The posters presented were supported by the generosity of many governmental and private funders, including:

- Ball State University – Chemistry
- Boise Technology, Inc.
- Collaborative Research Experience for Undergraduates (CREU)
- Computing Research Association Committee on the Status of Women in Computing Research (CRA-W)
- Delaware State University
- Department of Energy
- Department of the Interior US Fish and Wildlife Service
- Faith In Christ Ministries
- Loyola University of Chicago
- Middle Tennessee State University Psychology
- Morehead State University Institute for Regional Analysis and Public Policy
- National Center for Research Resources (NIH)
- National Center for Research Resources Department of Health and Human Services
- National Institute of Health Genetics and Developmental Biology
- National Science Foundation Directorate for Geosciences
- Northern Kentucky University
- Presbyterian College
- Southern Illinois University Carbondale Zoology
- University of Alabama at Birmingham Psychology
- University of Delaware Biological Sciences
- University of Georgia
- University of Wisconsin – Oshkosh
- US Army RDECOM Night Vision and Electronic Sensors Directorate
- Virginia Ball Center for Creative Inquiry at Ball State University
- Virginia Polytechnic Institute & State U Computer Science

Council on Undergraduate Research
734 15th Street, NW, Suite 550
Washington, D.C. 20005
Phone: 202.783.4810
Fax: 202.783.4811
Email: cur@cur.org
Internet: www.cur.org

Insert Nancys' Letter here

Program

Monday, May 4, 2009

Orientation Session

5:30 pm — American Association of State Colleges and Universities (AASCU)
First Floor Meeting Room
1307 New York Avenue
Washington, DC 20005

Light Dinner

Presentation of certificates

Speakers

Della Cronin
Vice President for Legislative and Public Affairs
Washington Partner, LLC

James Brown
Senior Legislative Associate, American Chemical Society

Tuesday, May 5, 2009

Morning Session - 8:30 –10:30am — Rayburn House Office Building, Room 2168 (Gold Room)
Continental Breakfast

Welcome – Jeffrey Osborn
President - Council on Undergraduate Research (CUR)

Introduction of Speakers
Jeffrey Osborn – CUR President &
Nancy Hensel – CUR Executive Director

Address – Representative Rush Holt
12th District of New Jersey

Address – Arlene Blum, PhD
Executive Director, Green Science Policy Institute

11:00 am–3:00 pm — Appointments with Representatives

3:30 – 5:00 pm — Poster set-up - Rayburn Office Building (B338, B339, B340)

5:30 – 7:30 pm — Poster session, reception and ACS Awards Ceremony
*Students, we ask that you step away from your posters once the ACS Awards Ceremony begins. At the conclusion of the ceremony, you may return to your posters.

7:30 pm — Break down posters

Please do not remove your poster until 7:30pm

Student Poster Abstracts

Alabama

Student: Felix Kishinevsky
Institution: University of Alabama at Birmingham Psychology
Faculty Advisor: Rosalyn Weller
Poster title: Obese Women with Greater Impulsivity Show Reduced Executive Function Brain Activation
Display Area: 1A
Funding: University of Alabama at Birmingham Psychology
Abstract: Obesity is a serious public health issue. Obesity may be accompanied by abnormalities in executive function circuitry related to inhibitory control or impulsivity. A useful task for studying impulsivity is the delay discounting (DD) of money task, in which an individual chooses between immediate and delayed, but greater, amounts of money. Studies using functional magnetic resonance imaging (fMRI) have shown that difficult vs. easy choices on the DD task produce more activation in executive function circuitry. We hypothesized that obese women who were more impulsive on DD would show less activation of their executive function system on difficult choices compared to less impulsive obese women. Obese (BMI > 30) women (n = 46) first completed a standard version of a DD task on a pc in the lab. An individualized fMRI version of the DD task was made for each magnet-eligible participant (n = 14) such that half the trials were difficult and half were easy. The task was presented in an event-related design using a Siemens Allegra 3 Tesla head-only magnet. Two analyses of task difficulty were used, based on relative number of immediate choices and on reaction time. Using both measures, we found that obese women who made more impulsive choices on the DD task had less activation of executive function regions of the brain when making difficult vs. easy choices than women who showed less impulsivity. Knowledge of brain structures that are working less effectively in obese individuals could inform drug or behavioral treatment.

Alaska

Student: Kimberly Beckford
Institution: University of Alaska - Anchorage Liberal Studies
Faculty Advisor: Ann Jache
Poster title: Teaching science to those who have no word for it
Display Area: 1B
Abstract: Differences in learning styles, vocabularies, and ways of gathering and preserving information between western science and Alaska Native culture have been identified as problems contributing to low test scores on National Assessment of Educational Progress science exams. This research project aimed to answer the following question: How can science education be improved for Alaska Native students? This question was investigated, through a partnership with The Imaginarium in Anchorage, Alaska and with funding through the Office of Undergraduate Research, using an evaluation of the Yup 'ik science curriculum, Yuungnaqpiallerput: The Way We Genuinely Live. The curriculum, funded by the National Science Foundation, was designed to improve science understanding through the use of culturally relevant concepts and tools. With traditional uses of

driftwood as the medium, the 9th-12th grade classes integrate Yup 'ik language and ways of knowing with western science concepts.
This research project evaluated the effectiveness of the 9th-12th grade classes regarding mixing traditional paints.

Arizona

Student: Kushal Mehta
Institution: University of Arizona Astronomy
Faculty Advisor: Markos Georganopoulos
Poster title: Observations of Quasar jet PKS 0637-752 and Implications
Display Area: 1C
Abstract: We present new optical data taken by the Hubble Space Telescope and we use them, together with existing radio, infrared and X-ray observations to produce the most complete coverage of the quasar jet PKS 0637-752 to date. The power source of quasars is believed to be accretion of matter onto a supermassive black hole. A common by product of such accretion is the ejection of collimated, polar outflows – i.e., jets – at nearly the speed of light. We use the observations to constrain the emission mechanisms and composition of this jet. We show that the jet cannot be dominated by magnetic fields and that the jet is electrically neutral for all jet configurations. We also show that the energy density in particles must be equal to that in the magnetic fields. We present a rather model independent argument that the jet has a spine-sheath geometry with the spine being faster and emitting most of the infrared, optical and X-ray emission. A paper on this project has been accepted for publication in the Astrophysical Journal.

Arkansas

Student: Adam R. Hurst, Heather K. Ferguson, John R. Sims
Institution: Ouachita Baptist University Biology
Faculty Advisor: Lori L. Hensley
Poster title: New Hope for the Treatment of Ewing's Sarcoma and Related Cancers
Display Area: 1D
Funding: National Center for Research Resources Department of Health and Human Services
Abstract: Ewing's Sarcoma is a bone cancer that primarily affects children and teenagers. These tumors are highly aggressive and have often already spread to other parts of the body at the time of diagnosis. With a five-year survival rate of approximately 30%, improved treatment options are desperately needed. Our research has focused on the abilities of two naturally-occurring compounds to induce death in Ewing's sarcoma cells in the lab. Our data show these compounds successfully kill Ewing's sarcoma cells as well as several other tumor types in the Ewing family of tumors. In order to test the efficacy of these substances in a more realistic model of human cancer, we developed Ewing's sarcoma cells that express the enzyme that allows fireflies to light up. These engineered tumor cells were then injected into the leg bones of living mice. Tumors were allowed to develop, and the growth of the glowing tumors was tracked using specific imaging techniques. The effects of different doses of our potential therapies can be used in these mice, and tumor responses in individual mice can be monitored and measured. We hypothesize that these experiments provide the rationale for the development of improved therapies for this devastating family of cancers.

California

Student: Iris Claire Ha
Institution: University of Californi, Los Angeles
Faculty Advisor: William E Lowry
Poster title: Deriving epidermal cells from human embryonic stem cells and induced pluripotent stem cells
Display Area: 1E
Abstract: Recent advances in nuclear reprogramming show great promise for the future development of patient-immunospecific tissue therapies and abatement of the controversies associated with embryonic stem cell-based regenerative medicine. Unlike human embryonic stem cells, which are derived from the inner cell mass of a developing embryo, human induced pluripotent stem cells can be generated from somatic cells through ectopic expression of the transcription factors Oct4, Sox2, c-Myc, and Klf-4 and are nearly identical to ESCs in morphology, gene expression, epigenetic state, and pluripotency. In suspension, both ESC and iPS clones form embryoid bodies containing cell-types representative of all three germ layers. Because these populations represent such a wide array of cell types, a major challenge in both ESC and iPS technology remains to isolate and characterize a functionally distinct cell population from a large, heterogenous pool. To address this issue, we are engineering reporters for epidermal-specific genes to stablely transfect into EBs. We will then isolate cells of epidermal lineage from EBs with fluorescence activated cell sorting (FACS) and characterize isolated sub-populations. We hope that characterizing human ESC- and iPS-derived tissue will provide a means for modeling for human disease and embryonic development in vitro.

Student: Gongjie Li
Institution: California Institute of Technology
Faculty Advisor: Nicholas Scoville
Poster title: Comparison between Simulated and Observational Results of Galaxy Formation for Large Scale Structures
Display Area: 1F
Abstract: The Millennium simulation is the largest numerical simulation of how minor fluctuations in the density of the universe's dark matter distribution are amplified by gravity to develop into the large scale structures and galaxy clusters seen today. Although the simulation has been compared with the astronomical observations of the local universe, the simulations have not been widely compared with high redshift, early universe observations. In our study we compare the simulations for the first time with observations from the COSMOS survey (the largest high redshift survey). Three quantities are proposed to characterize the structures and the structures distribution, namely the percent area of large scale structures at each redshift, the average area of large scale structure and the shapes as characterized by the square root of the area divided by the circumference. We calculate these quantities for both the observations and the simulations, and signify discrepancies between the existing simulations and observation. In particular, the simulations exhibit earlier development of dense structures than is seen in the observations.

Student: Christopher Paul Morris, Kevin Roy Parsons
Institution: California State University - Chico Biology
Faculty Advisor: Joseph P. Greene, Larry Kirk, Larry F. Hanne
Poster title: Use of Industrial Waste for the Microbial Conversion of Carbohydrates to Lactic Acid
Display Area: 1G
Abstract: Some of the most exciting research today is in the production of new sustainable products. An example of a sustainable product is the biodegradable plastic polylactic acid. The biggest obstacle for production of polylactic acid, is the cost associated with making its monomer lactic acid. A large portion of that cost is due to the cost of nitrogen and carbohydrates needed to grow the microorganisms that produce lactic acid. Our research focused on the use of industrial waste as a source for these two ingredients.

We began our research by trying to determine the best lactic acid producing bacteria. We tested four lactic acid fermenting bacteria and found that Lactobacillus rhamnosus produced the most lactic acid. We then looked at using brewery waste (spent yeast cells) as a nitrogen source. Hop components associated with yeast cells are known to inhibit bacterial growth, therefore pretreatment of yeast cells with charcoal or removal of yeast cell wall was necessary. In order to release nitrogen from the yeast cells it was necessary to pretreat the yeast cells. We found that heat pretreatment resulted in optimal nitrogen release and lactic acid production.

Additional studies addressed the use of other industrial waste (spent barley, rice hulls, and rice bran) as a carbohydrate source. Pretreatment for optimal release of sugars was acid/heat followed by enzyme treatment. By combining these sustainable waste products we were able to successfully produce lactic. These studies demonstrate that lactic acid can be produced from industrial waste.

Connecticut

Student: Daniel C. Osipovitch
Institution: University of New Haven Chemistry and Chemical Engineering
Faculty Advisor: Pauline Schwartz
Poster title: Applications of Parrondo's Paradox: The Development of Computational Models that Explore Novel Chemical Systems
Display Area: 1H
Abstract: A mathematical concept known as Parrondo's paradox motivated the development of several novel computational models of chemical systems. Parrondo's paradox is the unexpected situation in which two specific losing strategies can, by alternating them, produce a winning outcome. Our studies focused on finding a chemical analogy to this paradox. Our objective was to discover compuational models of systems of chemical reactions in which a higher yield of a product is formed when switching between conditions rather than under a fixed, steady-state condition. We found models that predict paradoxical behavior: a greater concentration of product was formed under oscillating temperature conditions than at any fixed temperature. In one such model, 15 times more product is predicted by oscillating the reactants between 300K (27 C) and 480K (207 C) than at any time between those points. We have come to understand how complex, non-linear behavior may arise in simple chemical systems. Our computational models of thermal cycling suggest new applications in chemistry, biochemistry and chemical engineering.

Delaware

Student: Kathryn Teixeira
Institution: University of Delaware Biological Sciences
Faculty Advisor: Deni Galileo
Poster title: Quantitative Analysis of Breast Cancer Metastasis to Brain
Display Area: 1I
Funding: University of Delaware Biological Sciences
Abstract: Breast cancer can metastasize to brain, and when this happens, it usually results in patient death within months. My work centers on utilizing our new quantitative model system for studying metastasis to brain. Here, human breast cancer cells were injected into blood vessels of the early chicken embryo, recovered from the brain, and counted several days later. The injected cancer cells expressed marker genes that allowed for their identification and selective survival after drug treatment to form cell colonies. The sensitivity of our system was tested by initially injecting blood vessels with 50,000 cells, which resulted in an average of 127.0 colonies per brain after drug selection. Injections of 5,000 cancer cells produced an average of 32.2 colonies. Thus, the ability to detect human breast cancer cells that metastasized to the brain after injection of only 5,000 cells into the blood vessels demonstrates that the chick embryo is a sensitive system to study brain metastasis.

Experiments by others with mice have shown that reinjecting breast cancer cells that have been recovered from the brain as above produced breast cancer cells with enhanced capacity to metastasize to the brain. It is unknown whether this enhanced metastatic potential is due to specific targeting of the cells to the brain, or to increased cell survival in brain compared to other organs. My experiments in chick embryos revealed that repeated reinjection and recovery of breast cancer cells resulted in increased numbers of cells metastasizing to brain, which indicates that they preferentially targeted the brain.

Student: Olumuyiwa Fagbami,
Institution: Delaware State University Chemistry
Faculty Advisor: Andrew Goudy
Poster title: Thermodynamic and Kinetic Measurements on MgH2 for Hydrogen Storage
Display Area: 1J
Funding: Department of Energy
Abstract: There is great interest in finding materials that can absorb and release large amounts of hydrogen rapidly and reversibly at moderate temperatures and pressures. When suitable materials are found, they could possibly be used in hydrogen fuel cell powered vehicles and thus, help solve some of the energy problems that this nation is currently facing. The Department of Energy has established a year 2010 goal of finding materials that can absorb and release at least 6 weight percent hydrogen. Magnesium hydride has attracted some interest over the years because it has a theoretical hydrogen holding capacity of 7.6 wt% and thus it can meet DOE's goal for hydrogen storage. The goal of this research was to study the thermodynamics and kinetics of hydrogen desorption from MgH2 and determine what process controls the desorption rate. Thermal gravimetric analysis (TGA) showed that MgH2 released 7 wt% of hydrogen at a temperature of 350 oC. Pressure Composition Isotherm (PCI) analyses performed on the sample at temperatures between 300 oC and 450 oC that the sample absorbed and released hydrogen reversibly. Desorption kinetics measurements were performed using a novel concept of constant pressure thermodynamic driving forces. Modeling studies

suggest that, at lower temperatures, reaction of hydrogen at the phase boundary controls the reaction rate, while at higher temperatures hydrogen diffusion is rate-controlling. Future studies are being planned to study the reaction kinetics of magnesium borohydride complexes, which have even greater hydrogen holding capacity than magnesium alone.

Student: Alexia Jean Russo
Institution: Delaware Technical and Community College Owens Campus
Faculty Advisor: Venugopal Kalavacharla
Poster title: Identification of Common Bean Molecular Markers in the region Surrounding Ur-3, a gene for Rust Resistance
Display Area: 2A
Funding: Delaware State University
Abstract: The immune response in plants is governed by resistance (R) genes, whose protein products initiate the physiological defense response. Plant R genes and other complementary genes required for function of the former are key to understanding how plants combat infection. We are studying genes in the economically important legume, common bean (Phaseolus vulgaris) that provide resistance to bean rust caused by the fungal pathogen Uromyces appendiculatus. The Ur-3 locus provides resistance to 44 of the 89 known races of bean rust in the United States, while the Crg locus is required for resistance mediated by Ur-3. Genetic material that we have developed includes susceptible mutants carrying deletions in molecular markers linked to both of these genes. The short term objectives of our research are to (a) identify sequences in the region of the Ur-3-cosegregating molecular marker SK14 (b) identify large insert bacterial artificial chromosome (BAC) clones using the SK14 marker and (c) identification of the bean homolog of the RPM1-interacting protein 4 (RIN4) (which plays a role in the Pseudomonas syringae resistance response in the model plant Arabidopsis). This will be useful as we can determine whether bean RIN4 plays a role in defense. All these objectives will help in our immediate goal to delineate the extent of deletion in the rust susceptible mutants. This will help in our long-term objective of molecular isolation and analysis of rust resistance genes in common bean and the understanding of how plants protect themselves against microbial pathogens.

Florida

Student: Evelyn Peters
Institution: University of South Florida
Faculty Advisor: Thomas W. Smith
Poster title: Creating an Identity – Art and Power in Ancient Rome and Washington D.C.
Display Area: 2B
Abstract: As an infant nation, the United States struggled for ways to express its independence and desired place in the world. Presented with a tremendous opportunity, the country's leaders and patrons invested in timeless and impacting expression – artwork. Many of these choices deliberately call upon the images and memories of ancient Rome, using similar methods to evoke pride and awe, or to instill a sense of dominance or power.

This research compares the political art of ancient Rome (31 B.C. – A.D. 117) with Washington, D.C. (1780-1900). By interpreting the artistic expression of national identity during both periods, we can infer numerous conclusions about each culture's common attitudes, worldview and motivations.

The research will include five case studies of varying media:

1. Preserving memory and establishing a history of leadership:
U.S. Capitol Building
Forum of Augustus

2. Emphasizing national stability internally and externally:
The Peace Monument
Ara Pacis Augustae (Altar of Augustan Peace)

3. Honoring the accomplishments of an ambitious nation:
Capitol Rotunda Frieze
Column of Trajan

4. Immortalizing worthy leadership qualities:
Portraiture of George Washington
Portraiture of Caesar Augustus

5. Symbols of power and ingenuity:
Washington Monument
Egyptian Obelisks Brought to Rome during the Empire

Comparing Rome to the American capital is significant in many ways. This highly visual project will examine the way we choose to portray ourselves politically – to ourselves and the world, and how that creates our identity – as deliberately and as enduringly as the Romans during the time of Augustus and Trajan.

Georgia

Student: Clare J Hatfield
Institution: University of Georgia International Affairs
Faculty Advisor: Pam Kleiber
Poster title: Drawing Boundaries on Bodies: Sexual Violence as a Tactic of War during India 's Partition
Display Area: 2C
Funding: University of Georgia
Abstract: This paper explores the varying qualities, strategic nature, and ultimate intentions of the use of sexual violence as a tactic of war during the Partition of the Indian subcontinent. Through an interdisciplinary and qualitative approach, I draw evidence from the fields of international affairs, religion, feminism, law, and creative writing to analyze the strategic nature of forcible impregnation, displacement, amputation and mutilation. In examining primary accounts of Hindu and Muslim rebels' preparation for and conduct during sexually violent campaigns, I argue that forms of sexual violence were not the result of wayward, sexually frustrated rebels, but rather were premeditated, strategic, and tactical components of organized campaigns of ethnic cleansing and forcible displacement. In addition, I will examine more recent reiterations of violence in the subcontinent to determine whether sexual violence remains a central tactic in ethnic conflicts in the region. In sum, I conclude that the rape, mutilation, and forcible marriage and impregnation were not elements of an unfortunate consequence of the break down of a state, but rather were systematic, comprehensive, and unconventional tactics of war. In order to prevent the use of this horrific tactic, the victimization of innocent civilians in conflict, and bring justice to those already victimized by ethnically charged sexual violence, policymakers can eliminate the efficacy of the tactic if societies cease in stigmatizing victims through public education programs and governments bring to justice perpetrators of such crimes in the post-conflict setting.

Hawaii

Student: Ashley Kanani Johnson
Institution: Chaminade University of Honolulu
Faculty Advisor: Patricia M. Lee - Robinson
Poster title: Phagocytosis of Streptococcus Pneumoniae by Antibody-Dependent Mechanisms in the Presence of Stimulated Neutrophils and in the Absence of Whole Hemolytic Complement
Display Area: 2D
Abstract: 40,000 deaths a year in the U.S. are attributed to Streptococcus pneumoniae (pneumococcus) and up to a million worldwide. This infectious and invasive human pathogen is the cause of both mucosal diseases and systemic infections in children and adults. In all cases the infection begins with binding to and colonization of the upper respiratory tract and nasopharynx. It is understood that capsule-specific IgA or IgG- initiated killing of S.pneumoniae occurs by complement-dependent mechanisms. However, studies have shown that there are low levels of complement in the lung.

We propose that killing with IgA or IgG may also occur by complement-independent mechanisms. By activating neutrophils via local inflammation, independent of the presence of whole hemolytic complement, this would abrogate the need for high levels of complement to affect IgA- and IgG- mediated killing in the lung. Type 2

pneumococci are used in a Streptococcus pneumoniae killing assay. The pneumococci bacteria are opsonized with human Type 2 polysaccharide specific monoclonal antibodies, IgG or IgA. Stimulated neutrophils are added to the opsonized bacteria and colony forming units (CFU) are counted to calculate percent kill.

Neutrophil stimulants, TNF-á and C5a demonstrated antibody-dependent killing of Streptococcus pneumoniae, without whole complement. With IgA opsonized bacteria combined with TNF-á and C5a stimulated neutrophils, the greatest percent kill was observed. Thus, S.pneumoniae can be killed by stimulated neutrophils and support antibody-dependent killing of S.pneumoniae in the absence of whole hemolytic complement.

Idaho

Student: Bryan T. Martin
Institution: Boise State University Chemistry and Biochemistry
Faculty Advisor: Owen McDougal
Poster title: What does NMR have to do with the Mixing of Oil and Water?
Display Area: 2E
Funding: Boise Technology, Inc.
Abstract: A novel method, termed z-axis single pulse slice selective spatially resolved excitation (SPS3RE) nuclear magnetic resonance (NMR) spectroscopy, is presented. This technique was developed to spatially characterize the interfacial region of a mixed phase system. Concepts employed in magnetic resonance imaging (MRI) were adapted for use in solution NMR to study the concentration of para-nitrophenol (pNP) as a function of spatial location within a biphasic system of carbon tetrachloride (CCl4, oil phase) and deuterium oxide (D2O, water phase). Similar to MRI, the presence of compounds in a solution can be measured as different parts of the sample are “focused” on. However, this new technique has the additional advantage of being able to identify compounds in a mixture by their unique spectral patterns. Thorough investigation with a series of NMR spectrometers, ranging from 300 to 700 MHz, illustrates the advantages and limitations of the SPS3RE NMR experiment. In the biphasic model system presented here, pNP was shown to have greater solubility in the water than oil phase. Interestingly, a gradual change in the concentration of pNP was observed upon transition from one phase to the other. This unexpected result not only indicates that oil and water are seen to mix, but it also provides a method to characterize the extent of the mixing. The SPS3RE NMR experiment is expected to be broadly applicable to research in the fields of energy, agriculture, defense, and biomedical/pharmaceutical sciences by providing a means for monitoring the changes occurring at the interface of any biphasic system.

Illinois

Student: Andrew John Dennhardt
Institution: Southern Illinois University-Carbondale Zoology
Faculty Advisor: Brooks Burr
Poster title: Dispersal characteristics of an American raptor population: the peregrine falcon (Falco peregrinus) in the midwestern United States
Display Area: 2F
Funding: Southern Illinois University Carbondale Zoology
Abstract: The main objective of the Midwest Peregrine Falcon Restoration Project has been to recover and restore peregrine falcon populations in the Midwestern United States—a population that was historically established in the area. Due to heavy organochlorine use in the 1950s and 60s, historic cliff nesting populations were extirpated and pushed to the edge of existence. With the help of the Endangered Species Act in 1972 and programs like the Midwest Restoration Project, peregrine falcons have returned to viable population status in the American Midwest. While analyzing the data, I found that the number of wild peregrines in the Midwest has increased since the establishment of the restoration program in 1982. I analyzed data from the restoration project database and found that mean dispersal distances for female peregrines were >2 times farther than males (226 vs. 105 km; $P < 0.001$). Results also showed that dispersal distances for hacked birds (mean = 197 km) did not differ from those of wild birds (mean = 158 km). Dispersal distances for urban born birds (mean = 170 km) also did not differ from cliff born birds (mean = 149 km). These findings will benefit future studies of peregrine demographics and population viability analyses.

Student: Evelyn Araceli Salazar
Institution: Loyola University Chicago
Faculty Advisor: Daniel Vaillancourt
Poster title: The Family Grows: Beauty in Latin America
Display Area: 2G
Funding: Loyola University of Chicago
Abstract: I am the daughter of Mexican immigrant parents, and I speak, read, and write Spanish fluently. During the 2007-2008 academic year, through the help of a Mulcahy Scholarship, I was able to contribute to Dr. Dan Vaillancourt's forthcoming book Beauty: The Sources, which will be the only work in any language devoted exclusively to sources on beauty from around the world. The book will include the best scholarship on beauty from many cultures, including Western, Latin American, Japanese, Chinese, Indian, African, and Islamic cultures. Since I am bilingual, I have been able to communicate with Spanish-speaking Latin American scholars in the field of aesthetics, and I have been able to conduct extensive research on Latin American aesthetics written in Spanish. Through my research, I found over three hundred articles, in Spanish, related to the philosophy of beauty. I narrowed these articles down to seven articles, and then translated them into English. They formed the basis for a scholarly article that Dr. Vaillancourt and I wrote. My research culminated in a 7,500 word article written in English for the International Conference on Diversity in Organizations, Communities and Nations and published in its prestigious journal, The International Journal of Diversity in Organizations, Communities and Nations.

For two-thousand years, the European-American view of beauty has been presented as universal instead of a cultural construct. This research is significant because it invites to the dialogue on beauty people from other cultures, in this instance from Latin America.

Indiana

Student: Erin Kay Slack, Kendra Phillips, Megan Smith
Institution: Ball State University Sociology
Faculty Advisor: John L. McKillip
Poster title: State of Assault
Display Area: 2H
Funding: Virginia Ball Center for Creative Inquiry at Ball State University
Abstract: Nationwide, the backlog of forensic evidence in sexual assault cases exceeds 250,000. This backlog delays prosecution and thus adds to the emotional trauma already experienced by the victim. In addition to this DNA backlog, numerous communication problems exist among law enforcement officials, forensic nurses, victim advocates, and judiciary officials during laboratory and criminal proceedings. To find solutions to these problems, a research team, involving students from seven different disciplines, devoted a full semester to studying the published research on sexual assault and then attempted to verify this research by videotaping interviews with sexual assault victims as well as experts in legal, medical and social services. The purpose of this cinematic research was to produce a documentary film that clearly defined problems commonly experienced by victims following a sexual assault as well as to explain how to: 1. improve the collection, testing, and storage of forensic evidence; 2. revise communication policies among agencies; and 3. meet the short and long term emotional needs of the victim. Research consultants for the project included the Indianapolis-Marion County Forensic Services Agency and the Madison County Sexual Assault Treatment Center. This project was funded by the Virginia Ball Center for Creative Inquiry at Ball State University, and its research findings will be broadcast on public television, informing the general public about how to solve the problems that exist currently among agencies following a sexual assault.

Student: Zachary C Ritchie
Institution: Ball State University Chemistry
Faculty Advisor: Hector Palencia
Poster title: N-heterocycle carbenes as organocatalyts: a new approach in biodiesel synthesis
Display Area: 2I
Funding: Ball State University Chemistry
Abstract: Biodiesel is made by reacting vegetable oils or animal fats with alcohols in the presence of a base which promotes the reaction. Recently, big manufacturing facilities have been built in Indiana increasing the role of biodiesel in the regional economy. Current technologies make use of caustic soda or sodium methoxide as bases. However, the main problem with them is their sensitivity to any moisture present in the oils/alcohols. The moisture deactivates the reagents and can form soap in the fuel. On the other hand, although sodium is a nontoxic metal, it has to be rigorously removed from the biodiesel to avoid accumulation of salts in engines after combustion. Researchers around the word are developing more efficient reagents to solve this problem. Better reagents should not be sensitive to moisture and should not need heat to work. This would lower the cost of biodiesel production. In this context we had developed a new method to solve some of the current problems. We use novel small metal-free organic molecules known as N-heterocycle carbenes (NHC) to promote biodiesel synthesis instead of the traditional bases. The NHC

employed can catalyze the reaction between soybean oil and methanol producing biodiesel almost quantitatively (95%) at room temperature over 10 h. The organocatalysts are tolerant to the presence of moisture, producing biodiesel in good yield (65%). Because NHCs have no metals their residues would not generate ashes on engines. Our novel approach may lead to the development of more efficient reagents for the biodiesel synthesis.

Iowa

Student: Shanon Marie Davis
Institution: University of Northern Iowa Physics
Faculty Advisor: Timothy E. Kidd
Poster title: Exploration of Nano-layers Grown on Silicon for use in Solar Cells
Display Area: 2J
Abstract: The inevitable depletion of fossil fuels in the world forces mankind to look elsewhere for a renewable energy source. One such source comes from the light that comes over the horizon every day: solar energy. Solar cells currently have around 13% efficiency, so they must have a large surface area to create a significant amount of energy. Nanometer scale features known as quantum dots have the potential to dramatically improve solar cells efficiency. With increased efficiency, production of solar cells would cost less, bringing solar energy to the average household. We created atomically-flat, chemically-inert, optically transparent surfaces on silicon to promote the growth of quantum dots. These layers must be grown inside of an ultra-high vacuum, in which the pressure is less than the pressure in space, to prevent unwanted chemical reactions. Various microscope technologies were used to verify the flatness and nanostructure of the sample surface. We measured the thickness of the surface layer deposited on silicon using an optical setup. The optimal thickness and growth temperatures for uniform coverage of the sample surface were determined from these measurements. Further use for the optical setup includes measuring how electrical and optical properties can be controlled by different forms of quantum dot material growth. The template we created conquers the first hurdle in research on the fundamental properties in solar energy from quantum dots.

Kentucky

Student: Amber Rogers
Institution: Northern Kentucky University
Faculty Advisor: Chris Christensen
Poster title: Investigating KeeLoq
Display Area: 3A
Abstract: KeeLoq is a block cipher used for remote keyless entry by many car manufacturers. KeeLoq encrypts 64-bit blocks and uses 32-bit keys. KeeLoq was developed during the 1980s and was sold by its developers in 1995. Encryption is accomplished by using a relatively simple non-linear feedback shift register. The cipher has been criticized for being insecure. The security of the algorithm is based upon its unusually large number of rounds -- 528. I have been studying and implementing two successful published attacks on KeeLoq in an attempt to develop a better understanding of the weaknesses of the algorithm. The two attacks I explored were the Algebraic Slide Attack by Courtois et al and the Meet in the Middle Attack by Indesteege et al. I have considered whether the cipher has strong and weak keys, and I have tried to determine the optimal number of plaintext/ciphertext pairs needed to break KeeLoq. I have considered how the number of rounds affects the degree and number of polynomials used in an algebraic attack, the number of unknowns that occur, the speed of the attack, and the computational memory required. Current attacks on KeeLoq require 2^16 plaintext/ciphertext pairs. My current work is aimed at developing an algebraic attack that needs fewer plaintext/ciphertext pairs. Quoting researchers in Belgium who have been exploring KeeLoq 's weaknesses: "Soon, cryptographers will all drive expensive cars."

Student: Sanda Zolj, Melissa Danielle Pawley
Institution: Bellarmine University
Faculty Advisor: Joann May Lau
Poster title: The apoptotic activity induced in female lung cancer by bioactive triterpenoid components of G. lucidum
Display Area: 3B
Abstract: There is a growing interest in the use of natural product for the treatment of caner. For centuries, Chinese herbalists have used the Reishi mushroom [Ganoderma lucidum (Curtus) P. Karst] as a remedy for diseases like hepatitis, bronchitis, and cancer. This study initially examined the effects of G. lucidum extract on proliferation of lung cancer. A female lung cancer cell line was treated with 15 different concentrations of G. lucidum and monitored 1, 2 and 7 days following treatment. Overall, there was a dose dependant, as well as time dependent, decrease in cell proliferation. The observed decrease in cell proliferation was due to signaled cell death, or apoptosis. Western blot analysis was used to examine the anti-apoptotic and pro-apoptotic proteins: Bcl-2 and Bax, respectively. To better understand the active components responsible for cell death, they were isolated from G. lucidum and further studied. Triterpenoids and polysaccharides have been shown to be the main constituents present in the extract. Previous studies with other cancer cell lines have shown contradictory results in regards to the active component. Some suggested that it was a polysaccharide, while others pointed to a triterpenoid. In this study, the triterpenoid component of G. lucidum appeared to be the bioactive component, based on proliferation assays. Triterpenoids were further separated by column chromatography and analyzed by gas chromatography/mass spectrometry.

Detailed biochemical characterization of this ancient herbal remedy could hold tremendous promise for the treatment of lung cancer.

Student: Brittany Ann Muench
Institution: Northern Kentucky University Biology
Faculty Advisor: Hazel Barton
Poster title: The Speleogenesis of Roraima Sur Cave: Nitrogen and the Hydrogen Economy
Display Area: 3D
Funding: Northern Kentucky University
Abstract: In starved cave environments, microorganisms must adapt to utilize available nutrients and sources of energy for growth and subsistence. To examine how these processes could lead to cave formation, we studied microbial adaptations in a cave on the Guyana Shield Plateau, Venezuela, characterized by Roraima Tepui. Field studies demonstrated the existence of vast microbial communities within Roraima Sur Cave despite the absence of observable sources of energy and nutrients, with data suggesting that ammonia is accumulating within the silica rock. The increase in ammonia increases the local pH and could be leading to cave formation and silica deposition. The accumulation of ammonia and the presence of ammonia-, nitrite-, and nitrate oxidizing Bacterial and Archeal species, in what is otherwise an extremely nitrogen-limited environment, would suggest that nitrogen plays an important role in microbial ecosystem energetics. Presumably, the nitrogen is brought into the cave by the abundant nitrogen fixing bacterial species found there; however, nitrogen fixation is energetically expensive, requiring large amounts of energy to generate ammonia in this starved system. Our results suggest that autotrophic hydrogen oxidation is providing the necessary energy. This hypothesis is supported by the cultivation of hydrogen-oxidizing Epsiloproteobacteria from the cave, that appear to drive a secondary methanogenesis and sulfate oxidation, ultimately powering nitrogen fixation. Such findings would be the first description of a hydrogen economy driving nitrogen energetics in a starved terrestrial system.

Student: Ashley Adkins
Institution: Morehead State University Institute for Regional Analysis and Public Policy
Faculty Advisor: Paul Steele
Poster title: National Prison Population Trends, with Particular Attention to the Commonwealth of Kentucky
Display Area: 3D
Funding: Morehead State University Institute for Regional Analysis and Public Policy
Abstract: State and federal prison populations have grown dramatically in America during the past thirty years. In 2007, the Commonwealth of Kentucky experienced the most rapid growth in prison population for any state in the entire country at an overwhelming rate of twelve percent (Pew Charitable Trust Center 2008.) The purpose of this research is to further the understanding of the relative influence of various social factors on growing incarceration rates. Comparisons were made between states with rapidly growing prison populations, such as Kentucky, slow-growing states, and the nation as a whole. Relying on secondary data from federal and state agencies, we examine the relative influence of changes in the State's (1) criminal incidents and arrests, (2) demographic and economic indicators, and (3) criminal justice statutes and operational policies on overall incarceration trends and those for various subpopulations of prisoners. After conducting both lagged interrupted time series and event history analyses we conclude that statutes and policies have had a relatively strong influence on prison populations, while demographic and economic effects have little direct effect, and crime rates are

actually negatively associated with prison population trends in recent years. Particular attention has been given to persistent felony offender laws, mandatory sentencing, longer sentences, transfer of juveniles to adult courts, and alternative programs such as drug courts in the current study. Findings support the work of the Kentucky's Criminal Justice Statistical Analysis Center, and will be made available to the Department of Corrections and the Kentucky Justice and Public Safety Cabinet.

Louisiana

Student: Mario Aragon
Institution: Tulane University
Faculty Advisor: Walter Murfee, III
Poster title: A comparison of the Angiogenic Response in Spontaneously Hypertensive versus Normotensive Rats
Display Area: 3E
Abstract: Hypertension is associated with increased microvascular resistance due in part to a loss of microvessels, termed microvascular rarefaction. Understanding whether this loss of microvessels is a result of vessel regression or impaired growth requires further investigation of the ability of hypertensive networks to undergo angiogenesis, defined as the growth of new vessels from existing ones. The objective of this study was to determine the angiogenic response of mesenteric microvascular networks stimulated in adult spontaneously hypertensive versus normotensive rats. Mesenteric tissues were harvested from 15-16 week old spontaneously hypertensive and Wistar rats according to 3 experimental groups: unstimulated, 3 days post stimulus, and 5 days post stimulus. The stimulus used was a 20 minute exteriorization of the mesentery tissue. Microvascular networks were immunohistochemically identified by PECAM (endothelial cell marker) labeling. Consistent with the phenomenon of rarefaction, SHR unstimulated microvascular networks were smaller than normotensive networks. By 3 days post stimulation both SHR and Wistar microvascular networks also displayed increased capillary sprouting. By 5 days both SHR and Wistar microvascular networks displayed an increase in vascular area. These observations suggest that hypertensive microvascular networks are able to undergo angiogenesis similar to normotensive networks.

Maine

Student: Joshua Abram Linscott, Nicholas Joseph Swerdlow
Institution: Bates College Biological Chemistry
Faculty Advisor: Paula Jean Schlax
Poster title: The role of transcript length in the translational regulation of RpoS, a key virulence regulator in the Lyme disease spirochete Borrelia burgdorferi
Display Area: 3F
Funding: National Center for Research Resources (NIH)
Abstract: The alternate sigma factor RpoS controls the expression of key virulence factors in Borrelia burgdorferi, the causative agent of Lyme disease. These virulence factors facilitate the bacterium's transfer from the tick vector to a mammalian host and subsequent mammalian infection. The regulation of the gene encoding RpoS is dependent upon the ability of the small ribosomal subunit to bind the 5'-untranslated region of the mRNA. In B. burgdorferi, a "short" rpoS transcript is expressed at high cell density and a "long" rpoS transcript containing a substantial 5'-untranslated region is expressed at low cell density. Our research investigates the effects of the long untranslated 5' leader sequence on translational initiation. Ribosome binding studies using nitrocellulose filter binding indicate that the affinity of the small ribosomal subunit to the short rpoS mRNA (K~ 4 x 10^7 M^-1) is slightly higher than the affinity to the long transcript (K~ 2 x 10^7 M^-1) at both 0 and 37 degrees C. The fraction of mRNA binding to the ribosomal subunit depends on both transcript length and the temperature. Translational efficiency assays using "toe-print" primer extension suggest that the translation of the short mRNA is significantly more efficient than the long at 37 degrees C. Our results suggest that the long transcript folds in a structure that inhibits translational initiation, consistent with expression of the gene under appropriate physiological conditions. By understanding translational initiation and regulation of this important virulence gene we will contribute to understanding the life cycle of this important pathogen.

Maryland

Student: Andrea Milagro Castillo
Institution: Towson University Chemistry
Faculty Advisor: Clare N Muhoro
Poster title: Synthetic, Characterization and Reactivity Studies of Phosphanyl(organyl)boranes
Display Area: 3G
Abstract: Our research focuses on syntheses of phosphanyl(organyl)boranes (POBs). POB systems have drawn interest because they can reversibly bind hydrogen. This important property makes POBs excellent systems for hydrogen storage. Importantly, POBs are metal-free and may lead to cheaper, lightweight hydrogen storage devices, thus improving on technologies based on transition metal systems.

In our lab we are using cheap, fast and clean chemistry to synthesize a library of POBs. We have already synthesized two unique families using titanium-catalyzed hydroboration of vinylphosphines and alkynylphosphines. The POBs that we have synthesized using novel reactions preclude spontaneous self-assembly, an important requirement for subsequent reactivity with molecules like hydrogen. On Capitol Hill, we will report on these latest developments, and provide structural and spectroscopic evidence for these discoveries, as well as results on the reactivity of POBs.

Massachusetts

Student: Daniel J Schepis
Institution: Bridgewater State College Biology
Faculty Advisor: Donald Padgett
Poster title: The Use of Aquatic Turtles by Pond-lily Plants for Seed Dispersal
Display Area: 3H
Abstract: This presentation examines the dispersal relationship between the Eastern Painted Turtle (Chrysemys picta) and the Pond-lily (Nuphar variegata), through seed ingestion in Southeastern Massachusetts' ponds. The results from this experiment show aquatic turtles provide a means for aquatic plants to effectively distribute their seeds between water bodies and into new habitats perhaps otherwise out of reach via other dispersal mechanisms. Fifty-four turtles were collected from a pond and held in the laboratory to obtain fecal samples and inspect for N. variegata seeds. Approximately one-third (29.63%) of turtles captured yielded 565 seeds (average of 10.5 seeds per turtle). There was no significant difference between males and females in the number of turtles yielding seeds or overall seed number in their feces. The ability of a plant to distribute its seeds (seed dispersal) is an important aspect of the survival and spread of many plant species. By casting its seeds far and wide, a plant increases the odds of survivability for the next generation by potentially lessening nearby competition and spreading into new, previously uninhabited environments. Aquatic plants rely primarily on water as a means to disperse seeds within isolated bodies of water. It has been suggested that aquatic plants may depend on animals to disperse seeds between isolated bodies of water, hence into new habitats. Information from this experiment can contribute to our understanding of the dispersal methods, or lack thereof, employed by rare and endangered aquatic plants species, like the Tiny pond-lily (N. microphylla), an imperiled species in Massachusetts.

Student: Christina Presenti
Institution: Assumption College Honors Department
Faculty Advisor: Smriti Rao
Poster title: An Empirical Analysis of the Determinants of Human Trafficking
Display Area: 3I
Abstract: In the last decade there has been growing concern over the problem of international human trafficking. Policy makers are hindered by the absence of systematic empirical analyses relating to trafficking. In this paper we employ econometric analysis of an innovative cross-country database on trafficking compiled by the United Nations Office of Drugs and Crime to identify the primary socio-economic characteristics of countries that are origin points for human trafficking. The results of ordinal probit regressions corrected for sample selection indicate that first, standard measures of economic well-being do not explain the level of trafficking in a country. We find that democracies are actually more likely to be trafficking origin points, as are countries that have experienced economic dislocation and/or conflict. Our study also suggests that the driving forces behind legal migration and trafficking are quite dissimilar. Our findings lead us to conclude that long term attention to fighting corruption and participation in international conventions safeguarding human rights contribute to the greatest reductions in trafficking.
We also find that countries with higher levels of gender inequality by conventional measures are not more likely to have higher levels of trafficking, conversely trafficking is more likely in countries that allow women some economic mobility – a reminder that improvements in women's education and earnings cannot be conflated

with an end to women's human rights violations. These unusual results are important as they dispel myths about the trafficking industry and shed light on areas that may have the greatest ability to reduce trafficking.

Michigan

Student: Cynthia L Aguirre, Mariah Lea Hanson
Institution: Central Michigan University Biology
Faculty Advisor: Jennifer Schisa
Poster title: Identification of genes regulating changes in aging eggs
Display Area: 3J
Funding: National Institute of Health Genetics and Developmental Biology
Abstract: As women age, the chance of conception and birth without abnormality decreases. One cause for this decrease in female fertility is a breakdown in the cytoplasmic contents of the egg, which are thought to maintain egg integrity over time. In order to identify the molecular mechanisms involved in this process, research on model organisms is valuable. In this study C. elegans, a hermaphroditic worm, was used to identify genes that regulate changes in aging eggs.
Eggs that are produced in young, wild-type worms are fertilized quickly by the animals' own sperm. However as worms age, their limited sperm supply is depleted and egg production continues. As a result eggs stack up and undergo pronounced changes, including the cytoplasmic reorganization of many mRNAs and proteins, such as MEX-3, into large granules. The hypothesis for the function of the granules in old eggs is that they maintain mRNAs in eggs when fertilization is delayed.
To identify genes required for the formation of the large granules in aging oocytes, we performed an RNAi screen and scored whether granules had formed in eggs. We have screened 193 genes to date and identified 6 that appear to regulate MEX-3 localization to granules. We are continuing to screen and, in parallel, characterizing the positive "hits." Our overall goal is to better understand the function and regulation of large granules in aging eggs; this work may have implications for better understanding infertility in women.

Student: Jacquelyn D Lewis
Institution: Hope College Chemistry
Faculty Advisor: Brent Krueger
Poster title: The Study of the Structural Dynamics and Binding of Biopolymers via the Use of Fluorescence-Detected Resonance Energy Transfer (FRET)
Display Area: 4A
Abstract: Binding and structural dynamics of biopolymers are important to the biomedical community because of the role they play in diseases such as heart disease, Alzheimer's, and many forms of cancer. We are combining an array of fluorescence techniques with computational modeling to better understand precisely these types of behaviors in biopolymers and, therefore, to better treat their associated diseases. We are specifically interested in binding of the Gata-1 protein to DNA and structural dynamics of the Hairpin Ribozyme. Gata-1 is a transcription factor that is essential in the regulation of hematopoiesis—the production of red blood cells. Abnormalities in Gata-1 binding have been linked to pathologies ranging from leukemia to anemia. The Haripin Ribozyme is a small catalytic RNA with both endonuclease and ligase activities. The Hairpin Ribozyme is a model for RNA enzymes that play critical roles in many diseases and biological processes. Results from steady-state, time-resolved, and single-molecule fluorescence methods are

presented along with initial findings from computational modeling demonstrating that computation and experiment can be closely linked.

Minnesota

Student: Tony Hewitt
Institution: Concordia College-Moorhead Biology
Faculty Advisor: Greg A. Hoch
Poster title: Monitoring of Golden-Winged Warblers at Tamarac National Wildlife Refuge, Minnesota
Display Area: 4B
Funding: Department of the Interior US Fish and Wildlife Service
Abstract: Tamarac National Wildlife Refuge in Becker County Minnesota is the western edge of the golden-winged warbler breeding range. Their populations have declined 2.5% annually for the last four decades and they are listed as a species of management concern by the US Fish and Wildlife Service. Golden-wings prefer oak savanna/scrub or young aspen stands after fire or timber harvest. During the summer of 2008, we mapped the territories of male golden-wings in both habitat types by recording perch sites with a GPS unit. We overlaid the points onto a digital aerial image using a Geographic Information System to determine habitat and size of each territory. Territory size averaged 0.34 acres with the largest territory at 1.87 acres. We recorded vegetation data for the canopy, shrub, and herbaceous layers within each territory. Vegetation data, combined with digital land cover data, will allow us to further refine the distribution models for golden-winged warblers developed by the US Geological Survey. We also measured detectability of golden-wings. This will help provide correction factors for national surveys used to develop population trends. Golden-wings belong to a guild of birds, including woodcock, towhees, and ruffed grouse, that require young forests. Their decline may be linked to a declining wood products industry. A developing biofuels industry dependent on short-rotation aspen harvests could create significant habitat for golden-winged warblers and similar species. This research could help guide both industry and natural resource managers to provide sustainable fuel sources as well as generate optimal wildlife habitat.

Missouri

Student: Kristen M Malone
Institution: University of Missouri - Columbia Biological Sciences
Faculty Advisor: Raymond D. Semlitsch
Poster title: Juvenile salamander dispersal and use of terrestrial microhabitat cues
Display Area: 4C
Abstract: An important challenge biologists are faced with today is balancing human land-use with the conservation of biodiversity. Amphibians are thought of as an indicator of environmental health. As we accumulate more information about amphibian species under stress, we develop a clearer understanding of how to protect them and the ecosystems in which they exist. The juvenile stage of amphibians is the most critical for population persistence and the key to species protection. Ambystomatid salamanders have an aquatic larval stage followed by dispersal into terrestrial habitats. We are interested in understanding whether olfactory cues that juvenile salamanders perceive from the microhabitat surrounding their natal pond can lead them to favorable habitat. We wanted to know if forest-associated salamanders perceive an olfactory cue from forest leaf litter not present in grassland litter. If they are getting the cue from leaf litter, is it present in both decomposing and freshly fallen leaves? We conducted experimental choice tests with two salamander species. Each salamander was presented with two substrate options. We tested forest versus grassland litter, followed by decomposing versus freshly fallen leaves. An individual 's substrate location was determined at 3-minute intervals for 60 minutes to assay preference. Spotted salamanders, a forest-dependent species, showed a significant preference for forest leaf litter, suggesting they use an olfactory cue in forest litter to select favorable microhabitat. Both species demonstrated a significant preference for decomposing leaf litter over freshly fallen leaves, suggesting the cue is from forest-associated fungi and decomposers.

Montana

Student: Timothy Brox
Institution: Montana State University - Bozeman Earth Sciences
Faculty Advisor: Brent Christner, Mark Skidmore
Poster title: Microbial Impacts on the Crystalline Structure and Liquid Vein Network of laboratory Ices: Implications for sub-zero microbial activity
Display Area: 4D
Funding: National Science Foundation Directorate for Geosciences
Abstract: Recent work has demonstrated microbial activity within the liquid filled inter-crystalline veins in ice. These discoveries dramatically increase the extent of the modern biosphere incorporating the large ice sheets of Antarctica and Greenland as biomes, and also hold profound implications for the survival of microorganisms during periods of extensive glaciation during Earth's history (e.g. "Snowball Earth") and on other planets (e.g. Mars) and their moons (e.g. Europa). In addition to examining microbial survival and activity in ices at sub-zero temperatures, it is important to characterize the habitat, the inter-crystalline liquid veins. I developed new non-invasive techniques to investigate microbial influences on the physical properties of ice and its liquid vein network. Four sample types were prepared in triplicate and frozen at -10oC: 1) deionized water only, and suspensions of 2) Sporosarcina sp. B-5, an isolate from Taylor Glacier, Antarctica, 3) Chryseobacterium sp. V3519-10, an isolate from the Vostok ice core, Antarctica, and 4) extracellular proteins extracted from Chryseobacterium sp. V3519-10. Chryseobacterium sp.

V3519-10 has a 54 kDa extra cellular protein that has the ability to inhibit recrystallization of ice, similar to ice-binding proteins previously found in sea ice microorganisms. The samples with extracellular proteins grew ten times the number of ice crystals than the deionized water samples and the samples with microbes grew two to three times more crystals than the deionized water. This indicates the presence of cold-tolerant microbes and to a greater extent their extracellular proteins significantly impact the vein network and thus the microbial habitat in ice.

Nebraska

Student: Kathleen McKillip, Nicolas A Villanueva
Institution: Creighton University
Faculty Advisor: Isabelle Cherney
Poster title: Are boys more vulnerable to stereotypes? Leveling the play ground
Display Area: 4E
Abstract: Stereotyping largely impacts the development of children's gender schemas early in childhood. By the age of four, many children exhibit the "hot potato" effect of not wanting anything to do with toys they associate with the other gender. Certain toys encourage gendered skills and degrees of play complexity. Feminine toys tend to elicit higher play sequences in boys and girls, but boys avoid play with these toys. The present study used neutral toy blocks in different contexts to assess whether this difference is due to toy choice or boys' lack of sequenced play. We hypothesized that exposing children to a counterstereotyped story may reduce gender specific behaviors and thus equalize play complexity of boys and girls. Thirty-four 4 year-olds from Hawaii and the Midwest heard a stereotyped and counterstereotyped vignette that they enacted with blocks. At the end, children were asked to categorize the same pictures they had categorized at the beginning of the study. Results showed that girls used significantly more blocks when enacting the stories than boys. Girls were also more likely than boys to change their decision about the gender of the toy after being exposed to the stereotyped and counterstereotyped story. When boys recategorized the gender of toys, it was mainly after hearing a counterstereotyped story. Both genders showed high levels of symbolic play. The results suggest that girls are more flexible in their stereotyped thinking or that boys are more rigid in their stereotyping.

New Jersey

Student: Ruth Dannenfelser, Autumn Judith Breese
Institution: The College of New Jersey Computer Science
Faculty Advisor: Peter J. DePasquale
Poster title: COMTOR: Comment Mentoring System - Evolving a Computer Science Educational Tool
Display Area: 4F
Funding: Collaborative Research Experience for Undergraduates (CREU) and Computing Research Association Committee on the Status of Women in Computing research (CRA-W)
Abstract: The detailed use of documentation is significantly underestimated as a way of improving software quality and speeding implementation. As students begin to program, they typically see commenting as a burden, failing to appreciate its importance. COMTOR, short for Comment Mentoring System, is a prototype educational tool being developed at The College of New Jersey with the goal of assisting students in learning to properly document the source code of a computer program. COMTOR is comprised of a number of test modules that can be run on student-authored software packages to give feedback on the quality of the documentation and source code within a computer program. This project details work being done to evolve the COMTOR system to increase its functionality and make it more usable and accessible. Additional modules are being developed to expand the scope of COMTOR. A set of metrics are being developed to rate the quality of program documentation, enabling COMTOR to provide more meaningful feedback to students and professors. Usability testing and interviews have been conducted to determine the weaknesses of the current interface in order to facilitate the development of a more user friendly interface. This project is funded in part by the Collaborative Research Experience for Undergraduates(CREU) sponsored by the Computing Research Association Committee on the Status of Women in Computing Research(CRA-W).

New York

Student: Jennifer Rose Rasmussen
Institution: Le Moyne College Spanish and Peace and Global Studies
Faculty Advisor: Mary L. Zampini
Poster title: The Effects of Phonetics Training on the Intelligibility and Comprehensibility of Native Spanish Speech by Second Language Learners
Display Area: 4G
Abstract: This poster will present a study that examined the impact of phonetics training on the intelligibility and comprehensibility of native Spanish speech as perceived by second language (L2) learners. Two learner groups (control, experimental) participated in the research. For the pre-test, both groups listened to a series of 32 sentences produced by four different native Spanish speakers and wrote down what they said (a measure of intelligibility—do the learners actually understand what is said?). In addition, they rated how easy they thought the speaker was to understand (a measure of comprehensibility). The experimental group then received six weeks of instruction on specific phonetic (pronunciation) characteristics of the Spanish dialect spoken by the native speakers and engaged in focused listening and pronunciation practice. One week after instruction ended, both groups took the post-test, which was identical to the pre-test. The results demonstrate that the experimental group showed significant improvement with respect to the intelligibility of the native Spanish speech, while the control group did

not. This research thus illustrates the benefits of phonetics training for helping L2 learners improve listening comprehension skills. The results also have important implications, however, for any institution that sends students or workers abroad, including student exchange programs, the Peace Corps and other service organizations, international businesses, and government agencies in Foreign Service. Moreover, the significance of this work traverses disciplinary boundaries in that it impacts research in computer and voice recognition technologies, as well as medical research and the treatment of patients with hearing deficits.

Student: Mark Esolen, Jacob Ryan Cawley, David M Reens, Britney Malaky NeJame
Institution: Marist College School of Science
Faculty Advisor: Zofia E. Gagnon
Poster title: PGM 's Turn Lethal
Display Area: 4H
Abstract: Recent evidence has shown that platinum group metals (PGMs) such as platinum (Pt), palladium (Pd), and rhodium (Rh) released from automobile catalytic converters and by industrial applications are deposited in the environment. This deposition is leading to increasing accumulation in living organisms. The toxicological effects of PGMs were analyzed by injecting developing chick embryos on the 7th and 14th day of incubation with 0.1, 1.0, 5.0, or 10.0 ppm solutions of Pt (IV), Rh (III), Pd (II), or a PGM mixture which consisted of an equal amount of each metal in saline solutions. Brain, liver, heart, and tibiotarsus tissue were harvested on the 20th day of incubation. Pathological changes such as brain cell edemas, apoptotic neurons, calcium deposits in the brain tissue, abdominal organs formed outside the body, eosinophilic inclusions in liver and ruptured gall bladders were observed in PGMs treatments above 1.0 ppm. The lethal dose occurred in a metal treatment of 10.0 ppm. The chondrocyte cells in tibiotarsus confirmed a decrease in cell diameter and length for all Pt exposures, which indicated weaker bones and an increased risk of deformities. High calcium inclusions were detected by spectroscopy imaging on paraffin embedded bone sections of chick embryos, all exposed to PGMs mixtures above 1.0 ppm. Chick embryos treated with PGMs mixtures were found to have the highest level of DNA and oxidative damage. The overall results indicate that PGMs present in our environment raise concern about the long-term health effects on all organisms.

Student: Bianca Marie Pier
Institution: Siena College
Faculty Advisor: Kenneth Winchell Helm
Poster title: Expression of ER-localized Small Heat Shock Proteins in Arabidopsis thaliana
Display Area: 4I
Abstract: Understanding the effects of environmental stress on plants is crucial in the development of stress-resistant, higher-yielding crops. Plants respond to heat stress by synthesizing small heat shock proteins (sHsp, 15-30 kDa), which are thought to play an important role in conferring the ability to survive high temperatures. Arabidopsis thaliana synthesizes a single ER-localized sHSP, AtHSP22.0, as well as a cytosolic sHSP, AtHSP17.6. In this study, liquid grown Arabidopsis thaliana seedlings were subjected to a 2hr 39„aC heat stress. Plants were permitted to recover at 24¢XC from 0hr to 24hr following heat stress, during which levels of AtHSP22.0 and AtHSP17.6 were measured. AtHSP17.6 was produced almost immediately after heat stress, reached a maximum after 12hrs, and declined slightly by 24hrs. AtHSP22.0 production did not occur to a measurable extent until

10hrs after heat stress, reached its peak at approximately 16hrs, and remained high at 24hrs. These results suggest that immediately following heat stress, the ER is hindered in its ability to accumulate sHSPs, while cytosolic sHSPs are rapidly synthesized. We hypothesize that the ER may be damaged by heat stress, and may thus be rendered non-functional for several hours afterwards. This hypothesis will be tested by comparative analysis of the mRNAs encoding AtHSP17.6 and AtHSP22.0, and a qualitative study of the effect of heat stress on the structure and function of the ER. By studying ER-localized sHSPs, we can learn not only about the function of sHSPs, but also about how plants adapt to heat stress.

North Carolina

Student: Kelsey A Durham
Institution: University of North Carolina at Wilmington Nursing
Faculty Advisor: Deborah Pollard
Poster title: Experiences of Certified Nurse Midwives in Providing Culturally Competent Care to Hispanic Women in Southeastern North Carolina
Display Area: 4J
Abstract: Introduction: The Hispanic population in North Carolina has more than quadrupled since 1990. Several studies have shown an increasing number of health disparities in the area of women's health for this population, specifically HIV, cervical cancer, and late initiation of prenatal care. While several studies examine these health care trends, there is little research about the experiences healthcare providers have in providing care to Hispanic women. One care provider to Hispanic women is the certified nurse midwife (CNM) who specializes in providing women's healthcare. The purpose of this study is to examine CNM experiences with providing care to Hispanic women to identify any specific challenges and recommendations to address this health disparity.
Methods: This is a qualitative research study that will consist of semi-structured interviews with certified nurse midwives. Approximately 5-7 CNMs will be interviewed to obtain information about past experiences with Hispanic women, barriers to providing care, resources to overcomes barriers, and levels of preparedness in providing culturally competent care. Flanagan's (1954) critical incident technique will be used to describe the experiences of CNMs caring for Hispanic women in Southeast North Carolina.
Results: This study is currently in progress. Completed study findings will be presented at the poster session.
Conclusions/Implications: Implications of this study highlight the increasing need for women's health care providers to provide culturally competent care to women of Hispanic origin in order to improve their overall health status.

Student: Larissa Katlin Ferretti
Institution: Elon University Department of Psychology
Faculty Advisor: Maureen Vandermaas - Peeler
Poster title: Effects of Parent Guidance on Preschooolers' Numeracy Skills
Display Area: 5A
Abstract: Mathematical knowledge at school entry has been found to be the strongest predictor of later academic achievement (Duncan et al., 2004), and more research is needed on the development of children's early numeracy. Numeracy applies not only to school-based mathematics but also to mathematics in everyday life (Doig, McCrae & Rowe, 2003). Emergent numeracy encompasses learning taking place at home before formal education is provided (Anderson, 1997). The goal of this project was to investigate how parent guidance strategies can help build preschoolers' emergent numeracy skills. Games provide a social context in which to learn and are an ideal activity for children's acquisition of numeracy skills (Bjorklund, Hubertz & Reubens, 2004). In this study, two interviews were conducted with 28 4-year-olds and one parent. Each dyad was randomly assigned to a comparison group, or a strategy group provided with ways to incorporate numeracy into the games. Each child completed the Test of Early Mathematics Ability 3rd ed., or TEMA-3, (Ginsburg & Baroody, 2003), in order to assess their mathematical knowledge. The dyad was then videotaped during two 15-minute game sessions. All families kept both games and an audio recorder for 2 weeks, after which a post-test of numeracy skills was administered. All data were transcribed and coded. Initial observations of parent guidance and journal entries support the importance of games for children's numeracy development. Parents reported that the 4-year-olds incorporated math skills developed during the game activities into everyday life. Additional results and conclusions are in progress.

North Dakota

Student: Steven Anthony Lewis
Institution: Minot State University Chemistry
Faculty Advisor: Mikhail Bobylev
Poster title: Application of the Accelerated Leuckart Reaction to Substituted Benzaldehydes
Display Area: 5B
Funding: National Center for Research Resources (NIH)
Abstract: Aldehydes and ketones are valuable building blocks for chemical industry. Reductive amination is a fundamental chemistry process that dramatically expands the application of aldehydes and ketones by transforming them into amines. The resulting amines are used in the synthesis of agrochemicals and medicines.
The Leuckart reaction is a unique one step method of reductive amination. It is a remarkably simple process that includes only two components: the carbonyl compound and formamide. The Leuckart reaction is completed simply by heating the components at 160ºC to 185ºC for 6 to 25 hours. However, the long processing time results in increased consumption of energy and increased waste.
During their work with formamide fungicides, Bobylev et al developed an accelerated procedure for the Leuckart reaction. The accelerated Leuckart reaction could be completed in 30 minutes or less. As a highly intensive process, the accelerated Leuckart reaction has a potential of being successful in the areas where the traditional Leuckart reaction was not.
Specifically, it was believed that the Leuckart reaction does not work well on substituted benzaldehydes and that certain substituted benzylformamides cannot be obtained via the Leuckart reaction. In this work, the accelerated Leuckart reaction was successfully applied to 4-chlorobenzaldehyde and produced 4-

chlorobenzylformamide in good yield. 4-chlorobenzylformamide is an important intermediate in the synthesis of medicinally active compounds. The new method is more selective, more efficient, and much more environmentally friendly. It uses much less energy and produces much less waste. The project is supported by NIH grant P20 RR016741 from the NCRR.

Ohio

Student: Carla Benton
Institution: Wright State University - Main Campus
Faculty Advisor: Doug Petkie
Poster title: Remote detection and Measurement of Vital Signs with Terahertz Radar
Display Area: 5C
Funding: US Army RDECOM Night Vision and Electronic Sensors Directorate
Abstract: A radar system operating at 0.228 THz was used for measuring the subtle displacement of a subject's chest wall due to respiration and heartbeat. Using various signal processing techniques, the signal was cleaned and the respiration rate and heart rate were extracted from the signal. The radar has been able to produce accurate results at a variety of distances up to 50 m. and recent improvements to the system and the signal processing have increased its operating range and accuracy. This system was also used to analyze the frequency and amplitude of the motion due to respiration and heartbeat on different parts of a person's body. In addition to providing a better understanding of the advantages of terahertz techniques, this study has demonstrated technologies that can be adapted for use in life detection and triage, intent detection at security checkpoints, and non-invasive imaging.

Student: Michael Liberatore, Wenyuan Wu, Jeffrey Alan Willert
Institution: College of Wooster Mathematics and Computer Science
Faculty Advisor: Pamela Pierce, Denise D. Byrnes
Poster title: Approximating the Circle-Squaring Process
Display Area: 5D
Abstract: Tarski's Circle-Squaring problem asks whether a circle can be partitioned into finitely many pieces that can be rearranged to form a square of equal area. This was proven possible in 1990 by Miklós Laczkovich, though his proof was non-constructive, which means we have no method of actually performing this decomposition. In order to help us visualize this task, we have developed an algorithm for approximate circle-squaring using regular, even-sided polygons, called 2n-gons. Our algorithm slices the polygons into finitely many pieces that are translated to form a square of equal area. Furthermore, we have developed a formula for the number of pieces required in our 2n-gon-to-square dissections, methods for placing shared edges and vertices of a cut in the final square and have implemented an optimal animation of the approximate circle-squaring process. We have also identified a sequence of integers that corresponds to the conjectured minimum number of pieces required in a 2n-gon-to-square dissection using translations alone. This sequence is published in the Online Encyclopedia of Integer Sequences.

Oklahoma

Student: Jacqueline Guidry
Institution: Oklahoma State University
Faculty Advisor: James N. George
Poster title: Comparison of Patient and Physician Perspecitves about the Side Effects of Corticosteroid Treatment and Perceived Bleeding Risks Associated with Idiopathic Thrombocytopenic Purpura (ITP)
Display Area: 5E
Abstract: Idiopathic Thrombocytopenic Purpura (ITP) is an autoimmune disorder that results in an abnormally low platelet count and bleeding. Normal platelet counts range from 150,000 to 400,000 and ITP patients generally have a platelet count of less than 50,000. There are a variety of treatment options to choose from for ITP; however, all of the currently available treatments have significant side effects. Side effects associated with corticosteroid treatments can include physical side effects like weight gain, stretch marks, and hypertension, but also psychological side effects like depression, trouble sleeping, and anger. Treatment is frequently deemed necessary due to the risk of life-threatening bleeding, such as intra-cranial hemorrhaging; however, for most patients the side effects associated with the treatment are worse than the side effects of the disease itself. We hypothesized that physicians, as compared to patients, underestimate the impact of the side effects of steroid treatment and overestimate their risk for bleeding, which was supported by our results. Out of 18 listed side effects, physicians underestimated the impact on patients for all but one of the side effects. For 6 of the 18 side effects, patients reported being bothered by the side effect over 30% more and over 20% more for all but three side effects. Also, physicians, as compared to patients, overestimated the patient's concern for bleeding even at very low platelet counts. Even for patients with platelet count of less than 10,000, only 32% of patients were very concerned as opposed to 70% of physicians.

Pennsylvania

Student: Sarabeth Brockley
Institution: Moravian College Biological Sciences
Faculty Advisor: Diane White Husic
Poster title: Analysis of Plant Succession at the Lehigh Gap - A Superfund Site Undergoing Restoration
Display Area: 5F
Abstract: The Lehigh Gap Wildlife Refuge is a 750-acre tract on the Kittatinny Ridge bordered by the Lehigh River, Appalachian Trail, and Delaware and Lehigh National Heritage Corridor. The site is also part of the Palmerton Zinc Pile Superfund site. Eighty years of zinc smelter air pollution (SO2 and metal particulates) resulted in a landscape almost devoid of vegetation. Beginning in 2003, metal-tolerant warm season grasses were tested as a means to revegetate the steep terrain, stop both the severe erosion and redistribution of the toxic metals, and serve as the first step in habitat restoration. The addition of soil amendments that accompanied the grass seeding apparently provided conditions sufficient for the emergence of both pioneering and invasive plant species. Certain saplings such as grey birch take up zinc and show extreme signs of stress. In contrast, the PA-endangered native species wild bleeding heart and a rare, non-native species, sandwort, are thriving, despite accumulating high levels of zinc. Monitoring the sandwort population size and distribution may help determine if this plant is an indicator of heavy metal

bioavailability. Such studies, along with an ecological assessment of biodiversity at the refuge, provide the baseline for ongoing succession studies at the restoration site.

Student: Meredith T Hanlon
Institution: Allegheny College Biology
Faculty Advisor: Catharina Coenen
Poster title: A Role for the Plant Hormone Auxin in Arbuscular Mycorrhiza, an Agriculturally Important Symbiosis
Display Area: 5G
Abstract: The arbuscular mycorrhizal (AM) symbiosis is one of the oldest and most prevalent relationships in nature, occurring between different species of AM fungi and over 80% of terrestrial plants. This 400 million year old relationship is thought to have assisted in the evolution of plants from water to land based environments, with the fungus helping to provide the plants with nutrients, especially phosphorus. The fungus exists naturally in the soil, creating an underground web of hyphae that allows for nutrient absorption, water retention, and plant resistance to pathogenic fungal infection. These extensive networks of hyphae secrete the soil protein glomalin, an aggregation protein that protects against erosion and accounts for one-third of the world's soil carbon. Although much is known about the beneficial nature of the AM symbiosis, little is known about it's mechanism on a molecular level. This project investigates the role of auxin, a plant hormone involved in nearly all aspects of plant growth and regulation, in the AM symbiosis by examining fungal colonization levels and patterns in tomato plants with mutations in their auxin response or transport systems. Understanding the role of auxin in the mycorrhizal symbiosis is essential for crop breeding efforts aiming to use AM for disease protection, erosion prevention, and crop growth on soils with marginal fertility or water availability.

South Carolina

Student: Carly M Eargle
Institution: Presbyterian College
Faculty Advisor: Mike Rischbieter
Poster title: An Analysis of the Pollen Profiles in Pond Deposition Basins and Associated Plant Community Structure in Young's Pond, Clinton, SC
Display Area: 5H
Funding: Presbyterian College
Abstract: Pollen has been useful in determining geographic orgins since 1895. Currently, the analysis of the pollen content of sediment samples is a major component in ascertaining vegetational response to past terrestrial environmental change. Pollen analysis can be used to investigate the impact of humans, successional change, and other factors that influence environment change. Since many analyses of past environments are based on pollen and spores collected from lake and pond sedimentary basins, we tested the validity of the primary assumption that pollen and spores collected from the depositional basins accurately reflects the plants that are growing in nearby environments. This research used a modified Russian d-section corer to obtain sediment samples from several ponds in and around the Clinton SC area. These cores were then sequentially sampled to obtain the pollen and spores contained within them. The samples were then analyzed by light microscopy to determine the species of angiosperms, gymnosperms, and spore-bearing plants (mosses, ferns, fern allies) present. From this part of the research, we

were able to provide a pollen profile that quantified the percentages of the various taxa present. This data was then compared statistically to the standing timber (Blake and Rischbieter 2008) to dtermine whether the palynomorphs accurately reflected the number and types of plants in the surrounding area.

South Dakota

Student: Elizabeth Ann Hahn
Institution: Sanford School of Medicine Neuroscience Group, Basic Biomedical Sciences
Faculty Advisor: Brian Burrell
Poster title: The Leech as a Model System for Studying Seizure-like Neural Activity
Display Area: 5I
Abstract: Epilepsy is a neurological disorder that affects approximately 2.7 million Americans and is characterized by seizures (Centers for Disease Control and Prevention, 2007), periods of abnormally elevated and synchronous neural activity. Although epilepsy is a relatively treatable neurological disorder, approximately 30% of epilepsy cases are resistant to current therapies (Mainardi et. al, 2008). We are attempting to develop the medicinal leech as a model system to study the physiological mechanisms that mediate seizure-like activity and investigate potential therapeutic strategies. Leech neurons are similar to our own neurons at the cellular level, so discoveries made about seizure-like activity in the leech are applicable to the human central nervous system (CNS). Seizure-like motor behavior can be chemically induced using a known pro-convulsant, pentylenetetrazole (PTZ), and this PTZ-induced seizure-like behavior can be inhibited using a known anti-convulsant, phenytoin. These same treatments also induce hyperexcitability in in vitro preparations of the leech CNS. The potential anti-seizure effects of two types of treatments were examined using the in vitro preparation. First, increases in the level of cannabinoid neurotransmitters, which are thought to have neuroprotective capabilities, inhibited PTZ-induced hyperexcitabililty. Second, PTZ-induced hyperexcitability was inhibited by fluoxetine, a serotonin re-uptake inhibitor used to treat depression that has also shown anti-convulsant effects. These results demonstrate that the leech can be used as a model system to study seizure-like neural activity and also suggest that both cannabinoid- and serotonin-based treatments have the potential to ameliorate hyperexcitability related to seizures.

Tennessee

Student: Amy Tyler Petty
Institution: Middle Tennessee State University Psychology
Faculty Advisor: Mary Ellen Fromuth
Poster title: Perceptions and Attitudes Towards Prescription Drug Misuse
Display Area: 5J
Funding: Middle Tennessee State University Psychology
Abstract: Prescription drug misuse is a growing trend, especially in young adults and teenagers (NIDA, 2006). According to SAMHSA (2006), young adults between the ages of 18 to 24 years old have the highest rate (14.5%) of prescription drug misuse. Despite its frequency, comparatively little research exists on prescription drug misuse. The purpose of this study was to explore the use of and attitudes towards prescription drug misuse.

Participants (229 undergraduates) completed a survey regarding use, exposure to, and attitudes towards prescription drugs, illegal drugs, and alcohol. A significant number of participants reported the misuse of prescription drugs while in college (17%) and high school (26%), and most reported exposure to prescription drug misuse (e.g., knowledge of others who illegally buy and sell prescription drugs). Additionally, 14% of participants reported using their parents' prescription medication without their knowledge, and 26% reported that their parents had given them their parents' own prescription medication. Data analyses revealed that prescription drug misuse was viewed differently than illegal drug and alcohol misuse. For example, although participants did not view illegal drug misuse as more harmful than prescription drug misuse, participants reported that the public has a greater awareness of the dangers of misusing alcohol and illegal drugs compared to prescription drugs.

Although there are methodological limitations (disproportionate number of women, socially desirable responding, etc.), this study does have implications for both further research and education. In addition to the need to educate students, there appears to be a need to educate parents about this problem.

Texas

Student: Chang-woo Lee
Institution: University of Texas at Austin Department of Biological Sciences
Faculty Advisor: Pedro Alvarez
Poster title: Phytotoxicity of Nanomaterials to Arabidopsis thaliana
Display Area: 6A
Abstract: Recent exponential growth in manufacturing and use of nanomaterials, engineered materials with at least one dimension of 100 nanometers or less, is projected to create a nanotechnology industry that will be worth approximately one trillion dollars by 2015. Increasing amount of commercial products, from cosmetics to medicine, is incorporating engineered nanomaterials, escalating the concern over the potentially harmful effects of nanoparticles. However, majority of the published papers focus on harmful effects of nanomaterials on animals and bacteria, and only a few studies have considered the toxicity of nanoparticles on plants. This shortage raises serious concerns as majority of engineered nanomaterials released in wastewater is projected to be incorporated into sewage sludge and eventually into agricultural fields. In order to gain a broader profile of nanotoxicology, effects of four nano metal oxides – aluminum oxide, silicon dioxide, iron (II, III) oxide, and zinc oxide – on the development of Arabidopsis thaliana (Mouse-ear cress) were

investigated. These effects were quantified using three commonly referenced toxicity end points: seed germination, root elongation, and number of leaves. Statistically significant negative and positive effects were observed at different concentrations of the four nano metal oxides. The findings from the present study could be used to develop proper nano material disposal methods, which will be essential in the upcoming years.

Student: Derek Robert Goodwin
Institution: University of Houston - Main Campus The Honors College
Faculty Advisor: Charles Orson Cook
Poster title: That Part of Hell Where We Should Work: Mary B. Talbert and the Texas N.A.A.C.P.
Display Area: 6B
Abstract: Although several National Association for the Advancement of Colored People (NAACP) histories exist, relatively little scholarship focused on the work of black women during the NAACP's early life. Men, rather than women, held the majority of the positions traditionally associated with leadership. However, records of the National Association of Colored Women (NACW), the NAACP, and newspapers from the end of the 20th century suggest that black women were essential to the NAACP's survival, particularly in the South.

This study seeks to fill part of this historical void by exploring the career of Mary B. Talbert, focusing specifically on her work to build the Texas NAACP. First, an extensive review of existing literature on the NAACP and black women in the early civil rights movement was conducted. Second, primary source collections including the Papers of the NAACP, Records of the NACW, and the Tuskegee Institute News Clippings File were analyzed in order to document Talbert's involvement. Finally, trends in NAACP history and United States history informed the study on the social and political environment in which Talbert conducted her work.

My research indicates that Mary B. Talbert and other black women played vital roles in the early Texas NAACP. Scholarly neglect of this subject has left many other episodes and persons virtually unnoticed. Mary B. Talbert's work in Texas represents only a small portion of this work. My project highlights this oversight and provides a mode for the research of black women in the early NAACP.

Utah

Student: Bradley J Hintze
Institution: Utah State University
Faculty Advisor: Sean Johnson
Poster title: A New Tool to Assist Low-Resolution Structure Determination
Display Area: 6C
Abstract: Proteins are important molecules that catalyze the reactions of life. The function of a protein is derived from its three dimensional structure. A powerful method for determining the structure of proteins is x-ray crystallography. The resolution of crystallographic data can vary between proteins – larger proteins and protein complexes tend to yield lower resolution data. While it is possible to build a protein model at low resolution, refining the model can often be problematic. Although a variety of methods currently exist for refinement of low-resolution structures, these methods are often complex and difficult to implement. For example, distance restraints between atoms are often manually defined by the researcher to aid refinement. This can be a very time consuming process because the researcher has to analyze each amino acid, and large protein structures can be thousands of amino acids long. We report a new computational tool that allows the user to easily define distance restraints for crystallographic refinement. This tool will simplify the model building and refinement of low-resolution structures.

Vermont

Student: Mallory Sargent-Hier, Caitlyn Dias, Merlin Poutre
Institution: Johnson State College Behavior Sciences
Faculty Advisor: Gina Mireault
Poster title: Humor Perception and Creation in 3 to 6 Month Old Infants: A Naturalistic Observation
Display Area: 6D
Abstract: Humor and laughter have serious evolutionary and developmental implications. Analogous behaviors have been described in other mammals (Panksepp, 2005) suggesting an evolutionary origin, and humor may function as an agent of social bonding. However, most research in this area has focused on the cognitive elements of humor, resulting in the exclusion of infants from humor research despite the fact that laughter typically emerges by 3 months (Wolff, 1963). In addition, focusing on humor and laughter from a cognitive perspective means that the social context has been largely overlooked. The aim of the present research is to describe humor perception and creation in infants (N=20) from 3 to 6 months using naturalistic observation. Using ongoing audio journals kept over three months, mothers describe observations of their babies' humor. In addition, questionnaire data collected at 3, 4, 5, and 6 months show the development of specific types of laughter (e.g., polite, contagious, etc.) described by Reddy (2008) in older babies, but not yet studied in the first 6 months of life. The evolutionary and developmental implications of humor and laughter are discussed, including the potential function of humor as an agent of social bonding.

Virginia

Student: Hannah Shepherd
Institution: James Madison University Geology and Environmental Science
Faculty Advisor: Elizabeth Johnson
Poster title: Water Contents of Yellowstone Magmas Estimated from Hydroxyl Concentrations in Feldspar Phenocryts
Display Area: 6E
Abstract: Over the past 2 million years, Yellowstone has produced three cataclysmic volcanic eruptions as well as many other smaller eruptions. We would like to better understand the cause of the past eruptions at this continental hotspot in order to better evaluate the risk of future eruptions.
The water contents of five eruptions of Yellowstone Volcano, Wyoming, (Headquarters Flow, Blue Creek Flow, Lava Creek Tuff, Biscuit Basin Flow, and Canyon Flow) were estimated using measurements of structurally incorporated hydroxyl (OH) in feldspar phenocrysts.
Feldspars from the Yellowstone samples were separated from the rock matrix by crushing and picking individual crystals, and were identified using an optical microscope. The feldspar phenocrysts were prepared for infrared analysis by creating two perpendicular doubly-polished thick sections of each crystal. Polarized infrared spectra were obtained on the Fourier-Transform Infrared (FTIR) spectrometer in the Department of Mineral Sciences at the National Museum of Natural History, Smithsonian Institution, Washington, D.C. The water concentration in each eruption was estimated by determining the amount of hydroxyl in each feldspar from the infrared spectra and then using a previously determined relationship between hydroxyl in the feldspar and water in the magma.
Based on these measurements, we estimate that the Yellowstone magmas contained less than 1.5 wt% water, which is very low and would not trigger an eruption. Therefore, magmatic water probably did not cause past mega-eruptions at Yellowstone.

Washington

Student: Derek Knight Rogalsky
Institution: Seattle University Chemistry
Faculty Advisor: Joseph Langenhan
Poster title: Expanding the Scope of Oxyamine Glycosylation to Enhance Anti-Cancer Activity
Display Area: 6F
Abstract: Carbohydrates are critical components of many of our front-line pharmaceutical drugs. Thus, the chemical synthesis of molecules that contain carbohydrates (called “glycosides”) is vital to drug discovery. Unfortunately, the bonds that link carbohydrates to other molecules are often difficult to create. To address this challenge, we have developed a new carbohydrate attachment method, called “oxyamine glycosylation.”

In this poster, we demonstrate that oxyamine glycosylation can be used to create simple alterations in the glycosidic linkages that are a part of many drug candidates. We show that this represents a powerful strategy for the optimization of drugs that is more efficient than traditional chemical methods.

Specifically, our work involved using oxyamine glycosylation to alter the glycosidic linkages on digitoxin, a drug with promising but sub-optimal anti-cancer activity. The resulting panel of digitoxin derivatives killed human cancer cells with potencies and selectivities that depended on the identity of the glycosidic linkage. Two candidates containing a novel glycosidic linkage were selective toward multi-drug resistant ovarian cancer cells.

Our results demonstrate that basic research in chemical methodology can lead rapidly to potential therapeutic agents. Since glycosides mediate numerous important biological processes—from complex cellular operations required to sustain life, to recognition events that are responsible for infections, inflammation, and autoimmune diseases—this research has broad significance for chemists and biochemists working in the areas glycobiology and drug discovery.

Student: Christopher Badi' Abdul-Wahid
Institution: Central Washington University Computer Science & Chemistry
Faculty Advisor: Levente Fabry-Asztalos
Poster title: Predictive software as a rapid screening tool for potential drug candidates
Display Area: 6G
Abstract: HIV/AIDS is a major challenge facing the world. However, FDA approval of one drug can require more than 10 years and over a billion dollars. Many thousands of potential drug candidates are synthesized and discarded during the search for a lead compound. We present a tool to reduce both discovery time and cost.

The predictive abilities of Artiﬁcial Neural Networks (ANN) are well documented. We use two ANN variants to predict the biological activities of potential drugs. Our models incorporate Fuzzy Logic, Feature Selection, Rule Extraction, and Evolutionary Methods. The experiments include two major phases: 1) training and optimization and 2) prediction. The ANN's are trained with a set of drug candidates whose biological activities are known. The fuzzy rules are extracted from the network and used to deepen our understanding of the relationship between molecular descriptors and activity. New candidates are then designed and screened. The best performant are then chosen for chemical synthesis. Our target enzyme is HIV-1: evidence indicates that its inhibition leads to reduced viral replication.

These tools are general and applicable to other enzyme models. We are applying our predictive models towards beta secretase (associated with Alzheimer's disease), Cathepsin D (associated with breast cancer) and Plasmepsin IV (associated with malaria).

West Virginia

Student: Danielle W. Clark
Institution: Marshall University Integrated Science and Technology, Chemistry
Faculty Advisor: Menashi Cohenford
Poster title: Identification of amino acid galactation sites in human albumin
Display Area: 6H
Abstract: Galactosemia is a genetic disease that is caused by an enzyme deficiency in the galactose metabolism. The disease has been recognized for over half a century and occurs in approximately 1 in 50,000 births. While this disease is generally fatal, a galactose free diet can allow patients to lead a relatively normal life. Nevertheless, most patients develop neurological abnormalities despite this diet. A possible indicator for the amount of galactose these patients ingest would be their blood proteins because galactose can bind to proteins in the body and allow for a measurement of galacted products with time. Currently, there are no clinical procedures to effectively measure the galactose levels on the blood proteins albumin and hemoglobin.
A similar clinical procedure is used in the monitoring of diabetic patients with hemoglobin A1C as a model protein. Our effort is focusing on producing a similar test for galactosemia. However, before developing such a test, it is important to identify the sites where galactose binds to the proteins. The objective of this study was to determine the amino acid sites where the sugar binds. The information gained in this research will allow for the development of a test for the management of galactosemia, a long awaited test to help these patients.

Wisconsin

Student: Marshall Scorcio
Institution: University of Wisconsin - Oshkosh Computer Science
Faculty Advisor: Kathy Faggiani
Poster title: Designing Systems that Gain Public Trust: An e-Voting Platform Prototype
Display Area: 6I
Funding: University of Wisconsin - Oshkosh
Abstract: Problems with electronic voting (e-voting) systems in the United States have been widely publicized. The result is a widespread lack of confidence in e-voting systems by election officials and the voting public. Prior research on e-voting systems reveals poor system design and development processes as the primary causes of e-voting system failure.

This project used the design research methodology, commonly used in engineering and computer science research, to address the technical problems with e-voting systems. The objective of the research was the creation of an e-voting system prototype, using a secure systems framework for software engineering, to address voting accuracy and technical security issues. The prototype was developed using open source tools to make the technical implementation of the e-voting software transparent. This transparency will allow e-voting system evaluators to more readily determine the safety, security, and accuracy of voting. After completion of the prototype, security testing was conducted to demonstrate that the prototype effectively implements security standards for online systems and provides a trustworthy, viable alternative to traditional voting processes.

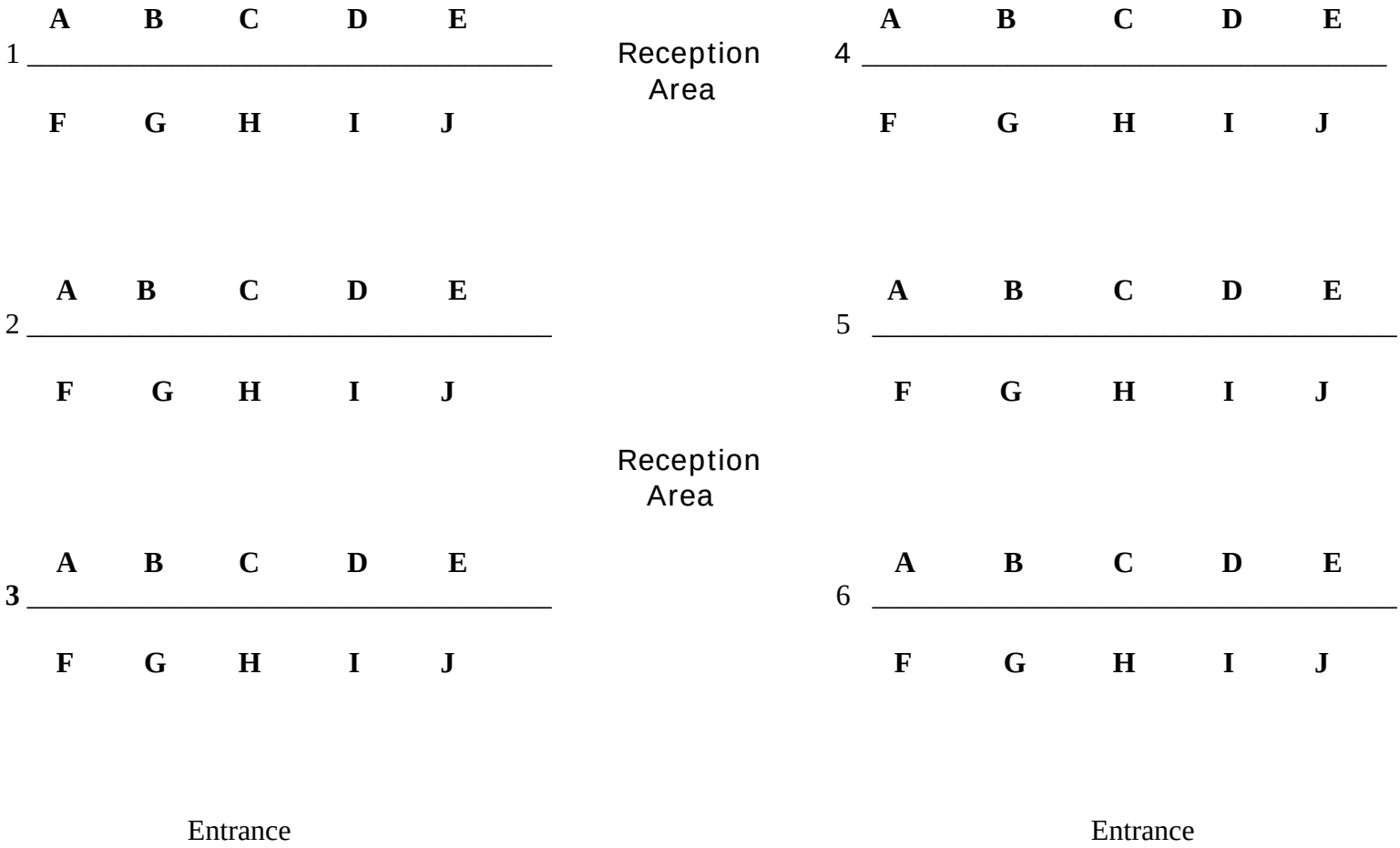
This research is important because a truly secure online e-voting system could greatly enhance voter accessibility and participation in the democratic process. Such

a system would gain the trust of citizens and restore voter faith in the election process. Voting is an important element of the world's belief in democracy, and the true representation of people's wishes to the government. The development of this prototype also demonstrates how computer science can contribute to the betterment of government and society.

Student: Rebecca K. Woiteshek
Institution: Carthage College Geography and Earth Sciences
Faculty Advisor: Julio Rivera
Poster title: Dire Straits: Using GIS to Better Identify and Serve the Urban Poor
Display Area: 6J
Funding: Faith In Christ Ministries
Abstract: This research addresses the problem of identifying communities in dire economic straits and in a state of profound transition within densely populated urban space. Target areas that would benefit from a partnership of local universities and community outreach centers are identified within the network area of a community center located in the Watts neighborhood of Los Angeles, California. Analysis of census data using geographic information systems (GIS) identifies subtle but important physical, economic, and ethnic distinctions that may affect service needs. Field work confirms patterns found in the original GIS analysis.

Previous approaches to the problem have defined the community boundary with a radius of one hour's walking distance. These analyses suggest that these approaches missed broad distinctions within this service district. The community reflects a larger tapestry of culture and language than was previously identified. This project will identify the differences between the sub communities and recommend possible tailored approaches for future research that will assist local community centers to better identify the populations they serve.

Rayburn House office Building
Rooms B-338, B-339 &B-340



Participants

Alabama
University of Alabama at Birmingham

Alaska
University of Alaska - Anchorage

Arizona
University of Arizona

Arkansas
Ouachita Baptist University

California
UCLA
California Institute of Technology
California State University

Connecticut
University of New Haven

Delaware
University of Delaware
Delaware State University
Delaware Technical and Community College

Florida
University of South Florida

Georgia
University of Georgia

Hawaii
Chaminade University of Honolulu

Idaho
Boise State University

Illinois
Southern Illinois University
Loyola University

Indiana
Ball State University

Iowa
University of Northern Iowa

Kentucky
Northern Kentucky University
Bellarmine University
Morehead State University

Lousinana
Tulane University

Maine
Bates College

Maryland
Towson University

Massachusetts
Bridgewater State College
Assumption College

Michigan
Central Michigan University
Hope College

Minnesota
Concordia College-Moorhead

Missouri
University of Missouri

Montana
Montana State University – Bozeman

Nebraska
Creighton University

New Jersey
The College of New Jersey

New York
Le Moyne College
Marist College
Siena College

North Carolina
University of North Carolina at Wilmington
Elon University

North Dakota
Minot State University

Ohio
Wright State University
College of Wooster

Oklahoma
Oklahoma State University

Pennsylvania
Moravian College
Allegheny College

South Carolina
Presbyterian College
Sanford School of Medicine

Tennessee
Middle Tennessee State University

Texas
University of Texas at Austin
University of Houston

Utah
Utah State University

Vermont
Johnson State College

Virginia
James Madison University

Washington
Seattle University
Central Washington University

West Virginia
Marshall University

Wisconsin
University of Wisconsin
Carthage College