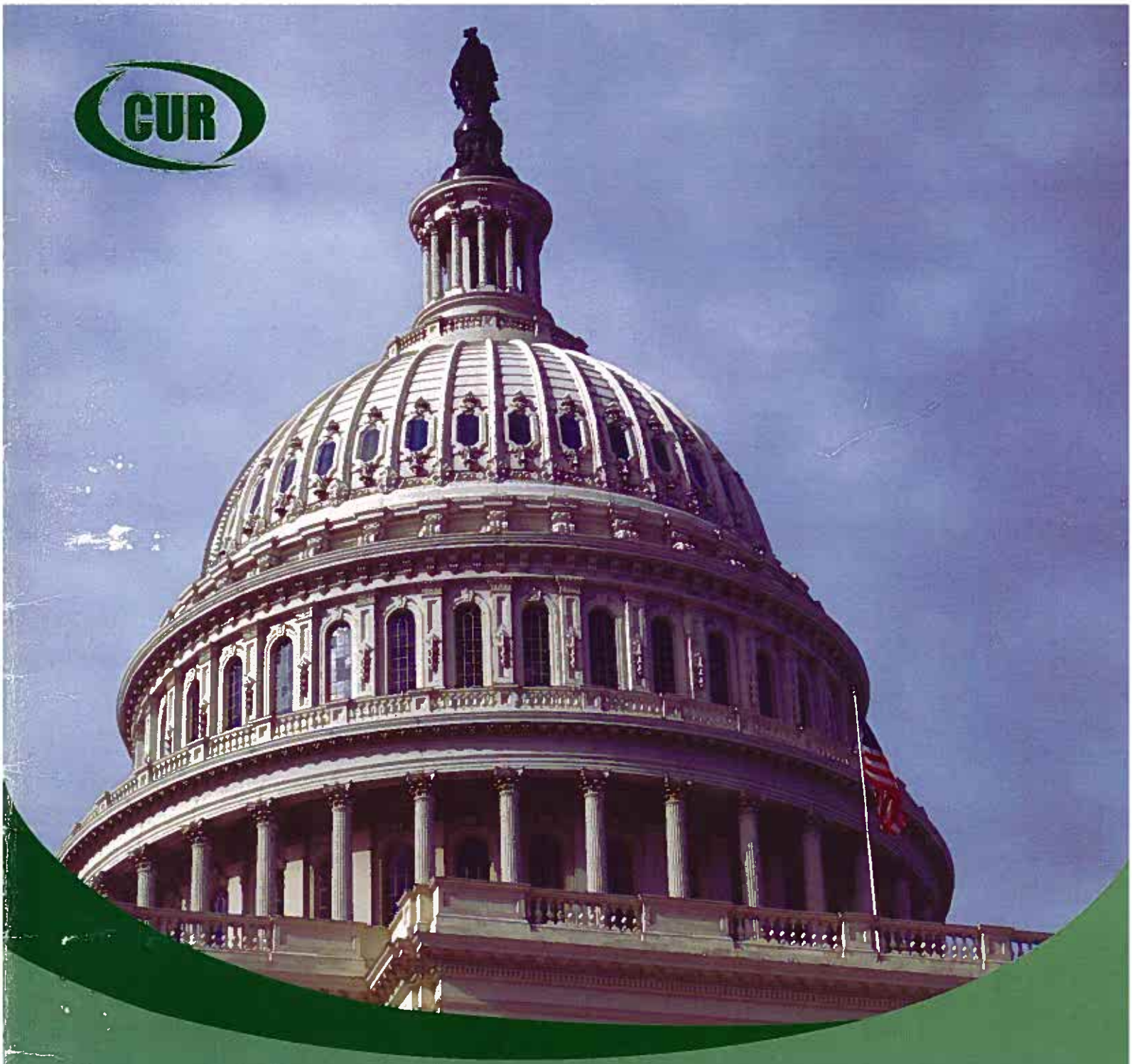

Council on Undergraduate Research

11th Annual

2007 POSTERS ON THE HILL

April 25, 2007

Rayburn House Office Building

Washington, DC

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

- American Chemical Society – Petroleum Research Fund
- Adrian Tinsley Program
- Andrew W. Mellon Foundation
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- John Marshall Foundation
- National Cancer Institute
- National Institutes of Health
- National Renewable Energy Laboratory
- National Science Foundation
- Office of Juvenile Justice and Delinquency Prevention

Council on Undergraduate Research
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Dear Posters on the Hill Participants:

I wish to congratulate you on your selection to participate in the 2007 Posters on the Hill. Your research project was selected from 400 applications, the most we have received in the history of Posters on the Hill. We are also pleased to welcome our first community college participant in Posters on the Hill, North Seattle Community College and our first humanities poster from Virginia Military Institute.

The Council on Undergraduate Research is very proud of your accomplishments and is pleased that you have been able to come to Washington, D.C. to participate in Posters on the Hill. We are also proud of our members who serve as advisors and mentors to undergraduate researchers.

We wish you success as you continue your research and your studies. Perhaps someday you will be a member of the Council on Undergraduate Research and come to Washington, D. C. when one of your students presents his or her research at Posters on the Hill.

Best Wishes.

Sincerely,

Nancy Hensel

Nancy Hensel
Executive Officer

Program

Tuesday, April 24, 2007

Field Trips
1:15 pm
All field trip participants meet in lobby of the Henley Park Hotel
926 Massachusetts Ave NW
Washington D.C. 20001
202-638-5200 or 800-222-8474

Orientation Session
5:30 pm Georgetown University Law Center – Hart Auditorium
600 New Jersey Avenue, NW
Washington, D.C. 20001
* Use 2nd Street Entrance of the Law Center

- Presentation of Certificates
- Speaker - James Brown
  Senior Legislative Associate, American Chemical Society
  How to Talk to Your Representative

*Light Dinner will be available following the Orientation Session

Wednesday, April 25, 2007

Morning Session - Rayburn House Office Building, Room 2168

8:30 am Continental Breakfast

9:00 am Welcome – Nancy Hensel
Executive Officer
Council on Undergraduate Research

Invited Speaker – Representative Rush Holt
12th District of New Jersey

Panel Discussion – *Careers in the Government*
Moderator: Dr. Richard Weibl, AAAS Center for Careers in Science & Technology

Panelists:

Alicia J. Chambers, Education Divison, American Chemical Society

Rieko Yajima , Ph.D. graduate from Penn State, recipient of National Academy of Sciences fellowship, and is interested in a career in policy.

Lenka Fedorkova, Treasurer, Washington DC Metropolitan Chapter of Association for Women In Science

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

3:30 – 5:00 pm Poster set-up

5:30 – 7:30 pm Poster session and reception
*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

Student Poster Abstracts

Alaska

Student: Reem Sheikh
Institution: University of Alaska – Anchorage
Faculty Advisor: Carol Jones
Poster title: Fluorescence Analyses of Asthma Associated Mucin Protein Expression After Exposure to Environmental Contaminants
Display Area: (1A)
Funding: Alaska INBRE and UAA Office of Undergraduate Research and Scholarship
Abstract: The incidence of chronic asthma has dramatically increased over the past two decades and is associated with exposure to environmental contaminants found in cigarette smoke and car exhaust (e.g., polycyclic aromatic hydrocarbons; PAHs). Asthmatic patients typically exhibit increased mucus production primarily composed of mucin glycoproteins produced by MUC1, MUC5AC, and MUC5B genes. While we know the toxicity of PAHs is primarily due to their binding of the aryl hydrocarbon receptor (AhR), a ligand-activated transcription factor, the relationship between the AhR and mucin gene expression is not well understood. These studies are designed to determine if activation of the aryl hydrocarbon receptor (AhR) alters mucin gene expression and protein localization in human lung epithelial cells (A549). We found that while MUC5AC expression increases with AhR activation, expression of MUC1 and MUC5B genes is reduced. Interestingly, immunofluorescence microscopy reveals increased cell surface expression of MUC1 and MUC5B with little detectable change in MUC5AC. These results suggest that while activation of the AhR pathway inhibits transcription of some major mucin genes, it stimulates mucin protein transport to the cell surface possibly contributing to asthmatic symptoms. AhR-dependent regulation of mucin transport has not been previously reported.

Arkansas

Student: April Helms, Michelle Dare and Shara Jones
Institution: Henderson State University
Faculty Advisor: James Engman
Poster title: Coral Reef Community Composition At Ten Sites In Caribbean Panama Reflects Human Impacts
Display Area: (1B)
Funding: Henderson State University Undergraduate Research Committee
Abstract: Coral reef communities are declining throughout the Caribbean. The most significant causes appear to be anthropogenic, including elevated sea surface temperatures, effects of overfishing, and eutrophication and sedimentation resulting from coastal development and deforestation. In contrast, reefs in the autonomous Kuna Yala region of Panama have been considered among the healthiest and least disturbed in the Caribbean, due to lower fishing pressure and minimal coastal development and deforestation. Despite this, at sites near densely populated Kuna islands, which lack wastewater treatment, or sites near the limited agriculture practiced, we predicted that reefs would be stressed relative to most of Kuna Yala.

Between July 2004 and July 2006, we surveyed ten reef sites in Kuna Yala, and one in adjacent Colon Province where coastal activity is more typical of most of Panama and the Caribbean. Sites in Kuna Yala were classified as "more impacted" or "less impacted" based on proximity to population centers and agriculture. Data were obtained by point sampling techniques using images from replicate underwater video transects. As predicted, more impacted sites displayed significantly greater reef degradation, evident in coral diversity and algal abundance. A 6-factor

Principal Component Analysis (PCA) using Shannon diversity, coral cover, algal abundance, dead coral cover, and abundance of branching coral species clearly differentiates between more and less impacted sites. Despite the apparent effect of Kuna villages and agriculture, all sites in Kuna Yala displayed higher coral diversity and species richness and lower algal abundance than at the site in the rapidly developing Colon Province.

Arizona

Student: Kathryn Plitchta
Institution: University of Arizona
Faculty Advisor: S. Patricia Stock
Poster title: A Worm and A Microbe: A New Model System for Understanding Symbiotic Interactions between Unicellular and Multicellular Organisms
Display Area: 1C
Funding: National Science Foundation, IOB Program
Abstract: Much of the biotic world lives in symbioses, varying from parasitic to mutualistic, and from temporary to essential collaborations. Symbionts adapt to their hosts with confounding complexity, able to control their reproduction, behavior and overall physiology. In these associations microbes typically colonize discrete locations of their hosts. Understanding how microorganisms and their hosts interact with each other is of fundamental importance. The proposed research focuses on an emerging model of animal-microbe mutualism between a symbiotic bacterium (Xenorhabdus, Enterobacteriaceae) and a soil-dwelling roundworm (Steinernema, Nematoda). The bacterium-nematode pair is pathogenic for a wide range of insects and has successfully been implemented in biological control and integrated pest management programs worldwide. The bacterial symbiont lives in a specific vesicle within the intestine of the roundworm, and is the only microbe capable of residing at this location and establishing a relationship with this host to achieve a mutually-beneficial relationship. Little is understood about the distinct physical nature of such colonization site, or how this beneficial animal-microbe association is formed and maintained. In this study, we examined the morphological, ultrastructural and developmental features of the bacterial vesicle across all currently known host (Steinernema) species. Results from this study provide critical information aimed at understanding the colonization process and interaction between the mutualists. The proposed research also explores new hypotheses regarding the evolution of this bacteria-colonizing structure considering currently developed molecular evolutionary histories of the roundworm-host. This model system has broad relevance to agricultural and medical research both for its basic and multidisciplinary research perspectives.

California

Student: Kevin Chavarria
Institution: California State University, Fullerton
Faculty Advisor: Nancy Segal
Poster title: When Parents Are Twins: Double Look at Social Relations Within Families
Display Area: 1D
Funding: National Institutes of Health
Abstract: The problem of identifying factors conducive to positive social relationships within families is important to solve if children are to function successfully at home and in society. The present study aimed to increase understanding of cooperative and caretaking behaviors using a unique research design: the twin-family method. This method is based on the fact that when identical twins marry and have children, each twin parent becomes the genetic "mother" or "father" of his or her nieces and nephews (i.e., co-twin's children). In contrast, when parents are fraternal twins, the conventional aunt/uncle-niece/nephew relationships remain unchanged. Three out of

four hypotheses were supported, based on responses from over 300 twins: (1) Identical twin aunts/uncles expressed greater social closeness toward nieces and nephews than fraternal twin aunts/ uncles; (2) Twins with female co-twins expressed greater social closeness toward nieces and nephews than twins with male co-twins; (3) Twins with female co-twins were more generous in giving gifts toward nieces and nephews than twins with male co-twins. Hypothesis 4, that MZ twin aunts/uncles would give gifts more generously to nieces/nephews than DZ twin aunts/uncles, was not supported. Possible mechanisms underlying the observed outcomes include perceived closeness and perceived physical similarity, as these measures were associated with twin type and with co-twin gender. These findings provide scientists with a new way to assess within-family relationships, and increase societal awareness of how and why these social relations may vary.

Student: Christopher Heiser and Eric Hinderleider
Institution: Dominican University California
Faculty Advisor: Mohammed El Majdoubi
Poster title: Differentiation of Mouse Embryonic Stem Cells into Neuroendocrine Cells in Vitro
Display Area: 1E
Abstract: Embryonic stem (ES) cells are undifferentiated cells that can replicate indefinitely and differentiate in vitro to become a wide variety of adult cells. Because undifferentiated ES cells can proliferate indefinitely, they could provide an unlimited source of specific, clinically important adult cells such as bone, muscle, liver, or blood cells. Previous studies have shown that ES cells can be induced to differentiate in vitro into functional neurons. Subsequently, diverse protocols have been developed to selectively promote neuronal differentiation of ES cells into specific neuronal subtypes including dopaminergic and motor neurons. The aim of the present study is to develop a protocol capable of coaxing ES cells into becoming neuroendocrine cells. These are a set of specialized neurons that release their neurohormones into the blood circulation to control most of our vital functions, including growth, reproduction, nutrition, sleep, stress responses and homeostasis.

Undifferentiated mouse ES cells (129/Ola cells) were cultured as aggregates in the presence of retinoic acid and forskolin for a week. Cells were then plated on polyornithine/laminin coated chamber slides and allowed to differentiate for an additional week. Using immunocytochemistry, we found that 20-25% of the newly derived neurons express chromogranin-A, a specific marker of neuroendocrine cells. This finding indicate that ES cells have the potential to differentiate in vitro into neuroendocrine cells, and can potentially be used as an in vitro model to study the still unknown molecular and cellular factors underlying the development of hypothalamic neuroendocrine cells during early embryogenesis.

Student: Tamara Jackson
Institution: University of California - Los Angeles
Faculty Advisor: Marjorie Harness Goodwin
Poster title: Were the Colonials Americans?: History Curriculum and National Identity Construction for Immigrant Children in Southeast Los Angeles
Display Area: 1F
Funding: UCLA Undergraduate Research Scholars Program
Abstract: My research addresses the influence of United States History curriculum on national identity construction for students from recently immigrated families. Traditionally, children were thought to acquire social knowledge through agents of socialization (such as the school) inactively, receiving a set of shared cultural understandings which they must internalize in order to be classified as insiders rather than being on the periphery. However, the recent academic trend toward understanding children's life-worlds as dynamic and pliable, rather than a set of adult understandings to be learned, has changed the way in which we understand youth identity construction. This shift towards recognizing children's social agency calls for a more student-centered approach to examining how youth construct their national identity. Hence, my research relies on capturing fifth-grade Mexican-American students' experience of identity construction

through both explicit and implicit curriculum, looking closely at the co-creation of historical truths in the classroom through the use of 'alternative frameworks' to participate in the 'classroom conversation'. I analyze audio-recordings, written responses to prompts about classroom activities, and semi-structured interviews with both the students and teacher, comparing what messages were intended for given lessons and what knowledge was actually created by the children through classroom interaction. I argue that history curriculum can present opportunities for children to create 'project identities', selves that can be understood as having a more fluid national identity. When engaged as an active epistemological practice, History can be used to create an empowering, insider identity for all American youth.

Student: Christopher Heiser and Eric Hinderleider
Institution: University of California - Los Angeles
Faculty Advisor: Robert Spich
Poster title: Corporate Codes of Conduct Do They Work?: An Analysis of Growth and Trends of Corporate Codes of Conduct by Transnational Corporations in the Global Economy with a Focus in: Environment, Labor, and Advertising.
Display Area:
Abstract: The corporate codes of conduct devised by the United Nations in an effort to reduce injustices inflicted around the world by transnational corporations are for the most part ignored by these corporations. As a result, toxic waste dumping, human rights violations, and unfair advertising practices have continued unchecked. In order to better enforce the corporate codes of conduct governing transnational corporations, we need a new regulatory policy that not only gives these corporations tax incentives for conducting business in other countries, but also holds them financially responsible for any violations. This will transform the current self-regulatory and non-aggressive corporate code of conduct policy into one that will hold corporations accountable for their actions. My research will focus on the violations committed by transnational corporations in the areas of environmental health, labor, and the advertising regulations of several nations. Due to the various interpretations of globalization and the lack of research in corporate codes of conduct, I will use as a basis for my investigations the United Nations Research Center and Policy Database. In addition, I will use Thomas L. Friedman work as a basis for discussing the concept of globalization and the global economy. To justify my methodology, I will utilize the experience and research of Professor Robert Spich, professor of Global Management at UCLA Anderson Business School and those of Professor Kal Raustiala, professor of Environmental Studies at UCLA Law School as well as professionals in perspective industries and representatives of the U.N.

Connecticut

Student: Scott Maddalo
Institution: Connecticut College
Faculty Advisor: Marc Zimmer
Poster title: Making Brighter Green Fluorescent Proteins
Display Area: 2B
Funding: National Institutes of Health
Abstract: Green fluorescent protein (GFP) is a commonly used molecular imaging tool in biology, chemistry, genetics and medicine. It can be used to track the spread of cancer, to detect bioweapons and to show when potatoes need to be watered. Probably the best indicator of the utility of GFP and GFP-like proteins is the fact that in 2004 about 50%, 35%, 60% and 20% of the articles in Cell, Development, Journal of Cell Biology, and Neuron mentioned or used GFP-like proteins. Recently, we have been trying to understand the photophysical behavior of GFP. This will allow us to design brighter GFP's that have new colors. Without any protein surround the GFP chromophore it does not fluoresce. Also changing any of the amino acid residues surrounding the chromophore can change the color and intensity of GFP's fluorescence. Therefore the protein

matrix has a profound influence on the fluorescence of its chromophore. We have previously shown that the protein cavity surrounding the chromophore in wild-type GFP is not complementary with a planar chromophore. This work shows that wild type GFP is not an anomaly; most of the GFP and GFP-like proteins in the protein databank have a protein matrix that is not complementary with a planar chromophore. When the pi-conjugation across the ethylenic bridge of the chromophore is removed the protein matrix will significantly twist the freely rotating chromophore from the relatively planar structures found in the crystal structures. The possible consequences of this non-planar deformation on the photophysics of GFP are discussed.

Florida

Student: Nathalia Alzate
Institution: Florida Institute of Technology
Faculty Advisor: Niescja Turner
Poster Title: Dst and the Ring Current: A Correlation Study
Display Area: 2C
Abstract: Geomagnetic storms produce magnetic disturbances by way of current systems in the magnetosphere. One of these current systems is the ring current situated approximately between 2-7 Earth radii above the equator. In order to study the strength of the ring current, measurements are taken on ground magnetometers, which measure the perturbation of Earth's magnetic field at the ground caused by the ring current. Recent work has also used direct particle measurements to calculate the energy of ring current for comparison to measured equatorial magnetic field strength. We are expanding on these studies by using POLAR and other satellite data for in situ measurements to compare the energy measured by satellites with the magnetic perturbation on the ground for different phases of storm. In this presentation, I will give an overview of storms and discuss previous study results and give results of our study.

Student: Andrew Moedinger
Institution: Stetson University
Faculty Advisor: Hala ElAarag
Poster title: For a Healthier Internet: Design and Implementation of a TCP-Friendly Protocol for Multimedia Applications over Wireless Networks
Display Area: 2D
Funding: Stetson Undergraduate Research Experience
Abstract: The growing popularity of multimedia applications is leading to an increased usage of protocols that lack congestion control mechanisms. If these protocols are not improved to respond to congested network conditions, there will be serious ramifications, potentially even congestion collapse, in which a network is rendered useless. Wireless networks are also becoming more widespread, and it is thus necessary to develop a multimedia protocol for the wireless medium, which has the eminent problems of high bit error rate and small bandwidth. This research presents IFTP-W, a TCP-friendly end-to-end congestion control protocol for media streams that we designed to function with the limitations of wireless networks. IFTP-W allows applications to designate a section of a packet as sensitive to error, and only this section is verified for integrity by checksum. One corrupted bit in a video or audio stream may cause a discolored pixel or distorted millisecond of audio; however, in many codecs, receiving the partially damaged packet results in better overall performance than dropping the packet. To test our protocol, we developed a C# discrete event networking simulator and conducted simulations to estimate the performance of IFTP-W under various network conditions. In our simulations, the fact that IFTP-W designates only part of the packet as sensitive to error allows a greater percentage of packets to be transmitted, resulting in a higher goodput and throughput and hence improved performance on wireless networks suffering from high bit error rates. This research has resulted in papers published in two peer refereed conference proceedings.

Student: Vanessa Teixiera
Institution: University of North Florida
Faculty Advisor: C. Dominik Guess
Poster title: "Why do they hate us?" A cultural-psychological theory of sucide terrorism.
Display Area: 2E
Abstract: Suicide terrorism has become a topic widely portrayed in media, but still is a puzzle for scientists. Why does someone volunteer to kill civilians and/or military personnel and in the process lose one's life in order to effect political change? This study starts with assumptions on suicide terrorism portrayed in western media, indicating that suicide bombers are poor, uneducated, or have serious psychological disorders. Newer research does not support these assumptions. In order to investigate the motivations, emotions, and thoughts of people who volunteer for a suicide mission, we studied interviews conducted with suicide bombers as well as speeches of terrorist leaders. The data analysis leads into a model on cultural and psychological explanations for suicide terrorism. The model explains how a person's decision to carry out the suicide bombing is a result of a combination of at least four factors: first, the historical-cultural macro-context, such as occupation by a foreign culture; second, group processes such as group cohesion and ideological training; third, immediate and anticipated rewards, such as martyrdom and expected eternal life; and fourth, mechanisms to eradicate possible doubts and guilt on his or her decision, such as dehumanizing the enemy. Some implications on how to prevent the development of terrorism are discussed.

Georgia

Student: James Morgan
Institution: Fort Valley State University (GA) and National Museum of Natural History (DC)
Faculty Advisor: Sarwan Dhir, Fort Valley State University
Poster title: Skeletal Morphology in Mammals: Soricid Feet in Relation to Phylogeny
Display Area: 2F
Funding: National Science Foundation
Abstract: Shrews are small insect-eating mammals of the Family Soricidae. Variation in the bones of the forefeet of small-eared shrews has been used previously to help understand classification and relationships among species. Variations in the forefeet show different adaptations are needed for a range of environments and will help scientists better understand the natural world. Few skeletons of shrews are available for study, so digital x-rays were used to closely observe the forefeet of 101 dried skins in which the bones of the forefeet were preserved. These specimens included eight species of shrews that are assumed to represent distinct lineages. The types are C. p.parva, C. p.floridana, C. nigrescens, C. mera, C. meridensis, C. mexicana, C. goldmani, and C. goodwini. The left hand of each specimen was digitally x-rayed, the resulting image edited, and the bones measured using Photoshop computer software. This study, focused primarily on the bones of digit III (middle finger) because digit III of all specimens appeared most variable. This variation is useful in distinguishing among species and groups of species. For example, C. meridensis has a long metacarpal (middle palm bone) relative to all other taxa. The length of the distal phalanx relative (bone of the fingertip) to the length of the middle phalanx (middle finger bone) distinguished three groups of species. In four species (C. p.parva, C. mexicana, C. goldmani, C. goodwini), the distal phalanx is less than 90% the length of the middle phalanx. In C. meridensis, the distal phalanx is greater than 100% but less than 120% and in C. mexicana, C. goldmani, and C. goodwini; the distal phalanx is more than 150%.

Hawaii

Student: Charissa Kahue
Institution: Chaminade University of Honolulu (HI) and St. Jude Children's Research Hospital (TN)
Faculty Advisor: Patricia Lee-Robinson, Chaminade University of Honolulu and Jennifer Carew, St. Jude Children's Research Hospital
Poster title: Inhibition of Autophagy and Histone Deacetylases as Novel Therapy for Imatinib-Resistant Chronic Myelogenous Leukemia
Display Area: 3A
Funding: National Institutes of Health
Abstract: Imatinib mesylate (STI-571, Gleevec) is a targeted chemotherapeutic drug used as front-line treatment in patients with chronic myelogenous leukemia (CML). Clinical resistance to imatinib is an emerging problem and occurs through several mechanisms. A major focus in the field of CML research is the identification and validation of novel therapeutic strategies to more effectively treat imatinib-resistant patients. Recent studies have suggested that histone deacetylase (HDAC) inhibitors may have activity against imatinib-resistant cells. One such HDAC inhibitor, suberoylanilide hydroxamic acid (SAHA), has been demonstrated to induce both autophagy and apoptosis in certain cell types. Considering that induction of autophagy may promote the survival of cancer cells, we hypothesized that the anticancer activity of SAHA could be potentiated by inhibiting autophagy. We tested this hypothesis using cells expressing different mutations in the Bcr-Abl fusion protein that render Gleevec ineffective in CML patients. Our results demonstrated that inhibition of autophagy synergistically enhanced the pro-apoptotic effects of SAHA in cells expressing both wildtype (Gleevec-sensitive) and mutant (Gleevec-resistant) forms of Bcr-Abl. Importantly, the efficacy of this combination was not diminished by impairment of p53 function, a frequent event in cancer and contributing factor in Gleevec-resistance. Taken together, our data suggest that inhibition of autophagy synergistically enhances the anti-cancer activity of SAHA. Moreover, combined inhibition of autophagy and HDAC activity may be a promising therapeutic strategy to treat Gleevec-refractory patients that do not respond to conventional regimens. Future studies are warranted to explore this exciting possibility.

Illinois

Student: Brett Kolditz and Steven Laub
Institution: Bradley University
Faculty Advisor: Kevin Kimberlin
Poster title: Novel Structures in Annealing Low Temperature Grown Silver Si(111)
Display Area: 3B
Funding: National Science Foundation
Abstract: Silver films of 1.35 ML and 6.2 ML have been grown epitaxially at 104K using in situ molecular beam epitaxy and studied with scanning tunneling microscopy (STM) and reflective high energy electron diffraction (RHEED). Annealing from 300K to 550K produces a diverse distribution of heights and sizes of flat topped, vertical sided islands. The maximum height of islands is 20ML in the 1.35 ML deposition but in the higher coverage, dendritic structures are formed which are exactly 20 or 24 ML in height. A RHEED transmission pattern is formed on the annealed substrates, and two orientations for the crystallites are found, with the Ag<111> parallel to the Si<111>. Finally, annealing above 550K produces typical 3D island "wedding cake" structures atop the rt(3) x rt(3) wetting layer on the Si(111).

Student: Sara Reardon
Institution: Southern Illinois University at Carbondale
Faculty Advisor: Michael Collard
Poster title: DEAF-1 Produces Epigenetic Regulation of Infertility, Obesity, and Cancer
Display Area: 3C
Funding: National Institutes of Health / National Cancer Institute
Abstract: Epigenetics is the study of how changes in chromatin structure of parents can affect gene expression in offspring without changing the DNA sequence. This field becomes of increasing importance as emerging data continues to show how environmental factors such as tobacco smoke, pesticides, and other chemicals can predispose descendants to cancer, obesity, infertility, and mental disorders. We have identified a developmental transcription factor, DEAF-1, that appears to be involved in epigenetic gene regulation. When male mice heterozygous for a Deaf-1 null allele are backcrossed onto wildtype females, their offspring display severe loss of sperm production in testis. Breeding heterozygous females to wildtype males rescues the phenotype and offspring display normal spermatogenesis. This parent-of-origin effect suggests that Deaf-1 is involved in epigenetic reprogramming in the germ cells of male parents. I purified a GST-tagged methyl-binding protein and used it to isolate methylated DNA from homozygous Deaf-1 knockout embryos and from wildtype embryos. The methylated DNA was hybridized to CpG island microarrays and Deaf-1 knockout DNA showed significant hypermethylation at the intergenic spacer region (IGS) promoter in 45S rRNA. IGS transcripts are believed to epigenetically regulate transcription of ribosomal genes; additionally, altered methylation of this promoter has been shown to be involved in transgenerational transmission of cancer. To confirm this microarray data, I used bisulfite sequencing to assay for methylation changes. Preliminary data confirms the microarrays' analysis, indicating that DEAF-1 is required for proper methylation to occur in the IGS promoter. We propose that DEAF-1 regulates environmental responses to produce infertility, obesity, and cancer.

Iowa

Student: Justin Bohnet
Institution: University of Northern Iowa
Faculty Advisor: Paul Shand
Poster title: Scaling Analysis of the Ferromagnetic Transition In Melt-Spun Gadolinium Nanocrystals
Display Area: 3D
Funding: National Science Foundation
Abstract: Magnetic materials are present in rewriteable disk drives, electric motors and generators, and signal transformers/receivers. To improve the performance of these and other devices, much research in magnetism continues to be done. In particular, materials that are disordered on the atomic and nanometer scales have recently been the subject of extensive research. The arrangement of atoms and the interactions between them significantly affect a material's magnetic properties. We have prepared a disordered pure gadolinium (Gd) system using a melt-spinning technique. This resulted in a system of nanometer-sized Gd crystals embedded in an amorphous Gd matrix. The structure was identified using X-ray analysis. AC susceptibility and DC magnetization measurements at various temperatures (280 -350 K) and DC bias fields (0 – 3 kOe) were performed on a sample of the nanocrystalline Gd. Using scaling ideas for a second-order phase transition and modified Arrott plots, critical exponents and the Curie temperature (TC) for the ferromagnetic transition in the nanocrystalline Gd system were obtained. TC was found to be 290 K, which is close to that of bulk crystalline Gd. The critical exponents extracted from the analysis were somewhat higher than but consistent with those of the Heisenberg model with short-range interactions, indicating that melt-spinning suppressed the interactions present in bulk Gd. This first step in our larger project helps us understand the effects of disorder from the melt-spun system and will used for comparison in future studies of disordered magnetic systems.

Kansas

Student: Lizette Vargas and Theresa Doyle
Institution: Kansas State University
Faculty Advisor: Carol Kellett
Poster title: Coming Home: The Impact of Deployment on Iraq and Afghanistan on Relationship Satisfaction
Display Area: 3E
Funding: Trauma Research and Consultation at Kansas State University
Abstract: Much of the literature on trauma and traumatic stress focuses on the individual, without an empirical description of the impact of trauma and post-traumatic stress within the couple or family system. These issues are particularly important as our military forces face continued deployments to Operations Iraqi Freedom (OIF) and Enduring Freedom (OEF) and continued exposure to war trauma. It is necessary to recognize that the stress of war deployment impacts not only the soldiers, but also their spouses/partners.

The current study reports data from 45 Army soldiers who recently returned from a military deployment to Iraq (Operation Iraqi Freedom) or Afghanistan (Operation Enduring Freedom) and their spouses/partners. The study focuses on identifying the effects of previous trauma on each individual and on the couple's relationship/interpersonal functioning through both quantitative survey measures and individual qualitative interviews with each partner. The qualitative analysis data from the individual interviews, which will be presented here, focuses on extracting central themes and descriptions from each participant, particularly focusing on the effects of war trauma on both partners and on their relationship functioning. The results suggest both issues of stress and trauma for OIF/OEF soldiers and their spouses/partners, as well as individual and couple resilience from their deployment experiences. The stress of war deployments impacts both the soldiers serving their country and their spouses/partners, who, in reality, are also serving the nation by maintaining their lives here, while they wait and hope for the safe return of their soldiers.

Louisiana

Student: Todd Spears
Institution: University of Louisiana - Monroe
Faculty Advisor: Ann Findley
Poster title: Monitoring Pollutants Via the Catfish Olfactory Response: Determining LC50 Values and Swimming Behavior in the Presence of Pollutants of Interest
Display Area: 3F
Funding: NIH-INBRE, ULM-HHMI
Abstract: Odorants are known to play various roles in fish behavior including providing vital information pertaining to the presence of potential food sources, the availability of reproductive mates, migratory cues, recognition of kin, and the avoidance of possible predators. This highly responsive chemical monitoring system can also be assessed as a pollution detector. Basic electrophysiological studies of olfaction in fish are currently underway to establish a sensitive monitoring protocol to assess the presence of environmental pollutants in the aquatic ecosystem. Channel catfish, goldfish, and hybrid bluegills are being exposed to the active ingredients in several herbicides (e.g., atrazine and glyphosate) and insecticides (e.g., synthetic pyrethins) to assess their reception and response to the noxious stimuli. Such measurements on a small number of individuals provide an attractive alternative to the common practice of performing terminal behavior studies on large numbers of animals. In order to interpret these data, however, we have established LC50 values for glyphosate, glyphosate+, atrazine, and sevin for the fish species of

interest. In addition, we have performed preliminary avoidance/preference, aberrant swimming pattern, and gill "coughing" response behavioral studies with these same pollutants.

This work was supported in part by NIH Grant P20RR16456 from the BRIN Program of the National Center for Research Resources, the ULM-HHMI Undergraduate Biological Sciences Education Program, the LA Governor's Office of Environmental Education, and the ULM Emerging Scholars Program.

Maine

Student: Carolyn Gorman
Institution: Bridgewater State College
Faculty Advisor: Teresa King
Poster title: Maternal Transmission of Body Image in School Aged Children
Display Area: 4A
Funding: Adrian Tinsley Program
Abstract: Body image affects many aspects of an individual's life from their confidence and self-esteem to clinical disorders such as depression, thus understanding the influences on body image is very important. Several studies have examined etiology factors of a negative body image in adolescent and adult women but more research is needed examining body image in girls and boys younger than 8 years old. This study examines transmission of body image attitudes from a diverse sample of mothers to their school aged children (6 - 8 years old). Participants were 28 mother-child pairs from two area schools. Mothers completed assessments measuring their satisfaction with their own appearance and their child's appearance. Children were interviewed individually to assess their body image. It was hypothesized that children's body image would be significantly associated with mother's body image. This hypothesis was not supported; however, mother's dissatisfaction with their child's appearance significantly predicted the child's own dissatisfaction with their appearance ($r = .593$, $p < .05$). Results also revealed that the children at this developmental stage are generally satisfied with their appearance. These results suggest that the transmission of body image dissatisfaction likely involves direct communication of dissatisfaction with the child's appearance rather than modeling of appearance dissatisfaction. This information is important in terms of developing more effective prevention and intervention strategies for a positive body image.

Student: Brett Zografos
Institution: Bridgewater State College
Faculty Advisor: Patricia Mancini
Poster title: Effects of 3-Methyleneoxindole (MOI) on Viability of Trypanosoma brucei: Possible Mechanisms of Drug Toxicity
Display Area: 4B
Funding: Adrian Tinsley Program
Abstract: Trypanosoma brucei is a protozoan parasite that causes sleeping sickness, a neurodegenerative disease that threatens over 60 million people and their domestic animals in sub-Saharan Africa. In this study, we have investigated the effect on this parasite of 3-methyleneoxindole (MOI), a plant derivative that has been shown to inhibit critical enzymes that prevent cellular oxidative stress in many cell types. MOI kills 90% of procyclic-form trypanosomes in a dose-dependent fashion at micromolar concentrations regardless of the type of assay medium. Cell death was measured by loss of motility and by live/dead staining using fluorescent probes. Membrane-impermeable probes entered MOI-treated cells but not control cells, suggesting membrane changes due to drug exposure, while probes for actin structure and mitochondrial or nuclear changes did not show significant differences. To determine MOI's mechanism of action, we assayed critical enzyme activities in the parasite. We established the experimental system by first

assaying yeast glutathione reductase, (GR), an enzyme that affects glutathione metabolism, and demonstrated inhibition by MOI. However, there was no detectable GR activity present within trypanosome homogenates. Instead, trypanosomes have a similar enzyme, trypanothione reductase, (TR), with a unique substrate, trypanothione, (TSST). We first demonstrated activity of TR with TSST in order to determine experimental conditions for the assay. Further assays indicated that 0.5mM MOI completely inhibits activity of TR in trypanosome homogenates suggesting that inhibition of this parasite enzyme might be a possible mode of action of the drug. Further studies on mechanism with more purified enzyme are currently in progress.

Maryland

Student: Marka Fenske
Institution: St. Mary's College of Maryland
Faculty: Randy Larsen
Poster title: Metabolomics: The Effects of PCBs on Snapping Turtles (Chelydra serpentina)
Display Area: 4C
Abstract: This study evaluates the cellular chemistry changes in snapping turtles (Chelydra serpentina) as a result of exposure to Polychlorinated Biphenyls (PCBs). The Hudson River has been historically contaminated with PCBs that primarily reside in the sediments. Turtles and other benthic animals of the Hudson are at risk of high exposure to this potential carcinogen. Significant research has quantified PCB levels in the Hudson River and other ecosystems in the United States including the Great Lakes and the Chesapeake Bay. Few studies have examined how high concentrations of PCBs may alter the chemical physiology of exposed organisms. Metabolomics measures metabolic responses to changes in gene and protein expression. This study profiles the changes in levels of metabolites in snapping turtle liver tissue as a result of exposure to PCBs. We use 2-D NMR and Principle Component Analysis to differentiate metabolite profiles in turtles from four groups. These groups consisted of a crosswise treatment of turtles from Hudson River eggs fed fish from the Hudson or a control lake and turtles from a control lake that were fed fish from the Hudson River or a control lake. Since PCBs accumulate in liver tissue and other high lipid organs, we hypothesize that the chemistry of these cells will be primarily affected. We believe that the use of metabolomics in environmental research will prove to be an effective method of analysis, and potentially open new doors in environmental toxicology and biochemistry.

Student: Chelsea Phillips and Jillian Hoffman
Institution: McDaniel College
Faculty Advisor: Wendy Morris
Poster title: Improving Lie Detection Accuracy Through Indirect Cues
Display Area: 4D
Abstract: Past research has shown that people are generally not very good at detecting deception. Although lie detection accuracy is low, recent research has shown that people feel differently when they have just heard a lie compared to a truth (e.g., they feel more comfortable if they've heard a truth) (DePaulo & Morris, 2004). Thus, there are indirect cues related to deception but people do not seem to use these indirect cues when making their judgments. The current study tested whether lie detection accuracy can be improved by training people to focus on indirect cues. Seventy-four college students (36 males, 38 females) viewed video clips of a man or woman telling either true or fabricated stories about their lives. The control group watched the video clip and guessed whether the story was true or false. The experimental group was given information explaining the advantages of utilizing indirect cues to detect deception (e.g.., people who hear made up stories feel less confident in their judgments of deception, while people who hear truthful stories feel more confident). The experimental group was asked to rate whether the story was true or made up, keeping in mind the significance of indirect cues. Results indicated that people instructed to pay attention to indirect cues were more accurate in detecting deception. Given that

individuals are better able to detect deception when using indirect cues, future research could determine whether this is a skill that can be developed and applied in professional contexts (e.g., law enforcement).

Michigan

Student: Kevin Formsma and Paul Boillot
Institution: Hope College
Faculty Advisor: Matthew DeJongh
Poster title: Bioinformatics Tools for Metabolic Model Generation
Display Area: 4E
Funding: National Science Foundation
Abstract: Our research focuses on automating the laborious task of metabolic model generation for prokaryotes. A metabolic model is a biochemical reaction network representing the enzymatic functions encoded in an organism's genome. Metabolic models help direct lab experiments, provide information for drug targeting, and can be used in genetic engineering (e.g., for renewable bio-fuel production). Currently the process of model generation requires a mostly manual effort to produce a model for a single genome.
insert
Our research uses the frameworks of the SEED, a web-based genome annotation tool, and of KEGG, an on-line database mapping enzymatic functions to biochemical reactions, to connect genetic and metabolic reaction information. The SEED environment annotates genes to functional roles. We assign metabolic reactions to functional roles, thus completing the link from genes to reactions. We have written tools to verify that the reactions form a connected network that is suitable for modeling analyses. This approach has a cumulative effect: once reactions are assigned to functional roles for a given organism, they are assigned for any other organism that has that same set of functional roles.
insert
We have demonstrated the efficacy of our method by reverse-engineering and automatically regenerating the reaction network from a published genome-scale metabolic model of Staphylococcus aureus N315. The work we did on S. aureus gave us enough reaction information to automatically regenerate 66% of a published model of E. coli K12. Ongoing efforts to complete the E. coli model will further increase our capability of automatically generating models for subsequent organisms.

Minnesota

Student: Lindy Watanskul
Institution: College of St. Benedict
Faculty Advisor: Charles Rodell
Poster title: Ageing Effects on Heart Rate and Arrhythmia in Drosophila Melanogaster.
Display Area: 4F
Funding: Florence Rooney Endowed Program
Abstract: Invertebrate hearts share a common evolutionary origin with hearts of vertebrates. As such, Drosophila melanogaster is a useful model with which to examine genetic and environmental effects on heart function. My project explores the effects of ageing on heart rate and heart arrhythmia of adult fruit flies. Heart rate is influenced by major-effect genes (single gene effects), and by the cumulative effect of many genes (polygenic effects). Most studies have focused on single gene effects; few studies have emphasized the polygeneic basis of heart rate. My project focuses on a polygenic analysis. Polygenic expression is influenced by both the underlying genotype and environment. For this reason, a polygenic approach to the study of heart rate is a useful model of cardio-vascular health in humans. My study of adult heart rate takes a

comparative approach by studying four different populations descended from flies collected in the Mississippi River Valley, Minnesota to Mississippi. For each population I determine heart rate and arrhythmia pattern for both male and female adults at ages 1, 10, 20 and 30 days. Adult flies were observed at low power with phase-contrast microscopy, heart contractions recorded on DVD using a video camera, and heart rates analyzed from slow-motion replays. In all populations, heart rates declined significantly with age, but patterns did not differ between males and females. Arrhythmia also exhibits a decline with age, with one population having a significantly greater amount of heart irregularity. This population difference opens the possibility to pursue further genetic analysis.

Missouri

Student: Adam Prasanphanich
Institution: University of Missouri-Columbia
Faculty Advisor: Charles Smith
Poster title: Development of Highly Specific Radiopharmaceutical & Molecular Imaging Agents for Diagnosis of Human Cancers
Display Area: 5A
Funding: Department of Veterans Affairs
Abstract: Imaging in nuclear medicine has made a large impact on health care by making diagnostic procedures quicker and highly accurate. Two forms of imaging, single photon emission computed tomography (SPECT) and positron emission tomography (PET), allow for imaging of injected radiopharmaceuticals. Controlled delivery to specific tissues of the radiopharmaceuticals allow for relevant diagnostic imaging.
insert
Many human malignancies, including breast and prostate cancers, differ from normal cells in that they over-express receptors, such as the gastrin-releasing peptide receptor (GRPr), on their cell surfaces. These receptors are highly specific to particular ligands. Bombesin (BBN), an amphibian analogue of the human gastrin-releasing peptide, possesses selectivity and affinity for the GRPr. Use of functionalized BBN allows for the delivery of diagnostically significant probes to GRPr sites with high specificity and affinity. Bombesin has been functionalized with radionuclides in hope of diagnostic as well as therapeutic applications.

I have been successful in synthesizing and characterizing derivatives of BBN, functionalized with a chelated radionuclide or fluorescent probe, with the desired characteristics of an imaging agent. In vitro cell studies have demonstrated internalization of radiolabeled BBN constructs in cancerous cell lines. Studies have confirmed uptake in tissues possessing the GRPr in living rodent models demonstrating the efficacy of such a strategy. My work focuses on modification of the derivatives to optimize the pharmacokinetics. The SPECT imaging capability of our BBN derivative, using Tc-99m, has been observed and was successful in resolving xenografted human prostate tumors. Improved derivatives capable of PET imaging, using Cu-64, are currently being studied.

Montana

Student: Kelly Conde
Institution: Montana State University
Faculty Advisor: Brian McGlynn
Poster title: Soil Water Alkalinity as a Function of CO2 Concentrations
Display Area: 5B
Funding: Undergraduate Scholars Program
Abstract: As a greenhouse gas, the formation and efflux of carbon dioxide (CO2) into the atmosphere are processes of global concern. An alternative mechanism for CO2 export is the formation and

release of dissolved inorganic carbon (alkalinity) from soil. CO2, a product of soil microbial respiration, accumulates in soil air due to limited transport to the surface. This accumulation leads to an increase of carbon dissolved in soil water as alkalinity.
insert
Alkalinity and CO2 concentration measurements were taken simultaneously to assess changes in soil water and stream water alkalinity as functions of the spatial and temporal variability of soil CO2 concentrations. The study site, Stringer Creek watershed, is located in the Tenderfoot Creek Experimental Forest in the Little Belt Mountains of Montana.
CO2 production was higher in wider riparian zones. Within those riparian areas, CO2 production increased with proximity to the stream. These trends in CO2 concentrations created parallel trends in alkalinity.
insert
Deviations occurred during times of low moisture. As soil moisture decreased soil CO2 concentrations decreased. Alkalinity however, continued to rise which may be attributed to soil water residence time. As connectivity to the stream declined due to a decrease in moisture, soil water residence time increased. With the increase in residence time more CO2 was dissolved in the same water, thus increasing alkalinity.

Nebraska

Student: Mallory Henninger
Institution: Creighton University
Faculty Advisor: Isabelle Cherney
Poster title: The Barbie Diet: Young American Children's Preference for Thinness
Display Area: 5C
Funding: Creighton University
Abstract: The prevalence of eating disorders appears to be increasing worldwide. Research suggests that approximately two thirds of anorexic patients and 40% of bulimic patients continue to exhibit significant symptoms after extensive treatment. Eating disorder prevention has called for a new focus in research: body image perception and dissatisfaction in children. For the current study, we interviewed 3-7 year-old children about their body image preferences. Children first responded to a series of vignettes by playing along with a Barbie and a Ken doll that they selected from a set of dolls padded to represent different body types. Children also viewed a panel of cartoon people differing in body size, and pointed to their favorite and least favorite image. Parent(s) also completed a survey about their own eating and exercise habits, as well as those of their child. In nearly every vignette, the children tended to favor the thin Barbie and either the average or heavy Ken. In the picture task, both girls and boys exhibited a strong preference for the thin female and a strong dislike of the heavy female. These data suggest that children as young as age three may unconsciously exhibit preferences for stereotypically ideal body types. We are also finding discrepancies between parents' descriptions of their children's favorite foods and their actual food preferences. Thus, parents may not be unaware of their child's food preferences as they think they are. Children's preferences for thin females start very early, suggesting that prevention programs have to start with young children.

Student: Elizabeth Killip and Jerod Petersen
Institution: University of Nebraska Kearney
Faculty Advisor: Maha Younes
Poster title: Forever Changed: The Transformation of Rural America Through Immigration
Display Area: 5D
Funding: University of Nebraska at Kearney
Abstract: This ground breaking qualitative case study explores the impact of immigration on one Midwestern rural community from the perspective of long-term residents, and businesses and human service providers. Data collection included 123 comprehensive phone interviews with long-term residents, 23 personal interviews with business leaders, and two focus groups. Of interest were the factors promoting immigration, impact of immigration on the community as a whole and businesses and their practices, view of immigrants, side effects of immigration, and recommendations for incoming immigrants, communities facing similar immigration challenges, and policymakers.

The outcome of the study reveals the quandary of rural areas that stretch their resources to accommodate the immigrants who breathe life back into their endangered communities. Incoming immigrants diversified the community, created new business opportunities, expanded the resident's world view, and increased community population assuring its survival. Despite the positives, the community experienced white flight that left remaining residents and businesses feeling overwhelmed by the multifaceted needs of immigrants, the challenges they confronted in various sectors, the diversity that engulfed them overnight, and the loss of majority culture they once enjoyed. Despite their appreciation for the economic and social contributions of immigrants, they regret the astonishing price the community paid to accommodate them. Having made all the adjustments, they fear policy changes that target immigrants and threaten the stability the community worked hard to achieve. The implications of this study are far reaching as participants offer crucial recommendations for incoming immigrants, communities facing immigration challenges, and state leaders and policymakers.

New Jersey

Student: Preethi Pirlamarla
Institution: Monmouth University
Faculty Advisor: Michael Palladino
Poster title: Hypoxia Inducible Factor-1 and its Role During Testicular Torsion Injury
Display Area: 5E
Funding: National Institutes of Health
Abstract: Testicular torsion is a debilitating condition that occurs when the spermatic artery twists, restricting oxygen delivery to the testis leading to germ cell-specific damage and cell death. Since transcription factor hypoxia inducible factor-1 (HIF-1) primarily regulates oxygen homeostasis in many tissues, we hypothesize that HIF-1 regulates oxygen-tension in the testis and is a key component activated to minimize the damage of testicular torsion. Active HIF-1 is a heterodimer, containing a hypoxia-dependent α subunit and a constitutively-expressed β subunit. This study was designed to determine effects of ischemia (I)/ischemia-reperfusion (I/R) on HIF-1α in the adult rat testis, determine testicular cell types expressing HIF-1α, and examine mechanisms regulating HIF-1 activation. Unilateral testicular I and I/R were surgically induced by 720o torsion for 1-6h and variable times of reperfusion; nuclear proteins were then analyzed by immunoblotting and immunopreciptation. Surprisingly, HIF-1α was found to be abundant and non-ubiquitinated during normoxia, suggesting normoxic activity. Results from immunoblotting and immunocytochemistry experiments showed HIF-1α localized mainly in Leydig cells. To determine mechanisms of HIF-1 activation, nuclear proteins from freshly cultured Leydig cells, cells cultured at 5% or 21% oxygen, or in 250μM H2O2 underwent immunoblotting. Levels of HIF-1α in cells cultured in 5% and 21% was significantly reduced compared to levels in fresh Leydig cells. Treating Leydig cells with H2O2 as a source of reactive oxygen species did not increase HIF-1α levels. Therefore, active HIF-1α appears to be present during normoxia in Leydig cells, suggesting an important role in testicular oxygen homeostasis. Supported by NIH grant R15-HD046451.

New York

Student: Jaclyn Tyson
Institution: Alfred University
Faculty Advisor: Karen Porter and Briana Nelson Goff
Poster title: Witnesses to Violence: What Secondary Victims See According to Domestic Violence Incident Reports
Display Area: 5F
Funding: Office of Juvenile Justice and Delinquency Prevention
Abstract: Children and adolescents who witness domestic violence are particularly vulnerable to cognitive, behavioral, academic, and social harm. Studies have shown that exposure to violence, such as that perpetrated by one parent against another, causes negative effects on the well being of these "secondary victims" of abuse. Working with the New York State Troopers, the Rural Justice Institute at Alfred University analyzed domestic violence incidence reports (DIRs). For this project, data were coded and computerized from 1,300 DIRs filed by the NY State Police in Allegany County between

1996 and 2003. Nearly two-thirds of the incidents reported to the police involved the presence of secondary victims which we define as family members present who may have heard and/or seen the violence. Our research examines the nature of the violence witnessed by these family members as reported in the DIRs. We find that the most common behavior reported is verbal abuse (56%) followed by pushing (30%) and grabbing (25%). Behaviors that show up as well, though at a much lower frequency, are forcible restraint (8%), threatening to use or using a weapon (5%), and injuring a child (2%). On average, an incident involved 2.5 acts of violence. These are the abusive actions and behaviors that witnesses see. On the scene, however, police officers must focus on the complainant and the suspect. We suggest that additional personnel accompanying the officer would allow for early intervention on behalf of secondary victims to assist them in dealing with the consequences of witnessing family violence.

Student: Roseanne Schuster
Institution: Canisius College
Faculty Advisor: Paula Dehn
Poster title: Utilization Of A Commercial ELISA To Assess Microcystin Levels In Lake Erie Sport And Pan Fish.
Display Area: 6A
Abstract: R.C. Schuster1, Jason Telecky2, & P.F. Dehn1, 1Biology, Canisius College, Buffalo, NY 14208, USA, 2NYSDEC Lake Erie Fisheries Unit, Dunkirk, NY 14048, USA.
Cyanobacterial toxins are stored in fish muscle, which pose a potential health risk to humans and other organisms who consume contaminated tissues. The purpose of this study was to assess microcystin levels in muscle tissue of common sport and pan fish from the eastern end of Lake Erie utilizing a commercial enzyme-linked immunosorbent assay (ELISA, EnviroLogix®). Yellow perch (6), small mouth bass (7), lake trout (5), and adult (6) and yearling (9) walleye were collected, fillets were homogenized, extracted in methanol, and analyzed for microcystin. Microcystin (ppb/g wet tissue) was present in all fish and species examined (yellow perch 7.3 + 1.6, walleye yearling 9.7 + 1.4, small mouth bass 9.4 + 1.5, walleye adult 6.6 + 2.2, and lake trout 10.3 + 0.6). Based on EPA's meal size of 227g, all mean levels exceed the World Health Organization's tolerable daily intake (TDI) guidelines of 0.04 µg/kg/day or 2.8 ppb for a 70 kg individual. One meal of Lake Erie fish provides levels of microcystin at least one order of magnitude higher than this TDI (yellow perch 23.6 + 5.1, walleye yearling 31.6 + 4.4, small mouth bass 30.6 + 4.7, adult walleye 21.5 + 7.2, and lake trout 33.4 + 1.9). Since previous studies have shown methanol extraction removes only unbound microcystin, our results under represent actual levels, indicating consumption of one Lake Erie fish meal may lead to significant human health effects and warnings regarding consumption of Lake Erie fish with respect to microcystin are necessary.

Student: Jamie Lou Mallonga
Institution: Rochester Institute of Technology
Faculty Advisor: Laura Tubbs
Poster title: Identification of Environmental Carcinogens Using the Protein Expression of Pseudomonas Putida KT2440 Determined by Two-dimensional Gel Electrophoresis
Display Area: 6B
Agnecy: College of Science at Rochester Institute of Technology
Abstract: By studying the effects of test compounds on the protein expression of a bacterium, the RIT Proteomics lab is working to develop a method to identify carcinogenic compounds that can compliment or replace the Ames test. The bacterium studied in this project is Pseudomonas putida KT2440, chosen due to its ability to survive on multiple carbon sources. When exposed to a test compound, proteins are expressed by the bacterium in response to the compound. Some examples of the test compounds being used are diethylstilbestrol, caffeine, and 9-aminoacridine, which are either known carcinogens or known not to be carcinogenic. The proteins of the bacteria are isolated, quantified and separated on a gel using two-dimensional gel electrophoresis. By comparing the proteins found during growth with just a benign carbon source to those produced with the same carbon source and a test compound, a protein signature can be determined. The proteins in the protein signature appeared, disappeared, multiplied, or decreased in the presence of a carcinogen and can be identified and form the basis for the new identification method.

North Carolina

Student: Melissa Apperson
Institution: Elon University
Faculty Advisor: Brooke Barnett
Poster title: CNN's Breaking News Coverage of Terrorism Across the Globe
Display Area: 6C
Abstract: This quantitative and qualitative content analysis of the first five hours of CNN's breaking news coverage of the Oklahoma City bombing, the September 11, 2001 terrorist attacks, the 2005 London subway attacks, and the 2006 India train attacks examines journalistic roles and conventions in breaking news situations. Results show that although CNN journalists spent most of their time performing the traditional journalist role, they spent 22% or more of the time as experts, eyewitnesses, or social commentators when covering these breaking news stories. Journalists strayed from everyday norms by reporting unconfirmed reports and rumors. Although not a specific variable for study in the quantitative analysis, qualitative results show journalistic speculation, including suggestions of who could be responsible for the attacks. The type and amount of coverage also differs upon whether the attack occurred on U.S. soil, and the relationship between the country affected and the U.S. For example, during the breaking news coverage of Oklahoma City and 9/11, CNN covered these events exclusively for the five hours studied. The terrorist attacks in India and London were covered for 54% and 91% of the five hours studied, respectively. The international coverage of the London subway attacks was interrupted for an update on the disappearance of American teenager Natalee Holloway, suggesting a potentially troubling ethnocentric focus to U.S. breaking news coverage of international terrorism. This study concludes that when the phrase "breaking news" is associated with coverage of terrorist events, journalists tend to break conventions; with breaking news becoming more customary, journalism conventions could become more relaxed offering less newsworthy coverage.

Student: Kristen Arnett
Institution: University of North Carolina at Pembroke
Faculty Advisor: Paul Flowers
Poster title: Fluorescence spectroelectrochemical sensing for in-situ determination of heavy metal ions.
Display Area: 6D
Funding: National Science Foundation
Abstract: In-situ chemical sensing techniques are increasingly utilized for various applications, including industrial process control, on-site environmental monitoring, and the detection of explosives and chemical weapons. Due to the increasing demand for this technology, a significant research effort is presently being directed towards the development of sensing technologies that exhibit both acceptable performance and good economy. This poster describes progress made by our group on the development of a fiber optic spectroelectrochemical (FOSEC) fluorescence sensor suitable for use in a variety of in-situ measurements. Aqueous copper(II) was chosen as a model heavy metal pollutant, and was used to assess the performance of the FOSEC sensor. Spectral data obtained suggest the sensor may be capable of detecting copper at very low concentrations, making it a potentially useful tool for trace environmental analyses. Preliminary results on the detection of copper using a multi-step analysis scheme are encouraging, though precision and sensitivity issues have been encountered and are presently being examined. This work was supported by funds from the National Science Foundation's Research Experiences for Undergraduates program (CHE- 0353724, Program Officer Richard Foust).

North Dakota

Student: Tiffany Ost
Institution: Valley City State University
Faculty Advisor: Andre Delorme
Poster title: Computer Modeling of Ligands in Ecydsone Receptor
Display Area: 6E
Funding: National Institutes of Health
Abstract: Atrazine, a widely applied herbicide, is used to control broadleaf weeds in corn and other crops. This herbicide has been classified as an endocrine disruptor, which means that it may have significant effects on hormonal pathways in low concentrations. Insect molting is controlled by mainly two hormones, juvenile hormone and 20-hydroxyecdysone. Our project looks at the 20-hydroxyecdysone hormone receptor of Manduca sexta and its binding capabilities with atrazine and other ligands. Our hypothesis is that atrazine will cause a significant disruption, more significant than the other ligands tested, of the 20-hydroxyecdysone pathway in developing larvae. Our goal is to determine if atrazine, BDE-99, BDE-100, Estradiol, Tamoxifen, and Bisphenol A, can bind to the 20-hydroxyecdysone receptor using computational approaches and to determine which one binds most strongly. The homology model of Ecydsone Receptor was downloaded from ModBase (http://modbase.compbio.ucsf.edu). Three-dimensional structures of the ligands were constructed using the SYBYL7.1 suite of programs running under Irix 6.5. The binding pockets of the ecdysone receptor were found using SiteID. The results of SiteID indicated that there were five different binding pockets on the ecdysone receptor. The ligands were then docked into the individual pockets using FlexX. The bound conformations for each ligands were selected based on FlexX score. The FlexX scores revealed that atrazine did indeed bind the best out of the ligands tested. This work was carried out by accessing resources of the Computational Chemistry and Biology Network (CCBN) at North Dakota State University. Supported by NIH grant P20 RR016741 from the NCRR.

Ohio

Student: Sonia Merritt
Institution: Case Western Reserve University
Faculty Advisor: Patrick Mather
Poster title: In Vitro Study of Drug Release Kinetics Using Nanostructured Polyurethanes as Delivery Matrices.
Display Area: 6F
Funding: Boston Scientific Corp
Abstract: In recent years, biodegradable polymers have aroused rapidly growing interest for controlled drug delivery applications. In some cases, the drug delivery matrix (polymer host) is permeable but bio-inert, while in other cases the matrix is biodegradable, releasing drug in proportion to degradation. The present work is part of a broad, multi-researcher, effort addressing uncontrolled drug release through the development of a family of nanostructured, biodegradable polyurethanes: polyhedral oligomeric silsesquioxane thermoplastic polyurethane (POSS-TPU).This polymer was designed with two characteristics in mind: biodegradability through incorporation the degradable poly(d,l lactide-co-caprolactone) constituent and mechanical durability even following extensive degradation through aggregation of the POSS groups. The latter phenomenon leads to robust physical crosslinking at a nanometer length scale. Our present experimental approach involves controlled deposition the POSS-TPU and a proprietary drug onto a metallic substrate followed by quantitative study of in vitro drug release kinetics by exposure to PBS buffer solution (pH = 7.4) at 37 C. Reversed-phase high performance liquid chromatography (HPLC), with a carefully selected "C8" column, was utilized to analyze the concentration of drug released into solution as a function of time. Our initial results of drug release kinetics using a particular POSS-TPU revealed rapid release at early times, obeying a drug diffusion model, followed by slower elution linked to polymer degradation kinetics. Our ongoing research is focused on studying the influence of polymer degradability, drug loading, and coating thickness on the drug release profile of this drug delivery system.

Student: Andrea Herrick, Michael Garee and Kevin Wells
Institution: Ohio Northern University
Faculty Advisor: Terrence Sheridan
Poster title: Measurement of Fundamental Parameters of Two-dimensional Debye Clusters
Display Area: 7A
Abstract: Complex (dusty) plasma is a system of dust particles floating in a normal electron-ion plasma. Micrometer-diameter particles typically acquire a negative charge and float above the lower electrode of a plasma discharge, where the upward electrical force balances the downward gravitational force. Microspheres that are all the same size may float in a single horizontal layer, forming a two-dimensional crystal. This system is very interesting because it is a two-dimensional solid, because the "atoms" (i.e., dust particles)can be easily viewed, and because the number of "atoms" can be varied from one to many thousand. The fundamental parameters of such a complex plasma are the particle charge, the Debye screening length,and the strength of the confining potential well. We have developed a method for determining these parameters by measuring resonance curves for the center-of mass and breathing modes and comparing them to theory. Small elliptical clusters with 15 and 49 particles (9-micrometer diameter) have been created and characterized in the DONUT experiment (Dusty Ohio Northern University experimenT). Resonance curves are determined by amplitude-modulating the radio frequency power that sustains the discharge, thereby exciting oscillatory modes. For these clusters, we find that each particle carries about 15000 electron charges, and that the Debye screening length is between 0.6 and 0.7 mm.

Oklahoma

Student: Abdiwahab Mohamed
Institution: University of Central Oklahoma
Faculty Advisor: Wei Chen
Poster title: Photothermal Effects During Laser Immunotherapy Treatment of Metastatic Tumors
Display Area: 7B
Funding: National Institutes of Health
Abstract: Metastatic tumors are prevalent among cancer patients and they are the major cause of treatment failure and cancer-related deaths. So far, there is no effective treatment modality for metastatic tumors. A new method – laser immunotherapy – for treating metastatic tumors has been developed using a combination of a near infrared laser, a photosensitizer, and an immunoadjuvant. It involves an intratumor injection of the sensitizer/adjuvant solution, followed by local non-invasive laser irradiation. This new modality has produced regression and total eradication of treated primary tumors and untreated metastases at remote sites in pre-clinical and clinical studies. The photothermal effect caused by laser irradiation played an important role in this novel therapy, as a precursor of systemic immunological responses. The tissue temperature distribution in biological tissues during laser irradiation was studied, using infrared camera and needle probe temperature measurement. Monte Carlo method for light tissue interaction and finite difference method for heat diffusion in tissue were used to determine tissue temperature, to provide a comparative study with the experiments. The simulation results are in excellent agreement with that of the experiments. We also investigated various parameters in connection with the achievement of a temperature range sufficient to ablate primary tumor cells and to develop the tumor resistance to metastases by stimulating the host immune system. Our results demonstrated that the photothermal effect in target tumor tissue could be precisely controlled. This could lead to optimal treatment protocols and improved efficacy of the laser immunotherapy.

Oregon

Student: Todd Curtis
Institution: Linfield College
Faculty Advisor: Jennifer Heath
Poster title: Characterization of Electronic Defects in CuGaSe2 Solar Cells
Display Area: 7C
Funding: National Renewable Energy Laboratory
Abstract: Electronic defects limiting the performance of CuGaSe2 (CGS) solar cells have been characterized. These thin film solar cells are promising for next-generation solar cell technology, as their production is relatively inexpensive, they can be grown on a variety of substrates including flexible substrates, and they are a promising component for future tandem solar cell devices. This technology will likely play a key role as we move away from fossil fuel dependence. However, currently the electronic properties of CGS devices are poorer than expected from studies of related films. In this study, limitations on device performance due to electronic defects in the CGS film are distinguished from effects due to defects at the interfaces.

Samples were grown with differing techniques at two different laboratories. Overall device performance is determined using Current-Voltage-Temperature measurements, and the physical properties of the devices are studied with Time of Flight Secondary Ion Mass Spectrometry. Drive-Level Capacitance Profiling and Capacitance-Voltage Profiling measurements indicate the number of electronic defects within the CGS layer and at its interfaces. These techniques verify that lower defect densities in the CGS film generally correspond to higher short-circuit currents and higher overall device efficiencies, although some devices were limited by poor interfaces. This indicates that limitations to device performance differ depending on the growth process and do not appear to reflect fundamental limitations of the CGS material itself. These results can be used to improve CGS deposition techniques and resulting solar cell efficiencies.

Student: Eric Nicholarsen and Phil Matthews
Institution: Western Oregon University
Faculty Advisor: David Foster
Poster title: The Effects of Forming, Member Competence and Self-Esteem on Group Processes and Decision Quality
Display Area: 7D
Abstract: Accuracy of group decisions is seen as dependent on merging information of individual members to produce a result that is better than that of any member alone. The current study predicted a relationship between member self-esteem, task competence, group forming and group performance. Data were collected from 63, three-person groups. Measures included the Rosenberg Self-Esteem Scale for individual self-esteem. Individual and Group Performance were assessed by comparing the decision against a known standard. Group Self-esteem Difference categories were calculated by comparing the self-esteem scores of the most competent with the least competent member. Group Added Value was the residual of group performance with individual member performance statistically removed. Procedurally, participants either engaged in the forming task or read a brief paper on stages of group development. Afterwards participants completed two decision making tasks first individually, then as groups. An ANOVA showed a significant interaction between Forming and Self-esteem Difference ($p < .05$). Groups whose least competent member had higher self-esteem than the most competent member and did not engage in the forming task performed significantly worse compared to the other groups. Exploratory analyses of group processes revealed that members of these poorest performing groups used significantly more "I" statements compared to the other groups. These analyses also showed that the least competent members of these poorest performing groups talked significantly more than the least competent members of the other groups. These results suggest that personality and environmental variables jointly shape group members' behavior. Further results and their implications are discussed.

Pennsylvania

Student: Leanne Tyler
Institution: Gettysburg College
Poster title: Rebel Factions and Sustainable Peace: An Empirical Investigation of Civil Wars
Display Area: 7E
Funding: Andrew W. Mellon Foundation (New President's Grant to Gettysburg College)
Abstract: During the past half century, the nature of warfare has been changing as intrastate wars have replaced interstate wars as the conventional form of conflict. In a post-conflict environment, the ability of ex-combatants and former enemies to collaborate for the purpose of reforming national institutions is essential to attaining sustainable peace. Our research examines the impact that the fate of the groups that participate in civil wars has on the type of political regime that emerges in the wake of civil wars. Factions may experience any one of several fates at the end of a civil war: some groups may emerge victorious and go on to make up the core of the post-war government; other groups' organizational identity may be preserved by negotiated settlements that give them a place at the political center; some groups may be allowed to survive but in some altered form; and other groups' organizational identities may be wiped out via arrest, exile, or death. We distinguish between these "fates" for the groups that participated in the 108 civil wars that were fought and at one point ended during the period between 1945 and 1999. We use this data to examine what effect the fate of these groups has on the type of political regime to emerge in the wake of civil wars in the countries that experienced these conflicts. Due to the devastating effect of civil wars on a country's social, political, and economic development, it is imperative that the international community devise ways to peacefully include warring factions in the institution-building process as a means of preventing future conflict.

Student: Kenneth Houser and Timothy Garrett
Institution: Lebanon Valley College
Faculty Advisor: Marc Harris
Poster title: Tunable oligomeric nano-devices synthesized from an ethoxy backbone that serve as highly efficient and selective molecular hosts for ion guests, such as Cs-137 radionecleotides
Display Area: 7F
Funding: National Science Foundation
Abstract: Now more than ever there is an immediate need to develop viable and sustainable energy technologies that operate independent of petroleum sources. This shift results from changing political climates, economic forces, sustainability issues, and environmental concerns. In response, current administration officials have allocated significant research money towards future "hydrogen-based devices" and advocated a recommitment to current nuclear technologies. The largest drawback to nuclear energy is the radionucleotide waste material, such as Cs-137, Co-60, and Pu-239 that is generated by fission reactors. Current research efforts have focused on the remediation of these nucleotides through molecular encapsulation, membrane filtration, or carbon nanotube binding.

Our group focus is on the design of highly tunable ethoxy-bridged bipyridine oligomers that encapsulate small cationic guests. The ion pair complexes that result follow the novel "same-fit" concept of host ether pocket size to guest ionic radii. One such complex containing a 25-atom pocket with one nitrogen and six oxygen donor atoms displays excellent selectivity and extraction efficiency (>98% extraction) for large Cs cations. Upon coordination of a photo- or electro-active metal center to the peripheral bipyridine units, these flexible complexes contain the ability to report the successful encapsulation of a guest ion. In addition, these complexes are recyclable through a pH dependent ion stripping mechanism. At low pH the pyridyl nitrogen donor atom is protonated favoring the empty pocket and upon basification the oligomer is recycled back to its active form. This poster presents the syntheses of these oligomers along with ion extraction selectivity and efficiency data.

Student: Matthew Batina
Institution: Slippery Rock University of Pennsylvania
Student: David Fujii
Faculty Advisor: Julie Snow
Poster title: Air quality in western Pennsylvania: Variability in atmospheric transport and its impact on boundary layer SO2
Display Area: 8A
Abstract: Within the United States, the Mid-Atlantic region receives the highest sulfate loadings. High sulfate loadings can result in increased health problems to populations already at risk, such as children and the elderly, and increased acid rain deposition. This study investigates the variability in atmospheric transport patterns to seven ground-based EPA monitoring sites as part of an ongoing study of regional atmospheric SO2. Atmospheric transport pathways and precipitation patterns along the pathways were examined using NOAA HYSPLIT back trajectories. A model was developed that integrates HYSPLIT outputs to describe regional transport patterns as they relate to surface SO2 emission sites. The model includes elevation, transport speed, precipitation, and potential source locations. Transport pathways were dominated by westerly winds from the Ohio River Valley but also included re-circulation from industrial and urban sites to the east. The observations indicate that regional SO2 concentrations, transport pathways, and potential SO2 source locations vary considerably over relatively small geographic areas. This suggests that further research on regional pollution must include finer scale examinations of regional circulation patterns.

Rhode Island

Student: Joshua Malouin
Institution: Providence College
Faculty Advisor: Nicanor Austriaco
Poster title: Characterization of the Anti-Apoptotic Gene, Bax Inhibitor-1 (BXI1), in the Yeast, Saccharomyces Cerevisiae
Display Area: 8B
Funding: Rhode Island INBRE
Abstract: Apoptosis or programmed cell death (PCD) is required for the removal of infected, damaged, or unwanted cells in development and disease. It is mediated by a distinct molecular pathway inside the cell, which includes members of the Bcl-2 family. One of these members, Bax, plays an important role in the pro-apoptotic response. Bax is a protein that appears to disrupt the mitochondrial membrane leading to apoptosis. It is found in a wide range of organisms. Bax Inhibitor-1 (BI-1) was first identified by its ability to block Bax-induced apoptosis in the budding yeast, Saccharomyces cerevisiae. It is one member of the Bcl-2 family of proteins that regulates programmed cell death. BI-1 is a conserved protein found among numerous animal and plant species including yeast. It has been shown to be overexpressed in many forms of cancer, such as prostate cancer and colon cancer. Studies in the mammalian system localized BI-1 to ER membranes, suggesting that it regulates an apoptosis pathway linked to endoplasmic reticulum stress. We are currently characterizing the yeast homolog of BI-1, which we are calling BXI1, by analyzing null mutants and overexpression stains of BXI1. Our recent work has linked BXI1 to endoplasmic reticulum stress and the Unfolded Protein Response (UPR) in yeast.

South Carolina

Student: Adam Dean
Institution: College of Charleston and Clemson University
Faculty Advisor: Chad Sosolik, Clemson University
Poster title: Tracking an Evolving Surface Using Scanning Tunneling Microscopy
Display Area: 8C
Funding: National Science Foundation
Abstract: In this work, we have explored the use of the scanning tunneling microscope or STM as a tool to probe the time evolution of surface morphology with sub-nanometer resolution. Specifically, we created island and vacancy features on a Ag(111) substrate by three distinct methods: sputtering of the surface with Argon ions, controlled crashing of the STM tip into the surface, and scanning the

STM tip across the surface with a gap voltage significantly higher than the typical imaging voltage. Each of these methods created hexagonal vacancies and islands, reflecting the underlying symmetry of the (111) surface. To enhance our data acquisition capabilities for these measurements, two software packages (Macro Scheduler and the Scanning Probe Image Processor) were integrated with our commercial STM control software (SCALA 5.0). This integration allowed us to automate large portions of the data acquisition and facilitated the user tracking of specific features for up to five hours at a time. Our results reveal that the tip crashing technique gives the most well-defined control over the surface modifications. When paired with our new automated software controls, STM tip crashes may prove to be an efficient method for creating features and collecting long time-scale statistics on surface diffusion processes.

Student: Teresa Mark
Institution: University of South Carolina - School of Medicine
Faculty Advisor: Sarah Sweitzer
Poster title: Vaso-occlusive Pain Early In Life Increases Acute Procedural Pain In the Pediatric Sickle Cell Population
Display Area: 8D
Funding: NIH - National Institute of General Medical Sciences
Abstract: Children with Sickle Cell Disease (SCD) experience significant painful vaso-occlusive episodes (VOEs) and increased rates of routine painful medical procedures to monitor disease severity and progression. The first VOE may occur as early as six months, but age of onset, frequency, and severity vary. Limited understanding of the mechanisms precludes effective SCD pain treatment. Studies of premature infants and male infant circumcision at birth indicate painful experiences early in life affect the developing nervous system and alter pain sensation. Little is known regarding the impact of VOEs on subsequent pain experiences. This study used a multi-method evaluation of pain in response to a routine venipuncture across three age groups (2-4, 5-9, & 13-18 years) of children with SCD. Venipuncture pain was evaluated via heart rate changes, parent and child pain reports, and observations of behavioral distress. This investigation is the first to conduct a multi-method evaluation of procedural pain across age. Change in heart rate, pain reports, and behavioral distress decreased as age increased. Data was also analyzed to compare the affect of VOE onset prior versus after 3 years. Patients whose first episode occurred in the first 3 years of life exhibited greater increases in heart rate, higher pain reports, and more behavioral distress. These data indicate venipuncture pain is greater for younger children and painful VOEs early in development sensitize a child to acute procedural pain later in life. These findings emphasize the importance of pain management during both routine painful procedures and VOEs especially in younger children.

South Dakota

Student: Luke Hofkamp
Institution: University of South Dakota
Faculty Advisor: Barry Timms
Poster title: Region-specific Growth Effects In the Developing Rat Prostate Following Fetal Exposure to Estrogenic Ultraviolet Filters.
Display Area: 8E
Funding: National Institute of Environmental Health Services
Abstract: Environmental endocrine disrupters are potential risk factors for humans. Many of these chemicals have been shown to exhibit disruption of normal cellular and developmental processes in animal models. Ultraviolet (UV) filters used as sunscreens in cosmetics, or additives in plastics, furnishings and household products, have previously been shown to exhibit estrogenic activity using in vitro and in vivo assays. The two UV filters examined in this study were 4-methylbenzylidene camphor (4-MBC) and 3-benzylidene camphor (3-BC). Pregnant Long Evans rats were fed diets containing doses of the chemicals that resulted in average daily intakes of 7.0 mg/kg and 0.24 mg/kg body weight for 4-MBC and 3-BC respectively, corresponding to effective doses in prior studies. On postnatal day 1, the whole pelvic region of males from control and exposed animals was removed and processed for histological serial sections. Using digital photographs, the epithelial ducts from specific regions of the developing prostate, plus the seminal vesicles and coagulating gland were identified, contoured and aligned. The total volume for each region was calculated from 3-dimensional, surface-rendered models

using Winsurf® software. Fetal exposure to 4-MBC (but not 3-BC) resulted in a significant increase in ductal volume in the coagulating gland, seminal vesicles, dorsolateral and ventral prostate compared to the untreated males. For both compounds there was a 60-85% increase in the number of ducts in the dorsal prostate. In the ventral ducts, increased distal branching morphogenesis appears to be a consequence of exposure. These dose levels are within the range of calculated human systemic exposure.

Tennessee

Student: Brent Stephens
Institution: Middle Tennessee State University
Faculty Advisor: Xiaoya Zha
Poster title: Enumeration of Orientable Embeddings of Odd Graphs
Display Area: 8F
Funding: MTSU Undergraduate Research Council
Abstract: The odd graph O_k is the graph formed by taking the vertex set to be the (k-1)-subsets of a (2k-1)-set, and letting two vertices be adjacent if the k-subsets are disjoint. We provide a characterization of the automorphism group for odd graphs and we develop a means to enumerate their embeddings based on the method developed by Mull, Rieper, and White in 1988. The idea is to find the cardinality of the fixed set for arbitrary automorphisms and then to apply Burnside's Lemma. We are able to take advantage of the symmetry of odd graphs and produce a number-theoretic formula for the number of distinct orientable embeddings of the odd graph O_k.

Texas

Student: Ian Bothwell
Institution: Southwestern University
Faculty Advisor: Martín Gonzalez
Poster title: Developing a Model for MucAB Mutagenesis: Examination of Posttranslational Pathways for MucA/MucA' Regulation in Escherichia coli.
Display Area: 9A
Funding: National Institutes of Health - National Institute of General Medical Sciences
Abstract: DNA mutations are responsible for a number of diseases and medical conditions, such as cancer. Interestingly, a broad spectrum of organisms, from humans to bacteria, produce enzymes known as "error-prone" DNA polymerases that replicate DNA and, under certain conditions, allow for mutations to occur. Understanding the regulation of these "error-prone" DNA polymerases will enhance our understanding of mutation-based disease states. We study these DNA polymerases using Escherichia coli because this bacterium is genetically well defined and has proven to be an economical means of studying the "nuts and bolts" of our molecular existence. Specifically, we study the regulatory processes of a set of proteins capable of forming an "error-prone" DNA polymerase: the MucAB proteins. The regulation of the MucAB proteins is of special interest for two major reasons: (1) the polymerase complex they form has been shown to be more mutagenic than polymerase complexes formed by other proteins, and (2) the mucAB operon is naturally found on a plasmid, which grants it a greater capacity to traverse between species. Intrigued by these characteristics, we have performed in vivo experiments to more closely examine how these proteins interact and are regulated. Based on our results, we have shown striking differences between the posttranslational regulation pathways of MucAB and other, more extensively studied DNA polymerases.

Utah

Student: Kristena Kons
Institution: Weber State University
Poster title: The Effects of Timed Exposure to Light Therapy on Melatonin Suppression in Air Traffic and Weapons Controllers: A Fatigue Countermeasure
Display Area: 9B
Funding: National Science Foundation
Abstract: Shiftwork is essential for military personnel working in a 24/7 environment. Many accidents that occur during shiftwork can be pinpointed to fatigued workers with desynchronized circadian rhythms. Fatigue-related accidents cost the U.S. Air Force $54 million annually, and given the nature of military personnel, these errors also threaten homeland security. Researchers have found that exposure to bright light resynchronizes circadian melatonin rhythms, reducing the amount of fatigue during shiftwork. This study examined whether timed exposure to light therapy would act as a fatigue countermeasure, reducing cognitive and physiological fatigue. Participants included 13 military air traffic and weapon controllers working rapidly rotating shiftwork schedules. Salivary melatonin samples and a computerized cognitive task developed by the military (SynWin) were used to measure physiological and cognitive fatigue. Fatigue measures were taken before and after the administration of light treatment once at the beginning of the morning/day shifts and once at the end of the swing shift. Melatonin and SynWin data were analyzed with a 2 x 2 (shift x light therapy) repeated measures MANOVA. Difference scores were used to condense the means of the pre-test/post-test data. The administration of light treatment resulted in an increased performance in SynWin scores for participants working the morning/day shifts. Light administration significantly suppressed melatonin levels during the swing shift, phase delaying melatonin circadian rhythms. The present findings demonstrate the feasibility of using an inexpensive and portable light therapy device during swing and night shifts in military settings to decrease fatigue related errors among military personnel.

Vermont

Student: Lee Corbett
Institution: Middlebury College
Faculty: Jeff Munroe
Poster title: Vermont Terroir: Investigating the Relationship Between Maple Syrup Chemistry and Bedrock Lithology
Display Area: 9C
Funding: Middlebury College Endowed Chair Fund- Stewart Professor of English for John Elder
Abstract: Maple sugaring is a key component in the cultural and environmental identity of Vermont. Currently, however, small-scale Vermont sugarmakers are having a difficult time competing in a market that is increasingly dominated by syrup imitations and large commodity producers. Terroir, the idea that the taste of food is intimately linked to the place where it is produced, may help these small Vermont sugarmakers find a market niche.

It is widely known among syrup producers that the taste of unblended syrup varies greatly between sugarbushes, but most consumers have not realized that syrup shares this characteristic with other place-based foods such as wine and cheese. Accordingly, this study was designed to explore how the geologic underpinnings of terroir, specifically bedrock lithology, relate to Vermont maple syrup. Defining this link will have important implications for Vermont culture and forest sustainability.

Eighteen small-scale producers were chosen from across Vermont, distributed on three bedrock types: limestone, shale, and pelitic schist. Chemical compositions of sap and syrup samples from each sugarbush were analyzed by ICP-AES. Five elements, (Ba, Ca, K, Mg, and Si) have notably different concentrations in sap and syrup from the three rock types, indicating that bedrock lithology plays a role in defining syrup chemistry. In syrups, differences in Mg and Si are particularly significant. Furthermore, double-blind taste tests reveal that consumers can detect the differences between syrups produced on different rock types to a high level of accuracy. Future work will explore these results through consideration of soil chemistry and syrup composition.

Student: Kristen Pelz
Institution: Middlebury College
Faculty Advisor: Helen Young
Poster title: Effects of landscape context and floral resources on bumblebees in New England
Display Area: 9D
Funding: Middlebury College Palen Fund
Abstract: Pollinator decline is of critical concern worldwide. In addition to the loss of native pollinators' functional role in local ecosystems, their loss is alarming from an economic perspective. This is because domestic honeybee colonies (which provide up to $40 million in pollination services nationally) are experiencing high mortality rates due to mite infestation. Their role as pollinators of crops could be filled by native bumblebees. In order to protect these bumblebee populations we must understand their habitat requirements. Recent studies have highlighted the need to look at what affects their populations at a landscape scale, which has been done using GIS in Europe and California, but never before in New England. We studied bees at the flowers they visited in meadows and old-fields of varying sizes and degrees of isolation from both other meadows and from forests. Agricultural fields (corn, alfalfa, and pasture) and urbanization add to the fragmented landscape that these pollinators navigate. Using GIS, we examined the effects of different land-use cover on bumblebee abundance. The proportion of visits to flowers by bumblebees was positively associated with percent forest cover, suggesting forested areas may be critical to bumblebee populations, likely because they provide vital nesting habitat. In addition, bumblebee abundance increased with increasing distance to honeybee colonies and with the proportion of the plant species that are native in the fields. These results suggest that bumblebee abundance is affected by many factors: forest cover (nesting habitat), density of honeybees (competition), and floral composition in fields (floral morphology).

Virginia

Student: Whitney Matthews
Institution: Virginia Military Institute
Faculty Advisor: Patricia Hardin
Poster title: Through the eyes of the artist: The Diary and Letters of Käthe Kollwitz
Display Area: 9E
Funding: VMI
Abstract: Käthe Kollwitz (1867-1945), a major artist at the turn of the nineteenth century, left behind a diary and numerous letters. Through her diary, letters, and artistic works, Käthe Kollwitz, an artist, a mother, a wife, and a friend, exposes the plight of the working class during the tumultuous socio-economic changes of that time, the impact of a modern war on the individual and society, and the role of the artist in expressing the uncertainty and fears of the larger society. These extant primary materials not only present unique insight into the life of a middle-class woman artist but also provide a glimpse into how women lived, worked, and struggled during a significant time in the changing role of women in society. Kollwitz thus stands as an example for all the women of her time. Through an examination of Kollwitz's diary and letters, this research explores the tremendous changes in society that took place at the turn of the nineteenth century through the eyes and life of a significant woman artist of the time. Research for this project was collected in Berlin, Germany at the state library and at archives.

Student: Sarah Remmert
Institution: University of Richmond
Faculty Advisor: Carol Parish
Poster title: Conformational Analysis of HIV gp41 Inhibitors
Display Area: 9F
Funding: American Chemical Society – Petroleum Research Fund
Abstract: Identification of inhibitory molecules targeting various proteins essential to the HIV lifecycle is necessary for effective anti-viral therapy, especially given growing viral resistance to available drugs. Gp41 – an HIV membrane protein responsible for fusion of the viral particle with the host cell – is an emerging target for inhibition. In particular, inhibition of this protein would arrest the HIV lifecycle prior to infection of CD4+ TH cells. In combination with currently available therapies for other viral proteins, development of drugs targeting gp41 is a promising field of research.

Nine potential inhibitors of gp41 were characterized by classical mechanical conformational searching techniques using the Schrödinger software package. Mixed low mode and Monte Carlo searching techniques were performed to exhaustively sample the OPLS2005/GBSA(water) potential energy surface of trisubstituted cyclohexane and benzene derivatives of C3 symmetry. Geometric structure, molecular length, and hydrogen bonding patterns were analyzed. Non-aromatic compounds exhibited exclusively chair conformation geometry at low energies, with a preference for axial or equatorial substituent positions depending upon the presence of additional ring substituent methyl groups. Increasing chain length often resulted in overall shorter molecular length, due to additional chain flexibility. These results were consistent with two dimensional temperature dependent NMR studies.

Washington

Student: Stephanie Bryner
Institution: Central Washington University
Faculty Advisor: Carin Thomas
Poster title: Correlation of Atmospheric Ultrafine Particle Iron and Mitochondrial Toxicity.
Display Area: 10A
Funding: National Institute of Environmental Health Science : AREA Grant
Abstract: Atmospheric ultrafine particles (UFPs, <0.1 μm diameter) have been shown to induce oxidative stress in murine macrophages and bronchial epithelial cells and to disrupt mitochondrial membrane ultrastructure. To further our understanding of the underlying mechanisms that control UFP toxicity, bovine heart mitochondria were exposed to atmospheric UFPs collected in rural Washington state and tested for reactive oxygen species production, lipid peroxidation and electron transport chain function. Particular focus was on the effect of UFP ferrous ion as determined spectrophotometrically and on surface chemical composition analyzed by time of flight secondary ion mass spectroscopy (TOFSIMS) and x-ray photoelectron spectroscopy (XPS). Results indicate that the extent of mitochondrial electron transport chain inhibition correlates with ferrous ion concentrations in UFPs even in the absence of detectable hydrogen peroxide production.

Student: Heidi Wilken, Donald Warren and Catherine Overstreet
Institution: North Seattle Community College
Faculty Advisor: Ann Murkowski
Poster title: Carbon Dioxide Evasion in Puget Sound Wetlands: Implications for Balancing the Carbon Budget
Display Area: 10B
Abstract: In this century, increasing concentrations of carbon dioxide (CO2) and other greenhouse gases in the Earth's atmosphere are expected to cause warmer surface temperatures and changes in precipitation patterns. Gaining a better understanding of CO2 sources and sinks on a global scale is therefore essential to managing potential impacts on humans and ecosystems. Importantly, recent research in the tropics has indicated that out-gassing of CO2 from rivers and wetlands of the central Amazon basin constitutes a significant carbon loss that was previously unidentified through traditional ground-based measurement1. In order to gain a better understanding of how the Puget Sound wetlands in Western Washington contribute to the carbon budget, we measure and quantify CO2 out-gassing from a local wetland environment using an infrared gas analyzer (IRGA). Results suggest that

atmospheric CO2 exchange rates increase with water depth, indicating that estimates should involve depth measurements as well as correct for seasonal variance in precipitation. This work, in conjunction with diurnal monitoring, supports the suggestion that significant evasion of CO2 occurs in freshwater ecosystems and should continue to be measured and included in global carbon cycle models.

1. Ritchey, J. E., Melack, J. M., Aufdenkampe, A. K., Ballester, V. M., & Hess, L. L. Out-gassing from Amazonian rivers and wetlands as a large tropical source of atmospheric CO2. Nature, 416, 617-620 (2002).

West Virginia

Student: Richard Merritt, Saeed Keshavarzian, Tom Cuchta, John Fishman and William Morris
Institution: Marshall University
Faculty Advisor: Bonita Lawrence and Clayton Brooks
Poster title: Integrating in the Future with Respect to the Past
Display Area: 10C
Funding: John Marshall Foundation
Abstract: In the 1930's, Vannevar Bush built a machine designed to solve and graph the solution of an ordinary differential equation, called a differential analyzer. Later, Douglas Hartree and his student Arthur Porter built a scale model based on Vannevar Bush's original machine out of Meccano parts. Marshall University has gathered together a team of talented mathematics students to rebuild Porter's design. The team has built a two-integrator model that solves second order linear differential equations, and is currently building a four-integrator differential analyzer. This will solve non-linear and higher order differential equations and plot graphs of solutions. Marshall University supports this program for several reasons, one of which is for the research studies of the mathematics department. With mechanical integration, one can avoid numerical approximations. Another reason is that working with the machine provides students the opportunity to get hands-on-experience using applied mathematics. One educational benefit is to use the machine as a teaching tool. Studying the machine offers students visual insight into how integration works in the mechanical sense, as opposed to using a calculator, which is a "black box". Students can see the internal components while it is running, and instead of microchips, there are interconnecting gears. In addition to all of these benefits, students will also benefit by applying concepts from other fields of mathematics in addition to calculus. Students interested in geometry, foundations of engineering, physics and mathematical modeling can benefit from setting up problems and watching the machine describe the equations visually.

Wisconsin

Student: Jameson Bothe
Institution: University of Wisconsin - La Crosse
Faculty Advisor: Keith Beyer
Poster title: Experimental Study of the Human Impact on Cirrus Cloud Formation
Display Area: 10D
Funding: National Science Foundation
Abstract: Aqueous atmospheric aerosols in the troposphere are known to contain ammonium, nitrate, and sulfate ions in varying ratios. These particles absorb and scatter solar radiation dependent upon their phase, thus contributing to the radiation balance (greenhouse effect). They may play a significant role in the probability of atmospheric reactions that occur on the surface of the aerosol. These particles can also be found at cirrus cloud altitudes under strong convective conditions where they could serve as cloud condensation nuclei (CCN), and thus impact the formation of these clouds. Therefore, understanding crystallization in these particles is critical.

We have studied the thermodynamic properties of the ammonium nitrate/ammonium sulfate/water system using differential scanning calorimetry (DSC) and infrared spectroscopy of thin films at temperatures relevant to the upper troposphere which is a temperature range not previously investigated. Combining melting point data from the literature with our data, we constructed a temperature-contour ternary phase diagram for the ammonium nitrate/ammonium sulfate/water system. We have compared our experimental data to the predictions of the Aerosol Inorganics Model and have found significant differences. The melting temperatures mapped on our ternary phase diagram may have broad implications for the earth's radiation balance due to the newly predicted temperatures at which crystalline phases can exist in atmospheric particles.

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

1	**2**	**3**	**4**	**5**		**6**	**7**	**8**	**9**	**10**
A/D	**A/D**	**A/D**	**A/D**	**A/D**		**A/D**	**A/D**	**A/D**	**A/D**	**A/D**
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B/E	**B/E**	**B/E**	**B/E**	**B/E**		**B/E**	**B/E**	**B/E**	**B/E**	**B/E**
C/F	**C/F**	**C/F**	**C/F**	**C/F**		**C/F**	**C/F**	**C/F**	**C/F**	**C/F**
1	**2**	**3**	**4**	**5**		**6**	**7**	**8**	**9**	**10**

Entrance **Entrance**

Participants

Alaska
University of Alaska Anchorage
Arkansas
Henderson State University
Arizona
University of Arizona
California
California State University, Fullerton
Dominican University of California
University of California, Los Angeles
University of California, Los Angeles
Connecticut
Connecticut College
Florida
Florida Institute of Technology
Stetson University
University of North Florida
Georgia
Fort Valley State University
Hawaii
Chaminade University of Honolulu
Iowa
University of Northern Iowa
Illinois
Bradley University
Southern Illinois University at Carbondale
Kansas
Kansas State University
Louisiana
University of Louisiana Monroe
Maine
Bridgewater State College
Maryland
St. Mary's College of Maryland
McDaniel College
Michigan
Hope College
Minnesota
College of St. Benedict
Missouri
University of Missouri-Columbia
Montana
Montana State University
Nebraska
Creighton University
University of Nebraska at Kearney
New Jersey
Monmouth University
New York
Alfred University
Canisius College
Rochester Institute of Technology
North Carolina
Elon University
University of North Carolina at Pembroke
North Dakota
Valley City State University
Ohio
Case Western Reserve University
Ohio Northern University
Oklahoma
University of Central Oklahoma
Oregon
Linfield College
Western Oregon University
Pennsylvania
Gettysburg College
Lebanon Valley College
Slippery Rock University of Pennsylvania
Rhode Island
Providence College
South Carolina
Clemson University
College of Charleston
University of South-Carolina School of Medicine
South Dakota
University of South Dakota
Tennessee
Middle Tennessee State University
Texas
Southwestern University
Utah
Weber State University
Vermont
Middlebury College
Virginia
Virginia Military Institute
University of Richmond
Washington
Central Washington University
North Seattle Community College
West Virginia
Marshall University
Wisconsin
University of Wisconsin – La Crosse