; the brackish mixolimnion (upper layer), and the monimolimnion (highly saline lower layer), which are separated by a distinct zone termed the chemocline. The aim of this study was to collect and isolate as many different aerobic/aerotolerant prokaryotic organisms as possible from the mixolimnion and monimolimnion. The culture media prepared for microbial cultivation reflected the chemistry of each site in terms of pH and salt concentration, and were inoculated with water and sediment from each layer. All

cultures were incubated at room temperature and the monimolimnion organisms were also grown at 8°C. Sixty-five isolates were obtained from Soap Lake samples collected in December 2006. There were 24 isolates cultured from the mixolimnion layer and 41 isolates were retrieved from the monimolimnion layer. The organisms took from a few days to 4 weeks of time to grow. Characterization of isolated microorganisms included analysis of colony and cellular morphology, determination of cell wall structure, and a variety of biochemical and metabolic tests. Additionally, molecular analyses were performed to aid in species identification. For further studies, techniques such as using the DNA sequencing will be helpful in determining if the isolates represent new, unique species.

Technological & Functional Variability in the Sunrise Ridge Borrow Pit (45PI408) Lithics

Vaughn, Kevin; Volkenand, Todd; McCutcheon, Patrick

Faculty Mentor(s): Patrick McCutcheon, Anthropology & Museum Studies

Session: 21 (Oral Session 3:20-5:00 in 137B)

The Sunrise Ridge Borrow Pit site, 45PI408, is a dense deposit of artifacts interbedded among a number of documented tephra layers from Holocene eruptive events in the southern Cascade Mountains of Washington State. Recent efforts to classify the artifacts from the site have revealed tremendous variability in technological and functional dimensions. Using a non-parametric statistical technique known as “bootstrapping” we assess the representativeness of our sample in terms of a 19 dimension paradigmatic classification. Despite a seemingly large sample size (n = 4,383) our sample is unrepresentative in several dimensions and thereby limits the analytic resolution of our investigation. Therefore, we utilize those dimensions that are representative in our assessment of the organization of technological and functional characteristics of the lithic assemblage. The results are placed in the context of current research questions and the emerging lithic contexts that are now well known from other excavated and analyzed lithic assemblages in the region.

Exercise Amount Needed to Improve Quality of Life and Fatigue in Breast Cancer Survivors

Wagner, Jessica; Burnham, Tim

Faculty Mentor(s): Tim Burnham, Health, Human Performance & Nutrition

Session: 4 (Oral Session 8:00-9:40 in 140)

Survivors of breast cancer often cope with negative side effects resultant to their diagnosis and subsequent medical treatment. Previous studies have shown exercise to be effective in reducing or alleviating many of these side effects. However, most studies have not been designed to evaluate the exercise dose needed to generate a

significant change in fatigue and QOL. PURPOSE: The purpose of this study was to examine the exercise dose required to significantly improve QOL and decrease fatigue. METHODS: 21 breast cancer survivors (43-79 years) were randomly assigned to either an exercise group or control group. The exercise group participated in a low to moderate intensity aerobic exercise program three times a week for ten weeks. The control group did not participate in the exercise program. Quality of life and fatigue were assessed weekly. RESULTS: Statistical analysis revealed a significant improvement in QOL in the exercise group compared to the control group ($p = .0003$) by week 4. The exercise group increased QOL 18.2% while the control group decreased QOL 3.5%. The exercise group showed a significant reduction in fatigue by week two compared to the control group ($p = .0001$). The exercise group reduced fatigue 56.1% while the control group increased fatigue 31.9%. CONCLUSION: These results indicate that low to moderate intensity exercise is of sufficient strength to improve QOL and fatigue in breast cancer survivors in just a few weeks.

The Rise of Sancho Panza

Wallace, Elizabeth

Faculty Mentor(s): Laila Abdalla, Douglas Honors College

Session: 18 (Oral Session 1:20-3:00 in 202)

This essay is about the character Sancho Panza, from Miguel Cervante's novel *Don Quixote*. It argues that the evolution of Sancho Panza's character throughout the work is indicative of the philosophical changes happening in Europe at this time. In the beginning of the novel Sancho is a simple minded man, who does not believe in himself. However, as certain events unfold, Sancho realizes his intellectual potential and becomes an empowered human being. As Sancho Panza develops, the character of Don Quixote, who symbolizes the feudal era, declines. Sancho Panza demonstrates a moment of significant change in European culture; he is the early modern man.

Play, Laughter, and Humor in Chimpanzees *(Pan troglodytes)*

Wallin, Jason; Jensvold, Mary Lee; Sheeran, Lori

Faculty Mentor(s): Lori Sheeran, Anthropology & Museum Studies

Session: 13 (Oral Session 1:20-3:00 in 135)

Play is a nearly ubiquitous mammalian behavior, and play is argued to occur across many animal taxa, including birds, non-avian reptiles, fish, and invertebrate species. Laughter is common in humans, and growing evidence from studies with chimpanzees, rats, and dogs shows that it may be common in other mammals. Humor in non-human animals is less well studied, though some theoretical work and anecdotes exist. The chimpanzee participants in this study, Washoe, Moja, Tatu, Loulis, and Dar, use the signs of American Sign Language to communicate with one another and their human

caregivers. Their abilities provide a unique window into play, laughter, and humor. As chimpanzees, they are humans' closest living relatives and share with us many behavioral and biological traits. Their play, laughter, and humor may help us better understand the evolutionary origins of our behaviors. In this study, we examined a longitudinal dataset spanning over 1,300 days, an archive of handwritten shift reports prepared by caregivers who had intimate and often long-term relationships with the chimpanzees. From this archive we are assembling a rich description of play, laughter, and potential humor in this unique family, including partner preferences in play and laughter; characteristic themes of play, laughter, and humor; and the use of signing across the categories. We are also generating hypotheses for future research into play, laughter, and humor in this unique family of signing chimpanzees.

The Effect of Gender and Age on the Freezing of *Pseudacris Regilla*

Walsworth, Austen; Irwin, Jason

Faculty Mentor(s): Jason Irwin, Biological Sciences

Session: 14 (Oral Session 1:20-3:00 in 137A)

The Pacific Chorus Frog, *Pseudacris regilla*, is a common frog in the western United States and Canada and is one of six known species that is able to survive freezing in nature. The goal of this study was to determine the effect of age and gender to which temperature they could survive being frozen. The hypothesis tested was that males will be the most susceptible to freezing. To study this, twelve specimens of male, female and juveniles were captured in October. The frogs were placed in an incubator at 10 C until December when the temperature was lowered to 4 C in the day and 1 C at night. They were then frozen at -2 C, -2.7 C and -3 C and were held at the minimum temperature for four hours. Each trial consisted of a male, female and juvenile placed in a container with moist soil (to initiate ice crystal formation), which was placed in a double-walled beaker. Alcohol from a refrigerated cold bath was circulated through the wall of the beaker, thus allowing precise temperature control. One trial conducted to -2.7 C and two -3 C, had no survivors, which was 9 frogs. Four trials to -2 C, all 12 survived except one male. Two sets of frogs were frozen to -3 C in order to determine glucose and glycogen content in the liver and thigh muscle. Glucose and glycogen are substances that protect the cells from damage caused by ice crystals. Frogs that had not been frozen were also dissected for the same information as a control.

Regulation of Functional Foods in Japan: Foods for Specialized Health Uses (FOSHU)

Warfel, Kimberly; Gee, David; Yuji, Aso

Faculty Mentor(s): David Gee, Health, Human Performance & Nutrition

Session: 25 (Posters in Ballroom C & D)

Although the number of functional foods in the US has been rapidly increasing, there are no specific regulations of these foods. In contrast, Japan has been regulating the marketing of functional foods for over fifteen years. The purpose of this study was to examine the history, regulations, benefits, and marketplace for Foods for Specialized Health Use (FOSHU) in Japan. Information was gathered in 2006 based on interviews with Japanese experts and published government and industry reports. FOSHU regulations were created in 1991 and currently over 500 FOSHU products have successfully passed through the extensive application process. Health issues targeted by these foods and some of their FOSHU ingredients include: gastrointestinal problems (oligosaccharides), hypercholesterolemia (soy proteins), hypertension (wakame peptides), hyperglycemia (guava polyphenols), hypertriglyceridemia (diacylglycerols), mineral absorption (calcium citrate malate), dental health (xylitol), and bone health (soy isoflavones). The best selling FOSHU have been related to gastrointestinal health. Growth of FOSHU in the marketplace has been steady, with the market for these products growing from $1 billion in 1997 to over $6 billion in 2006. Japan originated the concept of "functional foods" and is the only nation that has legally defined functional foods. The positive progress of Japan's FOSHU program has created food concepts that may eventually be applied in other industrialized nations.

Determination of Host to Activator Energy Transfer Efficiency in $YBO_3:Eu^{3+}$ and $(Y,Gd)BO_3:Eu^{3+}$

Warren, Katie

Faculty Mentor(s): Anthony Diaz, Chemistry

Session: 1 (Oral Session 8:00-9:40 in 135)

Abstract- $(Y,Gd)BO_3:Eu^{3+}$ is the red phosphor in plasma displays and mercury free lamps. In this work the non-radiative host to activator energy transfer efficiency of $YBO_3:Eu^{3+}$ is being compared to $(Y,Gd)BO_3:Eu^{3+}$. Energy transfer efficiency is determined by taking excitation and reflectance spectroscopy under vacuum ultraviolet (VUV) excitation. It is well known that co-doping $YBO_3:Eu^{3+}$ with gadolinium increases the emission intensity. This research will determine if the increase in emission intensity is due to an increase in energy transfer efficiency and electron mobility.

Amidst the Ruins: A Documentary on the Grassroots Restoration Effort after Hurricane Katrina

Wasserburger, Brandon

Faculty Mentor(s): Michael Ogden, Film and Video Studies

Session: 28 (Film and Art Session 1:20-3:00 in Theater)

On August 29th, 2005, Hurricane Katrina tore through the Gulf Coast region causing

monumental amounts of fatalities and damage. *Amidst the Ruins* is a passionate documentary that invites its audience to hear the inspiring stories of resilience and hope expressed by everyday citizens in Louisiana. The story follows a group of Central Washington University students and community members as they spend their Spring Break helping rebuild Louisiana. The students represent a large demographic of college students who traveled to the Gulf Coast making popular the current trend of what is referred to as the "Alternative Spring Break." They begin their journey in the Lower 9th Ward, but soon learn that they will be moving further South down the Louisiana Coastline to help people that have received less attention by the media and by relief workers. The students are exposed to a political protest, a FEMA trailer park resident, pastors concerned about their community, and much more. As they move closer to where the eye of the storm first hit, they notice their journey becoming more personal. The students meet a variety of people whose inner beauty matches the uncanny levels of destruction all around them. The film looks passionately at people, their spirituality, and their ability to survive amidst the ruins. Among many other films produced by Brandon Wasserburger, *Amidst the Ruins* has been recognized regionally by the National Broadcasting Society.

Ultrafine Particle Initiation of Lipid Peroxidation in Mitochondria

Wells, Josie; Thomas, Carin; Bullock, Eric; Johansen, Anne; Johnston, Justin; Bryner, Stephanie

Faculty Mentor(s): Carin Thomas, Chemistry

Session: 19 (Oral Session 3:20-5:00 in 135)

Atmospheric pollution has commonly been linked to various forms of cardiovascular and respiratory disease. Recently it was hypothesized that the onset of these diseases is due to small (ultrafine, < 0.1um in diameter) pollution particles. This study investigated the mechanism of membrane damage occurring after mitochondrial exposure to atmospheric ultrafine particles (UFPs). UFPs were collected from a rural area and tested for their ability to cause lipid peroxidation in mitochondrial membranes. Mitochondria were incubated with UFPs and aliquots were taken out at increasing time points of exposure. Malondialdehyde (MDA), used as an indicator of lipid peroxidation, was measured using a gas chromatograph mass spectrometer in both electron impact and negative chemical ionization detection modes. Results were analyzed and compared on the basis of exposure time, MDA concentration and UFP iron content. The data did not yield consistent trends during the chosen time range of exposure, likely due to insufficient time allowance for MDA formation after lipid peroxidation initiation.

RTI and Elementary Reading Remediation: What is working?

Weston, Juliette

Faculty Mentor(s): Christina Curran, Debbi Prigge, David Majsterek, Education

Session: 6 (Oral Session 8:00-9:40 in 202)

A review of the literature on response to intervention (RTI) reading models in elementary schools offers teachers insight into effective practices for addressing early reading difficulties in students. Response to intervention models are being implemented by school districts throughout the United States. Further, elementary schools that focus RTI strategies on reading are interested in procedures that discriminate students with learning disabilities from those who are low achievers, those whose difficulties stem from cultural differences, and those who have not received evidence-based instruction. At this early stage of RTI implementation, it is useful to scrutinize models being implemented in a wide range of school districts to determine which methods have the most promise, and how implementation of such models has been facilitated. While the research base for RTI models is evolving, positive trends are being seen as districts embrace change and move in this direction. Session participants will be exposed to various types of curricula that show promise for remediating reading difficulties. Interventions that vary from tier to tier will be presented, as well as the variability from one district to another. Session participants will be informed of the points at which districts report referring students for special education, and whether referrals for special education are increasing or decreasing as RTI models are implemented.

Manastash Showcase

Whitcomb, Katharine; Pybon, Rachel; Nelson, Jessi; James, Katee; Ellington, Luke

Faculty Mentor(s): Katharine Whitcomb, Toni Culjak, Joseph Powell, English

Session: 12 (Oral Session 10:00-11:40 in 202)

The English Department would like to showcase our student-edited, student-produced annual literary and arts magazine, *Manastash*. The presentation will feature a series of short readings by student writers whose literary work is featured in the current issue of *Manastash* and by students on the editorial or production staff of the magazine. The faculty editorial supervisor, Katharine Whitcomb, will introduce the reading with a few words about *Manastash* and the Manastash Practicum classes.

Bridging the Gap Between Human Perception and Scientific Understanding in Large River Systems

White, James

Faculty Mentor(s): Gina Bloodworth, Geography and Land Studies

Session: 15 (Oral Session 1:20-3:00 in 137B)

It is the perceptions and values of people that are wrapped up into the policies that affect how we shape rivers. In turn, the rivers themselves (especially in the West) shape

where and how we live, and influence our attitudes and perceptions. My preliminary research explores the use of qualitative modeling to bridge the gap between river attributes and human perceptions. I will use participatory modeling techniques to capture stakeholder perceptions about river systems, and human relationships with them. The participatory modeling process will result in a series of concept maps. I will build a model of physical and biological river attributes and processes based on an extensive review of empirical science from the body of scientific river literature. The concept maps and the physical river model will become inputs to a qualitative domain model that will allow the exploration of the interactions between physical and cultural processes at multiple scales, with the eventual goal of informing decision-making by providing predictions of the often dire consequences of human actions.

Historic Context and Evidence of Chinese Placer Mining at Cougar Bar in the Hells Canyon National Recreation Area

Wilburn, David; Painter, Ryan; Proszek, Kristina

Faculty Mentor(s): Morris Uebelacker, Geography and Land Studies

Session: 10 (Oral Session 10:00-11:40 in 140)

Placer mining in the Hells Canyon National Recreation Area left an indelible mark on the landscape consistent with patterns associated with Chinese immigrant labor. Chinese miners in the latter half of the 19th century were often forced to work in remote areas on less productive claims as a result of social pressures including legislation and violence. Our investigation included an on-site survey of a number of features at Cougar Bar and a review of historic literature. A number of cobble tent foundations associated with Chinese mining sites are present at Cougar Bar. A centrally located foundation includes the remains of an elaborate stone chimney arrangement consistent with the designation of a cooking quarters observed at other Chinese mining camps. It is probable that Cougar Bar was chosen as a mining site and abandoned as a result of racial pressure and violence that occurred in Hells Canyon.

Chicana Trinity: Mestiza Consciousness in Sandra Cisneros' *Woman Hollering Creek*

Wilson, Shannon

Faculty Mentor(s): Christopher Schedler, English

Session: 24 (Oral Session 3:20-5:00 in 202)

Gloria Anzaldua's essay "The New Mestiza," from her seminal text *Borderlands/La Frontera*, explores the fragmenting cultural forces at work on Chicanas. In contrast to this fragmentation, Anzaldua offers a pluralistic concept of Mestiza consciousness that synthesizes the competing demands of Mexican, Anglo, and Indigenous cultures. Myth plays an essential role in this synthesizing process. Anzaldua suggests that the Mestiza

must take inventory of her ancestry, including the myths and legends of both pre- and post-colonial Mexico. Armed with the knowledge of how these myths and legends have been wielded as tools of oppression against Chicanas, the new Mestiza reinterprets and reshapes the myths, legends, and archetypal figures of all her cultures to create empowered, pluralistic modes of identity. Chicana author Sandra Cisneros' collection of short stories, *Woman Hollering Creek*, is an example of this type of mythic re-appropriation. Cisneros' characters are engaged in the process of developing a Mestiza consciousness, as is Cisneros herself through the act of writing the text. This paper will explore the presence of the new Mestiza, as outlined by Anzaldua, in Cisneros' stories "Woman Hollering Creek," "Never Marry a Mexican," and "Little Miracles, Promises Kept." Within these stories Cisneros presents and reworks the mythical figures of La Llorona, La Malinche, and La Virgen de Guadalupe. She draws out the power of these cultural archetypes and subverts the oppressive, negative connotations previously associated with them, creating a Chicana trinity.

Interactive Java Physics Simulations

Wright, Ian

Faculty Mentor(s): Andrew Piacsek, Physics

Session: 7 (Oral Session 10:00-11:40 in 135)

Interactive simulations using the Java programming language were created to aid student learning of abstract physical concepts. These simulations run as applets embedded within web pages, allowing them to be accessed by students at any time from any computer connected to the internet. The interactive nature of these applets permits students to visualize and explore how physical systems respond to various parameters. Several of these physics applets were developed to illustrate acoustics phenomena, some of which are being used in PHYS103 "Physics of Musical Sound." One applet that will be demonstrated animates wavefronts emitted by a moving source (such as an airplane). Students can adjust the speed of the source to explore the Doppler effect and to visualize what happens when the source moves faster than the speed of sound. They can also change the rate at which the sound speed varies with height in order to explore the effects of refraction. Because these applets allow user interaction with the animation, students can directly witness results of changes they make to a system. These are, in effect, "virtual experiments" that can help students better understand the equations they are learning.

Seeing Red: Ochre Utilization, Tryon Creek Archaeological Site, Hells Canyon, Oregon

Wyatt, Noella

Faculty Mentor(s): Steve Hackenberger, Anthropology & Museum Studies

Session: 26 (Posters in Ballroom C & D)

The Tryon Creek site was initially excavated in the 1990s. As part of our Winter 2007 ANTH 320 lab class, students “re-excavated” the site using the computer program GIS (Geographical Information System) and worked with the collection of artifacts from the investigations. After completing my virtual dig, I analyzed the type, amount and distribution of ochre in House Feature 2. Both red and yellow ochre were identified. The fragment sizes and quantities of both types of ochre were tabulated and analyzed by unit and stratum. Ochre utilization is more apparent in specific areas of the house feature as well as at different depths of occupation. Literature review provides detailed information on the preparation and use of ochre, and informs archaeologists working in the Columbia Plateau. Future study will be performed to determine source locations for some of the samples using geochemical analysis as recommended by Erlandson, Robertson, and Descantes (1999).

The Influnece of the “Built” Environment on the Physical Activity Levels of Older Adults in a Rural Environment

Yeager, Kalyn

Faculty Mentor(s): Charilaos Papadopoulos, Health, Human Performance & Nutrition

Session: 13 (Oral Session 1:20-3:00 in 135)

Objective: To determine the relationship between perceived neighborhood characteristics and physical activity habits of older adults in a rural community. Methods: Twenty-seven participants completed a face-to-face interview about their perception of their neighborhood. An accelerometer was worn for seven days to estimate energy expenditure. Statistical Analysis: A multiple regression was used to identify the environmental influence on energy expenditure. An independent T-test followed to determine differences between older adults residing in a home versus an apartment. Results: Older adults (69.9 ± 8.3 years) expended 1,510 ± 724.9 kilocalories per week. General neighborhood satisfaction and safety from traffic were related to physical activity. Perceptions of residential density, access to services, street connectivity and walking facilities were different among individuals residing in an apartment versus a house. Conclusions: These results suggest that older adults living in a rural community are more physically active when they have a positive perception of their neighborhood.

An Interesting Phenomena of RNA Editing in Chloroplast Genomes of Gymnosperms

Yu, Jianing; Raubeson, Linda

Department: Biological Sciences

Session: 8 (Oral Session 10:00-11:40 in 137A)

In order for a gene to be expressed the DNA information must be transcribed into RNA information that is then translated into the amino acid sequence of a protein. RNA editing is a post-transcriptional process that results in modifications at specific locations. This poorly understood process sometimes results in proteins different from those that would be predicted from the DNA sequence. In land plants editing can occur in both the mitochondrion and chloroplast and involves C-to-U, or less commonly U-to-C changes in the RNA message. Previously, only one gymnosperm *Pinus thunbergii* has been fully investigated for RNA editing in the chloroplast genome. Now, we have examined ten genes from the chloroplast genome of the conifer *Araucaria heterophylla*. The genes *psbE, psbF, psbL* and *matK* did not exhibit RNA editing. However the genes *atpF, petB, petD, ndhB, ndhD*, and *ndhH*, had one, one, two, five, three or two edited sites, respectively. Most (64.3%) edits occur at the second position of the codon and are C-to-U edits, except one site is a rare G-to-A modification. By comparing the edited *Araucaria* amino acid sequences to other edited sequences, we see that the different original cDNAs of all ten genes become very similar in seed plants upon RNA editing. So, one function of RNA editing may be to conserve amino acid sequences in the face of DNA mutation.

Deep Tissue Massage is an Effective Treatment for Lateral Knee Pain

Zorn, Anna; Nethery, Vincent; Burnham, Tim; Kladnick, Ken; Musser, Bill

Faculty Mentor(s): Vincent Nethery, Health, Human Performance & Nutrition

Session: 4 (Oral Session 8:00-9:40 in 140)

Traditional treatment for persistent lateral knee pain is often slow in response (4-8 weeks) and somewhat unsuccessful (10 – 40%). In contrast, anecdotal reports suggest that deep tissue massage (DTM) elicits comparable or better success rates in less time. However, this practice is not typically incorporated into traditional treatment protocols due to a lack of supporting evidence. PURPOSE**:** The purpose of this study was to objectively investigate the effectiveness of deep tissue massage in relieving lateral knee pain by establishing a general rate and time frame for success following three DTM treatments. METHODS**:** Thirteen recreational or competitive athletes with persistent lateral knee pain were recruited for the study. Over the eighteen-day investigation, all subjects underwent a pre-treatment assessment (day #1) followed by three DTM treatments (days #1-10), a post-treatment assessment (day #10), and an eight-day follow-up period (days #11-18). Pre- and post-treatment evaluations involved perceived pain (visual analog scale) during static (seated), dynamic (10-min walk), and lateral knee compression (Noble and Renne) tests. Lateral thigh, hip, and knee flexibility (Modified Thomas and Ober tests) were also measured. All volunteers completed an informed consent, activity-injury history questionnaire, and an initial knee joint evaluation to assess eligibility prior to participation. RESULTS**:** Twelve of thirteen subjects (92%) reported improvement or resolution of lateral knee pain after three DTM treatments while maintaining near-normal activity levels. Knee pain elicited during the Noble compression test reduced by 61% (P=0.004) from pre- to post-treatment assessments, while pain during the Renne test decreased 31% (P=0.10). Post-

treatment knee pain during a 10-minute treadmill walk was substantially lower than pre-treatment values at the 1st (P=0.01), 5th (P=0.05) and 10th minute (P=0.0003). In contrast, measures of knee and hip flexion and hip abduction, and the angle of leg adduction were not different following treatment. CONCLUSION**:** Three deep tissue massages over ten days alleviated or significantly reduced lateral knee pain with 90% of patients gaining total relief over the 10-day treatment and 8-day follow-up cycles. Compared to literature reports for traditional treatment protocols, deep tissue massage positively impacts lateral knee pain with an equal or better success rate, in a shorter period of time, and with minimal disruption to activity levels.