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14th Annual

2010 POSTERS ON THE HILL

April 13, 2010

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Washington, DC

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- National Science Foundation, IOS, behavioral systems cluster
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- Plastic Safety Systems
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- Undergraduate Apprenticeship Program
- University of Houston
- US Department of Justice, Office of Juvenile Justice and Delinquency Prevention
- Virginia Military Institute
- World Cocoa Foundation

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Dear Posters on the Hill Participants:

I wish to congratulate you on your selection to participate in the 2010 Posters on the Hill. Your research project was selected from over 300 applications. 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 know that your undergraduate research experience has contributed positively to the value of your undergraduate education and that you will be better prepared as a result for graduate school or your career. You have had the opportunity to develop skills in analysis, critical thinking, problem-solving and innovation through your research project.

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. Or maybe you will be a Member of Congress and attend Posters on the Hill!

Best Wishes.

Nancy Hensel

Nancy Hensel
Executive Officer

Program

Monday, April 12, 2010

Orientation Session

5:30 pm American Chemical Society (ACS)
Marvel Room
1155 16th St., N.W.
Washington, DC 20036

Light Dinner

Presentation of certificates

Speakers

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

James Brown
Assistant Director for Advocacy, Office of Public Affairs
American Chemical Society

Tuesday, April 13, 2010

Morning Session -

8:30 –10:30am Rayburn House Office Building, Room B339

Continental Breakfast

Welcome and Introduction of Speaker
Nancy Hensel – CUR Executive Officer

Address – Dr. Wayne Clough
Secretary, Smithsonian Institution

11:00 am–4:00 pm Appointments with Representatives

4:15 – 5:00 pm Poster setup - Rayburn Office Building (B338, B339, B340)

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

7:30 pm Break down posters

Please do not remove your poster until 7:30pm*

California

STUDENT: MELISSA SUZANNE TAYLOR
INSTITUTION: LOYOLA MARYMOUNT UNIVERSITY
FACULTY ADVISOR: JEFF PHILLIPS
POSTER TITLE: MEASURING THE IMPACT OF THE MAST PROGRAM FOR IN-SERVICE TEACHERS
DISPLAY AREA: 1A
ABSTRACT: It is of concern to both policy-makers and the scientific community that the U.S. K-12 education system is not preparing students as well as other countries or even well enough to enter post-secondary majors in science, technology and mathematics (STEM). To directly address these concerns, Loyola Marymount University has developed a professional development program for in-service STEM teachers in secondary schools, Math and Science Teaching program (MAST). This program, which focuses on increasing student engagement and ultimately helping the teachers to become more self-regulated in their craft, has been highly successful. In the schools that have participated in MAST, scores on state mandated student tests have shown improvements. In an effort to better understand the effects of MAST on participants we have developed a survey that assesses teacher attitudes, practices, and knowledge of student learning. The survey has been given to new participants in MAST as well as those who have successfully progressed through the program, who serve as the "expert" comparison group. Among the differences between the groups, it is seen that those who have progressed through MAST welcome feedback on their teaching and secondly recognize that the amount of learning is dependent upon both the student and teacher.

STUDENT: TIRANUN RUNGVIVATJARUS
INSTITUTION: UNIVERSITY OF CALIFORNIA - LOS ANGELES
FACULTY ADVISOR: JOHN EDMOND | IVAN AXEL LOPEZ
POSTER TITLE: ANTI-OXIDANT ENZYMES UPREGULATION IN THE DEVELOPING CEREBELLUM OF THE RAT AFTER CHRONIC MILD CARBON MONOXIDE EXPOSURE (0.0025% IN AIR)
DISPLAY AREA: 1B
ABSTRACT: Have you ever thought about how secondhand smoking can affect brain development of unborn babies? Carbon monoxide (CO) is a constituent of tobacco smoke that is colorless, tasteless, and odorless, yet very toxic to humans and animals. When pregnant mothers are exposed to secondhand smoke, CO enters their blood circulation and readily crosses the placenta to bind to fetal hemoglobin. The developing nervous system of the fetus is thus extremely susceptible to the reduction of oxygen availability produced by CO exposure. This project tests the hypothesis that chronic, mild prenatal CO exposure subverts the normal development of the cerebellar cortex. To test this hypothesis, pregnant rats were chronically exposed to CO during gestational period. During postnatal period, rat pups were then divided into four different groups (A-D). Rat pups in group A were exposed to CO prenatally only, while those in group B were exposed to CO both prenatally and postnatally. Rat pups in group C were exposed to CO postnatally only, while those in group D were not exposed to CO at all (control). After twenty days of gas exposure, the cerebella of these rat pups were isolated and the levels of anti-oxidant enzymes were analyzed using immunofluorescence. We suspect that the immunoreactivity of these anti-oxidant enzymes would increase in cerebellar cortex cells of the 3 CO-exposed groups. This up-regulation should indicate that exogenously supplied CO during prenatal period subverts cerebellum development and promotes oxidative stress, which is involved in many neurodegenerative diseases like Alzheimer's, Parkinson's, and Huntington's disease.

Delaware

STUDENT: GHADA ALABED | JORDAN WHEATLEY
INSTITUTION: WESLEY COLLEGE
FACULTY ADVISOR: MALCOLM J. D 'SOUZA
POSTER TITLE: CREATING A STRUCTURE BASED SEARCHABLE DATABASE FOR FDA APPROVED CHEMOTHERAPY DRUGS USING KNOWITALL®
DISPLAY AREA: 1C
FUNDING: NATIONAL INSTITUTES OF HELATH
ABSTRACT: The process by which new chemotherapy drugs are discovered, tested in vitro, subjected to patient's trials, and finally brought to market, is a long, enormously costly and time consuming process. In general an average of 15 years at a cost of over 800 million dollars is required to introduce a marketable chemotherapy drug that is accepted by the FDA. Recently many in-vitro and in-silico techniques targeting the identification of "structure activity relationship" (SAR properties) have been developed for early identification and subsequent disqualification of misfit chemical compounds to help researchers improve time-consumption, and cost effectiveness for the development of new chemotherapy drugs. The latter in-silico method encompasses computerized testing of millions of searchable candidate chemical compounds using commercially available tools such as the KnowItAll® platform. The absorption, distribution, metabolism, excretion and toxicology (ADME/Tox), along with other pharmacokinetic parameters are usually reported in long wordy non-searchable PDF files at the FDA website. The aim of this study is to extract the relevant information from the printed drug packets and to create a chemical-structure based (SAR relevant) searchable database for FDA approved chemotherapy drugs using KnowItAll®. Subsequently, we will study the accuracy of predicting pharmacokinetic properties of chemotherapy drugs using this newly developed "FDA Chemotherapy Drug Database". The database will include the 3D chemical structures of the drugs, and ADME/Tox predictive properties could eventually serve as a customizable in-silico tool for screening chemotherapy drug candidates early in the process ultimately expediting the development and testing of new drugs.

Georgia

STUDENT: RUCHIR NISHIKANT KARMALI
INSTITUTION: GEORGIA INSTITUTE OF TECHNOLOGY
FACULTY ADVISOR: AARON D. LEVINE
POSTER TITLE: ASSESSING THE RISE AND IMPACT OF STATE FUNDING FOR STEM CELL RESEARCH
DISPLAY AREA: 1D
ABSTRACT: Human embryonic stem cells (hESCs) interest scientists because these cells can give rise to any cell type, and, thus, offer a new tool to explore the progression of disease and develop cell-based therapies. However, hESC research sparks controversy because cells are isolated from early human embryos. After federal funding for hESC research was restricted in 2001, several states adopted a role typically played by federal agencies and provided research grants for scientists in this field. These state programs were motivated by two goals: advancing scientific knowledge by supporting cutting-edge hESC research not eligible for federal funding and fostering economic development in their states. This project assesses the effectiveness of state stem cell policies in both dimensions. The first step in this process was the development of a database containing detailed information on all of the approximately 700 state stem cell grants awarded through June 2009. The abstracts of these grants were analyzed to assess the extent to which each state focused its funding on research ineligible for federal support. The second step is an ongoing survey of stem cell scientists designed to assess how state stem cell policies impact scientists' careers. Statistical techniques will be used to compare stem cell scientists in states that provide stem cell funding with those in other states to understand how state stem cell policies have affected the mobility of stem cell scientists and their choices of research fields. Together, these analyses will provide an understanding of the importance and limitations of state science policies.

Georgia continued

STUDENT: CORINNE E. GILMER
INSTITUTION: MERCER UNIVERSITY
FACULTY ADVISOR: BRIDGET G. TROGDEN
POSTER TITLE: A CHEMICAL-BIOLOGY APPROACH TO EXPLORING PLACENTAL MALARIA
DISPLAY AREA: 1E
ABSTRACT: Malaria is currently the leading cause of death and disease in many countries, especially in Sub-Saharan Africa. Women that are pregnant with their first or second child are particularly susceptible to malaria even though they have often acquired immunity over years of living in areas where the disease is prevalent. This pregnancy-associated malaria is due to a malaria infection in the placental tissue. In placental malaria , red blood cells infected with the malaria parasite hide in placental spaces, where they are able to evade the immune system, but interrupt the blood flow between mother and fetus. The outcomes of placental malaria include anemia, low birth weight, and death of both mother and child. The fact that this disease is almost entirely associated with underdeveloped countries is especially noteworthy. We are looking to explore the chemical interaction that allows the infected red blood cells to adhere to placental tissues. It is known that a certain type of protein present on the infected red blood cells causes this adherence. We have been working to isolate this protein in the lab in order to design drugs against it. This would enable us to learn more about the structure of this malaria protein and to stop the ability of the infected cells to hide in the placenta.

Hawaii

STUDENT: YANNICA THEDA S. MARTINEZ
INSTITUTION: CHAMINADE UNIVERSITY OF HONOLULU
FACULTY ADVISOR: PATRICIA LEE-ROBINSON
POSTER TITLE: STANDARDIZATION OF KDR ASSAY USING PYRIDINE[1,5-A]PYRIMIDINES AND 4-AMINOQUINAZOLINES
DISPLAY AREA: 1F
ABSTRACT: Vascular Endothelial Growth Factor (VEGF) is a signaling protein involved in vasculogenesis, the process of spontaneous blood vessel formation during embryological development, and angiogenesis, the formation of new blood vessels from pre-existing vessels. VEGF activates a signaling cascade when it binds to the Kinase insert Domain Receptor (KDR), which undergoes autophosphorylation and becomes activated, thus leading to malignant growth of cancer and tumor cells in overexpressed VEGF. Clinical trials have showed that the inhibition of KDR leads to anti-angiogenesis in various cancers. The major problem is the dissociation of the in vitro kinase inhibitor potency correlating to drug efficacy in humans. Our goal for this project is to standardize a KDR in vitro kinase assay that can be readily used by research groups, which establishes a baseline for potential correlation in clinical efficacy. The experimental method called for several controls of known KDR inhibitors from pyridine [1,5-a]pyrimidines and 4-aminoquinazoline chemical series and the use of HTScan VEGFR-2 kinase assay kit. The assay exhibited a high DMSO tolerability of 1% final concentration while still providing a good dynamic range. The pyridine [1,5-a]pyrimidines series showed moderate inhibitory potency of 46% and 72% inhibition at 25 uM as compared to IC50 in the range of 25 nM. Compounds from the 4-aminoquinazoline chemical series showed percent inhibition ranging from 28% to 64% at 20 uM. The HTScan VEGFR-2 kinase assay was reproducible and provided for a more realistic KDR inhibitory potency of known standards as compared to their low efficacy in human clinical trials.

Illinois

STUDENT: SCOTT KRABBE
INSTITUTION: ILLINOIS WESLEYAN UNIVERSITY
FACULTY ADVISOR: RAM MOHAN
POSTER TITLE: GREEN CHEMISTRY USING BISMUTH COMPOUNDS: BISMUTH(III) BROMIDE CATALYZED ALLYLATION OF TETRAHYDROPYRANYL ETHERS.
DISPLAY AREA: 1G
FUNDING: NATIONAL SCIENCE FOUNDATION
ABSTRACT: With increasing environmental concerns the need for green synthetic methods has assumed significant importance. In this context, bismuth compounds are especially attractive because most bismuth compounds are remarkably nontoxic. In addition, they are non-corrosive, easy to handle and inexpensive. The non-toxicity of bismuth compounds has led to numerous applications in the medicinal chemistry field (for e.g. the active ingredient in Peptobismol™ is a bismuth based compound). We have utilized several bismuth salts as catalysts for organic transformations. The present research focuses on the use of bismuth bromide as a catalyst for the allylation of tetrahydropyranyl and tetrahydrofuranyl ethers, which are common organic functional groups. These are multicomponent reactions in which the product of the first step is reacted further to yield a highly functionalized product. Such multicomponent reactions save steps and are attractive from a green chemistry perspective. The results of this study will be presented.

STUDENT: ANTOINETTE LETTIERE | JAMES SCHMIDT
INSTITUTION: SOUTHERN ILLINOIS UNIVERSITY CARBONDALE
FACULTY ADVISOR: ROBERT SWENSON
POSTER TITLE: SAVING SHOTGUNS IN CAIRO, IL
DISPLAY AREA: 1H
FUNDING: ADVENTURES IN PRESERVATION
ABSTRACT: Cairo, located at the southernmost point of Illinois, was once a thriving town with steamboat traffic, blues musicians, and an array of architectural styles. The town suffered from immense economic depression leaving Cairo with empty and deteriorating historic buildings throughout the city. SIUC School of Architecture and Adventures in Preservation teamed up to try and revitalize the town by demonstrating sustainable restoration practices and create affordable housing for Cairo by rehabilitating several "shotgun" style houses since a large number remaining are listed or to be included in the Cairo Historic District., Before restoration work begins, each house is thoroughly assessed by investigating the history and determining the original features. Work began in the summer of 2009 on a circa 1906 shotgun house at 2910 Sycamore with a two-week workshop led by Bill Black Jr., a preservation contractor from Paducah, KY. After being introduced to preservation techniques, students focused on the exterior of the house daily for another nine weeks., More than just beautifying the streets of Cairo, the goal was to bring hope and motivation to a disheartened community. The citizens of Cairo were encouraged to participate and learn skills that could benefit their own home and town year after year. Since many of the homes in Cairo are similar to the first project house, the overall process was clearly documented, made available at the local library for the community to reference, and as a handbook for future workshops.

Indiana

STUDENT: RONALD DEAN TAYLOR
INSTITUTION: INDIANA STATE UNIVERSITY EARTH AND ENVIRONMENTAL SYSTEMS
FACULTY ADVISOR: SCOTT E. ISHMAN | JONATHON B. MARTIN | ANTHONY EARL RATHBURN
POSTER TITLE: USING BENTHIC FORAMINIFERA TO ASSESS SEASONAL CHANGES OF MARINE ECOSYSTEMS IN THE ANTARCTIC
DISPLAY AREA: 1I
ABSTRACT: Polar ecosystems respond quickly to environmental changes, and as a result, are on the front lines of global climate change. Understanding how marine ecosystems respond to seasonal changes in polar regions is crucial for assessments of ecological responses to environmental changes of the past, present, and future. Foraminifera (marine organisms) are particularly sensitive indicators of past and present environmental change , and to better understand the impacts of seasonal changes, the SEASONS Project (Seasonal Ecological Analysis of Seafloor Organic Nutrient Supplies) examined sediment core samples collected across food availability gradients off the coast of the western Antarctic Peninsula in April 2008 (following a surface productivity bloom) and July 2008 (low surface productivity). Distribution patterns of Rose Bengal stained benthic foraminifera were determined from core samples taken in water depths of approximately 600-1200m. Dominant species found in this region included: Pullenia bulloides, Astrononion echolsi, and Bolivina psuedopunctata. Differences in assemblage characteristics and distribution patterns appear to be related to changes in organic input over space and time. Information about the responses of foraminifera to seasonal changes yields critical base line data for seafloor biodiversity and the impacts of climate change on marine ecosystems in the Antarctic. This study provides the first census of living Antarctic foraminifera on these timescales in this region, and generates modern analogs for reconstructions of environmental variability in the past based on fossil foraminifera. This information is important for predictions of ecological impacts of future environmental changes, including those affecting seasonality and food availability in the Antarctic.

Iowa

STUDENT: CARL DAVIDSON
INSTITUTION: SIMPSON COLLEGE COMPUTER SCIENCE
FACULTY ADVISOR: LYDIA SINAPOVA
POSTER TITLE: IDENTIFYING GENE REGULATORY NETWORKS USING EVOLUTIONARY ALGORITHMS
DISPLAY AREA: 1J
FUNDING: IOWA COLLEGE FOUNDATION
ABSTRACT: Understanding the genomes of various species contributes to quality of life in many regards. One important property of a genome is its gene regulatory network (GRN) – a system of feedback mechanisms controlling the expression levels of genes, i. e. which genes will be used for the synthesis of enzymes and proteins in response to the current cell environment. Understanding how GRNs work helps biologists determine the interactions between genes. Gene regulatory networks are elucidated from large data sets of gene expression levels over a number of different environmental conditions. The common modeling tools for GRNs are Bayesian networks – graphs representing relationships between a series of variables. Because the runtime of certain operations on Bayesian networks increases exponentially with the number of variables, optimization algorithms are typically used to create Bayesian networks. In this research we use genetic algorithms, which find favorable solutions to problems in a manner inspired by natural selection. Our genetic algorithm starts with a number of randomly created Bayesian networks and then combines them to produce the best fit to the gene expression data set. A novel method of representing Bayesian networks in genetic algorithms was developed that stores the topological sort of each network. We investigated what selection methods, fitness functions, and chromosome representations produce the best results in the implementation. The implementation could analyze data from a real life gene expression data sets. Analysis of a portion of the human transcriptome successfully demonstrated the algorithm could scale to large, real world applications.

Kansas

STUDENT: SONIA BARRERA | JOSE ROJAS | AIMEE SIEBERT
INSTITUTION: BETHEL COLLEGE
FACULTY ADVISOR: DWIGHT KREHBIEL
POSTER TITLE: VALIDATING A MUSIC SEARCH ENGINE THROUGH AFFECTIVE AND PHYSIOLOGICAL RESPONSES OF LISTENERS
DISPLAY AREA: 2A
FUNDING: NATIONAL SCIENCE FOUNDATION
ABSTRACT: Wide availability of music recordings on the Internet has stimulated creation of various music recommendation systems, using information about artist, genre, etc. to help the listener find desired music. The system or search engine employed here is unusual in being based solely upon measures of melody and timbre (Manaris et al., 2008). We tested the validity of search engine choices by examining affective and physiological responses of listeners. All participants listened to a set of seven songs - an experimenter-selected original song and three similar and three dissimilar songs selected by the search engine. An additional five songs were selected for each participant based on an original song from one of the participant's three favorite genres. During listening, EEG and peripheral psychophysiological activity were continuously measured. In response to each song, participants (n = 38) rated their own activation and pleasantness, and their familiarity with and liking of the music. Participants showed significantly higher ratings of pleasantness and liking and higher heart-rate for similar than for dissimilar songs. Significantly greater frontal cortical EEG asymmetry was also found for similar than for dissimilar songs in the set of seven songs. Hierarchical linear modeling showed that familiarity and pleasantness ratings were both strong predictors of liking. Results indicate that this search engine reliably predicts affective responses to music, including their physiological components, and that liking is related to familiarity and pleasantness across diverse music selections. The results also suggest intrinsic links between human affective responses and patterns of melody and timbre.

Kentucky

STUDENT: WALTER CHRISTOPHER KAEFF
INSTITUTION: NORTHERN KENTUCKY UNIVERSITY
FACULTY ADVISOR: JOHN JOSEPH METZ
POSTER TITLE: CLIMATE CHANGE ON CAMPUS - NKU 'S METHOD OF ANSWERING THIS GENERATION 'S CALL
DISPLAY AREA: 2B
ABSTRACT: In December 2007 President James Vortuba of Northern Kentucky University signed the American College and University Presidents Climate Commitment. Signatories agree to reduce and ultimately eliminate greenhouse gas (GHG) emissions from their universities' activities, and to promote research and education which leads to sustainable societies. A detailed inventory of current and historic GHG emissions was the first major requirement of the commitment. To meet the deadline for reporting emissions, the NKU President's Climate Commitment Taskforce, composed of administrators, faculty, staff, and students, designed a strategy to proceed. Over the course of two semesters, countless hours of research and analysis went into this project. With the guidance of Dr. John Metz, two students, Chris Kaeff and Jennifer Lantz, compiled all the required data and entered it into a "carbon calculator" specifically designed to produce emission inventories for universities. The intensive research of collecting 18 years worth of institutional records, and extrapolating results to establish historic population statistics, resulted in a clear picture of NKU's carbon footprint. More importantly, this work has established a base line upon which we can measure our current capabilities and future successes in reducing GHG emissions. Effectively, it's given the NKU community a chance to better understand our role and responsibility in this changing world. This poster will document all aspects of the project. From research and analysis to politics and presentations, it will emphasize the richness of experience for the undergraduate and the significant value that undergraduate research provides to an institution.

Maine

STUDENT: MARIAM ALAM
INSTITUTION: BATES COLLEGE
FACULTY ADVISOR: KAREN PALIN
POSTER TITLE: DEVELOPMENT OF CULTURALLY APPROPRIATE PICTOGRAMS FOR USE WITH PRESCRIPTION MEDICATIONS IN SOMALI POPULATION OF LEWISTON, ME
DISPLAY AREA: 2C
ABSTRACT: Recent research conducted by students in the Bates College biology class, Community-Based Research in Biology, shows that members of the local Somali immigrant and refugee community demonstrate difficulty in comprehending and adhering to prescription medication instructions due to language difficulties and low functional and health literacy. Our data from 26 home-visit interviews showed that none of the patients whom we interviewed were compliant with prescription medication use. Patient misunderstanding of prescription labels can have disastrous effects, including failure to complete treatments and potential for dangerous drug interactions. Partnering with B Street Health Center and Bedard Pharmacy, I seek to improve patient comprehension of and adherence to prescription medication instructions, and thereby patient health and health literacy, by developing culturally appropriate pictograms for use with prescription labels. The developed pictograms are intended to assist pharmacists, who are legally responsible for patient education, to convey information to patients with whom they cannot otherwise communicate. Pictorial images denoting typical medication instructions are being generated through workshops, smaller focus groups and interviews with local pregnant and breastfeeding Somali women, with the aid of a cultural broker. Participants are asked to choose which of several pictograms relaying the same medical information most effectively aids their understanding. The women will later be asked to draw their own images to convey this information. The images developed based on this data will be tested for their effectiveness at improving patient understanding and medical adherence through interviews with patients in their health care provider's office during routine follow-up visits.

STUDENT: NATALIE BROWN
INSTITUTION: BATES COLLEGE
FACULTY ADVISOR: PATRICIA BUCK
POSTER TITLE: ENGLISH LANGUAGE LEARNERS: HOW TO PROVIDE QUALITY EDUCATIONAL OPPORTUNITY
DISPLAY AREA: 2D
ABSTRACT: With the foundation of this study rooted in the discussion of how to create equal access to quality education, this project examines best approaches to teaching English Language Learners (ELL) through an in depth analysis of three states, Maine, Texas, and California, and the policies and practices implemented for limited English proficient student populations. Using a critical theorist framework, which situates social inequities within historical contexts and strives to create social change through a transformation of the stratifying economic systems, the present study discusses the pedagogical approaches used within the context of differing political opinions. How these methods translate to the state level legislation, and further, how federal mandates such as No Child Left Behind help or hinder these limited English proficient students' success as citizens is at the basis of this inquiry. Through textual analysis and interviews with state officials, policy analysts, and English Language Learner educators, this study looks at why ELL populations are a critical example of the problems within the US public educational system. Noting the disagreements between conservative, liberal, and radical approaches to helping these students, in examining the complexity of ELLs and their incorporation into public schooling, the study discusses the implications of 'best approaches' for such a heterogeneous and diverse group and how these students are not always properly supported and assisted within the system. Finally, recommendations are that can provide educators and policy makers with new perspectives on implementing ELL instruction and supporting this group within the educational system.

Maine continued

STUDENT: LINDSAY M. FORRETTE
INSTITUTION: UNIVERSITY OF NEW ENGLAND
FACULTY ADVISOR: TERESA DZIEWECZYNSKI
POSTER TITLE: I'M A LOVER...MAYBE: THE EFFECTS OF RECENT EXPERIENCE ON PERSONALITY IN SIAMESE FIGHTING FISH
DISPLAY AREA: 2E
FUNDING: NATIONAL SCIENCE FOUNDATION: IOS, BEHAVIORAL SYSTEMS CLUSTER
ABSTRACT: Consistent individual differences in behavior, or personalities, imply that individuals act the same way every time they are presented with a given situation while differing from one another in their responses. While animal personality has been explored in a variety of context, how individuals respond when both a male and a female are present at the same time is rarely investigated. We have established previously in the lab that male Siamese fighting fish exhibit consistent individual differences and fall into three categories when faced with this situation: lovers, fighters, and dividers. However, whether or not these responses can be shaped by recent experience is unknown. In this study, male Betta were first tested with paired male and female dummy conspecifics to determine preexisting personality. They were then allowed to fight with a male conspecific across a clear partition and then tested again with the dummies. Males were given three trials under each of the following conditions: winner no nest, winner nest, loser no nest, and loser nest. This allowed us to address the effects of both receptivity and experience on personality. It was predicted that males would switch their strategy as a result of fight outcomes. We found that while overall response towards the dummies was affected by fight experience, surprisingly, male strategy remained the same. This demonstrates that personality was unaffected by recent experience. This study provides an important addition to the study of personalities by demonstrating that decision-making is not necessarily influenced by recent experience.

Maryland

STUDENT: JAMES S. BARDSLEY
INSTITUTION: TOWSON UNIVERSITY BIOLOGY
FACULTY ADVISOR: ROLAND P. ROBERTS | LARRY E. WIMMERS
POSTER TITLE: DETECTION OF MISIDENTIFIED PLANTS IN THE INTERNATIONAL COCOA GENEBANK, TRINIDAD
DISPLAY AREA: 2F
FUNDING: WORLD COCOA FOUNDATION
ABSTRACT: Theobroma cacao is the major source of cocoa used in the manufacture of a variety of chocolate products. Thus, it is of much interest to maintain the quality of cocoa resources that contribute largely to many countries' economies. Since cacao seeds do not remain viable for longer than a week after being harvested, seed collections are impractical. Therefore, the genetic strains of cacao trees and their important qualities/traits must be protected by maintaining collections of living trees. The International Cocoa Genebank in Trinidad (ICG, T) is the largest cacao collection in the world, consisting of 2,300 plots, each meant to represent a unique genetic strain. However, due to the long term nature of living collections, many errors can be introduced over time, undermining efforts to maintain these genetic strains. Towson University and the University of West Indies have started this collaborative project to evaluate clonal errors in selected plots from the ICG, T. Simple Sequence Repeat (SSR) DNA analysis was identified as the most appropriate molecular tool for DNA fingerprinting germplasm collections. SSRs are short non-coding regions of DNA composed of nucleotide repeats which are flanked by unique functional regions of DNA. These regions tend to accumulate mutations among individuals within a species, usually represented as an increase in the number of repeats. Thus, one can distinguish between two individuals within a species by amplifying the SSR region through Polymerase Chain Reaction (PCR) and examine the length of the microsatellite. Preliminary results indicate a misidentification rate of approximately 25%.

Massachusetts

STUDENT: ABIGAIL S. CLARK
INSTITUTION: EMMANUEL COLLEGE
FACULTY ADVISOR: FAINA RYVKIN
POSTER TITLE: INVESTIGATION INTO THE ROLE OF COPPER IN CATALYTIC MECHANISM OF LYSYL OXIDASE
DISPLAY AREA: 2G
Abstract: Lysyl oxidase (LOX) is an extracellular copper-dependent enzyme that plays a significant biological role. LOX oxidatively deaminates endopeptidyl lysine residues to peptidyl á-aminoadipic-ä-semialdehyde. These peptidyl aldehydes initiate the cross-linking of collagen and elastin, thus, greatly contributing to the structural composition and repair of connective tissue within the cardiovascular, respiratory, skeletal and others systems within the body. The most intriguing aspect regarding LOX activity relates to its putative cell phenotype control and recently reported tumor suppressor activity. The enzyme has two cofactors: lysine tyrosyl quinine and copper 2+ ion, both involved in the catalytic mechanism of LOX. To date nothing is known about three-dimensional structure of this important enzyme including the role of the copper cofactor in its catalytic mechanism. Significant efforts were made to purify the enzyme until homogeneity and in sufficient amounts so to analyze the structural and functional aspects of LOX. Success in purification achieved in our research group allowed us to proceed with the elucidation of the role of the copper cofactor and its binding site using a variety of spectroscopic techniques, and computer modeling. The created computer-assisted 3D structure agreed with our fluorescence and circular dichroism data and provides, for the first time, a useful working structural model for LOX. The studies are in progress to understand the interaction between two cofactors during the catalytic mechanism, the effect of copper reduction on enzyme activity and the design of selective inhibitors for this enzyme.

Michigan

STUDENT: JULIA POWER BECKER
INSTITUTION: HOPE COLLEGE
FACULTY ADVISOR: GREGORY S. FRALEY | GERMAN TORRES
POSTER TITLE: RESVERATROL AMELIORATES BRAIN DAMAGE INDUCED BY SURGICAL CANNULAE: POTENTIAL FOR TREATMENT OF PARKINSON'S DISEASE
DISPLAY AREA: 2H
FUNDING: NATIONAL SCIENCE FOUNDATION, DIVISION OF BIOLOGICAL INFRASTRUCTURE
ABSTRACT: Patients with Parkinson's disease (PD) may resort to deep brain stimulation (DBS), a treatment in which electrodes are implanted into the subthalamic nucleus (STN) of the brain, providing relief from tremors and other signs of the disease. This treatment has proven effective for many PD patients; however, side effects result from cell death around the electrode leading to an ineffectiveness of DBS to ameliorate the signs of Parkinson's disease. Resveratrol (RESV) is a plant derivative that is known to have protective effects in cells. We hypothesized that RESV may have neuroprotective effects and prevent brain lesions associated with the physical presence of electrodes in the brain. To test this hypothesis, rats were injected with RESV on one side of the brain and DMSO (control) into the contralateral side, creating a within-subjects design study. The subthalamic nucleus (STN) was targeted because the STN is the target site in humans for DBS. All rats showed significant motor-deficits 7 days post-surgery. Neuronal damage was assessed using Nissl stains, GFAP immunocytochemistry, and Fluoro-Jade stains. The control side showed an increase in neuronal degeneration over time; however, RESV-treatment attenuated much of the neuronal damage. A follow-up study demonstrated that bilateral treatment with RESV prevents motor deficits associated with bilateral lesions, suggesting that the amelioration of lesions observed in the first experiment translates to prevention of motor deficits, similar to those in PD patients. Our studies suggest that RESV may have neuroprotective effects and be a useful tool in the treatment of Parkinson's disease.

Michigan continued

STUDENT: STEPHANIE LEIGH BOGEMA
INSTITUTION: HOPE COLLEGE
FACULTY ADVISOR: VIRGINIA P. BEARD
POSTER TITLE: POST-CONFLICT PEACE-BUILDING AND RECONCILIATION: THE ROLES OF GENDER AND RELIGION IN POST-GENOCIDAL RWANDA
DISPLAY AREA: 2I
ABSTRACT: Gender and religion have been shown to influence democratizing efforts in emerging African countries. Increased attention is being given by scholars to the roles that these two identities play in political development. One area in which an understanding of both gender and religion is crucial is in post-conflict, peace-building efforts in the developing world. This paper seeks to determine the roles of gender and religion during and since the 1994 genocide in Rwanda. In the aftermath of genocide, Rwandan women are now global leaders in shifting perceptions about the value of women in peace-building activities and reconciliation after conflict. Religious bodies are believed to have intensified ethnic discrimination that was exacerbated by European colonialism and subsequently contributed to the genocide. Religious groups, however, have also arguably been central players in post-conflict reconciliation in Rwanda. This research explores these potential roles across genders and religious groups and considers the relationships between gender and religion, highlighting the contributions of women as peacemakers and potential political leaders, as well as the role of religion in conflict and state-building.

STUDENT: JACLYN ANN VANSLOTEN
INSTITUTION: UNIVERSITY OF MICHIGAN - ANN ARBOR
FACULTY ADVISOR: SANDRA GREGERMAN | LORRAINE GUTIERREZ | ALBA RUEDA-RIEDLE
POSTER TITLE: PHOTOVOICE: DELRAY YOUTH FINDING THEIR VOICE THROUGH EDUCATION, ACTION AND REFLECTION
DISPLAY AREA: 2J
ABSTRACT: Recent research in the arena of environmental justice suggests a link between race, poverty, and environmental injustice (Delp, 272) (Loh, 113). The Delray district of Southwest Detroit has a population of 6000, of which over 50% are of color (Whiteman). Also, nearly 50% are below the poverty line (Whiteman) (US Census Bureau). These statistics put the neighborhood at-risk for environmental injustice., To address the needs of the community in this area, the Detroit Initiative, a partnership between the University of Michigan and People's Community Services Community Center was created. It was with the goals of this partnership in mind that I fashioned PhotoVoice: Delray. PhotoVoice is a process in which the youth of People's Delray are able to explore their community through photography as a medium. The objective of this project was to empower the youth of Delray to assess the strengths and needs of the community. I hypothesized that the PhotoVoice would have impact along three lines: personal skills (education), community impact (action), and personal growth (reflection). I was then able to assess this project through the use of pre- and post- surveys and youth interview methods., Evaluation results were strong and positive. Students showed improvements in both personal skills and personal growth through positive correlations between pre- and post-surveys. Also, it was through participant interviews that we discovered that its influence expanded past community line. Overall, the PhotoVoice holds great opportunity to act as a medium that promotes change when utilized with youth in districts of environmental injustice.

Minnesota

STUDENT: DYLAN THOMAS KESTI
INSTITUTION: THE COLLEGE OF SAINT SCHOLASTICA
FACULTY ADVISOR: HONG-MING LIANG
POSTER TITLE: AN ANALYSIS OF THE EFFECTIVENESS OF TWO USAID AGRICULTURAL PROJECTS IN RURAL ZAMBIA: 1995-2009
DISPLAY AREA: 3A
FUNDING: THE COLLEGE OF ST. SCHOLASTICA (MCNAIR SCHOLARS PROGRAM)
ABSTRACT: In order to address the complex global challenges that face the international aid arena, all actors must analyze their projects and design a modality of aid that crystallizes sustainable development. Research indicates that poverty and underdevelopment are complex and interconnected global challenges. Furthermore, with the effects of global climate change on food security, the international environment and development arena faces new challenges in order to catalyze sustainable development. The central question: what has been the impact of USAID on rural Zambian agriculture to increase outputs and incomes while deceasing hunger, poverty and malnutrition? The goal is to analyze the effectiveness of two USAID agricultural projects in 1995 and 2009 as case studies to analyze the effectiveness of aid under two juxtaposed modalities. This study is analyzing the effectiveness of the USAID aid in achieving its said aims and goals when the modality of delivery of the aid includes local community leadership, long term sufficient funding, and capacity building supporting community engagement. The evidence supports the hypothesis that aid projects not including community leadership, sufficient funding, and capacity building, are less likely to meet their aims and goals. It is time for the international aid arena to analyze their effectiveness, and redesign their approach to achieve the aims and goals of sustainable development. This is one study analyzing the effectiveness of two USAID agricultural projects in rural Zambia as case studies, but this study is one step in trying to assess the larger pattern of foreign aid and its impact.

STUDENT: INDUMINI A. WEERAMANTRI
INSTITUTION: MINNESOTA STATE UNIVERSITY, MANKATO
FACULTY ADVISOR: TRENT VORLICEK
POSTER TITLE: FLUOROQUINOLONE ANTIBIOTIC COMPLEXES INVOLVING HEAVY METALS, CIPROFLOXACIN, AND PHENOLIC DEGRADATION PRODUCTS: RELEVANCE IN GROUND AND WASTE WATER SYSTEMS
DISPLAY AREA: 3B
ABSTRACT: Fluoroquinolones, a class of potent antibiotics, enter the environment via waste water effluent and soil applications of human sludge or agricultural manure. The persistence of fluoroquinolones may pose a threat to aquatic organisms and promote bacterial resistance. According to pharmaceutical literature, metal fluoroquinolone complexes are highly stable and often have increased antimicrobial activity relative to the uncomplexed fluoroquinolone. However, minimal research has been conducted regarding the role metal-fluoroquinolone complexes play in environmental systems. The negative impact of microbial resistance on public health requires a clear definition of the environmental pathways leading to metal-fluoroquinolone formation. To begin filling this void, this research aims to characterize novel metal-fluoroquinolones potentially relevant in ground and waste waters. Quantitative analyses of aqueous test solutions show highly insoluble 1:2:1 ternary complex formation between cadmium (heavy metal found in animal and human wastes), ciprofloxacin (common veterinary fluoroquinolone antibiotic), and 4-nitrophenol (degradation product of pesticides and organic matter) at dilute (i.e., micromolar) concentrations and neutral pH. A 1:2:2 complex has been prepared from similar solutions containing 2-chloro-4-nitrophenol (degradation product present in pesticide-treated soils and chlorinated wastewaters). Experiments at varying pH demonstrate that the base form of the nitrophenols is required for formation of the complexes. In order to determine environmental relevancies, stability experiments involving the above complexes and those forming between various metals (cadmium, copper, iron, zinc), ciprofloxacin, and 2,4-dichlorophenol or 2,4,6-tricholorophenol are ongoing. These results are important because they point to an unaddressed reaction pathway available to heavy metals, powerful antibiotics, and toxic phenolic degradation compounds.

Minnesota continued

STUDENT: PATRICK ALBERT GARRITY | TIMOTHY YATES
INSTITUTION: ST. OLAF COLLEGE
FACULTY ADVISOR: RICHARD A. BROWN
POSTER TITLE: WEBMAPREDUCE: A FIRST STEP TOWARD PREPARING THE TECHNOLOGY WORKFORCE FOR THE MANYCORE COMPUTING REVOLUTION
DISPLAY AREA: 3C
FUNDING: NATIONAL SCIENCE FOUNDATION
ABSTRACT: For the first time in the history of computing, software performance is failing to keep up with the industry's improvements in computer hardware design. In short, today 's computers are already pushing the bounds of physics. The only solution in sight to overcome these barriers is manycore computing, which brings the power of many computers to a single machine. Inability to adapt software to the manycore solution has already created a gap between software performance and hardware capabilities. Without introducing the proper techniques to software design, this gap will continue to grow. Parallelism is the methodology required to address this alarming trend, and it is crucial that it be integrated into the training of future computing professionals, as well as current system designers throughout the industry. As a first step, we have produced WebMapReduce, a software system that enables introductory Computer Science students to learn and use the "map-reduce" form of parallelism. Map-reduce, engineered and wielded by Internet industry giants, has automatic appeal for students, and our system makes map-reduce parallelism accessible to beginners. This project is a significant component in an NSF-funded effort to inject training in parallel computing throughout Computer Science education at the college level, which in turn contributes to a broader national response to the coming challenge of manycore computing.

Missouri

STUDENT: KYLE W. ERVIN
INSTITUTION: UNIVERSITY OF MISSOURI - COLUMBIA
FACULTY ADVISOR: CARLOS SUN
POSTER TITLE: SAVING LIVES OF WORKERS AND DRIVERS BY IMPROVING ROADWAY WORK-ZONE SAFETY
DISPLAY AREA: 3D
FUNDING: PLASTIC SAFETY SYSTEMS
ABSTRACT: According to OSHA, each year, more than 100 employees are killed and more than 20,000 are injured in the highway and street construction industry. Current methods such as lowered speed limits and speed display units are used to increase awareness. Permanent rumble strips are restrictive in cost and location. Plastic Safety Systems has created an innovative Temporary Rumble Strip (TRS) system that is both inexpensive and completely removable. The effectiveness of this system has not been validated and that is the main goal of this project. Through this research the TRS system will be tested for the ability to lower driving speeds and increase driver awareness in roadway work-zones. Data will be collected under three conditions: control (no TRS), TRS as deployed by the Missouri Department of Transportation, and an altered deployment angle to attempt to reduce deflection. These setups will be evaluated using approximately two days worth of video and radar data. Parameters collected include vehicle speed upstream and downstream from the system, application of brakes, centerline crossovers and TRS deflection. The preliminary data trends show increased braking and increased centerline crossovers with the system in use. The data processing and analysis is almost complete and a final report will be submitted to the sponsor in December. If the system proves to be an effective means of lowering speeds and/or increasing driver awareness, this could be a simple and inexpensive way of improving work-zone safety on the nation’s roadways.

Missouri continued

STUDENT: CHRISTINE O'BRIEN
INSTITUTION: UNIVERSITY OF MISSOURI - COLUMBIA
FACULTY ADVISOR: JOHN VIATOR
POSTER TITLE: PHOTOACOUSTIC FLOWMETRY USED TO CAPTURE SINGLE MELANOMA CELLS FOR CANCER DIAGNOSIS AND TREATMENT
DISPLAY AREA: 3E
FUNDING: NATIONAL INSTITUTES OF HEALTH
ABSTRACT: Photoacoustics is a laser induced ultrasound effect caused by irradiating an absorber with a rapid pulse of light that creates heat and rapid expansion resulting in an acoustic wave. We have created a method that isolates single melanoma cells in blood samples using an automated photoacoustic detection flow system. Circulating tumor cells (CTCs) are cancer cells that have metastasized (broken off from original tumor and spread) through the blood stream. Metastatic melanoma cells are used because they are pigmented and absorb light thus generating a photoacoustic effect. To begin, a sample of melanoma cells in a white blood cell (WBC) suspension is prepared from an original blood sample and run through a photoacoustic flow system. Once detected, the signal triggers the cell to be extracted from the flow path in 10 uL volumes using a pump. This separates the cell from most of the solution. The new sample is diluted and run through the system again, completely isolating the melanoma cell from WBCs. We have achieved capture of dyed microspheres serving as a test standard; the next step is to isolate a single melanoma cell in vitro. Once perfected, this system will allow oncologists to monitor the effectiveness of metastatic patient's therapies immediately after treatment and as often as necessary instead of waiting months to see if tumors develop. By this stage the cancer may not be treatable. Furthermore, it will help determine the mechanism by which cancer cells metastasize by providing cancer biologists with early stage CTCs to study.

Nebraska

STUDENT: KAITLIN LOUISE CAMPBELL | HANNAH JO GRAWE
INSTITUTION: CREIGHTON UNIVERSITY
FACULTY ADVISOR: ISABELLE D CHERNEY
POSTER TITLE: A LEAGUE OF THEIR OWN: GENDER COMPOSITION OF EDUCATIONAL ENVIRONMENTS AND SUCCESS
DISPLAY AREA: 3F
FUNDING: CREIGHTON UNIVERSITY, COLLEGE OF ARTS & SCIENCES
ABSTRACT: Many factors contribute to an individual's success. High self-esteem correlates with persistence in difficult tasks, less stress, a greater sense of well being, and a lower likelihood to conform. Likewise, intrinsic motivation and achievement motivation can contribute to favorable outcomes at school and in the workplace. However, society generally associates success with masculine traits. We examined 424 high school students in single-sex and coeducational schools to ascertain how gender composition in educational environments relates to students' self-esteem, motivation, gender role attitudes, and academic success. Our data came from math tests and surveys, which allowed us to rank students on scales for relevant factors. We found that females in single-sex schools tended to have higher self-esteem, achievement motivation, intrinsic motivation, and masculinity than had females in coeducational high schools. They also scored better on the math test and had higher self-reported grade point averages than their coeducational school counterparts. Males in the single-sex environment performed better on the math test than did males in the coeducational environment. However, males in single-sex schools had lower achievement motivation, self-esteem, and intrinsic motivation than had those in coeducational schools. These results imply that sex-segregated educational environments encourage factors that can contribute to personal success for females, but have detrimental effects on such factors for males. Our research indicates that increased incorporation of single-sex learning environments, particularly for traditionally masculine subject areas, would greatly benefit females.

New York

STUDENT: MATTHEW R. JOHNSON | AMANDA SULLIVAN | EMILY TOBIN
INSTITUTION: ALFRED UNIVERSITY
FACULTY ADVISOR: KAREN PORTER
POSTER TITLE: KEEPING THE LIGHTS ON FOR TROUBLED YOUTH: IMPROVING AGENCY CAPACITY AND SUSTAINABILITY IN A RURAL SETTING
DISPLAY AREA: 3G
FUNDING: US DEPARTMENT OF JUSTICE, OFFICE OF JUVENILE JUSTICE AND DELINQUENCY PREVENTION
ABSTRACT: Juvenile delinquency is an ever-present problem that generates concern on the part of parents, schools, law enforcement agencies, and the community-at-large. Studies suggest that the amount of trouble adolescents get into as measured by property and violent crime data, DWI arrests, and juvenile intake numbers, for example, may be reduced by access to prosocial activities during afterschool hours. Rural areas are particularly underserved when it comes to youth recreation and other nonschool related programming. Further, youth-serving agencies, especially in rural areas, may face funding challenges. Our research involved systematic observation of five local youth-serving agencies in rural western New York. We studied their resources, performed needs assessment, and recommended changes that would allow the organizations to collect more and better data on their youth clients. We also provided technical assistance by training staff members on data collection and analysis and connected them with additional resources such as GIS mapping capabilities on the web and on our campus. Our findings suggest that most community partners not only made gains in operationalizing and measuring outcomes, but were able to write more compelling grant applications in an effort to "keep the lights on" for their programs and ultimately their clients. Through our university-community collaboration, our data indicate that by improving the way rural agencies track and monitor their programs, we are making a significant difference in the lives of troubled youth and addressing the important connection between juvenile delinquency and lifelong criminality.

STUDENT: LAURA HERREN
INSTITUTION: MARYMOUNT MANHATTAN COLLEGE
FACULTY ADVISOR: ALESSANDRA LERI
POSTER TITLE: CHLOROPEROXIDASE-LIKE ACTIVITY IN FUSARIUM OXYSPORUM, A PATHOGENIC PLANT FUNGUS
DISPLAY AREA: 3H
ABSTRACT: Organochlorine compounds have an infamous reputation as highly toxic environmental pollutants. Excessive or sustained exposure has been linked to severe health problems in humans, compromising development, reproduction, brain function, and immunity. Chlorinated organic compounds were long believed to be exclusively anthropogenic, but recent research has shown that they occur naturally, appearing at high concentrations in soil organic matter. The dominant processes leading to the formation of soil organochlorine are poorly understood but are believed to be associated with the decay of plant material. Natural chlorination may occur via catalysis by the enzyme chloroperoxidase (CPO), which converts inorganic chloride to reactive chlorine (HOCl) in the presence of hydrogen peroxide. Oxidized chlorine, released extracellularly, can react with organic matter to produce organochlorine. It is possible that decomposing organisms may produce HOCl to aid in the breakdown of plant material. The fungus Fusarium oxysporum, a plant pathogen, has been shown to induce senescence in healthy plant leaves. To assess the chlorinating activity of F. oxysporum, we employed a colorimetric assay using thionin as a substrate. Monitoring the decrease in absorbance at 598 nm, we observed dramatic oxidation of thionin in the presence of F. oxysporum, chloride, and hydrogen peroxide (versus the controls). Our results reveal CPO-like activity in the plant pathogen F. oxysporum, identifying a biological chlorination pathway that may be associated with plant senescence and decay. Ultimately, understanding how ecosystems tolerate and/or dechlorinate natural organochlorine may help humans develop environmental remediation strategies to alleviate the problems associated with anthropogenic organochlorine pollutants.

New York continued

STUDENT: HANNAH E SPINNER
INSTITUTION: SUSQUEHANNA UNIVERSITY
FACULTY ADVISOR: JAN L. REICHARD-BROWN
POSTER TITLE: A. PRE-TREATMENT OF SEA URCHIN SPERM, LYTECHINUS PICTUS WITH THALIDOMIDE PRIOR TO FERTILIZATION LEADS TO INCREASED ABNORMAL EMBRYO MORPHOGENESIS
DISPLAY AREA: 3I
FUNDING: SUSQUEHANNA UNIVERSITY
ABSTRACT: Thalidomide, a previously banned teratogenic drug, is now approved by the FDA for clinical use. Children of pregnant women who ingest this drug early in pregnancy run a greatly increased risk of developing a cluster of birth defects known as thalidomide syndrome. Unfortunately, the reproductive consequences of male use of thalidomide remain unknown, even though it can be detected in the semen of men ingesting therapeutic doses. Our laboratory developed a model system using sea urchin embryos to study thalidomide teratogenesis. We used this system to investigate the developmental consequences of pre-treating sperm with thalidomide prior to fertilization. Gametes were obtained following standard spawning techniques. Normal eggs fertilized with pre-treated sperm were placed in finger bowls with artificial sea water and incubated at 18 degrees Celsius. Data collection included sampling one hundred embryos from each culture at 24, 48 and 72 hours post fertilization. Thalidomide dose response studies indicated that a small pre-treatment of concentration (12 micro-molar) yielded the highest number of abnormal embryos. Further studies using this concentration and a pre-exposure time of one hour produced statistically significant levels of developmental abnormalities compared to control cultures at 48 and 72 hours post fertilization. Abnormalities including the embryonic skeleton and gut formation were most prevalent, with changes in developmental rate occurring as well. Our experiments indicate that pre-treatment of sperm with thalidomide adversely affects embryogenesis in sea urchins. These studies raise concerns about the increasing clinical use of thalidomide and human male reproductive consequences.

North Carolina

STUDENT: KIMBERLY B. DUGGINS
INSTITUTION: ELON UNIVERSITY
FACULTY ADVISOR: AMY A OVERMAN
POSTER TITLE: BEHAVIORAL AND ELECTROPHYSIOLOGICAL EFFECTS OF SCHEMA ACTIVATION ON MEMORY FOR CRIME INFORMATION IN OLDER AND YOUNGER ADULTS
DISPLAY AREA: 4A
ABSTRACT: Fifty-two young and 52 older adults were given background information about a suspect describing either a “good" or “bad" childhood. Participants then read a burglary description which contained equal amounts of incriminating and exonerating evidence, and were tested on their memory for details of the crime. Brain activity was collected via scalp electrodes during the memory test. Finally, participants were asked to judge the suspect’s guilt. It is hypothesized that participants in the bad childhood condition will have better memory for incriminating details, while participants in the good childhood condition will have better memory for exonerating details. It is also hypothesized that participants in the bad childhood condition will be more likely to judge the suspect guilty than those in the good childhood condition. Lastly, it is expected that older adults will be more influenced by these background conditions than young adults, and that different patterns of brain activity, reflecting different memory processes, will be observed between age groups. Preliminary results show no effect of childhood condition on judgments of guilt. However, there is a difference in memory accuracy for incriminating and exonerating details between the childhood conditions. Those in the bad childhood condition remember incriminating details more accurately than exonerating details. Also, older adult remember less accurately overall. This research has practical applications to our justice system, where its results may help inform new witness procedures for older adults and increase awareness of how knowledge of a defendant’s childhood history influences jurors’ interpretations of the evidence presented in court.

North Dakota

STUDENT: ZANE YOUNG
INSTITUTION: MINOT STATE UNIVERSITY
FACULTY ADVISOR: MIKHAIL BOBYLEV
POSTER TITLE: RAPID SYNTHESIS OF PIPERONYLFORMAMIDE
DISPLAY AREA: 4B
FUNDING: NATIONAL INSTITUTES OF HEALTH, NATIONAL CENTER FOR RESEARCH RESOURCES (NCRR)
ABSTRACT: Piperonylamine is a natural product related to piperine, an active ingredient of black pepper. Piperine and many other active ingredients of common spices, such as capsaicin in hot pepper, belong to an important group of natural products called vanilloids. Vanilloids possess analgetic, anti-irritant, and anti-inflammatory activity. Capsaicin is a potent pain reliever prescribed for pain associated with postherpetic neuralgia, a complication of shingles. Capsaicin has also been found to preferentially inhibit the growth of cancer cells in laboratory studies. It has also been shown to inhibit adipogenesis. However, capsaicin's pungency limits its usefulness to treat obesity., Piperonylamine was used in the synthesis of capsaicin analogs. These and other analogs may lead to the compounds that retain the medicinal properties of capsaicin but have reduced pungency. These compounds will be more suitable for internal application than capsaicin itself. Piperonylamine can be synthesized from piperonal by the Leuckart reaction via the intermediate piperonylformamide. In the literature, the synthesis of piperonylformamide was described only once, and it appeared to be a very slow reaction, taking 11 hours to complete. Recently, we developed an accelerated procedure for the synthesis of formamides. In this work, the accelerated procedure was applied to the synthesis of piperonylformamide from piperonal. The reaction was fully completed in 1 minute and produced piperonylformamide in good yield. The new reaction opens the way for the fast synthesis of piperonylamine and capsaicin analogs in the laboratory practice and industry. The project is supported by NIH grant P20 RR016741 from the NCRR.

Ohio

STUDENT: RACHEL YOHO
INSTITUTION: CAPITAL UNIVERSITY
FACULTY ADVISOR: KERRY L CHEESMAN | PATRICK J. SHIELDS | JERRY THOMAS
POSTER TITLE: ELECTRICAL PRODUCTION FROM A NOVEL MICROBIAL FUEL CELL USING A PIG MANURE SUBSTRATE
DISPLAY AREA: 4C
ABSTRACT: The future of electrical production is one of the most pressing issues facing society today. Microbial fuel cells have the potential to offset some of this problem through their ability to use many different materials to generate voltages. A novel microbial fuel cell was designed and implemented to use pig manure to produce electricity. This research investigated the physical and microbial properties of the fuel cells and looked to increase the voltage production by finding the optimal cathode material. The anode material was carbon cloth, while the cathode materials included: copper, brass, carbon cloth, titanium, sheet lead, galvanized low carbon steel, low carbon steel, aluminum foil-faced fiberglass, and stainless steel. Data collected included the voltage, internal resistance, and current outputs of the cells. Six of the cells were discontinued due to low voltage production. The remaining three cells (copper, brass, and carbon cloth) continuously generated voltages for over eighteen weeks. Compared to the discontinued cells, the carbon cloth, copper, and brass cathode cells produced consistently higher voltages of approximately 0.68 V, 0.65 V, and 0.55 V, respectively, for the majority of their life spans. These three cells displayed an average bacterial load reduction of approximately 93.6%. Further investigations include the relationship between electrode surface area and voltage outputs, and the bacterial composition of the manure. The electrical generation and decrease in the bacterial population of the manure give this technology great potential application for the future of the agricultural industry.

Ohio continued

STUDENT: ALLISON RAE GANSEL | ELIZABETH JOAN GAZDICK
INSTITUTION: UNIVERSITY OF DAYTON
FACULTY ADVISOR: MARK ERIC BENBOW
POSTER TITLE: UNDERSTANDING ECOLOGICAL FACTORS ASSOCIATED WITH AN INFECTIONS DISEASE OF CHILDREN: BURULI ULCER
DISPLAY AREA: 4D
FUNDING: NATIONAL INSTITUTES OF HEALTH, FOGARTY INTERNATIONAL
ABSTRACT: Buruli ulcer, a disease caused by the opportunistic pathogen, Mycobacterium ulcerans (MU), is prevalent in tropical environments, most often afflicting children and leaving them severely disfigured and socially stigmatized. The mode of transmission is unknown; however, it has been linked to aquatic habitats. Our goal was to understand ecological conditions associated with MU, providing novel information on transmission. A lab and field based microcosm experiment was used to investigate hydroperiod as factor influencing bacterial communities and MU. A lab microcosm experiment was initially conducted in Ohio to understand how water level fluctuations affect the formation of microbial communities, therefore providing the conditions for a hypothesized 'ecological release' of a pathogen such as MU in the environment. The study was then replicated in outdoor microcosms using water from a disease endemic village in Ghana, Africa. The microcosms consisted of inundated glass slides exposed to two hydroperiod regimes: unstable (daily water drawn out and then replaced after 24 hrs.) and stable (no water removal). The slides were harvested over time, and the bacterial succession characterized using a phenotypic microarray approach and MU densities quantified by PCR. We found that bacterial communities changed over time along with MU density increases, indicating that MU may be responding to bacterial communities. However, we did not find a strong effect of hydroperiod on MU densities, which may be due to the small size of the study that limited our power to detect a strong effect. These results will help develop disease prevention plans for Buruli ulcer.

Oklahoma

STUDENT: HENRY LE
INSTITUTION: UNIVERSITY OF CENTRAL OKLAHOMA
FACULTY ADVISOR: WEI R. CHEN
POSTER TITLE: LONG-TERM IMMUNE RESPONSE AGAINST EMT6 TUMORS IN MICE INDUCED BY COMBINATION OF LASER IMMUNOTHERAPY AND SURGERY
DISPLAY AREA: 4E
ABSTRACT: Laser immunotherapy (LI), a promising approach for the treatment of malignancies, has shown its advantage in stimulating antitumor immunity. The treated tumors remain at the treatment sites after LI are believed to play an important role in the stimulation of antitumor immunity. However, the residual tumors may not be fully destroyed by LI and may continue to grow and metastasize. The present study was designed to further investigate the impact of residual tumors after LI. Laser immunotherapy consists of a near-infrared laser, a light-absorbing dye (indocyanine green), and an immunostimulant (Glycated Chitosan). Female Balb/C mice, implanted with 105 EMT6 mammary tumor cells, were divided into 4 groups: untreated control, LI, LI followed by immediate surgery resection of residual tumor (LI+S0wk), and LI followed by surgical resection of residual tumor after 1 week (LI+S1wk). Successfully treated mice from all treatment groups were rechallenged with 105 and 5x105 EMT6 cells, consecutively. The LI+S1wk group had the highest survival rate (72%) after 90 days, while the mice survival rates of the LI+S0wk, LI, and control groups were 50%, 46%, 0%, respectively. Survival rates of the treated mice after the first and second tumor rechallenges, ranging from 73% to 95%. Our results indicate that mice in all experimental groups developed antitumor immunity. However, combination of LI with surgical removal of residual tumors showed improved therapeutic efficiency. This study indicates a necessary balance between using treated tumors to stimulate immune responses and removing the treated tumors to avoid further tumor development and metastasis.

Pennsylvania

STUDENT: JOSHUA PHILIP BOW | RIKKI MILLER
INSTITUTION: EDINBORO UNIVERSITY OF PENNSYLVANIA
FACULTY ADVISOR: PETER J MCLAUGHLIN
POSTER TITLE: THE CANNABINOID CB1 NEUTRAL ANTAGONIST AM 6527 REDUCES FOOD-MAINTAINED FR5 LEVER PRESSING DIFFERENTLY FROM PREFEEDING IN RATS.
DISPLAY AREA: 4F
ABSTRACT: Operant conditioning has been an important aspect of psychology for decades. Aspects of operant tasks, in which rats press a lever for food, can be used to study the biochemical mechanisms that underlie motivation for food and other natural rewards. The cannabinoid CB1 receptor antagonists are a new class of drugs that are believed to work in the opposite fashion of marijuana. Therefore, they are believed to reduce motivation for a variety of rewards; however, it is not known if they truly affect lever-pressing for food in the same manner as a natural reduction in motivation would. A newly-discovered CB1 antagonist, AM 6527 was compared to prefeeding in the current study. One group of rats received a range of doses of drug, while the other group of rats received varying amounts operant pellets before the task in the prefeeding condition. Both groups were then observed performing an operant task in which the rats were required to press a lever five times to receive a food pellet. As expected, both the drug and the prefeeding reduced responding for food. Under closer examination, subtle differences in the overall patterns of responding were noticed. Therefore, it is concluded that CB1 receptor antagonists reduce food consumption but not in a similar way to prefeeding. The amount of difference between prefeeding and CB1 antagonists is not known and more research is being done to put these results in perspective.

STUDENT: ANDREW T. DEEN
INSTITUTION: GETTYSBURG COLLEGE
FACULTY ADVISOR: JACK RYAN
POSTER TITLE: "THE EVOLUTION OF SOUNDTRACK IN CIVIL WAR FILM"
DISPLAY AREA: 4G
FUNDING: GETTYSBURG COLLEGE
ABSTRACT: The Civil War film genre has long relied on music to invoke emotion and provide thematic continuity. Although the earliest silent films about the Civil War lacked pre-recorded sound, most movie halls provided live accompaniment in the form of a pianist or small orchestra. The 1915 premiere of Birth of a Nation was revolutionary: for the first time, a film director was personally involved in the compilation of the orchestral score used to accompany the film. The introduction of synchronized, pre-recorded sound helped solidify the musical conventions then emerging within the genre. One of these trends was the use of pre-existing Civil War melodies to establish historical setting. The role of period music in the Civil War film genre continues to expand. Although early film composers wrote exclusively for the symphonic orchestra, present-day composers often include "authentic" period music ensembles like the fife and drum corps. As period music becomes a staple feature of the genre, film composers and directors must decide how best to integrate originally composed music with pre-existing Civil War melodies. Filmmakers are confronted with other artistic challenges, including the intersection of diegetic music (music whose source is visible on screen) and non-diegetic music (off-screen music like a symphonic soundtrack), and the concept of musical authenticity. Some recent films challenge the traditional scoring conventions of the genre by using music in innovative ways.

Pennsylvania continued

STUDENT: SARA E. NEVILLE
INSTITUTION: PENN STATE BRANDYWINE
FACULTY ADVISOR: LAURA A. GUERTIN
POSTER TITLE: INTEGRATING GOOGLE EARTH WITH THE QUEST FOR SCIENCE LITERACY
DISPLAY AREA: 4H
FUNDING: NATIONAL SCIENCE FOUNDATION - GEOSCIENCE TEACHER TRAINING (GEO-TEACH)
ABSTRACT: As technology advances, students have access to an ever-growing library of resources to enhance their learning. Young students, however, may not choose to read nonfiction, Earth science-based books during their free time. With the help of Google Earth, a new method of learning called the Google Earth QUEST (Questioning and Understanding Earth Science Themes) brings visualization, technology, and relevant scientific content into the classroom. Inspired by the award-winning Google Lit Trips and the National Science Foundation-funded TESSE (Transforming Earth Systems Science Education) Workshop for pre-service and in-service 6-12 teachers, the Google Earth QUEST was formed to bring the content of nonfiction books into TESSE participants' classrooms. Teachers struggled with communicating the knowledge they gained from the workshop's common read, The Control of Nature by John McPhee, to their students in a fresh and meaningful way. One public showing of the QUEST for The Control of Nature to the workshop's participants has provided great feedback, unanimous praise, and a desire for more. Immediately, several teachers requested Google Earth QUESTs for Dirt: The Erosion of Civilizations, by David Montgomery, and Field Notes from a Catastrophe: Man, Nature, and Climate Change, by Elizabeth Kolbert. A Google Earth QUEST not only summarizes important content for students, but pairs technology and a visual experience with science literacy. Google Earth QUESTs are satiating a hunger for innovative ways to teach; with Google Earth's easy, free access, a QUEST has the ability to bring science literacy to a worldwide demographic.

STUDENT: AAKASH SHAH
INSTITUTION: URSINUS COLLEGE
FACULTY ADVISOR: REBECCA L. LYCZAK | GREGORY M. WEIGHT
POSTER TITLE: THE ROLE OF THE PROTEIN PAM-1 IN THE NERVOUS SYSTEM
DISPLAY AREA: 4I
FUNDING: NATIONAL SCIENCE FOUNDATION
ABSTRACT: Alzheimer's disease is marked by the buildup of tau proteins. Recent experiments have shown that the human protein PSA can degrade tau proteins, thus preventing their accumulation during Alzheimer's. Such findings hint at the therapeutic potential of this protein in treating Alzheimer's. However, this protein must be better understood before its therapeutic potential can be harnessed. The purpose of this study was to elucidate the function of this protein by determining the role of a nearly identical protein known as PAM-1 in the nervous system of nematodes. Assessing the behavioral deficits associated with the loss of PAM-1 protein function revealed that this protein likely plays a role in motor activity, coordination, reversal movements, and sensitivity to chemicals, heat, and touch.

Rhode Island

STUDENT: MICHAEL LEVINSON | HENRY TRIMBACH
INSTITUTION: ROGER WILLIAMS UNIVERSITY
FACULTY ADVISOR: CHUNYAN BAI
POSTER TITLE: AUTHORSHIP ATTRIBUTION FOR ANONYMOUS EMAILS: EFFECTS OF INTENTIONAL DECEPTION
DISPLAY AREA: 4J
ABSTRACT: In the past decade, the number of computer security threats has exploded. Every year brings record numbers of malware attacks, data breaches, and network intrusions. Security specialists must work constantly to develop strategies to defend against these attacks. To do this, it is necessary to study attacks that have been successful and determine exactly how they were performed. These efforts are included in the discipline known as computer forensics. Sometimes these attacks incorporate non-technical elements using deception and social engineering. These are often delivered through vectors such as phones or, increasingly, email. Hackers will attempt to anonymize their emails to protect their identities, or try to impersonate a legitimate user to gain access to information or deflect blame. The study of authorship categorization aims to identify the author of a text, using structural and stylistic cues. Authorship categorization techniques have been used in the study of historical documents and works of literature, for forensic analysis for criminal cases, and other applications. An area of interest is how well these techniques can be applied to e-mail authorship. Our research will focus on testing the effectiveness of authorship categorization algorithms in forensic setting. Specifically, we will investigate whether authorship categorization of emails can be defeated by authors who intentionally try to mask their true identity by altering their writing style or imitating the style of another person. Experiment results will be collected and analyzed. We anticipate that intentionally deceptive e-mails will be categorized less accurately than e-mails written with no such intentions.

STUDENT: RACHEL CATHERINE MIELCAREK
INSTITUTION: ROGER WILLIAMS UNIVERSITY
FACULTY ADVISOR: LONNIE GURALNICK | DALE LEAVITT | ROXANNA SMOLOWITZ
POSTER TITLE: POTENTIAL FACTORS LEADING TO THE JUVENILE MORTALITY OF THE NORTHERN QUAHOG, MERCENARIA MERCENARIA, FARMED IN WELLFLEET, MA: FOOD AVAILIBILITY, QPX DISEASE, AND DISSEMINATED SARCOMA.
DISPLAY AREA: 5A
ABSTRACT: The culturing of quahogs, Mercenaria mercenaria, is a $50 million dollar industry in the northeast U.S. Though considered to be the top shellfish farming town on Cape Cod, hard clams cultured on Egg Island in Wellfleet Harbor have been recently infected by Quahog Parasite Unknown (QPX), a significant pathogen of M. mercenaria. Disseminated sarcoma, a fatal disease resulting from the proliferation of tumor cells in the vascular system, has also been indentified in Wellfleet cultured clams in the last 2 years. Currently, the infected quahogs farmed on Egg Island display behaviors indicative of both stress and/or infection, such as rising to the sediment surface. However, quahogs are showing progressive juvenile mortality; normally uncharacteristic of both QPX and disseminated sarcoma. The objective of this research project is to evaluate the vigor and health of farmed quahogs on Egg Island; as well as, examine the animals for the presence of disease. The ultimate goal is to investigate the possibility that the combination of one or more stress factors is leading to the juvenile mortality of the quahogs; presumably low food availability, infection with QPX disease, and/or disseminated sarcoma. Based on our findings, we will have a better understanding of whether the quahogs are succumbing to lack of nutrition, disease, or both; and whether the location of the quahogs within the flats affects their survival.

South Dakota

STUDENT: YUN ZOU
INSTITUTION: UNIVERSITY OF SOUTH DAKOTA
FACULTY ADVISOR: ALEXANDER ERKINE
POSTER TITLE: MOLECULAR CHAPARONE EXPRESSION
DISPLAY AREA: 5B
ABSTRACT: Molecular chaperones (most are known as Heat Shock Proteins, HSPs) are critical for the protection of cells from misfolded and/or mutated proteins. In myocardial infarction, molecular chaperones participate in repairs of damaged cardiac cells so that myocardium could survive under stress. The overexpression of molecular chaperones, however, is not always beneficial to the body. For instance, molecular chaperones are often hijacked by cancer cells, allowing the disease to bypass immune system and continue amplifying. Therefore, understanding the mechanisms of molecular chaperon activation will allow us to either up- or down-regulate molecular chaperon expression depending on the situation and eventually lead us to a more sophisticated treatment for heart attack, cancer, and other diseases. The principal transcriptional activator of HSP genes is heat shock factor (HSF). Upon stress, the activation domains of HSF recruit a range of coactivator complexes to cause the transcriptional activation of HSP genes. This activation is often characterized by a rapid and intense chromatin remodeling at the promoter region of HSP genes. Using Chromatin Immunoprecipitation coupled with real-time Polymerase Chain Reaction, I have previously demonstrated the functional interaction between HSF and chromatin remodeling complexes SWI/SNF, RSC, and ISW1. Further, Fluorescent Resonance Energy Transfer (FRET) assay provides a more direct approach to test physical contacts during activation. Yeast strains were constructed in order to fuse FRET-inducing moieties with HSF and coactivator complexes. Depending on whether physical contacts occur during recruitment, different wavelengths of light will be observed and interactions between HSF and coactivator complexes can be established.

Tennessee

STUDENT: MERRANDA HOLMES | SHANNON MURPHY
INSTITUTION: MIDDLE TENNESSEE STATE UNIVERSITY
FACULTY ADVISOR: STEPHEN WRIGHT
POSTER TITLE: DETECTION AND DIFFERENTIATION OF BACILLUS ANTHRACIS-SIMULATING ENDOSPORES: ENDOSPORE PRODUCTION AND ANALYSIS USING AN OPTICAL BIOSENSOR
DISPLAY AREA: 5C
FUNDING: SOUTHEAST REGION RESEARCH INITIATIVE
ABSTRACT: There is concern regarding the use of Bacillus anthracis endospores as a bioweapon, highlighting the importance of having accurate, rapid detection methods established in the event of an anthrax attack. Because current detection methods are based on time-consuming culture, fluorescence techniques, or evaluation of DNA, an optical biosensor is being developed to identify unknown endospores in real-time without fluorescent labels. This study was conducted to prepare, enumerate, detect, and differentiate B. atrophaeus, B. pumilus, and B. thuringiensis endospores to determine suitability of non-pathogenic simulants for B. anthracis and to use them to perform preliminary testing of endospore detection with the biosensor. Scanning electron microscopy evaluation showed these endospores had dimensions similar to those reported for B. anthracis, indicating they are acceptable simulants in relation to size. Fluorescence analysis showed polyclonal B. atrophaeus antibodies bound all three organisms, monoclonal B. atrophaeus antibodies cross-reacted with B. pumilus, and monoclonal B. thuringiensis antibodies bound only B. thuringiensis. The limit of fluorescence-based detection was approximately 30 endospores for each of the simulants. The biosensor showed comparable sensitivity, with results complete within 30 minutes. The results of this study demonstrate that the optical biosensor is able to detect endospore-antibody binding without fluorescent labels in timely fashion, suggesting that this system holds promise for rapid identification of B. anthracis endospores.

Tennessee continued

STUDENT: MICHELLE CATHERINE SHROYER
INSTITUTION: RHODES COLLEGE
FACULTY ADVISOR: MAURICIO CAFIERO
POSTER TITLE: MODERN QUANTUM CHEMISTRY CALCULATIONS OF LIGAND-NUCLEIC ACID BINDING MODELS
DISPLAY AREA: 5D
ABSTRACT: Flat planar molecules called intercalants can bind to DNA. This binding can cause the DNA to deform or unwind, disrupting normal cellular function. This phenomenon called intercalation is responsible for carcinogenesis and also explains the action of some chemotherapeutic drugs. We have calculated structures and interaction energies for a model intercalant bound to nucleic acid base dimmers (Ten total dimmers including all possible pairings of Adenine, Guanine, Thymine, and Cytosine) in order to gain insight into the mode of action of intercalants. We optimized structures into sandwich structures and more deformed structures using modern quantum chemistry methods The counterpoise corrected interaction energies or calculated using modern quantom chemistry methods. Our preliminary results show that most DNA want to deform into a more T-shaped structure rather than a stacked sandwich structure implying how much DNA would want to unwind rather than just spread apart.

Texas

STUDENT: JAYME PETERSON
INSTITUTION: TEXAS A & M UNIVERSITY AT GALVESTON
FACULTY ADVISOR: GLENN A JONES
POSTER TITLE: USING HURRICANE IKE TO ASSESS THE FEMA 500/100YR FLOOD LINE AND THE ECONOMIC IMPACT OF INCREASED FLOOD INSURANCE RATES ON GALVESTON ISLAND
DISPLAY AREA: 5E
ABSTRACT: In September 2008 Hurricane Ike's 12-13 ft storm surge damaged over 75% of the structures behind the Galveston Island Seawall, displacing thousands of residents, including all faculty, staff and students of Texas A&M University at Galveston. However, the surge also left exceptionally well-preserved flood lines on buildings throughout the city providing a unique opportunity to assess FEMA's Flood Insurance Rate Maps (FIRM), specifically the placement of the 500/100yr flood zone boundary. For a home located in the 500yr flood zone, insurance is optional and relatively inexpensive ($200-300/yr). Whereas, a home located in the 100yr flood zone, insurance is required and relatively expensive (>$1,300/yr). A combination of differential GPS and laser leveling were used to establish precise vertical elevations of the flood line throughout the city. This data was integrated with the NOAA digital elevation model (DEM) for Galveston, and the USGS' real-time pressure sensors deployed near the island prior to hurricane landfall. Results show that the preserved flood lines accurately recorded the height of the surge and that the FEMA 500/100yr flood line was accurately placed throughout most of the city. However, projections of global sea-level rise over the next 30 years will require moving this line from the nominal 9 ft contour to the present-day 10 ft contour. Examination of the city tax assessor records show that moving this line will place an additional 2000-3000 homes within the 100yr flood zone, thus increasing Galveston Island flood insurance payments by over 1 million dollars annually.

Texas continued

STUDENT: MEGAN DERRICO
INSTITUTION: TRINITY UNIVERSITY
FACULTY ADVISOR: BENJAMIN SURPLESS
POSTER TITLE: FLOW CHARACTERISTICS AND GEOCHEMISTRY OF BASALTIC LAVAS IN THE BLACK GAP AREA, WEST TEXAS: IMPLICATIONS FOR CO2 SEQUESTRATION IN FLOOD BASALT FORMATIONS
DISPLAY AREA: 5F
ABSTRACT: Worldwide flood basalt formations are considered promising targets for permanent CO2 capture and storage. The evaluation of flood basalts for extensive geologic sequestration requires focused, small-scale studies to assess the porosity and permeability characteristics of basalt flows as well as these flows' potential to react with and trap CO2 within new, stable carbonate minerals. More than 14 laterally-continuous, well-exposed 22 million year old basalt flows in the Black Gap (BG) volcanic field, east of Big Bend National Park (BBNP) in west Texas, are ideal for this type of study. Based on detailed field analysis of vesiculation patterns in the 2 – 6 meter thick BG flows, storage of CO2 would occur in the porous, highly permeable, upper vesicular zone, which makes up 40-70% of the total flow thickness. The middle dense zone, with low permeability and porosity, would function as a cap between flows and limit CO2 movement, allowing time for mineralization to occur., These distinct vesiculation patterns and other field evidence were used in my study to conclude that the dominant emplacement mechanism for these flows was inflation, also common in flood basalt formations. Another important aspect of my research was geochemical analysis of the BG flows. Based on collected data, I concluded that BG lavas are geochemically distinct from older rocks exposed in BBNP, suggesting the flows were derived from a different mantle source. Further geochemical research on BG basalt flows could constrain the possible in-situ carbonate mineralization rates in crystalline silicates, which would permanently stabilize dissolved CO2.

STUDENT: NADA SARRAJ
INSTITUTION: UNIVERSITY OF HOUSTON - MAIN CAMPUS
FACULTY ADVISOR: SAMINA SALIM
POSTER TITLE: MODERATE TREADMILL EXERCISE PREVENTS OXIDATIVE STRESS-INDUCED ANXIETY IN RATS
DISPLAY AREA: 5G
FUNDING: UNIVERSITY OF HOUSTON
ABSTRACT: Nada Sarraj, Manish Taneja, Kaustuv Saha, Gaurav Chugh and Samina Salim, , Pharmacological and Pharmaceutical Sciences., University of Houston,Texas, USA. Anxiety is a fundamental emotion required to cope with threatening stimuli. In general, anxiety is protective, but excessive anxiety can prove disabling and could manifest in anxiety disorders. Overall, anxiety disorders affect ~40 million people in the U.S. Although effective treatments for anxiety disorders are available, a vast majority of anxiety patients experience side effects from these medications. The failure to treat these patients costs $42 billion a year in lost productivity. Therefore, improving the understanding of mechanisms of anxiety is important. The involvement of abnormalities in traditional neurotransmitter systems have long been the focus of most anxiety research. Involvement of oxidative stress in anxiety is an evolving concept. Beneficial effects of physical exercise on anxiety are also known but the mechanisms enabling this protective role have never been addressed. In our studies, oxidative stress in rats was produced by an oxidant producing agent, L-Buthionine-(S,R)-sulfoximine (BSO) which increased oxidative stress in the brain regions implicated in the anxiety response (hippocampus, amygdale, locus coeruleus). This was accompanied by decrease in the levels of antioxidant proteins implicated in anxiety. Anxiety behavior tests revealed that BSO treated rats were more anxious than control rats. Interestingly, prior treatment either with tempol (an antioxidant agent) or exercise training in rats attenuated BSO-induced increase in oxidative stress and anxious behavior. Future studies will investigate mechanisms enabling these effects. (Grant support: University of Houston GEAR)

Texas continued

STUDENT: JUSTIN ALLEN JOHNSON | JOHN JACOB MAKIS
INSTITUTION: UNIVERSITY OF TEXAS - AUSTIN
FACULTY ADVISOR: KEITH J STEVENSON
POSTER TITLE: SYNTHESIS, CHARACTERIZATION, AND CATALYTIC EVALUATION OF DENDRIMER-ENCAPSULATED PALLADIUM AND PALLADIUM-COPPER NANOPARTICLES
DISPLAY AREA: 5H
FUNDING: FRESHMAN RESEARCH INITIATIVE
ABSTRACT: Metal nanoparticles, which exhibit unique properties due to their very small size and structure, are an area of burgeoning interest in the fields of medicine, electronics, and, of particular significance, chemical catalysis. More efficient and economical means of production and stabilization of nanoparticles are needed for their practical application as useful catalysts. Presented is the synthesis and characterization of palladium and palladium-copper nanoparticles using dendrimers, which are highly-branched, three-dimensional organic polymer templates. These dendrimer-encapsulated nanoparticles (DENs) are prepared through the binding of the metal ions to the dendrimer and subsequent reduction to metal nanoparticles on the scale of 1-3 nm. These nanoparticles were characterized using UV-Visible spectroscopy and transmission electron microscopy (TEM). Additionally, the catalytic abilities of the DENs were probed using a model colorimetric reaction. A linear dependence was found to exist between the rate constant of the reaction and the ratio of metal to dendrimer, and the bimetallic palladium-copper systems exhibited greatly enhanced catalytic activity when compared to their monometallic counterparts. The development and investigation of methods such as these will eventually allow for a high degree of control over and practical production of these nanoparticles for more viable future applications.

Utah

STUDENT: TYLER B. LARSEN
INSTITUTION: UTAH STATE UNIVERSITY
FACULTY ADVISOR: LISA BOYCE
POSTER TITLE: MOTHERS OF TODDLERS WITH DISABILITIES: UNDERSTANDING PARENTING STRESS, DEPRESSION, AND RESPONSIVENESS
DISPLAY AREA: 5I
FUNDING: U.S. DEPARTMENT OF EDUCATION
ABSTRACT: This study examined associations among perceived health, sense of competence, parenting stress, and depression of 89 mothers with toddlers with disabilities living in Utah urban areas. A high percentage (48%) of these mothers met the screening criteria for depression. Mothers were interviewed and observed interacting with their toddlers. Maternal interviews included questions about health, sense of competence as a parent, social interactions, perceived difficulty of the child, and the family's social and economic status. These factors were used to assess the parents' stress. On average, the mothers had poor health, felt incompetent as parents, felt their children were difficult, and were very distressed in their parenting roles. Many of the mothers were socially isolated from friends and their spouse. Mothers' stress, health, and feelings of lack of control or competence may have a significant influence on depression as indicated by high associations between these characteristics. Our results did not indicate an association between maternal depression and observations of mothers' affection, responsiveness, or teaching and talking during interactions with their toddlers. These findings suggest these mothers are supportive and responsive with their toddlers with disabilities, but could benefit from greater social and emotional support than they are receiving. This study was funded by the U.S. Department of Education.

Utah continued

STUDENT: CHRISTIAN PETERSEN
INSTITUTION: WEBER STATE UNIVERSITY
FACULTY ADVISOR: LAUREN FOWLER
POSTER TITLE: PERCEPTUAL, COGNITIVE, AND PHYSIOLOGICAL RESPONSES TO VIDEO GAME PLAY
DISPLAY AREA: 5J
FUNDING: NATIONAL SCIENCE FOUNDATION
ABSTRACT: Visual attention is an important component of any occupation that requires high levels of vigilance. Previous research has found that playing video games may improve attentional and perceptual abilities. For example, it was found that Israeli Air Force flight school cadets who played the video game Space Fortress significantly outperformed a no-game control group on actual flight performance. It was considered to be so successful that the Israeli Air Force added it to their training program. This study was designed to examine the effects video game playing has upon performance on measures of visual attention and alertness. Thirty participants were recruited. Following completion of a demographics questionnaire, participants were asked to complete a Useful Field of View Task to measure the spatial distribution of the participants' visual attentional resources, and an Attentional Blink task to measure the temporal distribution of visual attention. Blood pressure, heart rate, and galvanic skin response were then measured. Participants then played Halo 3 for 20, 40, or 60 minutes. Physiological measures were again taken and the cognitive tasks were re-administered. A multivariate analysis of the data showed that blood pressure and performance on the Useful Field of View both significantly increased after video game play. This suggests that playing video games improves visual attentional abilities, as well as increases alertness via physiological arousal. Implications for real-life are abundant; such skills are highly beneficial for occupations where rapid processing of information and decision making is essential such as air traffic controllers, airline pilots and the military.

Virginia

STUDENT: TAREK AZIZ LAHLOU
INSTITUTION: GEORGE MASON UNIVERSITY
FACULTY ADVISOR: JILL K NELSON
POSTER TITLE: RADIO TRANSMITTER LOCALIZATION FOR HEALTH CARE APPLICATIONS IN RURAL GUATEMALA
DISPLAY AREA: 6A
FUNDING: UNDERGRADUATE APPRENTICESHIP PROGRAM
ABSTRACT: Radio communications are an effective way to increase access to health information in rural areas of low-income countries, where FM radios are often the only source of media communication available. Radio transmitter localization and population mapping are fields that rarely overlap but have enormous potential for multidisciplinary growth. In rural regions of Guatemala, FM radio stations broadcast to a population of residents who have only very crude hand-crank or battery-powered radio receivers. Partner for Surgery, a non-profit organization, makes several trips to these regions each year to provide free surgical care to area residents. Their primary means for notifying rural residents of upcoming visits is through radio broadcast. The goal of my research is to estimate the locations and coverage areas of radio transmitters in these rural regions. Through merging census information, long-range imagery, and radio coverage maps, we can estimate the population reached by FM-broadcast public health messages, as well as the approximate locations of those reached. The results obtained allow Partner for Surgery to better understand the population they serve and to plan broadcasts such that the maximum number of residents are reached. Through my research, I am refining a technique for collecting simple broadcast-related measurements, creating coverage maps, and estimating access to health communications in mountainous rural regions. We are conducting field work in Guatemala, but the methods under development can be used worldwide to improve health care in rural underserved areas.

Virginia continued

STUDENT: S. MINERVA VENUTI
INSTITUTION: GEORGE MASON UNIVERSITY
FACULTY ADVISOR: PADMANABHAN SESHAIYER
POSTER TITLE: MATHEMATICAL AND COMPUTATIONAL MODELING OF AN INTRACRANIAL SACCULAR ANEURYSM
DISPLAY AREA: 6B
ABSTRACT: Fluid structure interaction models can be used to gain insight into a number of different applications, such as the interaction between airflow and wings of micro-air vehicles and blood pressure interaction with arterial walls. This work focuses on modeling an intracranial saccular aneurysm, which is a focal dilatation of an arterial wall within the brain. Between 2 and 5% of the population harbor aneurysms within their brains and 15 to 30% of those that harbor at least one aneurysm have multiple lesions. While there have been a number of papers written about intracranial saccular aneurysm, specific mechanisms responsible for their genesis, enlargement, and rupture is still under investigation. It has been hypothesized that one of the reasons for a saccular aneurysm to enlarge and rupture is because the dynamic behavior of the arterial wall is unstable because of the pulsatile blood flow. To investigate this hypothesis, a coupled mathematical model of an intracranial saccular aneurysm is developed herein. This model incorporates the interaction between the blood pressure, the wall structure, and the cerebral spinal fluid that surrounds the aneurysm. Analytical and numerical methods to derive exact solutions will be examined to study the response of various subclasses of lesions against imposed pulsatile blood flow.

STUDENT: MATTHEW A. SINKEZ
INSTITUTION: VIRGINIA MILITARY INSTITUTE
FACULTY ADVISOR: ROBERT E BURNETT
POSTER TITLE: PAKISTAN: THE NUCLEAR IMPLICATIONS OF AN ISLAMIST TAKEOVER
DISPLAY AREA: 6C
FUNDING: VIRGINIA MILITARY INSTITUTE
ABSTRACT: The terrorist acts of September 11th, 2001 established Islamic extremism as a major threat to the United States. With the subsequent invasions of Afghanistan and Iraq, the battlefield was effectively shifted to different regions of the world. In particular, Afghanistan was thought to the be the hiding place of Osama Bin Laden who is now allegedly living under the protection of Islamist groups in the Afghan-Pakistan region. As result, Pakistan, already facing mounting tensions with India and threatened by radical Islamic groups within its own borders, has found itself in a precarious position. Many believe, for good reasons, that an Islamist takeover in Pakistan might have grave implications. Therefore, it is important to understand the nature of this perceived threat in order to mitigate or eliminate the problem. The purpose of this paper is to analyze the effects of an Islamist takeover in Pakistan on its nuclear diplomacy in the region. However, contrary to some assessments given in recent years, this paper will argue that an Islamist takeover in Pakistan will not necessarily make the use of a nuclear device more or less likely.

Washington

STUDENT: MORGAN ELIZABETH EISENLORD | JESSICA M. PELKEY | KATHY K. PERREIRA
INSTITUTION: NORTH SEATTLE COMMUNITY COLLEGE
FACULTY ADVISOR: ANN MURKOWSKI
POSTER TITLE: IDENTIFICATION AND MAPPING OF HARMFUL ALGAL CYSTS IN THE PUGET SOUND BASIN
DISPLAY AREA: 6D
ABSTRACT: Paralytic shellfish poisoning (PSP) has become a major problem in Puget Sound causing repeated closures of shellfish beds, which affect both commercial and recreational harvests. In addition, the increased frequency of such events may have both ecological and human health implications. Alexandrium catenella is one of the dinoflagellete species of algae responsible for producing toxins that cause PSP in this region. When environmental conditions become favorable, resting cysts of A. catenella bloom, releasing the toxins(Cox et al, 2008). These cysts have been found in the sediments of various regions around Puget Sound and identified visually as A. catenella. There has, however, been very little definitive confirmation of their identity, as this requires molecular techniques. We are using the polymerase chain reaction (PCR) on individual cysts to confirm the identity of these A.catenella cysts. This will allow us to both accurately map the spatial distribution of the cysts, as well as better understand the timing and mode of their introduction to the Puget Sound Basin.

STUDENT: RACHEL CATHERINE HISCOX
INSTITUTION: UNIVERSITY OF PUGET SOUND
FACULTY ADVISOR: WILLIAM KERN BREITENBACH | JANE CARLIN
POSTER TITLE: THE OREGON MISSION COLLECTION: SCANDAL ON THE FRONTIER!
DISPLAY AREA: 6E
FUNDING: SUMMER RESEARCH GRANTS IN THE ARTS, HUMANITIES AND SOCIAL SCIENCES UNIVERSITY OF PUGET SOUND
ABSTRACT: The University Archives housed in the Collins Memorial Library and the University of Puget Sound is home to a collection of missionary letters and papers known as the Oregon Missions Collection. This collection, dating from the 1820's to the 1850's, contains three boxes of letters from missionaries, and those hoping to become missionaries, in the Oregon Territory. The Oregon Missions Collection: Scandal on the Frontier was a dual part research project. This work was an in depth study of unique information to be found in the Oregon Mission Collection. During research, it became evident that the collection contained fascinating information relating to a conflict between Jason Lee, Superintendent of the Oregon Mission, and Elijah White, the mission's first doctor. In the past, little has been known or written about this conflict, and this work brings into light a conflict that ended with Elijah White's expulsion from the Methodist Church, and in the eventual dismissal of Jason Lee from the Oregon Mission. This work reveals a detail from the history of the Pacific Northwest and shows some of the reasons for the downfall of the Methodist Mission to Oregon. Because of the importance of the collection to historical research, the project's secondary focus was on the digitization of the collection so that they would be available for public use. This involved taking scans and making transcriptions of the documents and making them available on the University of Puget Sound website.

Washington continued

STUDENT: RITA SODT
INSTITUTION: UNIVERSITY OF WASHINGTON
FACULTY ADVISOR: KRISTIN SWANSON
POSTER TITLE: FIGHTING CANCER WITH MATH: A PATIENT-SPECIFIC COMPUTATIONAL MODEL OF BRAIN TUMOR GROWTH
DISPLAY AREA: 6F
ABSTRACT: "Can math cure cancer?" is the provocative title of a recent Forbes article (10/2/08) featuring the pioneering research of the lab in which I am performing undergraduate research. The primary difficulty with treating brain tumors, particularly gliomas, the same type of highly invasive and deadly kind of tumor that took Ted Kennedy's life, is that even the most advanced medical imaging is unable to detect the true extent of cancerous cells diffusely distributed throughout the brain. We have shown that up to 99% of the tumor cells are invisible to magnetic resonance imaging, MRI. A novel computational model developed by Dr. Kristin Swanson can simulate and predict patient-specific glioma growth, in vivo, and in real time, based only on data collected from routine MRIs, and can produce a virtual tumor that shows the full extent of invasion of cancerous cells in the brain. My role has been to enhance the existing model by taking into account the complex and anisotropic pathways of invasion of the human brain by incorporating information from diffuse tensor imaging (DTI) MRI. We compare the results with the observed growth in individual patients to determine which technique more accurately predicts the growth of gliomas in vivo. The ultimate goal is the development of the best patient-specific tool for predicting brain tumor growth and invasion in individual patients to a level necessary to be, for the first time, "one step ahead of disease" rather than trailing in our ability to predict the behavior of each patients' tumor.

Wisconsin

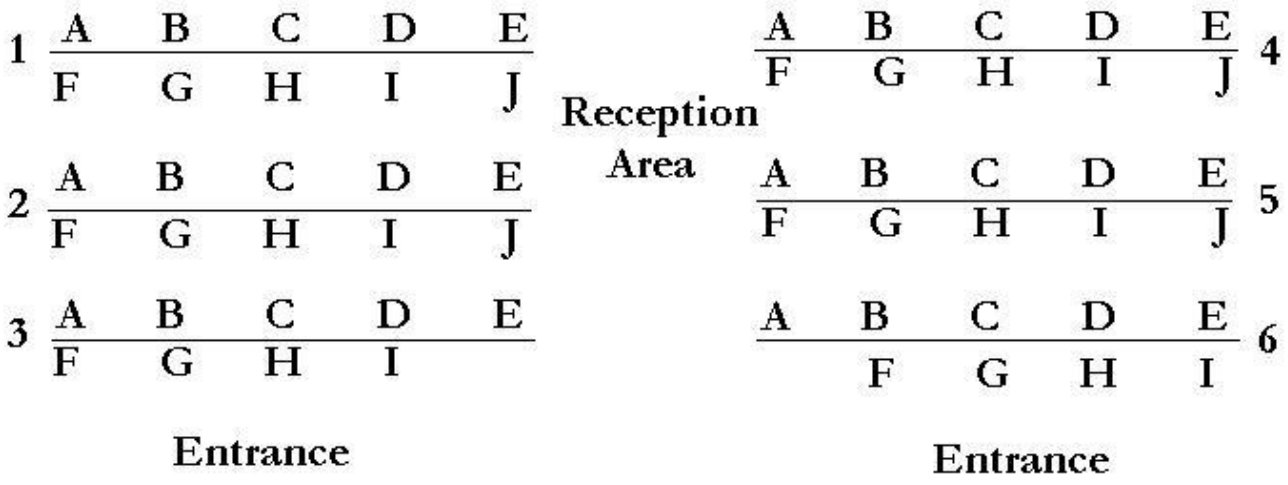
STUDENT: LAURA KATHERINE POTTER
INSTITUTION: CARTHAGE COLLEGE
FACULTY ADVISOR: KEVIN F. MORRIS
POSTER TITLE: INVESTIGATING THE INTERACTIONS BETWEEN Â-BLOCKER DRUGS AND CHIRAL POLYMERS USING NUCLEAR MAGNETIC RESONANCE SPECTROSCOPY
DISPLAY AREA: 6G
FUNDING: PETROLEUM RESEARCH FUND
ABSTRACT: Most drug molecules are chiral meaning they are found in two different forms that are mirror reflections of one another. The subtle differences in the structures of these two forms or enantiomers can affect dramatically the drug's interaction with biological receptors. For example, one enantiomer may produce the desired biological effect, while the other may be inactive or even toxic. Therefore, the FDA requires the biological functions of both enantiomers be investigated separately before a drug can be sold. The development of instrumental techniques that separate enantiomers is, therefore, an important area of research in analytical chemistry. One such technique is electrokinetic chromatography. In this experiment, the enantiomers interact with a polymer as they are both pulled through a capillary by an electric field. This research project used magnetic resonance spectroscopy to study the binding of six â-blocker drugs to polymers used in electrokinetic chromatography. These drugs are used to treat conditions such as angina pectoris, tremors, and glaucoma. The goal of our research was to characterize the interactions between the drugs and polymers and to identify specific intermolecular interactions that bring about the separation in electrokinetic chromatography. The binding constants measured with magnetic resonance showed that polymers containing ten carbon chains most efficiently separated the â-blocker enantiomers. Binding interaction maps for the â-blocker drugs were also generated. These maps allow the drug atoms that are close to specific polymer atoms to be identified. From these maps structural models of the drug:polymer complexes were developed.

Wisconsin continued

STUDENT: MICHAEL T. SCHREIBER
INSTITUTION: LAWRENCE UNIVERSITY
FACULTY ADVISOR: DAVID HALL
POSTER TITLE: UNDERSTANDING THE MECHANISMS OF COMMON COLD-INDUCED ASTHMA EXACERBATIONS
DISPLAY AREA: 6H
FUNDING: NATIONAL INSTITUTES OF HEALTH
ABSTRACT: In both children and adults, asthma exacerbations are caused primarily by the common cold, with human rhinovirus (HRV) being the most common infectious agent detected. Major- and minor-group human rhinoviruses (HRV) enter cells by binding to the cell surface molecules ICAM-1 and LDL-R. The focus of the resulting viral infection is in the cells lining the lungs. We hypothesize that a sentinel immune cell in the lung, the macrophage, is responsible for the inflammation and resulting asthma exacerbation after HRV infection. We demonstrate that the small molecular-weight G-protein Rac is differentially and uniquely activated by the binding of major- and minor-group rhinovirus to macrophages. The activation of macrophages through Rac results in the differential release of several molecules that are key in asthma exacerbations including MCP-1, IP-10 and IL-10. This is the first report of a relationship involving major- or minor-group HRV exposure, small molecular-weight G-protein activation, inflammatory mediator release and macrophages. This suggests that Rac as an excellent drug target in treating virus-induced asthma exacerbations. This work was supported by the Wriston scholarship, NIH R15 AI065505-01A1 and NSF 0521112.

STUDENT: DREW ANDERSON | SAMANTHA JAKEL | KYLE JERO
INSTITUTION: UNIVERSITY OF WISCONSIN - RIVER FALLS PHYSICS
FACULTY ADVISOR: JAMES M. MADSEN
POSTER TITLE: THE ODEN ICE BREAKER CALIBRATION CRUISE: EXTENDING THE ICETOP ARRAY FOR SOLAR STUDY
DISPLAY AREA: 6I
FUNDING: NATIONAL SCIENCE FOUNDATION
ABSTRACT: This project will calibrate a detector like those used in the IceTop surface array at the South Pole. IceTop uses tanks of ice with embedded light sensors to look for particles from outer space known as cosmic rays. The minimum energy needed to reach the detector depends on the value and direction of the Earth's magnetic field. By sailing from north to south across the equator, the change in the Earth's magnetic field will provide a way to determine the low energy calibration of the IceTop detector. The calibration will enable the IceTop array to study particles from the sun produced during solar storms, an important technological topic for satellite and power grid safety. Three undergraduate students, Drew Anderson and Kyle Jero from the University of Wisconsin River Falls and Samantha Jakel from the University of Wisconsin Rock County, will monitor data collection aboard Oden on three separate legs of the journey from Sweden to Uruguay, Uruguay to Antarctica, and Antarctica to Chile.

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



Participants

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Georgia Institute of Technology

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Kansas
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Maine
Bates College
University of New England

Maryland
Towson University

Massachusetts
Emmanuel College

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Hope College

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The College of Saint Scholastica
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