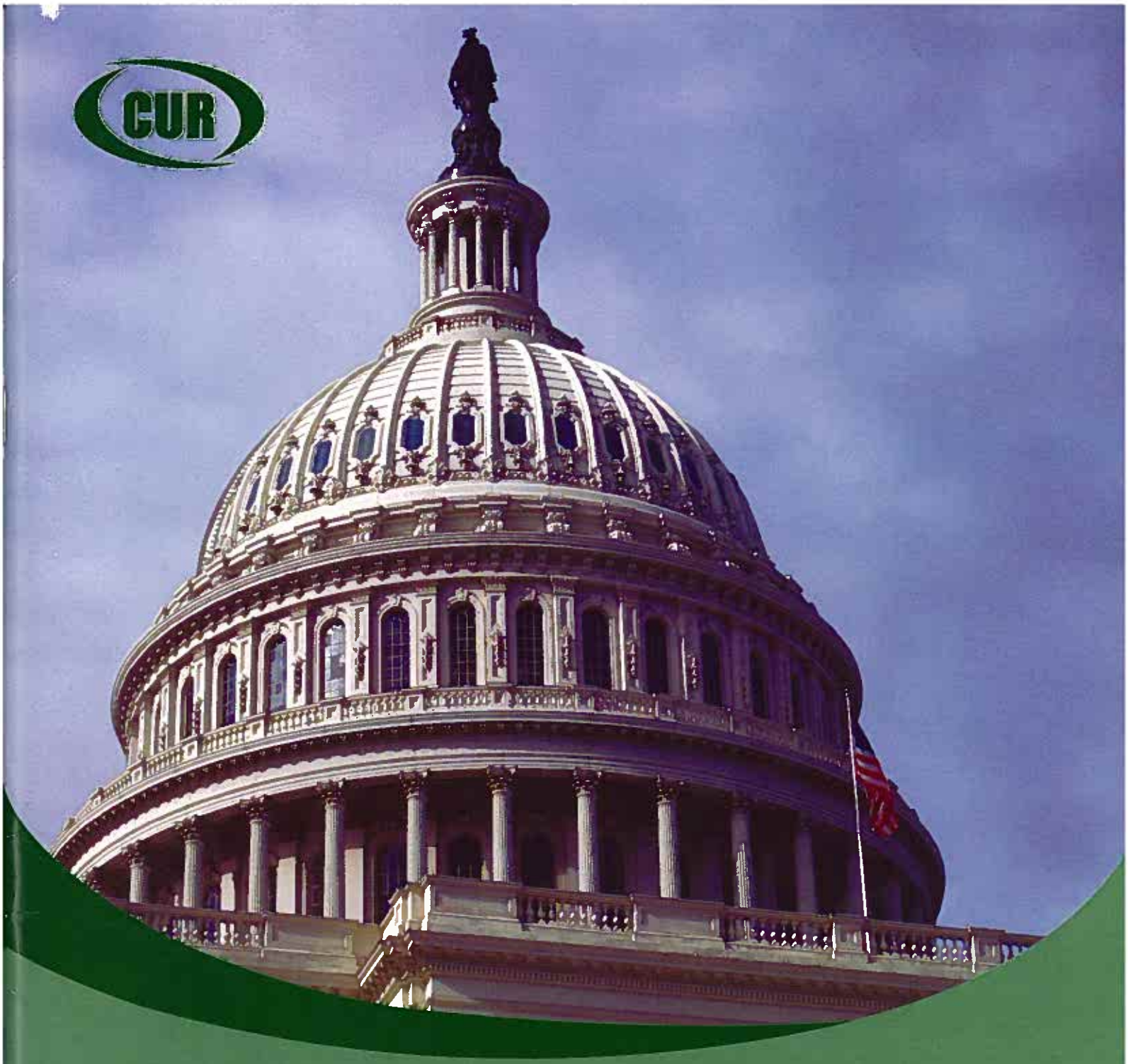


Council on Undergraduate Research

2006 POSTERS ON THE HILL

April 25, 2006

Rayburn House Office Building
Washington, DC

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

- American Psychological Foundation & Council on Undergraduate Research
- Center for Integrative Natural Science and Mathematics
- Defense Advanced Research Projects Agency
- Department of Defense
- Department of Energy -National Nuclear Security Administration via Laboratory Laser Energetics
- Eli Lilly III Internship
- EPSCoR of the National Science Foundation
- Howard Hughes Medical Institute
- Inter-Disciplinary Experimentation And Scholarship/JOVE
- M. J. Murdock Charitable Trust
- Merck-SURF Program
- National Aeronautics and Space Administration
- National Cancer Institute
- National Institute of Justice
- National Institute of Mental Health
- National Institutes of Health
- National Science Foundation
- Nebraska EPSCoR (NSF)
- Partnership for Innovation
- Research Corporation
- US Environmental Protection Agency
- US Forrest Service

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

Dear Posters on the Hill Participants:

I wish to congratulate you on your selection to participate in the 2006 Posters on the Hill. Your research project was selected from 300 applications, the most applications we have had in the history of Posters on the Hill.

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
Executive Officer

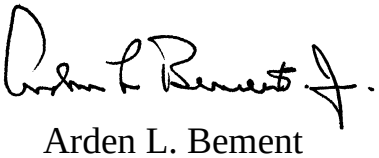
Congratulations to the Participants of the Annual “Posters on the Hill” Competition!

It is exciting to anticipate that 300 students have results from a research project to present in an annual poster session competition sponsored by the Council on Undergraduate Research.

Congratulations to those selected to participate in the “Posters on the Hill,” event and best wishes to all who competed. Know that you are the future scientists and engineers that our Nation needs to progress and prosper.

Hopefully, many of you will have an opportunity to participate in some of the National Science Foundation-sponsored research and education activities. Good luck.

Sincerely,



Arden L. Bement
Director

,

Program

April 24, 2006

Field Trips

12:00 Noon — NASA and NIH field trip participants meet in hotel lobby and depart

1:15 pm — Natural History Museum field trip participants meet in hotel lobby and depart for Museum

Orientation Session

6:00 pm — American Chemical Society – Marvel Hall
1155 Sixteenth Street, NW
Washington, D.C. 20036

Speaker - James Brown
Senior Legislative Associate
How to Talk to Your Representative

*Light Dinner will be served

April 25, 2006

Morning Session - Rayburn House Office Building - B-339

8:30 am — Continental Breakfast

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

Keynote – Julia Warner, Ph.D.
Legislative Assistant
Congressman Vernon J. Ehlers

9:45 am — Certificate Presentation

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

Poster Session - Rayburn House Office Building - B-338, B-339, B-340

3:30 – 5:00 pm — Poster set-up

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

7:30 pm — Break down posters

Student Poster Abstracts

Arizona

POSTER TITLE: Genetic and Biochemical Analyses of Genetically Engineered Lethal Viral Assembly Proteins
STUDENT: **James Cherwa**
FACULTY: Bentley Fane
INSTITUTION: University of Arizona
FUNDING: National Science Foundation
DISPLAY AREA: 1A
Abstract:
Scaffolding proteins often mediate the efficiency and fidelity of viral morphogenesis. Analogous to scaffoldings used in building construction, scaffolding proteins provide a template upon which to place structural components. Following the assembly of the procapsid, an immature virus particle, scaffolding proteins are removed and not found in the mature virion. There are 240 subunits of the phiX174 scaffolding protein per procapsid. The subunits form asymmetric tetramers that are associated primarily with one coat protein. Each subunit in the tetramer has a unique structure, which is governed by its specific interactions with coat and neighboring scaffolding proteins within the lattice. The procapsid crystal model suggests that the ability of a particular alpha-helical region to assume two different conformations is critical to lattice formation. To test this hypothesis, mutations designed to lock this helix into one conformation were introduced into a cloned gene. The mutant proteins were expressed in vivo. Expression efficiently inhibited wild-type assembly, viability falling six orders of magnitude. These data indicate that the mutant proteins interact with wild-type subunits and prevent procapsid assembly, which has been verified by a direct biochemical analysis. Viruses resistant to the dominant lethal proteins arose at a frequency of 10e-6. The responsible amino acid substitutions are located in the coat protein. They may create coat proteins that exclude lethal scaffolding proteins or accommodate them productively. Experiments to distinguish between these two models are currently being performed. The results of this analysis demonstrate how genetically engineered scaffolding proteins could be developed into antiviral therapies.

California

POSTER TITLE: Defining Yellow-bellied Marmot Matrilines Using Association Indices
STUDENT: **Deepa Nanayakkara**
FACULTY: Daniel Blumstein
INSTITUTION: University of California, Los Angeles (UCLA)
FUNDING: NA
DISPLAY AREA: 1B
Abstract:
The level of association between individuals of a given species may vary widely: animals in a social population may show random association or preferred association and/or avoidance of association. Unlike highly social marmots that live in well-defined and physically isolated social groups, yellow-bellied marmot matrilines (female kin groups) may be immediately adjacent to each other. Previously, patterns of space use overlap were used as an indirect measure to define foraging and social groupings of yellow-bellied marmots (Frase & Armitage 1984; Armitage 1986); however, this method has some limitations. Here, we evaluate to the utility of using association indices to define matrilines of yellow-bellied marmots (Marmota flaviventris).
We analyzed locational data collected by trapping and regular observations using the program SOCPROG 2.2 (Whitehead 2004), a program traditionally used to study marine mammal associations from observational data. We first focused on simple matrilines (i.e., those with only a single adult female) to explore various analysis options and then applied them to interpret association patterns in more complex social groups. We suggest that matrlines can be defined as groups containing those individuals with a ≥ 0.5 association index. Given our sampling protocols, sufficient data were obtained only when we used the year as the unit of analysis. When

applied to more complex social groupings, this criterion meshed with observers' intuitive group memberships. In conclusion, calculating association indices using SOCPROG is a novel way to describe marmot association patterns and to define matrilines quantitatively.

POSTER TITLE: Potential Treatment Strategies to Improve Nuclear Shape Abnormalities in Diseased Fibroblasts
STUDENT: **Stephanie Young & Sandy Chang**
FACULTY: Loren Fong
INSTITUTION: University of California, Los Angeles
FUNDING: NA
DISPLAY AREA: 1C
Abstract:
Hutchinson-Gilford Progeria Syndrome (HGPS) is a genetic disease that causes premature and accelerated aging in children. HGPS patients show loss of body hair and subcutaneous fat, osteoporosis, and atherosclerosis that causes death at an average age of thirteen. HGPS is caused by an accumulation of progerin (a mutant form of prelamin A) at the nuclear envelope, which in turn causes misshapen nuclei. Prelamin A is the precursor molecule to lamin A, a protein essential for maintaining the structural integrity of the nucleus. Our lab showed that if these precursor proteins are redirected away from the nuclear envelope by blocking protein farnesylation, (via a farnesyltransferase inhibitor, or FTI) nuclear shape abnormalities are significantly reduced, suggesting a possible treatment strategy for "lamin A diseases" such as HGPS. We tested whether the FTI-based therapeutic strategy might also be applicable to diseases associated with mutations in lamin A and lamin C, alternatively spliced products of LMNA. This would broaden the scope of "treatable" laminopathies. Cells with the Lmna mutation N195K have misshapen nuclei and results in a cardiomyopathy in mice. We performed cell culture, immunofluorescence staining, and western blotting. We found, based on the frequency of defective nuclei by fluorescence microscopy, that the FTI-treated N195K cells had significantly fewer nuclear blebs and folds than vehicle-treated cells. We are currently testing Emery-Dreifuss muscular dystrophy human fibroblasts to determine whether an FTI will be effective in resolving their nuclear shape defects. Our studies could potentially offer new therapeutic strategies to overcome diseases of the nuclear lamina.

Connecticut

POSTER TITLE: Duvane Diterpenes in Hair-borne Droplets Defend Tobacco Budworm (Heliothis virescens) Caterpillars from Predation
STUDENT: **Sarah Arnold**
FACULTY: Scott Smedley
INSTITUTION: Trinity College
FUNDING: Trinity College Faculty Research Committee
DISPLAY AREA: 1D
Abstract:
Insects rely on a wide range of physical and chemical defenses against predators. Hairs on the body surface of tobacco budworm (Heliothis virescens) larvae bear droplets after the caterpillars feed on their host plant, tobacco (Nicotiana tabacum). I provide conclusive evidence that these droplets are obtained through direct contact of the hairs with tobacco trichome secretion rather than through ingestion of the secretion. In bioassays with the predatory ant Crematogaster lineolata, I show that the main constituents of the droplets, tobacco-derived duvane diterpenes, account for previous demonstration of the larval droplets' defensive activity. Although ingestive sequestration of host plant defensive chemicals by insect herbivores is common, this appears to be the first example of an herbivore benefit from external anointment of such substances.

Florida

POSTER TITLE: LIGO Detection Efficiency Studies in Searches for Gravitational Waves from Binary Neutron Star Inspirals
STUDENT: **Sarah Caudill**
FACULTY: Peter Shawhan
INSTITUTION: California Institute of Technology
FUNDING: National Science Foundation
DISPLAY AREA: 1E
Abstract:
Gravitational waves are one prediction of Albert Einstein's general theory of relativity. The Hulse-Taylor binary pulsar offers indirect evidence for these waves but direct tests have not been possible until recently. Scientists at several sites across the globe, including LIGO (Laser Interferometer Gravitational-Wave Observatory) are currently utilizing optical interferometry in an attempt to detect gravitational waves. Several astrophysical events including binary neutron star inspirals may act as sources of gravitational waves by creating ripples in spacetime. Binary neutron star inspiral waveforms are described by only two parameters, the masses of the two stars (neglecting spin). Detecting gravitational wave signals from inspiraling binary neutron stars thus requires a two-dimensional bank of theoretical waveform templates for matched filtering. The method of template bank construction was analyzed from a study of the LIGO algorithm library (LAL). The goal of the bank construction algorithm is to ensure that any signal in the region of interest of the parameter space closely matches one of the templates without wasting CPU time. Accuracy of the expected 0.97 minimal match value was reviewed using ellipses of constant match drawn around templates in both the currently used square bank and a promising new hexagonal bank. The more efficient hexagonal bank layout system will soon be implemented in place of the square system. Further research will involve generalization of the mismatch measurements to the higher dimensional parameter spaces (including spin) used for binary black hole searches.

Hawaii

POSTER TITLE: Influence of a Previous Exposure to Vibrio Campbellii On the Immune Response of the Blue Crab, Callinectus Sapidus.
STUDENT: **Charles Rathburn**
FACULTY: Karen Burnett
INSTITUTION: Chaminade University of Honolulu
FUNDING: National Science Foundation
DISPLAY AREA: 1F
Abstract:
By 1 h following the injection of Vibrio campbellii into blue crabs, culturable bacteria are eliminated from the hemolymph and hemocyte numbers decline. We hypothesized that crabs with established bacterial infections, as observed in natural populations, may be more susceptible to infection on subsequent exposure to pathogenic bacteria. Blue crabs were injected with saline or V. campbellii (105 g^-1 crab). Both groups received a second injection of Vibrio 2 or 24 h after the first injection. Total hemocyte counts (THC) ml^-1 and colony forming units (CFU) V. campbellii ml^-1 hemolymph were measured immediately before and at selected timepoints following the second injection. By 2 h after the initial injection, but not at 24 h, THC ml^-1 was significantly lower (P=0.05) in Vibrio-injected animals than in saline controls. When the second injection containing bacteria was administered 2 h after the first injection of either saline or Vibrio, crabs having received two doses of bacteria had significantly lower CFU ml^-1 in the hemolymph at 10, 20, 40 and 120 min after the second injection, compared to crabs first injected with saline (P=0.043). When the second injection containing bacteria was administered 24 h after a first injection of either saline or Vibrio, there was no difference in bacterial CFU ml^-1 in hemolymph between the treatment groups at any subsequent timepoint tested. These results suggest that recent exposure to a sub-lethal bacterial infection may improve the short-term immune response of crustaceans to additional infections when environmental conditions are optimal (NSF DBI-0244007 and IBN-0212921.)

Iowa

POSTER TITLE: Race and Traditional Values: Prejudiced Responses by Liberals vs. Conservatives
STUDENT: **Jennifer Bumgarner & Ryan Weipert**
FACULTY: Helen Harton
INSTITUTION: University of Northern Iowa
FUNDING: NA
DISPLAY AREA: 2A
Abstract:
Dovidio and Gaertner's (1998) Integrated Model of Racism suggests that politically conservative and liberal European-Americans (EAs) tend to express racism differently, with conservatives demonstrating modern racism, and liberals, aversive racism. Supporting this model, conservatives show a bias against African-Americans (AAs) vs. EAs, whereas liberals show the opposite (Nail, Harton, & Decker, 2003). Conservatives, however, react favorably toward "dependable" and "married" AAs (Sniderman et al., 1991), suggesting that their bias may be related to assumptions about violations of traditional values. Liberals show increases in physiological arousal when touched by an AA, suggesting that their bias may relate to an internal, race-based conflict (Nail et al.). We tested these ideas by comparing responses to an AA vs. EA from a "traditional" vs. "nontraditional" background. EA community members read a newspaper article and suggested a sentence for a 17-year-old male arrested for drug possession. A photograph and story details manipulated race and background. As expected, conservatives were most lenient toward the EA traditional male. Conservatives were the most punitive, however, toward the AA traditional male, suggesting a possible backlash effect. Liberals suggested the harshest sentences for the EA traditional male. However, they gave similar sentences in all other conditions, suggesting that that their judgments may be equally affected by race and background. Sentences were partially mediated by anger toward the perpetrator, but unrelated to sympathy. These results provide further support for the model and suggest that individuals' assumptions about others' backgrounds may help explain the expression of prejudice.

Illinois

POSTER TITLE: Biological Warfare in Invasive Plants
STUDENT: **Kimberly Lang**
FACULTY: Kelly McConnaughay
INSTITUTION: Bradley University
FUNDING: Partnership for Innovation
DISPLAY AREA: 2B
Abstract:
Alliaria petiolata (garlic mustard), an invasive species in temperate forests throughout North America, has led to a decrease in species diversity and alterations in nutrient cycling. Garlic mustard produces an arsenal of secondary chemicals in the glucosinolate family, specifically glucotropaeolin and sinigrin, which have strong biocidal properties that deter herbivores and kill fungi. We hypothesized that carbon and nitrogen availabilities in the environment would modulate internal (tissue level) C and N availability, which in turn modulate glucosinolate production. We examined variability in plant growth, tissue carbon, nitrogen, and glucosinolate profiles in garlic mustard populations from five forest sites that vary in light availability, soil pH, and possibly soil nitrogen. Total plant growth differed significantly across sites. First year plant growth was positively correlated with current light levels whereas second year plant growth was not. Glucosinolate production in first year plants was highest in sites where glucosinolate production was least for second year plants. Soil pH was positively correlated to sinigrin levels of second year plants, possibly suggesting that sinigrin has an effect on soil properties. Sinigrin profiles were negatively correlated with percent tissue carbon in first-year plants while positively correlated with percent tissue nitrogen in second-year plants. Global change is altering the balance of many ecosystems making them more susceptible to invasive plants that thrive on disturbance of native areas. Understanding factors that regulate the amount of glucosinolates in garlic mustard will improve our ability to manage systems that are, or could become, dominated by this aggressive invader.

Indiana

POSTER TITLE: Student Directed West Nile Virus Program Generates New Mosquito Discoveries and Community Good Will
STUDENT: **Steven Moberly**
FACULTY: Claude Baker
INSTITUTION: Indiana University Southeast
FUNDING: Eli Lilly III Internship and others
DISPLAY AREA: 2C
Abstract:
West Nile virus (WNV) reportedly entered the United States in 1999 and began its documented spread across the nation. The virus reached Indiana in 2001, and Indiana University Southeast initiated a student directed WNV research and monitoring program in 2002. The purpose of this study was to monitor the spread of WNV in three southern Indiana counties (Floyd, Clark and Harrison). Since its inception, over 200 students, with the author as project director, have been involved with the program; conducting studies on mosquito biodiversity and WNV cycling. More than 50,000 mosquitoes were identified in 2004 and 2005. Most specimens were tested for WNV at the Indiana University Southeast laboratory or at the state reference lab in Indianapolis, Indiana. The author found the first Asian Rock Pool Mosquitoes, Ochlerotatus japonicus, in Indiana in 2004. While working to uncover the distribution of the newly introduced mosquito, the research team discovered the first Indiana specimens of Ochlerotatus japonicus to test positive for WNV. In addition, we discovered a close correlation of positive WNV mosquito pools with drought conditions. This research project has provided many students with research opportunities, while concurrently protecting public health through mosquito control efforts and networking with local, state and federal agencies such as health departments and the CDC. Our research has been funded by Eli Lilly, Indiana University and indirectly through funding from the individual health departments, the Indiana State Department of Health and the Centers for Disease Control.

Kentucky

POSTER TITLE: Improved Methods to Relate Metabolic Activities to Biogeochemical Signatures in Carbonate Rock.
STUDENT: **Ariel Bennett**
FACULTY: Hazel Barton
INSTITUTION: Northern Kentucky University
FUNDING: CINSAM
DISPLAY AREA: 2D
Abstract:
To study organisms in oligotrophic environments such as caves, researchers have carried out molecular phylogenetic analysis to identify species present without the need for cultivation, although this method only allows us to postulate on the metabolic activity identified. In cave environments, these analyses are further hampered by carbonate rock, which binds DNA tightly and limits extraction. To overcome these issues, we have developed improved mechanisms of ribosomal RNA (rRNA) extraction from carbonate rock with target-specific biotinylated oligonucleotide probes, allowing physical extraction using streptavadin-coated magnetic beads. Recovered 16S rRNA can then be reverse transcribed to cDNA for more accurate phylogenetic analysis in these geologically complex samples. To determine the effectiveness of this technique, we used gel shift assays to assess 16S rRNA binding to biotinylated primers, demonstrating the recovery of target sequences. To better examine the metabolic interactions of unculturable microbial species with the host rock on which they reside, we initially reacted CaCO3 with metabolically significant organic acids. We then analyzed the chemical change that occurs using Attenuated Total Reflection-Fourier Transform InfraRed (ATR-FTIR) spectroscopy, allowing us to directly measure the metabolic activity on a host rock directly. Our results suggest that organisms living in low biomass environments do indeed change the local geochemistry of the environment with identifiable metabolic

processes. Together, we hope these data will lead to a better understanding of microbial activities that lead to survival in extremely starved subterranean environments.

Maryland

POSTER TITLE: A Method of Measuring Arsenic in Groundwater
STUDENT: **Randall Reif**
FACULTY: Randolph Larsen
INSTITUTION: St. Mary's College of Maryland
FUNDING: NA
DISPLAY AREA: 2E
Abstract:
The concentration of inorganic arsenic (As) in groundwater is a global health concern. Arsenic exists in two inorganic forms, arsenite and arsenate with the former being more toxic than the latter. Arsenic is classified by the International Agency for Research on Cancer (IARC) as a Group A human carcinogen causing skin, bladder, lung, and prostate cancer. The Environmental Protection Agency (EPA) lowered the drinking water standard for arsenic in groundwater from 50 to 10 ppm in 2002. Recent tests indicate that the drinking water wells in Maryland's Caroline, Dorchester, Kent, and Queen Anne's counties all have arsenic concentrations exceeding the drinking water standard. The toxicity of arsenic makes it important to discover an easy method of detecting it. In order to address this need I am constructing an instrument that is affordable, efficient, and sensitive. It will be made up of individual parts that can be purchased separately and then assembled. The instrument is battery operated and small enough to be easily transported which allows for on site measurements. Each measurement takes only five minutes to run. The instrument is designed to have a lower detection limit of 1 ppb which is 4 orders of magnitude less than the current EPA standard for arsenic.

Massachusetts

POSTER TITLE: Investigation of the Effects of the Built Environment on Patient Health Outcomes and Staff Satisfaction
STUDENT: **Laura Baldassari, Christopher Werner, Molly Conforte & Michael Caputo**
FACULTY: Edward Clancy
INSTITUTION: Worcester Polytechnic Institute
FUNDING: NA
DISPLAY AREA: 2F
Abstract:
Medical professionals claim that improvements to the built environment of health facilities have positive effects on patient health outcomes and staff satisfaction. Despite extensive research, inadequate empirical evidence exists to support the benefit of renovation. The Department of Human Services, Victoria, Australia, needs assurance that investment in facility improvement is worthwhile. Through literature review, interviews, and focus groups, a methodology consisting of evaluation tools, surveys, and data organisation tools was developed and pilot tested for the collection of data from facilities targeted for replacement. A framework was established for follow-up studies to be performed in renovated facilities.

POSTER TITLE: Characterizing Flow in Polymer Coated Capillaries for Small Scale Separations
STUDENT: **Peter Bartline**
FACULTY: Kimberley Frederick
INSTITUTION: College of the Holy Cross
FUNDING: National Science Foundation
DISPLAY AREA: 3A
Abstract:

In order to maximize analytical productivity and minimize waste, it is important to be able to conduct rapid separations with very small sample volumes. One technique that has been developed to accomplish this is capillary electrophoresis (CE). In order to produce more stable separations, the glass capillaries used for CE can be coated with various materials including polymers. One subset of these materials are polyelectrolyte multilayers (PEMs) which have successfully been used in CE but are also of interest in optoelectronics, environmental remediation and artificial tissues. PEMs are created by stacking alternating layers of positively-charged and negatively-charged polymers inside of the capillary. Our research focuses on studying flow inside PEM coated capillaries in order to understand how PEM materials respond to fluid flow and changes in solution composition. These results will be important both for separation applications but also for biotechnology and material science.

Michigan

POSTER TITLE: NMR Study on PPI Dendrimer Encapsulation of L-Dopa
STUDENT: **Casey Manning**
FACULTY: Minghui Chai
INSTITUTION: Central Michigan University
FUNDING: Research Corporation
DISPLAY AREA: 3B
Abstract:

In comparison with classic drug delivery systems: liposomes (poor stability and nonspecific targeting) and polymers (polydisperse), monodisperse and amphiphilic dendrimers have great potentials in drug delivery. Utilizing the nanosize voids inside a well-defined dendrimer structure, pharmaceutical drugs can be “wrapped” by the dendrimer via encapsulation. Such dendrimer-drug complex has an enhanced solubility, permeability and retention effect, which allows the system to target certain cells more effectively than the drug itself for sustained drug release in intravenous delivery.

L-Dopa, commonly used for treating the Parkinson’s, is insoluble in water. Large doses in therapy induce side effects such as dystonia and dyskinesia after chronic use. Slow-release forms of L-Dopa (Sinemet and Madopar) have showed the reduction of the problems. In this project, we use the third generation poly(propylene imine) dendrimer (PPI-3) to encapsulate L-Dopa via dendritic voids, which clearly enhanced the drug solubility. NMR (nuclear magnetic resonance spectroscopy) techniques are applied for probing the drug-dendrimer interaction. Based on 2D NMR experiments, the structure of the dendrimer-drug complex has been fully characterized. Diffusion coefficients derived from diffusion NMR measurements show that the dendrimer encapsulated drug diffuses much slower than the drug alone in water, which indicates the encapsulated drug might have longer retention inside human body for a slower release. Diffusion coefficients can also be used to calculate the binding constant of the dendrimer-drug complexation which can provide quantitative information on the efficacy of dendrimer encapsulation of drugs. This work may provide important information on employing dendrimers for better therapy of the Parkinson’s.

POSTER TITLE: Using Sediments from Small Dune Lakes to Reconstruct the History of Lake Michigan Coastal Dune Complexes
STUDENT: **Emily Timmons**
FACULTY: Edward Hansen
INSTITUTION: Hope College
FUNDING: NA
DISPLAY AREA: 3C
Abstract:

The eastern coast of Lake Michigan is dominated by large coastal dunes, valued for their beauty, unique ecological communities, and recreational uses. Recently chronologies of dune growth have been developed using radiocarbon ages from paleosols (ancient soils), but, because of fragmentary preservation and exposure, these histories are incomplete. We have used optically stimulated luminescence analysis to obtain ages for stabilization of current dune surfaces, but this gives little information about older events. Neither technique

offers much insight into the nature of the environmental changes that caused dune growth and migration. Sediments from small lakes within dune complexes preserve a continuous record of events. We are analyzing sediments in cores from two small lakes within the coastal dune complex near Holland, Michigan. Radiocarbon ages from plant material in the cores give a depositional chronology that goes back 7000 years. Thin sand layers formed during periods of dune migration and growth and give a higher resolution, more complete chronology than other techniques. Differences in fossil diatom assemblages at different levels in the cores reflect changes in water depth and clarity that reflect changes in the watershed. Pollen assemblages in the cores depend on the plant assemblages in the dunes and have the potential to track ecological changes over the last 7,000 years. We are working towards an integrated history of the ecology and landscape of the coastal dunes. A better understanding of how dunes responded to environmental change in the past should help us plan how to protect them in the future.

Minnesota

POSTER TITLE: Relative Uncertainty of U.S. Geological Survey Petroleum Assessments in Gulf Coast Region: 1995-2004
STUDENT: **Erin Saupe**
FACULTY: Larry Davis
INSTITUTION: College of St. Benedict
FUNDING: NA
DISPLAY AREA: 3D

Abstract:
The U.S. Geological Survey (USGS) has completed four National petroleum assessments in the last 25 years. We have analyzed uncertainty in estimated volumes of undiscovered gas and oil resources for two successive (1995 and 2004) USGS assessments of the Gulf Coast region. Assessment uncertainty is related to (1) compiling and interpreting geologic data, (2) defining and risking assessment units (AUs), (3) estimating sizes and numbers of undiscovered accumulations, (4) using different assessment methodologies, (5) and changing perceptions of AUs by petroleum geologists through time.

To quantitatively express relative uncertainty at the AU level, we introduce a dimensionless uncertainty coefficient (UC). UC=(F5 - F95)/F50, where F5, F50, and F95 are the 5th, 50th, and 95th fractiles of a probability distribution representing the estimate of undiscovered gas or oil for the AU. The UC is based on the assumption that the fractile range of the estimated undiscovered resource (F5-F95) includes all aspects of uncertainty. Dividing by F50 normalizes the uncertainty range relative to the magnitude of the undiscovered resource.

We analyzed 23 gas or oil AUs in the Gulf Coast region by ranking their UC scores, which range from 1.01 to 4.26. Four of the five most certain AUs (UCs < 1.5) are conventional AUs from the 2004 USGS assessment. The fifth and most certain AU (1995 Cotton Valley Blanket Sandstone Gas, UC=1.01) was assessed as continuous. This most certain AU was reassessed as conventional (UC=1.95) in 2004 when additional data led to a change in interpretation of accumulation type. The five most uncertain AUs (UCs > 3.45) were assessed in 1995. The most uncertain AU in 1995 (Hosston Updip Oil, UC=4.26) was reassessed in 2004 (Travis Peak-Hosston Updip Oil AU) with a larger UC (1.69).

An overall increase in relative AU certainty from 1995 to 2004 for Gulf Coast AUs is a result of a better understanding of the petroleum geology and to changes in assessment methodology. Analysis of relative uncertainty in petroleum assessments improves understanding of petroleum provinces so that priorities can be set for AU reevaluation.

POSTER TITLE: Blind-Sequential Police Lineups to Reduce False Eyewitness Identifications
STUDENT: **Shannon Ryan**
FACULTY: Nancy Steblay
INSTITUTION: Augsburg College
FUNDING: National Institute of Justice
DISPLAY AREA: 3E
Abstract:
DNA exoneration cases have demonstrated that eyewitness error is a significant contributor to false convictions. To address this problem, psychological scientists have developed the "blind-sequential" lineup protocol. Central features include a lineup administrator who does not know who the suspect is ("blind") and a presentation format of one photo at a time ("sequential"). Hennepin County (HC) recently completed a pilot program for blind-sequential lineups, providing the first available field data.

Recommended procedure for the blind-sequential lineup includes only one viewing of the lineup. The rationale is that the witness viewing the traditional simultaneous lineup (the "6-pack") engages in relative judgment – comparing photos to find the one that most resembles the perpetrator. This strategy may aid detection if the offender is present in the lineup, but results in false identifications in offender-absent lineups. The sequential format was designed to inhibit relative judgment – to force the witness to rely instead on absolute memory.

HC revised the protocol to allow a second viewing of the sequential lineup at witness request. This laboratory study investigates the question of what impact repeated lineup viewing has on witness choice, accuracy, and confidence. 200 participants viewed a simulated crime via computer and attempted to identify the perpetrator in a sequential or simultaneous lineup. Subjects could request multiple viewings of the lineup. The prediction (analyses to be completed) is that with repeated viewing, the witness will slip into relative judgment, evidenced by increased choosing and confidence but reduced accuracy. Results will be compared to the HC field data.

Missouri

POSTER TITLE: The Genetic Impact of an Invasive Species On a Common Native Species, the Hybridization of Morus Rubra and Morus Alba (Moraceae)
STUDENT: **Haley Wolf**
FACULTY: Selene Nikaido
INSTITUTION: Central Missouri State University
FUNDING: Central Missouri State University, Honors College
DISPLAY AREA: 3F
Abstract:
Two centuries ago, the Asian white mulberry (Morus alba) was introduced to populations of its North American relative, the red mulberry (M. rubra). Difficulty in identifying mulberry morphologically suggests that hybridization may occur, but evidence is limited. Interbreeding over generations may lead to the extinction of the parental species if the hybrids are more fit than their parental species. To examine the extent of hybridization, DNA sequence was analyzed. Seven mulberry individuals (two red, two white, and three morphologically intermediate) were haphazardly chosen from a wooded ravine near Warrensburg, Missouri. The internal transcribed spacer (ITS1) between 28S and 5.8S ribosomal DNA of each individual was analyzed from five clones of amplified DNA. Sequences of cloned DNA were compared to an M. alba reference sequence from GenBank. Aligned ITS1 sequences fell into two groups, each with a distinct sequence. Sequences of the group that included the M. alba sequence were classified as white mulberry. Sequences of the other group were classified as red mulberry. Although the majority of individuals had either white or red mulberry sequences, one individual had both red and white mulberry sequences and appears to be a hybrid. The other two morphologically intermediate individuals had red mulberry sequence. The morphologically identified red and white mulberry had sequences that matched their morphological designations. The findings of this research have documented that hybridization does occur between red and white mulberry. A more exhaustive study is underway to understand the genetic structure of this population.

POSTER TITLE: Auditory Hazards in a Public Restroom
STUDENT: **Kecia Jennings**
FACULTY: Mary Haskins
INSTITUTION: Rockhurst University
FUNDING: NA
DISPLAY AREA: 4A
Abstract:
AUDITORY HAZARDS IN A PUBLIC RESTROOM. Kecia Jennings and M.F. Haskins. Biology Department. Rockhurst University, Kansas City, MO. Auditory and wind speed levels of electric hand dryers in several public restrooms were tested using a Radio Shack digital sound meter and a Kestrel 3000 anemometer. Decibel readings between machines were significantly different ($p<0.001$) and ranged widely (70 dB to over 120dB). The loudest readings were comparable to the noise produced by a small jet engine. Machines also exhibited significant differences in wind speed ($p<0.001$). Of those dryers that were found to have the highest decibel readings, wind speeds averaged well over 160 km/hr (100 mph) and the maximum wind speed recorded was 347 km/hr (216 mph). Electric hand dryers may be useful in saving paper and in promoting cleanliness in public restrooms. However, the safety and efficiency of these high-powered machines should be considered before installation.

POSTER TITLE: Conservation of Terrestrial Habitat: Intra-population Movements and Foraging Behavior of the Gray Treefrog (Hyla versicolor)
STUDENT: **Rachel Mahan**
FACULTY: Raymond Semlitsch
INSTITUTION: University of Missouri-Columbia
FUNDING: National Science Foundation (other lab funding: US EPA and US Forest Service)
DISPLAY AREA: 4B
Abstract:
Amphibians are bioindicators of the health of the environment, upon which we depend for clean air and drinking water. Because amphibians are declining faster than birds or mammals and because few data exist regarding the amount of terrestrial habitat needed for population persistence, it is crucial to gain knowledge of their ecology.

I conducted mark-recapture and stomach-flushing studies of the gray treefrog (Hyla versicolor) in Missouri to determine the amount of terrestrial habitat utilized and its significance. Artificial arboreal refugia were placed in trees surrounding breeding ponds to be used as diurnal refuges like natural treeholes. Treefrogs captured diurnally in refugia and nocturnally by hand at breeding ponds were marked, weighed, and stomach-flushed to elucidate foraging and movement patterns of both sexes. To determine diet, I identified stomach contents to species, whenever possible.

My data indicate that gray treefrog activity extends at least 200 meters from breeding ponds. Individuals caught at ponds weighed less and their stomachs contained fewer prey items than individuals caught in refugia. This suggests that treefrogs utilize terrestrial habitat to forage at distances well beyond the perimeter of breeding ponds. Prey consisted mostly of arboreal beetles and ants, indicating that foraging occurs in trees rather than on the forest floor. These studies provide data that can be used to make wildlife management decisions that include the needs of amphibians, as well as to understand what these "canaries in the coal mine" are trying to tell us about the future health of the environment.

POSTER TITLE: The Saigon Moment: Differences Among Vietnamese Immigrants to America, Before, During, and After 1975
STUDENT: **Stephanie Le**
FACULTY: Steven Reschly
INSTITUTION: Truman State University
FUNDING: Truman State University
DISPLAY AREA: 4C
Abstract:

Relatively little literature on Vietnamese immigration to the United States exists, surprising given the significance of Vietnam and the Vietnam War in recent American history. This offers an opportunity to study the impact of trauma in migration and ethnic identity, similar to the Germans after 1848, Armenians, Russian Jews, Volga Germans, and other refugees from political and military upheaval.

Moral values once guided by ancient Confucian principles have changed dramatically for Vietnamese refugees and immigrants to the US due to the shock and trauma of the fall of South Vietnam in 1975. While historians have thoroughly researched assimilation patterns among the Vietnamese living in America, many have neglected to take their study one step deeper into determining why and how their traditional values have changed. I have interviewed 24 Vietnamese immigrants and Vietnamese-Americans, 7 who left Vietnam before 1975, 12 who left during and immediately after April 1975, and 5 who left the reunified Communist Vietnam.

My research shows that the timing of emigration from South Vietnam was a decisive factor in shaping the cultures of Vietnamese immigrants to the US. The experiences of the Vietnamese who left before 1975, the boat people who fled following the fall of Saigon in April 1975, and immigrants since 1975 vary widely. Travel routes, degree of danger, social position, educational level, and other factors differentiated these three groups, as shown by ideas about marriage; generational conflicts among first, second, and third generation individuals; and shifting concepts of masculinity and femininity within families.

POSTER TITLE: Towards the Development of a Chitosan Membrane for Enzyme Immobilization
STUDENT: **Tamara Klotzbach & Michelle Watt**
FACULTY: Shelley Minteer
INSTITUTION: Saint Louis University
FUNDING: DARPA
DISPLAY AREA: 4D
Abstract:

Previous research has examined the use of hydrophobically modified Nafion® to modify electrodes for the application to biofuel cells. Biofuel cells are of interest as biodegradable energy sources because they employ biocatalyst such as enzymes instead of heavy metals to catalyze an electrochemical reaction. This research details the first use of hydrophobically modified chitosan to modify electrode surfaces. Chitosan was modified by reacting it with a saturated alkyl aldehyde, allowing the polymer to form micelles. The modified chitosan was resuspended in a 1% by weight mixture in t-amyl alcohol, chloroform, or 50% aqueous acetic acid. Nafion® was modified by mixture casting Nafion® with alkyl trimethyl ammonium bromide salts and resuspended as a 5% by weight mixture in ethanol. It was shown that by hydrophobically modifying chitosan and Nafion®, the polymers form micelles, and the transport properties of redox species to the electrode surface are altered as a function of the size and charge. Modified chitosan shows similar transport properties of redox species as modified Nafion®. Micellar polymers are also known to provide a stable environment for the immobilization of enzymes. Fluorescence microscopic assays and cyclic voltammetry were used to determine the optimal modified polymer for effective enzyme immobilization. Enzyme immobilization was carried out with alcohol, aldehyde, formaldehyde, formate, lactic, and glucose dehydrogenases. Results show that enzymes can be successfully immobilized and retain their activity in modified chitosan and Nafion® polymers. Future work involves determining the enzyme lifetime in the polymers and further development of a chitosan based biofuel cell.

Montana

POSTER TITLE: Influence of Co-contaminants and Natural Organic Matter on the Reduction of 2,4,6-trinitrotoluene (TNT), Chromium(VI), and Carbontetrachloride By Zero-valent Iron
STUDENT: **David Steppler**
FACULTY: Robin Gerlach
INSTITUTION: Montana State University
FUNDING: Department of Defense
DISPLAY AREA: 4E
Abstract:

The contamination of soils and groundwater is becoming a growing problem for many United States governmental agencies and industry. Specifically, the Departments of Defense and Energy, the Environmental

Protection Agency, and NASA are seeking to develop efficient ways to control and detoxify 2,4,6-trinitrotoluene (TNT), chlorinated organics (e.g. carbon tetrachloride), and heavy metal contaminated sites. There have been several studies performed aiming to detoxify each of these contaminants alone in a system, but there are many sites with more than one contaminant present. Thus, it is important to understand the behavior of these contaminants in mixed waste streams. Our study was designed to determine the detoxification kinetics and product formation for each contaminant in zero-valent iron (ZVI) permeable subsurface barriers. We determined the influence of contaminant mixtures and anthroquinone-2,6-disulfonate (AQDS), a model for humic substance, on the detoxification mechanisms. We found significant differences in transformation pathway and kinetics depending on the composition of the mixed waste stream. Our findings will contribute towards improved ZVI-based permeable reactive barrier design.

Nebraska

POSTER TITLE: Bridging the Gender Gap: Increasing Women's Performance on a Visual-Spatial Task
STUDENT: **Jariel Rendell & Ryan McDonough**
FACULTY: Isabelle Cherney
INSTITUTION: Creighton University
FUNDING: Nebraska EPSCoR (NSF)
DISPLAY AREA: 4F
Abstract:
Despite the equivalent overall intellectual capacity of males and females, researchers have identified robust cognitive sex differences with males outperforming females on certain tests of visuospatial ability. Tests of visuospatial ability have been used to predict success in engineering courses and are part of standardized admissions tests. Thus, it is important to understand factors that influence these abilities because they have implications for real-life career opportunities and for potential earnings. In order to examine the role of perception, environment, fine-motor skill, and background in visuospatial performance, the present study compared male and female performance on visuospatial tests with varying perceptual, environmental, and fine-motor demands. In the first condition, male and female participants completed visual-spatial tests presented in the traditional paper-and-pencil format; in the second condition, participants completed the same tests on a tablet PC. In both conditions, tests varied in terms of the fine-motor and perceptual demands placed on participants. Overall, both male and female participants performed better in the paper-and-pencil condition than in the tablet PC condition, but males tended to outperform females in both conditions. However, visuospatial sex differences disappeared on tests involving a fine-motor component, suggesting that both the test medium and the fine-motor demands of cognitive tests influence gender differences. Participants with previous spatial and computer play experiences scored significantly higher than those with less experience, suggesting that spatial perception is in part determined by prior experiences. Females' performance may benefit from involvement in more spatial activities.

POSTER TITLE: It's all in the Family: Children's and Parents' Perceptions of Children's Rights
STUDENT: **Leah Skovran & Emily Polachek**
FACULTY: Isabelle Cherney
INSTITUTION: Creighton University
FUNDING: American Psychological Foundation & Council on Undergraduate Research
DISPLAY AREA: 5A
Abstract:
An emphasis throughout the United Nation's Convention on the Rights of the Child (1989) is the clause about "the best interest of the child." The purpose of the current study was to combine parents' and their young adolescents' perceptions of children's rights to examine whether support for nurturance rights and for self-determination rights diverge within a family unit. Unlike other studies, rather than survey adults and children as separate samples, we interviewed parents and their 10-16 year old children, using a revised Children's Rights Inventory. Overall, parents thought that their children would advocate for more rights and earlier than their children actually did. Parents and children responded differently to a quarter of the vignettes. In each case, children were more reluctant than their parents to advocate for the right to choose a class, to see a movie, to

decorate their own room, to choose with whom to live, to consume alcohol, and to pay for their own clothing. In general, results showed that the proportion of agreement between the parents and their children was greater on questions dealing with self-determination rights than nurturance rights. These results differ from studies that have considered children's and adults' perceptions of children's rights separately, suggesting that it is important to consider children's rights within the family context. It is also important to note that despite some differences between the parents' and adolescents' responses, overall, they have similar views on what they think their children can and cannot do.

New Jersey

POSTER TITLE: Transcriptional Regulation of RET and Its Co-receptor
STUDENT: **Elliana Vera-Merino**
FACULTY: Quinn Vega
INSTITUTION: Montclair State University
FUNDING: National Institutes of Health
DISPLAY AREA: 5B
Abstract:
RET is a mammalian receptor tyrosine kinase that is activated by association with a protein co-receptor GFR-a (1-4) and its corresponding ligand (GDNF, Neurturin, Artemin or Persephin). RET signal transduction is an indispensable component for kidney/enteric nervous system development and receptor activation has been studied in some detail. However, it is much less clear how RET or its co-receptor is down regulated. The study of receptor inactivation is critical since three forms of cancer are known to be caused by unregulated RET activity. Further, recent studies showing that treatment of Parkinson's patients with a RET ligand can decrease disease symptoms makes the understanding of post-ligand RET regulation a critical component for any long term treatment plans. In order to determine if RET and its co-receptor are down-regulated transcriptionally in response to ligand, RNA levels for RET and its co-receptor, GFRa-2 were measured using real time PCR. In these experiments, RNA was purified from SK-N-SH cells, a human neuronal cell line, after treatment with GDNF for 0-72 hours. In a 2-step RT-PCR process, RNA levels were measured using real time PCR and SYBR green in an MX3000 Real Time PCR machine. Real Time PCR studies were also performed on 18S to control for sample variation and assays were performed in the absence of template to control for mispriming. All controls have been developed and the changes in gene _expression are presently being analyzed.

POSTER TITLE: Self-assessed Physical and Mental Health Among Latinos in New Brunswick, New Jersey: A Measurement of Somatization
STUDENT: **Karol Silva**
FACULTY: Peter Guarnaccia
INSTITUTION: Institute for Health, Health Care Policy, and Aging Research
FUNDING: National Institute of Mental Health
DISPLAY AREA: 5C
Abstract:
Background: Demographic studies show that Latinos are younger, less educated, poorer, and face language and acculturation problems that make them vulnerable to mental health problems. However, one of the challenges to forming concrete conclusions about the mental health status of the Latino population in the U.S. is that Latinos tend to express psychological or emotional distress through physical symptoms, a tendency known as somatization.

Purpose: The purpose of this study is to determine the relationship between self-assessed physical and mental health among Latinos and understand how demographic variables, such as sex, age, ethnicity, immigration status, education, and level of acculturation affect this relationship to better understand somatization in this population.

Methods: With a sub-sample of Latinos (N=734), chi-square tests were conducted for each outcome variable, self-assessed physical and mental health, by all predictors variables, sex, age, Latino Ethnicity, citizenship, birth

place, education, and language of interview. Two logistic regressions were also conducted for each outcome to determine how sex, age, Latino ethnicity, birth place, and language of interview can potentially predict poor self-reported ratings of both physical and mental health.

Results: Respondents who were older, Mexican, non-US citizens, non US-born, had low education, and completed the interview in Spanish were more likely to report poor physical and mental health. All respondents were more likely like rate their physical health as poor than their mental health.

Conclusions: Respondents had higher ratings for mental health than for physical health because they choose to communicate distress through poor ratings of physical health.

New Mexico

POSTER TITLE: Tongue Strength and Speech in Oculopharyngeal Muscular Dystrophy
STUDENT: **Gwyneth Sprouls**
FACULTY: Amy Neel
INSTITUTION: University of New Mexico
FUNDING: NA
DISPLAY AREA: 5D
Abstract:
Oculopharyngeal muscular dystrophy (OPMD) is a rare genetic myopathy occurring in Hispanic northern New Mexicans (Becher et al., 2001), as well as several other populations throughout the world. OPMD is characterized by progressive ptosis (drooping eyelids) and dysphagia (swallowing problems) that develop in the fifth decade of life, and may also be accompanied by flaccid dysarthria (slurred speech). Fatty replacement of muscle tissue has been observed in some speech muscles (King et al., 2005). The purpose of this study is to document speech problems associated with OPMD and to relate them to deficits in tongue strength and endurance. The individuals with OPMD who have been studied so far demonstrated markedly reduced tongue strength and endurance compared to normal controls, while speech intelligibility was relatively preserved. There was evidence of reduced diadochokinetic rates (repetitions of movement requiring alternating contractions of various muscles) and slower articulation rates in sentences compared to controls suggesting that these individuals may be slowing their speech in order to maintain articulatory accuracy. Continued study of speech characteristics in OPMD is underway, including detailed acoustic analysis, to determine how speech is affected by tongue weakness in this population.

New York

POSTER TITLE: A Review of Human Cognitive Performance During Long-Term Spaceflight
STUDENT: **Anthony Nelson**
FACULTY: Raymond Collings
INSTITUTION: State University of New York College at Cortland
FUNDING: NA
DISPLAY AREA: 5E
Abstract:
The National Aeronautics and Space Administration (NASA) currently has plans for manned long-term spaceflights to the International Space Station (ISS), the Moon, and eventually Mars. It is important that cognitive performance in spaceflight is analyzed to ensure an optimum level of safety and performance for the astronauts involved. This paper reviews the current literature in this area. While few deficits in basic cognition (logical reasoning, memory, sustained attention, psychomotor speed) have been found, there are significant deficits in perceptual-motor performance and dual-task performance. Perceptual-motor deficits appear to be related to microgravity effects on motor control systems, although there is some evidence that microgravity affects the vestibular system, which in turn leads to the deficits. Dual-task deficits reflect a decrease in the number of items that can be attended to at one time. These deficits appear to result from work and isolation-

related stressors. Although spatial processing has been found to decline in space, these deficits are masked by compensatory actions. These deficits are due to a lack of gravity, which is the main reference cue used to determine position sense on Earth. Prior research has been conducted primarily during short spaceflights, and longer flights are necessary to better understand these effects. Furthermore, previous research has generally consisted of pre- and post-flight conditions that differ from the flight conditions in both a lack of gravity and an increase in work and isolation-related stressors. Conditions similar to those found during spaceflight are necessary to discern effects resulting from these stressors from microgravity effects.

POSTER TITLE: Marking a Conformational Change in Amyloid Beta Protein by Gold Colloidal Nanoparticles
STUDENT: **Daniel Welchons & Bradley Johnson**
FACULTY: Kazushige Yokoyama
INSTITUTION: The State University of New York at Geneseo
FUNDING: National Science Foundation
DISPLAY AREA: 5F
Abstract:
Denaturization and the subsequent self-organization of amyloid beta-peptides (AB) is a critical event leading to the onset of Alzheimer's disease. Our study aims to design a sensitive indicator for probing this process. We investigated the ability of gold colloidal nanoparticles to mark the self-organization process of AB. Absorption spectroscopy was conducted on AB conjugated gold colloidal nanoparticles with the size of 20 nm diameter as a function of pH ranging from pH 2 to pH 10. The reddish color of the unconjugated colloidal nanoparticle exhibited a band centered at 520 nm. However, a remarkable color change to blue was observed at pH 5 and lower, and had an absorption peak shift to ca. 700 nm. We speculated that a cluster of unfolded AB proteins conformed to an oligomer on the colloidal surface at pH 5. The similar pH dependence of the shift was also confirmed for segments of AB proteins. In order to determine the reversibility of the color change between blue and red, the pH of the solution was repeatedly varied between pH 4 and 10. Quite interestingly, reversibility was only observed in a full sequence of AB but not in segments of AB. Furthermore, among tested gold particle sizes ranging from 10 to 100 nm in diameter, only gold nanoparticle with 20nm diameter exhibited reversibility. Therefore, we concluded that oligomers that undergo a reversible change need to be comprised of full AB sequences, and this structure takes place at a specific size of gold nanoparticle.

POSTER TITLE: A Fundamental Study of Indium Mediated Allylations
STUDENT: **Jodi Connell**
FACULTY: Walter Bowyer
INSTITUTION: Hobart and William Smith Colleges
FUNDING: NA
DISPLAY AREA: 6A
Abstract:
Allylation is a critical reaction for forming new bonds between carbon atoms, and it is essential in developing new compounds. Currently, the well known Grignard reaction is commonly used to achieve this goal. However, it requires large volumes of toxic and flammable solvents. In contrast, indium mediated allylation offers a more environmentally friendly alternative because water can be used as the solvent. However, little is known about the way in which this reaction proceeds. This lack of fundamental understanding discourages its adoption by industry. We are investigating the fundamentals of the reaction. Most importantly, we are determining the steps through which the reaction proceeds (its mechanism and intermediates) and the overall rate of the reaction. To achieve this, we have designed a novel cell for constraining reactivity to a single face of the indium surface. By combining these measurements with NMR spectroscopy and photomicroscopy, we have found evidence that the indium intermediate has a +1 charge. Furthermore, the reaction is first order with respect to allyl bromide. The results of these fundamental studies will assist in more rational selection of reaction conditions, facilitating application of the reaction.

POSTER TITLE: Detecting Charged Particles with Charge Injection Devices
STUDENT: **Samantha Hammond, Benjamin Apker & John Punyon**
FACULTY: Kurtis Fletcher
INSTITUTION: State University of New York at Geneseo
FUNDING: DOE-NNSA via Laboratory for Laser Energetics
DISPLAY AREA: 6B
Abstract:
Nuclear fusion, the process that powers the stars, is an attractive solution to the world's future energy needs. However, there have been tremendous technical difficulties in creating the conditions to fuse light nuclei together to form heavier nuclear and excess kinetic energy at an affordable cost. One method under study at the Laboratory for Laser Energetics is inertial confinement fusion (ICF) using the powerful OMEGA laser system to implode tiny pellets of deuterium and tritium. CID cameras, used for x-ray imaging on OMEGA laser system, can also be used to detect charged particles, such as those emitted in ICF reactions. We have demonstrated that CID cameras can be used to detect alpha particles from a radioactive source, and that the flux of alpha particles is identical to that measured using a surface barrier detector. In a series of experiments using the SUNY Geneseo 2 MV Van de Graaff accelerator, we have also determined the efficiency for detection of 2H(d,p)3H protons by simultaneously detecting protons with a surface barrier detector and a CID placed at identical angles in the scattering chamber. In all cases the careful selection of appropriate energy-degrading foils is necessary to maximize the charged particle signal in the CID. Future work will focus on tests of the system using inertial confinement fusion products at the OMEGA laser facility. (Supported in part by the US Department of Energy through the University of Rochester's Laboratory for Laser Energetics.)

North Carolina

POSTER TITLE: The Role of the Nurse Practitioner in the Screening and Intervention of Childhood Obesity in Rural Southeastern North Carolina
STUDENT: **Sara Crohn**
FACULTY: Jeanne Kemppainen
INSTITUTION: University of North Carolina- Wilmington
FUNDING: NA
DISPLAY AREA: 6C
Abstract:
Introduction: Overweight and obesity among children has doubled and even tripled in some age groups since the 1970s, with 6-11 year olds being the most affected. The lasting effects of childhood obesity contribute to diabetes, cardiovascular disease, and cancer into adulthood. Whereas there are many current studies researching the actions of pediatricians and family physicians related to childhood obesity, little research has focused solely on the measures implemented by nurse practitioners in this current epidemic. The purpose of this study is to identify strategies utilized by nurse practitioners in the screening and intervention of obesity in children living in rural Southeastern North Carolina.
Methods: A widely accepted method of behavioral analysis, the critical incident technique developed by Flanagan (1954), was used to obtain self reports on the behaviors and activities of nurse practitioners related to obesity in children. A purposive sample of 10 nurse practitioners in rural Southeastern North Carolina participated in critical incident interviews focused on screening, defining, and intervention strategies related to childhood obesity. The data obtained through the critical incident interviews will be analyzed through the standard procedure developed by Flanagan (1954). A listing of specific activities and behaviors will be determined.
Results: This study is currently in progress. Completed study findings will be presented at the poster session.
Conclusions/Implications: Implications of this study illuminate the increasing need for health care professionals such as nurse practitioners to facilitate awareness of childhood obesity and to develop community interventions in this epidemic.

Ohio

POSTER TITLE: Synthesis and Purification of 4-(2-methoxy isopropyl) Styrene Inimer
STUDENT: **Cortney Hoch**
FACULTY: Dr. Judit Puskas
INSTITUTION: University of Akron
FUNDING: National Science Foundation
DISPLAY AREA: 6D
Abstract:
The synthesis by living carbocationic polymerization of arborescent polymers, which are "tree-like", branched polymers; involves the use of an inimer (initiator-monomer) 1. The arborescent polymers that are produced by this method include arborescent polyisobutylene (arb-PIB) and block copolymers of arbPIB- b- PS (polystyrene). This inimer was produced from 4 Br styrene by reacting it with magnesium to create a Grignard compound, followed by adding acetone, to give 4-(2-hydroxy-isopropyl) styrene after neutralizing the product. In the second step, methyl iodide and sodium hydride were added to transform the alcohol to a methoxy group. The 4-(2-methoxy-isopropyl) styrene inimer was then characterized by 1H and 13C NMR, and we plan to use 2D NMR (COSY). The yield of the first step was >90%, but the final yield was only 40%. Based on the proposed mechanism of the reaction2-4, a new recipe is being developed that doesn't involve the formation of the alcohol intermediate. This will hopefully improve the final yield.

Oklahoma

POSTER TITLE: Lack of Population Genetic Structure in the Bat Fly (Trichobius major) in Oklahoma and Texas
STUDENT: **Kendra Byrd**
FACULTY: Gregory Wilson
INSTITUTION: University of Central Oklahoma
FUNDING: College of Graduate Studies & Research, University of Central Oklahoma
DISPLAY AREA: 6E
Abstract:
The bat fly, Trichobius major, is an obligate ectoparasite which resides on the cave myotis, Myotis velifer. Previous morphological studies revealed no significant differences among bat flies from cave localities in Oklahoma. Because T. major are "poor fliers," it was assumed that movement of bat flies among cave localities was probably accomplished via the host, M. velifer. However, no one has examined population genetic structure and gene flow using molecular techniques. Therefore, our goal is to use molecular techniques to study the population genetic structure and gene flow of T. major in an attempt to elucidate their dispersal methods. We hypothesize that gene flow of bat flies within and among cave localities will be reduced due to the inability to independently disperse themselves. Sequence data for a 450 base pair fragment of the cytochrome oxidase I (COI) gene of the mitochondrial genome (mtDNA) was used to infer population genetic structure and gene flow of T. major in Oklahoma and Texas. DNA sequence data for 48 individuals from nine widely separated cave localities revealed no mtDNA sequence variation. We suspect the COI gene included in our study is not mutating at a rate appropriate to infer population genetic structure for T. major. Future efforts will incorporate bi-parentally inherited nuclear markers (i.e., microsatellites) to more accurately infer population genetic structure of T. major. Additional investigation into the genetic aspects of T. major will contribute toward a better understanding of the fragile cave ecosystems that occur throughout Oklahoma and Texas.

Oregon

POSTER TITLE: Laser Cooling and Magneto-Optic Trapping of Neutral Atoms
STUDENT: **Evan Carlson & Abraham Olson**
FACULTY: Shannon Mayer
INSTITUTION: University of Portland
FUNDING: M. J. Murdock Charitable Trust
DISPLAY AREA: 6F
Abstract:
Laser cooling and trapping of atoms is an effective technique for producing a high-density, ultra-low-temperature gas. Trapped atoms are used for experiments in high-resolution spectroscopy, cold-atom collisions, and as a starting point for atom interferometry and Bose-Einstein condensation. The Nobel Prize in physics was awarded in 1997, 2001, and 2005 to scientists who pioneered many of the experimental techniques used in this research field. Practical applications range from the development of more accurate atomic clocks, which can improve the resolution of global positioning systems and time-keeping for space exploration, to quantum computing. In our poster, we present the theory and experimental apparatus for a rubidium magneto-optic trap. Light is directed into the rubidium gas from six directions via three pair of laser beams. The light is tuned to a frequency slightly below the resonance frequency of the atom, and as a result, a moving atom will be Doppler shifted closer to resonance with one of the lasers in a pair and farther from resonance from the other. The atom is more likely to absorb light from the laser that is closer to resonance. When a photon of light is absorbed, the momentum of the photon is transferred to the atom, decreasing the velocity of the atom. The imbalance in absorption probability between the oppositely-directed lasers provides a velocity-dependent force to damp the atoms' velocity. Atoms are "trapped" by making for force position dependent via a weak magnetic field. Trapped atoms will be used for high-resolution optical spectroscopy and non-linear optics.

Pennsylvania

POSTER TITLE: Tandem Hydroacylation-Michael Addition in the Synthesis of Pharmaceutical Precursors
STUDENT: **Daniel DiRocco**
FACULTY: Holly Bendorf
INSTITUTION: Lycoming College
FUNDING: Merck-SURF Program
DISPLAY AREA: 7A
Abstract:
A search of the literature reveals a variety of aminomethyl-substituted benzothiepines, that are biologically active and are of pharmaceutical interest. Previous work in our laboratory demonstrated that omega-alkynals that contain a sulfide functional group afford high yields of benzothiepine products via a rhodium-catalyzed, chelation-assisted intramolecular hydroacylation. We have recently developed facile entry into the aminomethylbenzothiepine ring system. A one-pot procedure involving chelation-assisted hydroacylation followed by Michael addition of primary and secondary amines produces the desired compounds in high yield. Current research is focused on the asymmetric synthesis of aminomethylbenzothiepines.

POSTER TITLE: Analysis of the NSF REU Chemistry Applicant Pool Over Four Years: What Is the Demand for Undergraduate Research?
STUDENT: **Devin Coon**
FACULTY: Joseph Grabowski
INSTITUTION: University of Pittsburgh
FUNDING: National Science Foundation
DISPLAY AREA: 7B
Abstract:
The National Science Foundation's REU (Research Experiences for Undergraduates) program has been in existence since 1987 and is an effort to attract undergraduates to careers in science. In a pilot year (2001) and for

three consecutive years (2003-2005), records on applicants to the nation-wide set of Chemistry REU programs were collected, collated, refined, and analyzed to answer a number of questions including: (1) How big is the pool of students seeking a Chemistry REU experience? (2) Do the applicants to REU Chemistry sites attend primarily undergraduate or research intensive institutions? (3) Do REU site directors all make offers to the same students? (4) How broadly do students apply for Chemistry REU programs? Answers to these and other questions provide the necessary data to have a meaningful discussion about the demand for summer undergraduate research experiences and whether REU programs might be expanded.

POSTER TITLE: Predicting Attitudes Towards the U.S. Policy of Preemption
STUDENT: **Devin Rice & Sarah Zentymer**
FACULTY: Philip Dunwoody
INSTITUTION: Juniata College
FUNDING: NA
DISPLAY AREA: 7C
Abstract:
We conducted a survey to evaluate a variety of factors that predict support for the U.S. foreign policy of preemption. We asked participants to estimate the likelihood that the U.S. would suffer a terrorist attack within the next five years because our government failed to take action against a threatening group (known as a false-negative). We also asked participants to generate as many consequences as possible to the above false negative. We asked participants a similar series of questions about the likelihood of the U.S. attacking a group wrongly perceived to be a threat (known as a false-positive) and the potential consequences of such an act. We found that participants' who produced more false-negatives than false positives showed greater support for the policy of preemption and that participants' estimates of the likelihood of future false-negatives and false-positives were directly related to support for preemption. In addition, we measured the following individual difference variables to see if they correlated with support for preemption: Authoritarianism, International Insecurity, and American Social Identity. We found that all of the individual difference variables were significantly correlated with support for the policy of preemption. The individual differences combined with the perceptions of false-negatives and false-positives account for 62% of the variability in support for the policy of preemption. Future research will focus on clarify the relationship among these variables.

POSTER TITLE: In Vitro Metabolism & Decomposition of the Aklylating Agent Benzaldehyde Dimethane Sulfonate (BEN)
STUDENT: **Kimberly Kicielinski**
FACULTY: Merrill Egorin
INSTITUTION: University of Pittsburgh Medical Center
FUNDING: National Cancer Institute
DISPLAY AREA: 7D
Abstract:
BEN is proposed for clinical studies based on preclinical activity against renal carcinomas. Pharmacokinetic studies documented several BEN metabolites including: a carboxylic acid (m/z 396) and mono-N-dealkylated metabolite (m/z 258). Because metabolites & decomposition products are probably less active than BEN, we characterized the enzyme responsible for BEN N-dealkylation, and BEN stability in tissue culture medium. BEN was metabolized to products with m/z of 396 & 258 by mouse and human hepatic S9 fractions. Metabolism of BEN to the m/z 396 product was confined to cytosol, whereas metabolism to the m/z 258 product was restricted to microsomes. BEN metabolism to the m/z 258 product was > 2 times faster with NADPH than NADH, 2-8 times faster aerobically than anaerobically, & eliminated by CO. Human microsomal metabolism of BEN to the m/z 258 product was inhibited by the CYP3A inhibitor ketoconazole but not by chemical inhibitors of CYP2D6, 2C9, or 2E1. BEN metabolism to the m/z 258 product was inhibited by anti-CYP3A antiserum but not by antisera to CYPs 2C8, 2C9, 2C19, or 2D6. BEN was metabolized to the m/z 258 product by cloned human CYP3A4, but not by CYPs 2C8, 2C9, 2C19, 2D6, 1A2, or 2E1. BEN decomposed in tissue culture medium with t1/2 ~8 h. BEN decomposed sequentially to products with m/z 302 & 224, i.e. sequential hydrolysis of methane sulfonate groups. These products were not observed in enzyme incubations. BEN metabolism and decomposition should be considered when planning clinical studies.

Support: Carnegie Mellon SUR Grant & NCI-N01CM07106

South Carolina

POSTER TITLE: Nitrogen In Urban Watersheds: Sources, Sinks, and Pathways
STUDENT: **Lehne Slater**
FACULTY: Brannon Andersen
INSTITUTION: Furman University
FUNDING: National Science Foundation
DISPLAY AREA: 7E
Abstract:
Humans have modified the nitrogen cycle tremendously, particularly increasing the flux from terrestrial to aquatic environment. One focus of the River Basin Research Initiative at Furman University is the relationship between urbanization and nitrogen concentrations of streams in the South Carolina piedmont. Brushy Creek watershed, with 60% urban land cover, is the most urbanized watershed in the area. Unlike studies of previous watersheds, urbanization was concentrated in the headwaters of Brushy Creek, and no point source or agriculture inputs exist. The objective of the study was to characterize trends in nitrate concentrations and the biogeochemical processes controlling them.

In the summers of 2004 and 2005, water samples were collected from 31 localities for a total of 156 samples. Samples were analyzed for pH, dissolved oxygen, conductivity, major cations and anions, dissolved organic carbon, total dissolved nitrogen and alkalinity. In contrast to previous urban watershed studies, small headwater streams had the highest concentrations of total dissolved nitrogen. Unlike forested watersheds, which typically contain significant dissolved organic nitrogen, dissolved nitrogen in Brushy Creek was mostly nitrate. Nitrate concentrations at the headwaters ranged from between 9 and 16 mg/L and exponentially decreased to approximately 3 mg/L in the main channel.

With commercial urban land cover, the primary source of nitrogen in headwaters likely is acid deposition. Unlike forested watersheds, denitirifcation is not a significant sink of nitrogen, perhaps allowing nitrogen to accumulate. Stream incision could also lead to enhanced nitrification. Ponds in the urban landscape proved to be a significant sink of nitrogen.

POSTER TITLE: Rejection of Retained Children: Not My Child's Playmate
STUDENT: **Sarah Coles**
FACULTY: Judith Kizer
INSTITUTION: University of South Carolina Upstate
FUNDING: CURS at University of South Carolina
DISPLAY AREA: 7F
Abstract:
The 2001 No Child Left Behind Act asserts that schools that do not perform up to each states' satisfactory academic progress will be sanctioned and may lose portions of their federal funding. The implementation of this federal act could result in some students being held back (retained) until grade level criteria are satisfied. Jimerson and Kaufman (2003) have shown that retention can lead to negative academic consequences for students such as higher dropout rates, and negative social effects such as lowered self-confidence. The purpose of the present project was to assess the effects of possible stigma related to retention and to assess whether or not one of the variables associated with a greater likelihood of retention (i.e., gender) affected those perceptions. Participants read a scenario describing a child, Max or Amanda, who was reading at the kindergarten level in first grade and who had either been retained in the first grade or promoted to the second grade. Participants made ratings on a variety of dimensions. Contrary to our predictions, gender did not have a major effect. Participants thought the retained child would do better in school and thus were more likely to recommend retention rather than promotion. In spite of this recommendation, participants indicated that they would be more likely to let their own child play with the promoted child. This supports the existence of a social stigma associated with retention.

South Dakota

POSTER TITLE: Synthesis of a Series of Bicyclic Diquinones Via 1,4-Diacetoxyanthracene: Potential Cancer and Leukemia Drugs
STUDENT: **Jesse Van Heukelom**
FACULTY: Grigoriy Sereda
INSTITUTION: University of South Dakota
FUNDING: EPSCoR of the National Science Foundation
DISPLAY AREA: 8A
Abstract:
Bicyclic quinones and diquinones are attracting attention from the world of chemistry as building blocks for organic synthesis, i.e. mimicking intramolecular photoelectron transfer. They have shown a wide spectrum of biological activities: anti-inflammatory, anti-malaria activity, and cytotoxicity against resistant leukemia L1210 cell lines. Upon the addition of various functional groups on the third benzene ring, the project is expecting to control the pharmacokinetics properties and to chemically link them to porphins rings for entry into the human body. The purpose of my research is to synthesize a series of new bicyclic diquinones and evaluate the role of the non-quinone benzene ring in the cytotoxicity of bicyclic diquinones, to explore the relationship between the cytotoxicity of triptodiquinones toward leukemia and ovarian cancer cells, and to optimize photodynamic and biological properties of the system by varying the diquinone fragment and its linkage with the porphyrin moiety. In addition, the project will examine whether lone benzene rings play a role in the cytotoxicity, and what implications they may have. Each quinone's cytotoxicity will also be assessed in relationship to their red-ox potentials to find the quantitative structure-activity relationships of the compounds. Upon synthesis, the quinones will have their cytotoxicities analyzed against ovarian cancer cells at the University of South Dakota's school of Medicine and the L1210 leukemia cells at South Dakota State University. Currently, my colleagues and I have synthesized and analyzed five new bicyclic quinones in the series of the desired eight new quinones.

Tennessee

POSTER TITLE: Diagnosing Osteoporosis with Ultrasound: A Novel Single Probe Technique
STUDENT: **Daniel Keedy, David Johnson & John Janeski**
FACULTY: Brent Hoffmeister
INSTITUTION: Rhodes College
FUNDING: National Science Foundation
DISPLAY AREA: 8B
Abstract:
Osteoporosis is a major public health problem. According to the National Institutes of Health, approximately 10 million Americans are affected by this degenerative bone disease, resulting in more than 1.5 million fractures annually including approximately 300,000 hip and 700,000 vertebral fractures. Early diagnosis is the first critical step toward effective treatment. Most diagnostic techniques rely on x-rays to detect decreased bone density associated with osteoporosis; however, ultrasound is becoming increasingly used for this purpose. Ultrasonic bone densitometry systems offer notable advantages over x-ray systems including lower cost, greater portability, and the lack of ionizing radiation. However, a major disadvantage of commercially available ultrasonic systems is that they require a separate ultrasonic transmitter and receiver that are typically placed on either side of a bone, usually the heel bone. Measurements at clinically important sites such as the hip and spine are difficult or impossible to make. To address this limitation, we have developed a new ultrasonic technique that uses a single ultrasonic probe. The probe transmits ultrasonic pulses into the bone and then receives the returned (backscattered) signal. We performed single-probe ultrasonic backscatter measurements on 25 specimens of human bone of varying densities. The backscatter signals were analyzed to determine the average backscattered power returned from the bone specimens. We found that the backscattered power exhibited a highly significant linear correlation ($R = 0.93$) with the density of the specimens. This suggests that single-probe ultrasonic backscatter techniques may be a useful tool for detecting density changes in bone associated with osteoporosis.

Texas

POSTER TITLE: Morphological Monitoring of a Storm-dominated Microtidal Barrier Island: Galveston Island's Westend, Texas, USA
STUDENT: **Andrew McInnes**
FACULTY: Timothy Dellapenna
INSTITUTION: Texas A&M University at Galveston
FUNDING: NA
DISPLAY AREA: 8C
Abstract:
This ongoing monitoring program quantifies the relationships between temporal and spatial scales of morphologic change on a heavily developed and modified transgressive barrier island beach. A continuous synoptic alongshore surveying method was developed to examine the morphological variation of the Gulf beaches over the approximately 30 km section of the westend of Galveston Island. Near-weekly wetline surveys were conducted to record the position of the wetline immediately after the turn of the high tide; regular monitoring enables determination of shoreline migration and deviation due to storm events and annual cycles. Archiving and analysis of these short-term vacillations provides a long time-series of shoreline position and is of utility to coastal management and numerous stakeholders. The wetline is the wet/dry interface on the beach and is the furthest point of wave run-up, and is recorded by tracing the wetline immediately after the turn of the high tide utilizing an all Terrain Vehicle (ATV) equipped with a post-processed kinematic Global Positioning System (GPS). This system provides high-resolution topographical surveying with sub-decimeter accuracy in the horizontal dimension. The data is assembled in order to determine mean wetlines – monthly, quarterly, or annually; repeated landward advance of the shoreline is indicative of potential erosional hotspots. This work demonstrates that by using this economically feasible surveying method, highly accurate shoreline positions can be used to monitor the morphological changes of the shoreline. Quantitative analysis of the wetline deviations has enabled the identification of zones experiencing repeated relative advance/retreat of the shoreline.

POSTER TITLE: In Search of a New Molecule Formed by Rare Gas Atoms
STUDENT: **Joseph Hunt**
FACULTY: Cristian Bahrim
INSTITUTION: Lamar University
FUNDING: Lamar University
DISPLAY AREA: 8D
Abstract:
This project investigates the possibility for two rare gas atoms to form a molecule. Our test model is the collisional interaction between Helium and Neon atoms using a model potential which has successfully explained various experiments. This model potential leads to many bonding and anti-bonding states typical for stable molecules. These states inspired us to search for possible modes of vibration within several potential wells. Their discovery would clearly prove the existence of a HeNe molecule. Our quantum model uses a Morse potential. To the best of our knowledge, we have identified for the first time modes of vibration within a temporary molecule formed by rare gases. Our model could be adapted to any collisional interaction between rare gas atoms at thermal energies.

For experimental testing of our predictions, we propose several vibrational–electronic transitions that can be investigated in spectroscopic measurements using the absorption of infrared radiation. Also, we predict the abundance of Ne excited atoms after collision and successful absorption of an IR radiation, which can be tested in spectroscopic measurements of spontaneous emission.

The laws of chemistry simply deny the formation of a molecule between two rare gas atoms. A successful experiment for the identification of vibrational states in a temporary HeNe molecule would revise this restrictive point of view. Also, there is a technological interest in studying the interactions between Helium and Neon atoms. We expect that this study could help increasing the efficiency of HeNe lasers.

Utah

POSTER TITLE: Utah and The Indian Child Welfare Act Today.
STUDENT: **Kalista Francom**
FACULTY: Kathryn Mackay
INSTITUTION: Weber State University
FUNDING: WSU University Office of Undergraduate Research
DISPLAY AREA: 8E
Abstract:

Congress enacted the Indian Child Welfare Act (ICWA) in 1978. Before that time, an alarming number of Indian children were taken from their families and placed in non-Indian foster and adoptive homes or boarding schools. Child welfare studies have documented the devastating effects upon many of these children. Tribal sovereignty has also been violated. ICWA permits tribal courts to preempt state jurisdiction in making child care decisions about the future of Indian children. The Act also establishes minimum standards for the removal of children, the termination of parental rights, and it enforces tribal sovereignty in child placement proceedings. My personal interest in ICWA stems from my Indian heritage, and awareness of my Yankton/Oglala Sioux great and great-great grandmothers, who suffered from forced home removal.

Little definitive research has been done on the success or failure of this legislation on a state by state basis during the past 27 years. My project's focus is on the current function and impact of ICWA in the state of Utah. Utah has four different tribes affected by the Indian Child Welfare Act: the Goshutes, the Northern Utes of Utah, the White Mesa Utes and the Navajos of Utah. My descriptive research is intended to discover how well Utah stands in compliance with ICWA. Questions answered through direct interviews and literature review were: to what extent is ICWA benefiting the lives of Utah's urban and reservation Indian children; what is working well; what areas are needing improvement; and what are the existing limitations.

POSTER TITLE: Development, Aid, and Foreign Direct Investment: A model
STUDENT: **Steve Kapfer & Chris Miller & Richard Nielsen**
FACULTY: Daniel Nielson
INSTITUTION: Brigham Young Univeristy
FUNDING: Office of Research and Creative Awards
DISPLAY AREA: 8F
Abstract:

In this paper we argue that development aid - including bilateral grants and multilateral loans - interacts with foreign direct investment to produce improvements in measures of development. More precisely, this model assumes the following steps: (1) Development aid stimulates partial development, including improvement of domestic infrastructure and governance, (2) partial development attracts foreign direct investment, which (3) promotes economic growth. Growth provides additional revenue for governments to expend on the provision of public goods, such as policies to promote health, education, and social safety nets - all key to more holist measures of development. Presumably, certain forms of development aid are more important than others at different stages of development. Using simultaneous equation estimation, we refine the model to reflect the relative importance of ODA and FDI at each level of development, and determine if a threshold of good governance and infrastructure exists that must be reached in order to attract FDI. Prior scholarship has addressed some of these questions using bilateral development aid data. We will test the model using the new, comprehensive database of bilateral, multilateral and FDI data, the Project-Level Aid Database, which includes more than 500,000 development projects from 1970 to 2000. These new data will allow us to provide previously unavailable insights to the relationship between development, international aid, and FDI.

Vermont

POSTER TITLE: The 'Electronic Tether': The Influence of Frequent Parental Contact on the Development of Autonomy and Self-Regulation in Emerging Adulthood
STUDENT: **Elena Kennedy**
FACULTY: Barbara Hofer
INSTITUTION: Middlebury College
FUNDING: NA
DISPLAY AREA: 9A
Abstract:
Ongoing exploration, making one's own decisions, and taking responsibility for one's actions characterize the period of Emerging Adulthood (Arnett, 2000). For most emerging adults, leaving home for college is their first experience of living independently while learning to regulate themselves and contact with their parents. Though autonomy development often defines adolescence, many individuals enter college having developed neither autonomous parental relationships nor competent self-regulatory abilities. These factors are linked with educational, psychosocial, and occupational attainments in the college setting and beyond, thus healthy relationships and self-sufficiency are often vital to adaptive functioning (Bell, Allen, et al., 1996). Our research addresses how emerging adults can effectively navigate the transition away from parental dependence to self-reliance, despite continuing parental involvement as facilitated by electronic communication.
As recently as the 1990s, entering college meant suspending communication with parents, but cellular phones and e-mail have since saturated our society – transforming student-parent communication from an occasional to a frequent occurrence. Instant access and constant interaction have come to typify relationships between college students and their parents, thus developmental research must include the complex interplay of technology and communication. By tracking the form, frequency, and content of communication between college first-years and their parents, we are investigating the facilitation of autonomy and self-regulatory development, each of which is central to reaching adulthood. Our study includes parent and student surveys collected prior to the start of the fall semester, weekly reports from a subset of students, and end of first semester surveys from both parents and students all collected online. We hope this research will be beneficial to college students, their parents, and college administrators.

POSTER TITLE: Supernova Remnants in the Galaxy M33
STUDENT: **Emily McNeil**
FACULTY: P. Frank Winkler
INSTITUTION: Middlebury College
FUNDING: National Science Foundation
DISPLAY AREA: 9B
Abstract:
When massive stars explode in supernovae they leave telltale shells of excitation in the Interstellar Medium, which reveal themselves through optical emission lines. I am surveying the nearby galaxy M33 for supernova remnants (SNRs) using optical data from Kitt Peak National Observatory. The data include deep emission-line images obtained from the Burrell Schmidt telescope and high-resolution images taken with the 4-m telescope for the Nearby Galaxy Survey. I compared images of M33 in emission lines of [S II], [O III] and H-alpha looking for possible SNRs. Using a [SII]:H-alpha flux ratio of 0.3 or higher, which characterizes shock excitation, I identified 87 SNR candidates in addition to the 99 SNRs already known through previous optical studies. With careful flux and size measurements, these data promise a more complete survey of the SNRs in M33. We will complement the survey using data from a very large project on the Chandra X-ray Observatory examining X-ray sources in the central region of M 33. When there is a more complete list of SNRs, it will be possible to calculate an accurate supernova rate for one of our nearest neighbors. M33 is a valuable source of information because it is a similar type galaxy to the Milky Way, without the difficulties of extinction and ambiguous distance measurements that attend surveys in our own galaxy. This work will add to the understanding of stellar evolution and supernovae in galaxies similar to our own.

This work is supported by the NSF through grant AST-0307613.

POSTER TITLE: Synthesis of S/O Linked Mimetics of Hyaluronic Acid Resistant to Enzyme Degradation
STUDENT: **Heather Rideout**
FACULTY: Brian Kyte
INSTITUTION: University of Tennessee
FUNDING: National Science Foundation
DISPLAY AREA: 9C
Abstract:
Previous studies show that hyaluronic acid (HA) oligosaccharides will delay tumor formation, suppressing metastasizing melanoma cells. The delayed formation of tumors suggests a possible enzymatic breakdown of HA. We have begun to carry out the synthesis of a HA mimetic which replaces the beta(1->4) glycosidic linkage with a sulphur linkge between the disaccharide's two glucose derivatives, glucuronate (glucuronic acid) and N-acetylglucosamine. We will be modifying the lengths of the mimetic oligosaccharide using an enzymatic synthesis. This form of HA should be resistant to hyaluronidase and may show medicinal potential as a more permanent suppressor of metastasizing cancer cells.

POSTER TITLE: T-Tauri Variability in the Young Stellar Cluster IC 348
STUDENT: **Stella Nordhagen**
FACULTY: William (Bill) Herbst
INSTITUTION: Wesleyan University
FUNDING: National Science Foundation (through the Keck Northeast Astronomy Consortium)
DISPLAY AREA: 9D
Abstract:
Through this study, which drew on seven years worth of photometric data from a regular monitoring program at Wesleyan's observatory as well as spectroscopic data from the WIYN Observatory at Kitt Peak, Arizona, information was gathered on the variability characteristics of a cluster of T-Tauri stars (young stars which have yet to evolve to the stable portion of their stellar lifetimes.) In addition to identifying numerous previously-unknown rotational periods and velocities, this study was the first to measure a radial velocity for the cluster IC 348, and was able to determine the recurrence period of one of the longest known stellar eclipses, that of the unusual star HMW-15.
As many of the stars studied have characteristics similar to our own sun, studying them allows us to effectively study the sun's past and understand its formation and evolution. Additionally, most of these stars are at the point in their lifetime when planet formation occurs, providing us with an opportunity to learn more about the creation of our own solar system and the planetary systems of similar stars, knowledge which could have large implications for our understanding of our own place in the universe.

Virginia

POSTER TITLE: Immortalization and Characterization of Quail Proepicardial Cells
STUDENT: **Angela Grant & Veronika Redmann**
FACULTY: Kathy Schaefer
INSTITUTION: Randolph-Macon Woman's College
FUNDING: NA
DISPLAY AREA: 9E
Abstract:
During embryonic development, some proepicardial (PE) cells - a cluster of cells that migrate to and cover the surface of the developing heart - leave the surface of the heart and penetrate into the area below the epicardium, a process called epithelial to mesenchymal transformation (EMT). Some of the cells which have made this transformation will then aid in the development of the coronary vasculature. The signals that lead to EMT and the formation of the coronary vasculature are currently unknown. Knowledge of the mechanisms that lead to the formation of the coronary vasculature may help in the prevention and treatment of cardiac defects, including the use of embryonic stem cells for revascularization of damaged heart muscle in heart attack victims. We have isolated PE cells from quail embryos, grown them in culture, and have been studying their morphology and

cellular protein expression to identify cues that lead to their transformation. The proepicardial cells isolated from the quail embryos grown in culture are mortal and die after several divisions (in roughly a week). Hence, the long-term goal of this study is to transfect the proepicardial cells with DNA coding for immortalizing genes so that these cells can remain viable in long-term tissue culture. Immortalizing these cells would provide a useful tool to determine the genetic pathways important for cell migration, tissue type switching and blood vessel formation in the coronary tissue during development.

POSTER TITLE: Current Flow Effects in Microelectronic Devices
STUDENT: **Cara Campbell**
FACULTY: Susan Matts
INSTITUTION: University of Mary Washington
FUNDING: Unversity of Mary Washington
DISPLAY AREA: 9F
Abstract:

Integrated circuits control almost every aspect of modern life - from cars, appliances and computers to movies, CD and DVD players as well as many musical instruments. The circuitry continually grows smaller to increase device speed. Current (electron) flow does not pose a significant problem on the everyday scale (e.g. cable TV wires). On the smaller scale of today's technologies (cellular phones and Palm Pilots), however, this electromigration in the small wires (thin films) can cause considerable damage.

Electromigration occurs when electrons flowing through a thin film bombard the metal atoms that make up the film. These atoms are held together by an electric coulombic force. As some of these metal atoms are bombarded, the electric force is overcome and they are pushed due to elastic collisions in the direction of current flow. This metal atom movement causes holes in the metal at one end (the cathode) and hillocks at the other end (the anode). Electromigration is most prevalent along grain boundaries (regions between adjacent metal crystals where the crystal structure is not uniform). Heating causes electromigration to occur more quickly.

Electromigration will cause a circuit to fail when enough atom movement stops electron flow. In our research at UMW, we are trying to carefully monitor electromigration by examining optical and SEM images of thin film metal surfaces that have experienced current flow. By precisely controlling current flow and using quantitative microscopy via optical processing we hope to accurately quantify the damage. This research has both theoretical and technological implications.

POSTER TITLE: Understanding the Origin of Animal Body Plans
STUDENT: **Kay Holstien & Brittany West**
FACULTY: April Hill
INSTITUTION: University of Richmond
FUNDING: Howard Hughes Medical Institute
DISPLAY AREA: 10A
Abstract:

Our long-term goal is to elucidate important conserved developmental gene networks that support the origin of animal form, so we are completing a survey of sponge genomes that includes isolating, sequencing, and phylogenetically analyzing presumptive developmental master control genes from sponges. It has been hypothesized that the appearance of animal specific developmental gene families (e.g. Hox, Tbx, Wnt) was linked to the origin and evolution of animal multicellularity, and since sponges are the oldest and most primitive animal, we believe that they hold clues about the ancestral state of animals.

We have isolated two novel Tbx genes from two distinct sponges. One of the sequences shows significant similarity, based on phylogenetic analysis, to the Tbx 4/5 family in more complex animals. Tbx 4 and Tbx 5 are involved in limb and fin formation in complex organisms. The sponge Tbx4/5 ortholog seems to be consistent in expression across larval developmental stages and is turned on in normal adult sponges. The other novel Tbx gene does not appear to fall into a distinct group of Tbx genes. This gene shows high expression during early larval development and sponge cell aggregation experiments. In contrast, the adult stages have lower expression.

We are planning in situ hybridization experiments to study spatial expression patterns of these genes. Additionally, we will use bioinformatic approaches to begin to determine the suite of developmental toolbox genes present in sponges, including the Tbx and Wnt families when the sequence of the first sponge genome becomes available in early 2006.

POSTER TITLE: Ligand Induced Changes in the Conformational Stability of Glutamate Dehydrogenase
STUDENT: **Sarah Wacker**
FACULTY: J. Ellis Bell
INSTITUTION: University of Richmond
FUNDING: National Science Foundation
DISPLAY AREA: 10B
Abstract:
Bovine Glutamate Dehydrogenase (GDH) is subject to extensive allosteric regulation and requires substrate induced subunit interactions for maximum catalytic activity. We performed guanidine hydrochloride unfolding, heat inactivation, and differential scanning calorimetry (DSC) experiments to examine the effect of ligands on GDH conformational flexibility. The results of these experiments were correlated with previous studies on the effects of ligand induced conformational changes, cofactor binding, and overall activity. Without ligands, GDH can be thought of as poised to allow subunit interactions. Substrates which do not trigger or block cooperative interactions lead to enhanced stability, while ligands permitting efficient catalysis or enhancing catalysis were shown to increase flexibility. Particularly, studies show ADP and norvaline greatly stabilizing the enzyme: both ADP and norvaline have previously been demonstrated to block subunit communication. Furthermore, NADP(H) makes GDH much less stable than NAD(H) correlating to the fact that NADP(H) only binds to the active site while NAD+ first binds to the ADP binding site and then to the active site. Strength of the subunit interfaces of the GDH hexamer was investigated in GuHCl experiments; the study revealed that norvaline greatly stabilizes all interfaces while other ligands have moderate effects on either the trimer-trimer or the monomer-monomer subunit interactions. From these experiments a pattern emerges of ligands stabilizing GDH conformation, acting to block subunit interactions, and inhibiting the overall activity, or ligands increasing conformational flexibility, promoting subunit interactions, and allowing part of the binding energy to promote catalysis through subunit interactions.

Washington

POSTER TITLE: Predictors of Fatigue In Air Force Personnel: An Assessment of Temperament, Character, and Performance.
STUDENT: **Raelynn Wheeler**
FACULTY: Lauren Fowler
INSTITUTION: Weber State University
FUNDING: National Science Foundation
DISPLAY AREA: 10C
Abstract:
Millions of dollars are spent yearly on military research to address the problem of human error resulting from fatigue. The USAF is one sector of the military that is committed to finding ways to reduce such effects. This study was designed to assess predictors of fatigue in air force personnel. Seventeen air traffic controllers and weapons controllers were used at a USAF base. The participants had a rapidly rotating, counter-clockwise weekly shift change. Data were collected for a Tuesday day and swing shift and Thursday day and swing shift for each participant. Participants were tested once early in the shift and once at shift end on a computerized task measuring their multi-tasking capabilities. This task was part of the Automated Neuropsychological Assessment Metrics (ANAM) which is an assessment tool developed by the Army and Navy. The Temperament and Character Inventory (TCI; Cloninger, 1994) was used to assess the effects of personality traits on individual performance. The TCI was used to predict susceptibility to fatigue at different phases of shiftwork. Using a multivariate analysis, results showed that those who scored high on the temperament subscales of the TCI demonstrated increased performance on the ANAM, while high scores on character dimensions of the TCI

decreased ANAM performance. These findings suggest that the multitasking performance is affected by fatigue, and the TCI can be used to predict susceptibility to the fatigue effects. Thus, the TCI is a tool that can be used to help increase awareness of performance abilities in military shiftworkers.

POSTER TITLE: Effects of Recovering Populations of the Sea Urchin Diadema Antillarum on Coral Recovery and Benthic Community Structure, Caribbean Costa Rica
STUDENT: **Sarah Myhre**
FACULTY: Alejandro Acevedo-Gutiérrez
INSTITUTION: Western Washington University
FUNDING: NASA Space Grant
DISPLAY AREA: 10D
Abstract:
We surveyed the benthic community and the population density of the long-spined sea urchin Diadema antillarum on the shallow fore-reefs of the Gandoca-Manzanillo Wildlife Refuge, Caribbean Costa Rica, over a period of eight weeks. The total area covered by live scleractinian coral, non-calcareous macroalgae and calcareous macroalgae was 17.86%, 7.98% and 7.75%, respectively. The mean density of D. antillarum was 0.25 individuals m-2 and had an effect on the benthic community of the refuge. In zones with high D. antillarum densities, the cover of non-calcareous macroalgae was low and the cover of live coral was high, while the opposite occurred in zones with low D. antillarum densities. D. antillarum density was not related to the coverage of calcareous macroalgae. The values of D. antillarum density and area covered by live scleractinian coral were twice and seven times larger, respectively, than those reported four years ago for the study site. In the same lapse of time, the coverage of non-calcareous macroalgae went from ~79% to 50.7% of algal cover. These results indicate that a recovery of scleractinian coral in the Caribbean coast of Costa Rica has been occurring during the past four years and that the benthic community is apparently moving from a macroalgae-dominated phase to a coral-dominated one.

Wisconsin

POSTER TITLE: Estrogen Induced Sexual Abnormalities: A Genetic Model for Assessing Estrogenic Pollutants in the Environment
STUDENT: **Kendra K. Scudder**
FACULTY: E. Katherine Miller
INSTITUTION: University of Wisconsin - River Falls
FUNDING: University of Wisconsin System
DISPLAY AREA: 10E
Abstract:
Residual pharmaceuticals and industrial chemicals found in natural water systems and public water sources may exhibit toxic effects on humans. Among these, estrogenic compounds are causing increasing concern due to effects they are having on wild populations. In order to understand the effects of estrogenic exposure on complex organisms, it is necessary to begin by studying the effects on a more simple system. The present study addresses the question by assessing the multi-generation effects of two estrogenics, bisphenol A (BisA) and 17-estradiol (E2), on the model organism Caenorhabditis elegans. Fecundity, reproduction, and physical abnormalities are used as toxicity endpoints. Initial data show that exposure of C. elegans to BisA decreases egg production relative to the concentration of BisA and the generational time of exposure. Several developmental abnormalities also appear, including a protruding vulva and a retarded growth period for exposed larva. The most significant of the findings, however, was the change in male to hermaphrodite population ratios, dropping from 45-50% male to as low as 9% male. This suggests that BisA may have caused some degree of infertility in the population. Studies using E2 are currently in progress. RNAi technology is used to “knock-out” selected genes in an effort to understand the mechanism by which these effects are caused. In understanding how they are caused, science can address the relation and impact on humans more effectively.

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
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**

Entrance **Entrance**

Participants

Arizona
University of Arizona

California
University of California, Los Angeles

Connecticut
Trinity College

Florida
Stetson University

Hawaii
Chaminade University of Honolulu

Iowa
University of Northern Iowa

Illinois
Bradley University

Inidana
Indiana University Southeast

Kentucky
Northern Kentucky University

Louisiana
Northwestern State University of Louisuana

Maryland
St. Mary's College of Maryland

Massachusetts
Worcester Polytechnic Institute
College of the Holy Cross

Michigan
Central Michigan University
Hope College

Minnesota
College of St. Benedict
Augsburg College

Missouri
Central Missouri State University
Rockhurst University
University of Missouri – Columbia
Truman State University
Saint Louis University

Montana
Montana State University

Nebraska
Creighton University

New Jersey
Montclair State University
Rutgers University

New Mexico
University of New Mexico

New York
State University of New York at Cortland
State University of New York at Geneseo
Hobart and William Smith Colleges

North Carolina
University of North Carolina – Wilmington

Ohio
Youngstown State University

Oklahoma
University of Central Oklahoma

Oregon
University of Portland

Pennsylvania
Lycoming College
University of Pittsburgh
Juniata College
Carnegie Mellon University

South Carolina
Furman University
University of South Carolina Upstate

South Dakota
University of South Dakota

Tennessee
Rhodes College

Texas
Texas A&M University at Galveston
Lamar University

Utah
Weber State University
Brigham Young University

Vermont
Middlebury College
Saint Michael's College

Virginia
Randolph-Macon Woman's College
University of Mary Washington
University of Richmond

Washington
Washington State University
Western Washington University

Wisconsin
University of Wisconsin – River Falls