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Environmental Research Center  
Gettysburg College  
Graduate School of Creighton University  
John Hopkins University, Division of Pulmonary and Critical Care Medicine  
Kentucky Space Grant program  
Morehead State University  
National Aeronautics and Space Administration  
NASA Space Grant Undergraduate Program  
National Science Foundation (NSF)  
NSF-Division of Earth and Ocean Sciences  
NSF-Linguistics Program  
Research Corporation for Science Advancement  
United States Department of Education  
United States Department of Education -McNair Scholars Program  
United States Department of Energy  
United States Department of Homeland Security-Domestic Nuclear Detection Office  
University of Montana  
Urge to Compute  
Washington Space Grant Consortium



Dear Posters on the Hill Participants:

I wish to congratulate you on your selection to participate in the 2012 Posters on the Hill. Your research project was selected from over 850 applications. The Council on Undergraduate Research is impressed by your accomplishments and is pleased that you have been able to come to Washington, D.C. to participate in this prestigious event. We are proud of our members who serve as advisors and mentors to undergraduate researchers and believe you and your students are stellar examples of the best in higher education.

This is our 16<sup>th</sup> annual Posters on the Hill event and directly follows the second annual Undergraduate Research Week. Due to the success of last year's special luncheon honoring our Humanities participants, we have continued this event, as well as our tradition of an evening session for the Sciences.

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, your career, and the future. You have had the opportunity to develop skills in analysis, critical thinking, problem-solving and innovation through your research project, all of which are important for future success, whichever path you may choose.

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.

A handwritten signature in black ink, reading "Elizabeth L. Ambos". The signature is written in a cursive, flowing style.

Elizabeth L. Ambos  
Executive Officer

# CUR Arts & Humanities Posters

The following posters will be presented April 24, 2012

12:00-1:30 p.m. – Rayburn Office Building, 338-B & 339-B

Poster display location is shown in parentheses, abstract is shown on page to right.

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(1) Sam Calvin Brown

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## Colorado

University of Denver  
(2) Amelia Newport

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## Florida

University of Central Florida  
(3) Caitlin Elizabeth Bradley

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## Illinois

Loyola University Chicago  
(4) Angelica Krajewski

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## Massachusetts

College of the Holy Cross  
(5) Christine Roughan

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## Michigan

Hope College  
(6) Katie Callam

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## New Jersey

The College of New Jersey  
(7) Domenico Siravo

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## Pennsylvania

Gettysburg College  
(8) Brenda Clark  
(9) Lauren H. Roedner  
Shippensburg University  
(10) Kayla Reed

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## Virginia

Virginia Commonwealth University  
(11) Victoria Elizabeth Hribar

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## West Virginia

West Virginia University  
(12) Jaclyn Noelle Daugherty

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## Wisconsin

University of Wisconsin- Stevens Point  
(13) John Lenz | Michael Bixby | Julienna Hagan

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# CUR Science and Social Science Posters

The following posters will be presented April 24, 2012

5:00-7:30 p.m. – Rayburn Office Building, 338-B, 339-B & 340-B

Poster display location is shown in parentheses, abstract is shown on page to right.

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**Poster Display Area Floor Plan**

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## Student Poster Abstracts – Arts and Humanities

### Arkansas

**STUDENT:** Sam Calvin Brown

**INSTITUTION:** University of Arkansas at Little Rock

**DIVISION:** Arts and Humanities

**FACULTY ADVISOR:** James Levernier

**POSTER TITLE:** Sound, Fury, and Scripture: The Bible and William Faulkner's The Sound and the Fury

**DISPLAY AREA:** 1

**ABSTRACT:** Although it has been noted that the Bible “so permeates Faulkner’s fiction that... it may very well provide the most profound...instance of intertextuality in his novels,” almost all scholarship on The Sound and the Fury sidesteps the subject. In this essay I argue that to understand the novel requires reading it within the context of the Biblical references and allusions that saturate the text. In each of the novel’s four sections, Faulkner introduces a specific pattern of Biblical tropes. Each trope in turn critiques a different aspect of American history and culture. The first section, known as “Benjy’s Section,” introduces both the syntax and imagery of Genesis to assess the dangers inherent in viewing America as a New World Eden. The second section, “Quentin’s section,” contains New Testament allusions that critique the romantic ideologies of pre-Civil War America. The third section, “Jason’s Section,” mocks scripture from both testaments to underscore the hypocrisy of early twentieth-century America, which used both its Christian and romantic heritage to glamorize a decidedly corrupt capitalistic economic and social system. In the final section, “Dilsey’s Section,” Faulkner references the Book of Revelation to demand a radical rethinking of American culture.

### Colorado

**STUDENT:** Amelia Newport

**INSTITUTION:** University of Denver

**DIVISION:** Arts and Humanities

**FACULTY ADVISOR:** Susan Schulten

**POSTER TITLE:** Colorado and the Election of 1876

**DISPLAY AREA:** 2

**ABSTRACT:** In his book, By One Vote, historian Michael Holt delves into the intricacies behind the narrow and highly contested Republican victory in the presidential election of 1876. He identifies Colorado as one of the deciding factors in gaining that Republican victory. Holt makes the point that if the Democrats had rallied together and denied Colorado statehood, they would have taken back the White House. This oversight left Holt dumbfounded: “How, I asked myself, could [the Democrats] have been so stupid as to allow Colorado’s admission in time to participate in the presidential election?” My research project has, in essence, sought to answer this question. I believe that the reason Colorado was able to become a state was a combination of support from leading national Republican figures and the miscalculation of a few key Democrats. In my research, I especially wanted to focus on the national perspective towards Colorado’s role in the election. This research is important because Colorado’s role in the election of 1876 has been largely overlooked, in spite of the fact that Colorado’s participation played an essential role in the outcome of the election. I felt that Colorado’s story deserved to be told, because it is the perfect example of how great an impact civic participation can have. In the case of Colorado in the 1876 election, one vote truly did make all of the difference.

## **Florida**

**STUDENT:** Caitlin Elizabeth Bradley

**INSTITUTION:** University of Central Florida

**DIVISION:** Arts and Humanities

**FACULTY ADVISOR:** Ilenia Colón-Mendoza

**POSTER TITLE:** The Power of the Poster: The Economic Affects of Propagandistic Art and Imagery in Wartime America

**DISPLAY AREA:** 3

**ABSTRACT:** Over the course of World War I and World War II, the American government created several nationalizing campaigns to help bring the public together. Posters were distributed and hung in public areas, and were meant to advertise the needs of the military. During World War I, campaigns for thrift stamps and victory bonds urged consumers to invest in the treasury, and therefore pay for the war. One campaign even asked housewives to knit socks to send to soldiers to protect against trench foot. Throughout World War II, campaigns advised consumers to ration the food they ate, and to grow victory gardens. Another campaign asked drivers to join car clubs, and carpool to work to save gas. These efforts were intended to persuade consumers to spend less and invest more, which balanced the money spent on the war by the government. After these wars ended, America's economy was stable. In contemporary wartime (The Iraqi War), the American government has not utilized these nationalizing strategies to help reduce the government debt. It is the intention of my research to define the role that nationalizing art and propagandistic imagery play in terms of stabilizing the economy, and to indicate that these campaigns improve the economic standing of wartime America.

## **Illinois**

**STUDENT:** Angelica Krajewski

**INSTITUTION:** Loyola University Chicago

**DIVISION:** Arts and Humanities

**FACULTY ADVISOR:** Daniel Vaillancourt

**POSTER TITLE:** The Roots and Routes of the Polish Memoir

**DISPLAY AREA:** 4

**ABSTRACT:** Approximately 10 million Americans are descendants of Polish immigrants. It is essential that contemporary American citizens are aware of the historical roots of such an important population in the United States. It is especially important that these understandings are founded on what Poles themselves have expressed. Despite overwhelming political, religious, and social strife since the twelfth century (or perhaps because of it), Polish writers have embraced creative nonfiction, popularly known as memoir, as an important form of expression. From the earliest texts to present-day works, Poles have explored the events of their lives through personal reflection, which has prompted Nobel laureate Czeslaw Milosz to claim that Poles burn with a "craze for memoirs." The problem with the Polish memoir is that, in the words of scholar Marian Kaczmarek, "We do not yet have a history of Polish memoir." It is therefore no wonder, for example, that Polish memoirs rarely appear in academic work—or anthologies—written by Western European and American scholars. However, the distinct ontology of the Polish memoir and its significance are especially fascinating for an American audience because the roots of Polish memoir form during a time when Poland mirrors the contemporary United States. At that time, Poland was a vast nation of ethnically and religiously diverse peoples who participated in a democratic government. Therefore, experiences portrayed in this genre are worth examining because of what they teach readers about the past, the present, and the future.

## Massachusetts

**STUDENT:** Christine Roughan

**INSTITUTION:** College of the Holy Cross

**DIVISION:** Arts and Humanities

**FACULTY ADVISOR:** Neel Smith | Mary Ebbott

**POSTER TITLE:** Editing the Oldest Complete Manuscript of the Iliad

**DISPLAY AREA: 5**

**ABSTRACT:** The Homer Multitext project (<http://www.homermultitext.org>) uses a digital medium to more faithfully represent our primary sources for the Homeric epics, and thereby portray the variation natural to its oral tradition as well as put its textual tradition in a historical context. Our research focused on a 10th century AD manuscript known as the Venetus A (Marcianus Graecus Z 454 [= 822]) the oldest complete primary source for the Iliad (which stems from a 2nd millennium BC oral tradition). This manuscript is notable for its scholarly commentaries ("scholia") dating as far back as the 3rd century BC. Working from high-resolution digital photography, we deciphered the manuscript's material and created a digital diplomatic edition of the text and accompanying scholia of Iliad 1. Our edition publishes all of Book 1's scholia in their entirety for the first time. We also annotated the location of each scholion so that visual evidence from the primary source can be automatically retrieved from the online images. We compiled inventories across all 24 books of the Iliad and other graphical features not systematically published or studied before. These features include marks classifying types of scholia to numbers indexing epic similes in the main text. Our research then pursued related questions: why are these features present in the manuscript? What might they tell us about its construction or sources? With the publication of our edition within the Homer Multitext, this complete information will be immediately accessible to other scholars for their own research.

## Michigan

**STUDENT:** Katie Callam

**INSTITUTION:** Hope College

**DIVISION:** Arts and Humanities

**FACULTY ADVISOR:** Julia Randel

**POSTER TITLE:** The Compositional Process of Clara Schumann's Piano Trio in G Minor, op. 17

**DISPLAY AREA: 6**

**ABSTRACT:** Clara Schumann (1819-1896) presented her first solo piano concert at age eleven and was soon considered equal to the virtuoso Franz Liszt. She married the composer Robert Schumann, corresponded with the composer Johannes Brahms, raised seven children, and composed over forty works in several genres. Despite these accomplishments, she struggled with self-doubt regarding her compositions and creative abilities. She lost confidence in her Piano Trio in G minor, op. 17, after her husband composed his own trio. Although Schumann's trio is her longest and most complex work, it has never before been subject to an in-depth source study. The autograph manuscript, preserved at the Robert Schumann-Haus in Zwickau, Germany, contains substantial revisions which offer a window into Schumann's creative process. The researcher compared over nine hundred measures of the manuscript (in a digital copy) to the first edition of 1847, noting discrepancies in pitch, note value, articulation, and dynamics; she also transcribed almost two hundred measures crossed out by Schumann. This analysis revealed that Schumann revised melodies and transition sections almost exclusively, which greatly improved continuity between musical ideas in the trio. The manuscript's revisions point to a thorough and well-organized compositional process, despite Schumann's fears of inadequacy. An understanding of Schumann's revisions allows performers to interpret the trio in a more meaningful way. Decisions regarding the phrasing of melodies, for example, can be guided by their development throughout the compositional craft. This informed approach to interpretation will draw performers and listeners closer to Schumann's personal vision of the trio.

## **New Jersey**

**STUDENT:** Domenico Siravo

**INSTITUTION:** The College of New Jersey

**DIVISION:** Arts and Humanities

**FACULTY ADVISOR:** James S. Taylor

**POSTER TITLE:** Distributive Justice in End of Life Healthcare

**DISPLAY AREA: 7**

**ABSTRACT:** Since medical care is often expensive and is limited to finite resources, questions arise when deciding how these resources shall be justly distributed. This research project specifically focused on policies of presumed consent in organ transplantations; in which persons are presumed to have consented to have their organs removed for transplantation unless they carry documentation explicitly stating otherwise. This project hopes to aid in evaluating if certain policies of organ transplantation and procurement fit into popular distributive justice schemas better than others. The research first consisted of acquiring data from nations with presumed consent, like those in continental Europe, and those with informed consent, like in the United States. These data included socioeconomic background, age, regional background and race. After the data were collected they were then compared and analyzed in order to search for any trends of inequality or inefficacy potentially associated with different organ procurement policies. In addition to gathering data, the research involved consolidating and reviewing the relevant literature on distributive justice. The findings of the empirical analysis were evaluated with the findings of the relevant literature on justice. The results of this research can be useful for policy makers hoping to create a just and morally permissible system of organ redistribution. It can also demonstrate the usefulness of combining philosophical argumentation and empirical analysis when discussing bioethical problems.

## **Pennsylvania**

**STUDENT:** Brenda Clark

**INSTITUTION:** Gettysburg College

**DIVISION:** Arts and Humanities

**FACULTY ADVISOR:** Jennifer Bloomquist

**POSTER TITLE:** Amazigh Language, Race, and Education in Morocco

**DISPLAY AREA: 8**

**FUNDING:** Gettysburg College

**ABSTRACT:** The situation of the Amazigh (or Berber) population in Morocco is similar to that of the Native Americans in the United States in that the Amazigh have watched land that they have inhabited for centuries be occupied by strangers. As in the United States, it is only recently that the government has begun to think about protecting their rights and culture. A fact that often goes unrecognized, and hinders the creation and passage of legislation, is that "Amazigh" refers to varied cultures and languages that make up a majority of the population instead of one small homogenous group. This paper provides a brief history of the relations between the Amazigh and their colonizers, with a focus on present-day issues. It explains the effects of current debates and recent decisions on Amazigh language, race, and education from the perspective of policy-makers, human rights organizations, educators and scholars, and the general public. The outcome of the research shows that although considerable progress has been made since French colonization and the beginning of Independence, there is still a long way to go if the Moroccan government wants to properly respect the Amazigh population in regard to equal rights legislation. Amazigh culture is still stereotypically associated with rural or uneducated areas. The resources for education that includes Amazigh history and language, as well as teacher training, are only now trickling into the education system. While Tamazight language is being promoted and incorporated into some schools, the standardized version does not reflect authentic usage and continues to impede progress.

## **Pennsylvania continued**

**STUDENT:** Lauren H. Roedner

**INSTITUTION:** Gettysburg College

**DIVISION:** Arts and Humanities

**FACULTY ADVISOR:** Sharita Jacobs Thompson | John E. Ryan

**POSTER TITLE:** First Step toward Freedom: Women in Contraband Camps In and Around the District of Columbia During the American Civil War

**DISPLAY AREA:** 9

**FUNDING:** Gettysburg College

**ABSTRACT:** A white Quaker abolitionist woman from Rochester, New York, and an escaped female slave who lived in an attic for years to avoid capture, were not likely to become friends during the Civil War. Racial inequality was just as rampant in the North as slavery was in the South. However, these two women, Julia Wilbur and Harriet Jacobs, befriended one another in Alexandria, Virginia where they both volunteered to work with “contrabands-of-war”. More commonly known as fugitive slaves, these refugees needed shelter, medicine, food, clothes, and many other necessities of life as they continued toward true freedom. Julia and Harriet were allies who dedicated their lives to providing donated necessities, advocacy, schooling and hope for a brighter future. Through personal, intimate diaries and correspondence spanning over fifty years, the story of these two women; their friendship, hardships, successes, acquaintances and overall feistiness in the face of danger, moral inequality and established institutions is woven together in a unique, inspiring, unpublished story.

**STUDENT:** Kayla Reed

**INSTITUTION:** Shippensburg University

**DIVISION:** Arts and Humanities

**FACULTY ADVISOR:** Allen Dieterich-Ward

**POSTER TITLE:** Through the Eyes of a Woman: The Impact of Nature on a Pioneer Woman's Life

**DISPLAY AREA:** 10

**ABSTRACT:** There have been many scholars whose work is focused on the history of the western United States, specifically the period of westward expansion. The history that is told through the works of these scholars is extensive but also gender-specific. The history of traveling westward and of the West in general has been monopolized by men. Not only was that specific field of history monopolized by men but the sources used by these male scholars were also mostly sources from the male perspective. Through the use of trail diaries and letters written by women traveling along the Oregon and Santa Fe overland trails, this project seeks to broaden the perspective of the history of the westward expansion to include women and the perspectives of women who traveled westward to the Pacific Coast. By incorporating the existing scholarly work with primary and secondary source material concerning women, this project will not only fill a gap in the research done on women traveling on the Overland Trails but it will also take a critical look at how women interacted with nature and how nature and the environment affected their daily lives on the trail.

## Virginia

**STUDENT:** Victoria Elizabeth Hribar

**INSTITUTION:** Virginia Commonwealth University

**DIVISION:** Arts and Humanities

**FACULTY ADVISOR:** Dianne T.V. Pawluk

**POSTER TITLE:** An Art Display for the Blind and Visually Impaired

**DISPLAY AREA: 11**

**FUNDING:** National Science Foundation

**ABSTRACT:** Art museums provide access to the diversity of the world's visual culture, both historical and contemporary, and an opportunity to experience the life-enhancing power of art which impacts the social, psychological and spirituality of an individual. Unfortunately for individuals who are blind and visually impaired, most museums do not allow visitors to touch artwork, which greatly limits the experience of these individuals. When museums adapt their policies, such as when the Milwaukee Art Museum allowed a group of individuals who were blind to touch sculptures, overwhelming emotional experiences may be provided for these individuals. However, despite the fact that paintings are a dominant and extensive form of art, they are still relatively inaccessible. Access is typically limited to auditory descriptions and tactile diagrams that focus on the structural elements (i.e., objects and shapes). Perhaps, more important than the structural elements, particularly when considering the personal impact on an individual, is the style and expressiveness of a painting. We developed a refreshable tactile display which conveys the tactual equivalent of brushstroke, color and color contrast which expresses this information visually. The haptic display consists of: (1) a tactile component to provide texture information about the brushstrokes, (2) a thermal component to represent information about color through the cool-warm spectrum, and (3) a sensor to update current location within the painting in order to change the tactile and thermal feedback to create contrast.

## West Virginia

**STUDENT:** Jaclyn Noelle Daugherty

**INSTITUTION:** West Virginia University

**DIVISION:** Arts and Humanities

**FACULTY ADVISOR:** Kirk Hazen

**POSTER TITLE:** Revising Sociolinguistic Methods for the 21st Century

**DISPLAY AREA: 12**

**FUNDING:** National Science Foundation -Linguistics Program

**ABSTRACT:** Sociolinguistics has been a fractured area of study since its inception in the 1960s, with the focus falling between linguistic questions and anthropological questions. Recently, research shifted towards the variationist study of social meaning and identity. The early First Wave approach employed demographic categories to answer linguistic questions, often leaving aside what language variation meant for its speakers. Third Wave sociolinguistics instead addresses how language variation and social identity co-construct one another. This paper examines how compatible these approaches are to fulfilling the widest range of sociolinguistic goals. By re-examining a First Wave study of native Appalachians, this study assesses the feasibility of First Wave data for answering Third Wave questions, offering a critique of what data should be collected to provide for a better sociolinguistic analysis. Linguistic features significant to this study are aI ungliding (eg. mine vs. mahn), was leveling (eg. They were vs. They was), quotatives (eg. He said vs. He was like), and G-dropping (walking vs. walkin'). By looking at the social meanings of individual variants and the interview contexts of their usage, First Wave data can yield benefit for Third Wave questions, but other questions encompassing how a speaker uses his or her style to construct their social identity go unanswered. This study argues that the data collected for First Wave studies are not sufficient for a Third Wave analysis. First Wave studies must supplement data with the day-to-day activity in which speakers regularly linguistically construct themselves in social scenarios.

## **Wisconsin**

**STUDENT:** John Lenz | Michael Bixby | Julienna Hagan

**INSTITUTION:** University of Wisconsin- Stevens Point

**DIVISION:** Arts and Humanities

**FACULTY ADVISOR:** Valerie H. Barske

**POSTER TITLE:** UWSP Archives on East Asia: Analyzing Works from the Malcolm L. Rosholt Collection

**DISPLAY AREA: 13**

**ABSTRACT:** This research project represents the first study analyzing primary source materials on East Asia from the Malcolm L. Rosholt Archival Collection held in the UWSP Library. From 1932-1937, Malcolm Rosholt covered the Japanese invasions of China as a journalist, publisher, and editor of an English-language newspaper in Shanghai. While in China, Rosholt focused on achieving a complex understanding of the Chinese language, and cultural history. During World War II, the Army Air Corps commissioned Rosholt to employ his linguistic and cultural training as a liaison officer for the elite "Flying Tigers," 1943-1945. Rosholt later became known for his works on local histories in Wisconsin including Portage County. As part of an initiative for original historical research on topics that connect East Asia and Central Wisconsin, we presented our preliminary research on the archives at the University of Wisconsin Stevens Point Undergraduate Research Symposium Spring 2011. Our poster presentation examined Rosholt's personal narratives on the Flying Tigers, his in-depth journal of Chinese to English translations, and visual artifacts from the "Four Great Masters" of the Yuan Dynasty (ca. 1271-1368). We plan to continue our studies to address the following research questions: In what ways might the Rosholt archive challenge standard narratives of history and mainstream assumptions about the role of the U.S. in pre-WWII China? How might the study of the Rosholt archives help us to historicize foreign relations between the U.S. and East Asia in order to positively affect contemporary foreign policies and cultural strategies towards China, Japan, and Korea?

## Student Poster Abstracts – Science and Social Science

### Alabama

**STUDENT:** Tonya S. Hutto

**INSTITUTION:** University of Alabama

**DIVISION:** Social Sciences

**FACULTY ADVISOR:** Rebecca Howell

**POSTER TITLE:** The Impact of Race on the Criminal Sentences of Youth Convicted in the Adult Court

**DISPLAY AREA:** 1A

**ABSTRACT:** Research confirms that minority adults who are sentenced in the criminal court are rendered lengthier and more severe punishments than their white counterparts. It is unclear, however, whether these findings hold for juveniles who are convicted and sentenced in the adult criminal justice system. Given that the U.S. Constitution prohibits the disparate treatment of individuals by the justice system based upon race, determining whether racial bias exists in the sentencing of juveniles has critically important implications for the moral status of our society and systems of justice. The sole study (Jordan & Freiburger, 2010) that investigated whether racial bias exists in the criminal sentencing of juveniles yielded substantial race effects; as compared to similar white youth, black teens (followed by Hispanics) were more likely to be sentenced to incarceration than probation. The current research extended this study by examining the impact of race on juveniles being criminally sentenced to restitution, probation, and jail. Three hypotheses were tested: (1) minority juvenile offenders convicted in adult court are less apt to be sentenced to probation and restitution, but more apt to be sentenced to jail than white offenders; (2) juveniles convicted by a judge or jury are more apt to be sentenced to jail than those who plead guilty; and (3) juveniles transferred via legislation or a prosecutor are more likely to be sentenced to probation and restitution than youth waived by a judge. Important legal and extra-legal correlates of sentencing outcome were controlled. The findings and policy implications will be presented.

### Arizona

**STUDENT:** Michael Andrew Schaffner

**INSTITUTION:** University of Arizona / Lunar and Planetary Lab

**DIVISION:** Physics/Astronomy

**FACULTY ADVISOR:** William Boynton

**POSTER TITLE:** Water on the Moon: Remote Sensing from the Lunar Reconnaissance Orbiter

**DISPLAY AREA:** 1B

**FUNDING:** NASA Space Grant Undergraduate Program

**ABSTRACT:** Previous NASA lunar missions have suggested the presence of ice on the moon's north and south poles. Unlike the earth, the moon has very little axial tilt, giving rise to cold regions called permanently shadowed regions (PSRs) which are located deep inside polar craters that never receive sunlight. NASA's Lunar Prospector mission detected areas of enriched hydrogen, thought to be due to ice, near the South Pole where it was believed that this ice was trapped in the many polar PSRs. Such ice deposits could be essential to future lunar missions that include human habitats or base stations for missions to Mars. We have been analyzing new higher-resolution data from the Lunar Exploration Neutron Detector (LEND), a Russian instrument onboard NASA's Lunar Reconnaissance Orbiter (LRO). We have confirmed the presence of ice; but surprisingly we found that the locations of the ice deposits are not closely related to the PSRs. The scientific community is very interested in explaining this perplexing result of our research. We are developing one possible model to explain these observations that considers thermal variations due to solar heating and the lack of a lunar atmosphere. We are also examining other hydrogen deposition and migration models that may help explain our findings. Our research is evaluating these possibilities through statistical analysis of data from LEND's eight neutron detectors, which continue to collect data today as part of the ongoing LRO mission.

## Arkansas

**STUDENT:** Mark Castleberry | Claudia Gonzalez | Lauren Story | Jonathan Shields | Shannon Fiser

**INSTITUTION:** Henderson State University

**DIVISION:** Biology

**FACULTY ADVISOR:** James Engman

**POSTER TITLE:** A Molecular Genetic Survey of Extremophile Microbes from Blanchard Springs Caverns, Arkansas

**DISPLAY AREA:** 1C

**FUNDING:** National Science Foundation/Arkansas Science and Technology Authority

**ABSTRACT:** Microbes from cave environments are increasingly considered important, as members of biotic communities in these extreme environments, as facilitators of cave formation, as evolutionary models, and as agents of disease, including white nose fungus, responsible for the deaths of millions of bats across North America. This project is using molecular genetic techniques to survey the bacterial flora of Blanchard Springs Caverns, Arkansas. Although considered to be the most biologically diverse cave in the Ozark Plateau, no previous survey of its microbes has been conducted. Samples from four sites in undeveloped reaches of the caverns were plated on selective media, with resulting pure cultures stored in glycerol at -80 C. A 1500 base pair region of the 16S SSU rRNA gene from these colonies was amplified with polymerase chain reaction (PCR) and sequenced using universal bacterial primers. All sequences have forward/reverse strand double coverage in excess of 95%. Sequences obtained were compared with those in the GenBank database (National Center for Biotechnology Information) using the BLASTN program. Sequence identity of 99% determined species-level identification; 97%, genus level only. Additional biochemical analysis was conducted using commercially available test strips and microscopic analysis with various stains to determine phenotypic characteristics. This survey has resulted in identification of rare and unusual species including *Aminobacter lissarensis*, *Arthrobacter kerguelensis*, and *Oerskovia enterophila*, all previously unknown from North America. Additional members of *Bacillus* and *Pseudomonas* have not been conclusively identified to species, and work is proceeding to determine if these are species new to science.

**STUDENT:** Cara L. McKinney | Nolan West | Vikki K. Bennett

**INSTITUTION:** Ouachita Baptist University

**DIVISION:** Biology

**FACULTY ADVISOR:** Lori L. Hensley

**POSTER TITLE:** The Effects of Ajulemic Acid on Tumor Cell Viability and Metastatic Potential in the Ewing's Sarcoma Family of Cancers

**DISPLAY AREA:** 1D

**FUNDING:** Arkansas INBRE

**ABSTRACT:** Ewing's Sarcoma is a bone cancer that primarily affects children and teenagers. These tumors are highly aggressive and have often already spread to other parts of the body at the time of diagnosis. With a five-year survival rate of only approximately 30%, improved treatment options are desperately needed. Our research has focused on the ability of the synthetic compound ajulemic acid to induce death in cultured Ewing's sarcoma cells as well as in a novel bioluminescent mouse model developed from tumor cells engineered to express the enzyme which allows fireflies to light up. Our data show this compound successfully kills Ewing's sarcoma cells as well as several other pediatric tumor types in vitro, and we have seen complete tumor regression in approximately 33% of our treated mice. Because metastases or spread of the cancer significantly decreases survival rates, we are investigating the ability of ajulemic acid to decrease migratory and invasive abilities of the tumor cells as well as hallmarks of angiogenesis, the growth of new blood vessels to support tumor growth. Our data demonstrate that ajulemic acid inhibits the migration of tumor cells and endothelial cells, the cells that line blood vessels and direct their growth. Additionally, this compound inhibits vascular growth in an aortic ring assay. Taken together, our data suggest we can kill Ewing's sarcoma cells and decrease the ability of any remaining tumor cells to spread. We hypothesize that these experiments provide the rationale for the development of improved therapies for this devastating family of cancers.

## California

**STUDENT:** Kenneth M. Williams

**INSTITUTION:** University of California, Santa Barbara and California State University San Bernardino

**DIVISION:** Mathematics/Computer Science

**FACULTY ADVISOR:** Arturo I. Concepcion | B.S. Manjunath | Golnaz Abdollahian

**POSTER TITLE:** Botanicam: Plant Recognition

**DISPLAY AREA:** 1E

**FUNDING:** National Science Foundation

**ABSTRACT:** Plant blindness is a term introduced by Wandersee and Schussler in 1999 to describe "the inability to see or notice the plants in one's own environment, leading to the inability to recognize the importance of plants in the biosphere and in human affairs." The goal of this project was to develop a mobile application aimed toward increasing awareness and appreciation for plants in our environment. We have developed the mobile application entitled "Botanicam," which is a front-end for handheld mobile devices (e.g. mobile phones, PDAs, and tablets) used to interact with an autonomous plant recognizer located on an external server. The server is capable of identifying the genus, species, and common name of a plant that is sent back to the mobile device which then produces textual and visual results that are useful to the user. Once identified, all relevant plant information (genus, species, common name, a link to further information about the species, etc.) are displayed on the device's screen as the output of the application. This provides a convenient user interface that facilitates the process of image collection and annotation for botanists and enables amateur users to learn about the plants in their environment.

## Colorado

**STUDENT:** Kurt Iversen

**INSTITUTION:** National Institute of Standards and Technology (Physical Measurement Laboratory - Magnetism Group)

**DIVISION:** Physics/Astronomy

**FACULTY ADVISOR:** Shannon Mayer

**POSTER TITLE:** Spin Valves and Magnetic Tunnel Junctions

**DISPLAY AREA:** 1F

**FUNDING:** National Science Foundation

**ABSTRACT:** This poster will describe research in spintronics that was conducted at the National Institute of Standards and Technology in Boulder, CO during the summer of 2011 as part of the NIST Summer Undergraduate Research Fellowship program. A spintronic device is one that uses the electron's magnetic moment (its spin) as well as its charge to perform operations, such as data storage or logic. When electrons in a metal are exposed to a strong magnetic field, they tend to align with that field. It is easier for these electrons to move into another piece of metal if that metal has a magnetic field oriented in the same direction. In a magnetic spin-valve, one layer of a circuit has a fixed magnetic field orientation and another layer's orientation is free to rotate. Thus, an electric current can switch the free layer into a "low" or "high" orientation at will. This is seen as a change in the electronic resistance of the circuit. This change is characterized experimentally by four point probe measurement of the sheet resistance of a sample while an electromagnet provides a varied magnetic field orientation of the free layer. Many of today's spintronic devices are based on the "tunneling magnetoresistance" effect of CoFeB/MgO/CoFeB tunnel junctions. In this presentation relevant background is discussed and the fabrication, operation, and behavior of spin-valves and magnetic tunnel junctions are described. This area of research has a wide array of practical uses; applications include computer memory, computer processors and sensors to detect magnetic fields.

## **Connecticut**

**STUDENT:** Kristina Donathan

**INSTITUTION:** Yale University

**DIVISION:** Social Sciences

**FACULTY ADVISOR:** Patricia Lee-Robinson

**POSTER TITLE:** Public Perception on Punishment of Juveniles With Different Underlying Factors to the Commitment of the Crime

**DISPLAY AREA: 1G**

**ABSTRACT:** Increasingly, genetic information is presented in criminal court to influence judgments regarding perpetrators of crime. This study assessed public attitudes toward juveniles who had committed a violent crime and investigated whether presenting information about childhood maltreatment history, genotype, or both would influence perceptions. Participants (N=377), ages 18-81, filled out an 8-question survey after reading one of four vignettes about a juvenile who had been found guilty of committing a violent crime: 1) with childhood maltreatment history; 2) with genotype; 3) with both, and 4) with neither. Compared to having no maltreatment and genotype information, including either or both in the vignette, lead to the crime being viewed as significantly less controllable and more likely to occur again in the future. Having both genotype and maltreatment history lead to the juvenile being viewed as significantly less responsible for the crime and the crime as significantly less avoidable. Mention of a maltreatment history, with or without genotype, resulted in significantly higher levels of empathy from participants, compared to having neither mentioned in the vignette. Presenting maltreatment history and/or genotype information significantly influences public perception about juvenile delinquency. Results indicate that presenting maltreatment and genotype information together uniquely decreases the public's view that the crime is within a juvenile's control.

## **Florida**

**STUDENT:** Judson B. Locke

**INSTITUTION:** Florida Institute of Technology

**DIVISION:** Physics/Astronomy

**FACULTY ADVISOR:** Marcus Hohlmann

**POSTER TITLE:** Nuclear Terrorism Prevention with Particle Physics Technology

**DISPLAY AREA: 1H**

**FUNDING:** Domestic Nuclear Detection Office, Department of Homeland Security

**ABSTRACT:** Terrorists intending to detonate a nuclear or dirty bomb on US soil could smuggle uranium and other special nuclear materials (SNM) into the US through any of about 800 ports-of-entry by hiding the SNM in cargo. Current methods of detecting hidden SNM rely mainly on radiation naturally emitted by nuclear material. These methods can be defeated in many cases by shielding the SNM with a lead container less than a quarter-inch thick. At Florida Tech, we have employed state-of-the-art, high-precision particle detection technology originally developed for particle physics experiments such as those at Fermilab, Brookhaven National Laboratory, and CERN to construct a new device allowing us to detect shielded nuclear contraband. We use a scanning technique called muon tomography, which is completely harmless to humans and cargo and was pioneered at Los Alamos. The idea is to place the cargo inside our detector and precisely track subatomic particles called muons, which are naturally produced in the atmosphere, as they enter and exit our system. These muons scatter significantly when they hit heavy elements, such as uranium, allowing us to reconstruct 3D images of the cargo showing where SNM may be located. We have built and operated two muon tomography prototypes and have successfully demonstrated that we can image and distinguish between metal targets of different materials and shapes. The Domestic Nuclear Detection Office (DHS) has funded our research, and we have contributed significantly to undergraduate and graduate education on nuclear detection, public awareness of SNM smuggling, and new detector technologies.

## Florida continued

**STUDENT:** Claire Comiskey

**INSTITUTION:** New College of Florida

**DIVISION:** Social Sciences

**FACULTY ADVISOR:** Sarah Hernandez

**POSTER TITLE:** Deposits Grow, Disempowerment Lingers: Economic Status and Social Empowerment in a Women's Self-Help Group Microfinance Program in Rajasthan, India

**DISPLAY AREA: 1I**

**ABSTRACT:** Using a case study from rural Rajasthan, India, this research examines the impact of women's involvement in microfinance self-help groups run by nongovernmental organizations (NGO) on their economic status and social empowerment. Microfinance – a financial service small in size provided by financial institutions to the poor – has garnered immense popularity as a strategy for poor women in developing countries to become empowered and lift themselves out of poverty. However, there is disagreement as to whether microfinance programs achieve these dual aims. Although the concept of microfinance has seen immense popularity and microfinance programs have been funded abundantly, there has been neither widespread proof of its effectiveness nor many critiques of its implementation on the ground. Thus, the knowledge gained from this research could help inform the model of microfinance programs for women by illuminating what aspects of the self-help group model have and have not been effective in terms of poverty alleviation and women's empowerment. Conclusions from this study are made from content analysis of interviews with twenty-four women participating in microfinance self-help groups, these groups' financial profiles, and the researcher's observations of how the NGO's workings impacted the program. Findings indicate that the women's participation did not cause them to make more money, but did allow them to accrue savings that they valued. Most women did not experience social empowerment from their participation. An analysis of this program's pitfalls will indicate broadly how women's microfinance programs can be better designed and implemented.

**STUDENT:** Christopher Ray Brown

**INSTITUTION:** University of South Florida St. Petersburg

**DIVISION:** Mathematics/Computer Science

**FACULTY ADVISOR:** Alison Watkins

**POSTER TITLE:** Monitoring Employment Risks through Linguistic Analysis of Electronic Communication

**DISPLAY AREA: 1J**

**ABSTRACT:** Employers are faced with a growing range of risks relating to employee behavior. Problematic employee behavior may take many forms, including harassment, intimidation, poor customer relations and malicious acts. Waiting for problematic behavior to fully manifest may leave an employer open to legal liability, hurt co-worker morale and in extreme cases lead to physical harm of other employees or customers. However, predicting which employees may be most at risk for problematic behavior is quite challenging. Various laws and high costs make direct psychological fitness examinations challenging and relying solely upon supervisor or coworker assessment may lead to unfounded accusations. We propose active monitoring of electronic communications as one method that may identify problems early, allowing for proactive mitigation through coaching and employee assistance programs. Recent linguistic research has found strong correlations between word use and behavior. Subtle differences in the frequency of common words can provide clues about behavior. Changes in word use patterns over time may reveal stress or interpersonal relationship problems. Any monitoring of communication raises obvious privacy concerns. One advantage of our proposed system is that it utilizes statistical processes to reveal underlying behavioral issues in a uniform and consistent manner. This contrasts sharply with existing efforts which often rely upon subjective assessments by supervisors or coworkers. Furthermore, our system simply identifies individuals who may warrant further attention, it does not prove intent or malice, it simply raises a warning,

## Georgia

**STUDENT:** Kylia Goodner

**INSTITUTION:** Berry College

**DIVISION:** Biology

**FACULTY ADVISOR:** Michael Morgan

**POSTER TITLE:** Quantifying Differential Gene Expression in Diseased Corals Using Real-Time PCR

**DISPLAY AREA:** 2A

**ABSTRACT:** Coral reefs worldwide are experiencing unprecedented levels of degradation and stress. Increasing ocean temperatures are known to disrupt the symbiotic relationship between corals and their photosynthetic partners called zooxanthellae, which result in the observable condition known as coral bleaching. Another visual manifestation of coral stress is Caribbean Yellow Band Disease (CYBD). This disease is characterized by the presence of a yellow halo shaped bleaching pattern, and is currently believed to be a disease of the zooxanthellae. Rising water temperatures have been shown to increase the spread of the disease, while decreasing coral reproduction rates. The objective of this study was to characterize CYBD at the level of gene transcription by quantifying the relative amount of gene transcripts present in healthy, diseased, and non-diseased portions of diseased corals in the coral species *Monstratea faveolata*. Five genes of interest (GOIs) were chosen because of a prospective role in the disease, and were quantified using quantitative-Real Time Polymerase Chain Reaction. Results suggest CYBD produces a strong immunoglobulin and relative elevated protein turnover response, but not a cellular oxidative response within diseased coral tissue. Results also suggest that zooxanthellae may be functioning more like heterotrophs as the disease develops. Coral reefs play an important role in tropical marine ecosystems; therefore it is vital to characterize genetic responses associated with coral diseases in order to develop diagnostic tools that can accurately monitor coral health.

## Idaho

**STUDENT:** Jeremy A Farrell

**INSTITUTION:** Idaho State University

**DIVISION:** Chemistry

**FACULTY ADVISOR:** John Kalivas

**POSTER TITLE:** Multivariate Calibration and Maintenance Using No Reference Samples

**DISPLAY AREA:** 2B

**FUNDING:** National Science Foundation

**ABSTRACT:** Calibration is the process in analytical chemistry of forming a mathematical model to relate chemical and/or physical variables (analytes) to a measured instrument signal, such as at a near-infrared (NIR) wavelength. Multivariate calibration is when a model is formed using many different signals. Maintenance is the process of updating an existing model, to be able to predict samples that were measured in a new condition (such as at a different temperature). Multivariate calibration and maintenance has many applications to various industries. An example of this is using multivariate calibration and maintenance in the pharmaceutical industry to build a model with samples created in a laboratory, updating that model with samples from full production, and then using that model to predict samples in full production. Using multivariate calibration and maintenance to predict analytes typically requires many reference samples (measured in both conditions) in order to build the model. Obtaining these reference samples can be very time consuming and costly. Because of the problems involved with using reference samples it is desirable to develop a method where no reference samples are required, yet the model is still adequate to predict the analyte. This study focuses on developing a new method of multivariate calibration and maintenance using no reference samples and evaluating its effectiveness compared to multivariate calibration and maintenance with many reference samples.

## Illinois

**STUDENT:** Esmeralda Zamora

**INSTITUTION:** Southern Illinois University Carbondale

**DIVISION:** Social Sciences

**FACULTY ADVISOR:** Daryl G. Kroner

**POSTER TITLE:** Mental Illness in Correctional Institutions: A Look at its Effects on Institutional Behavior

**DISPLAY AREA:** 2C

**FUNDING:** McNair Scholars Program

**ABSTRACT:** Mental illness can impact how an inmate functions within a correctional facility. This study explores the effects of depression and schizophrenia on nonviolent and violent institutional behavior using data from 3,686 interviewed offenders. An offender's criminal history as well as the recent history and symptoms of mental disorders were included as predictors. Correlation and logistic regression analyses were used to test the overall hypothesis of mental health predicting the occurrence of institutional misconducts. Based on the results, several recommendations for practice and for future research will be provided.

## Indiana

**STUDENT:** Daniel O. Popoola

**INSTITUTION:** Indiana University-Purdue University Indianapolis

**DIVISION:** Health Sciences

**FACULTY ADVISOR:** Kenneth B. Durgans

**POSTER TITLE:** When a Fire Leads to a Drink: Enhancement of Alcohol-Seeking by Microinjections of Nicotine Directly into the Reward Neurocircuitry

**DISPLAY AREA:** 2D

**FUNDING:** U.S. Department of Education

**ABSTRACT:** Alcohol addiction is a cyclical disorder that is characterized by periods of alcohol consumption and abstinence. The periods of abstinence are frequently brief, and the rate of relapse to alcohol consumption is typically higher than 95% within a year. The vast majority (80-95%) of alcoholics concurrently use nicotine. The use of nicotine can potentiate self-reported craving for alcohol following a relapse episode. The goal of the present project was to determine the biological basis of nicotine's ability to stimulate alcohol (EtOH)-seeking in a rodent model of alcoholism (alcohol-preferring [P] rat). Specifically, the current project examined the effect of nicotine on EtOH-seeking when administered directly into the brain reward neurocircuit (posterior Ventral Tegmental Area – pVTA). In order to determine the neurotransmitter systems regulating nicotine's ability to enhance EtOH-seeking when administered into the pVTA, two subsequent studies examined the effect of co-administration of nicotine with an acetylcholine nicotine receptor (AChN) antagonist (mecamylamine (MEC)) or with a serotonin-3 (5HT3) receptor antagonist (zacopride (Zac)). Nicotine binds with high affinity to both the AChN and 5HT3 receptors. The data indicate that at very low concentrations nicotine microinjected into the pVTA increased EtOH-seeking in P rats. Co-administration of mecamylamine or zacopride blocked nicotine's ability to potentiate EtOH-seeking. Overall, the results show that nicotine can enhance alcohol-seeking behaviors through activation of the AChN and 5-HT3 receptors in pVTA. The clinical implication of the data set would be that to reduce the amount of alcohol-craving, which could lead to relapse, nicotine use should also be terminated

## Iowa

**STUDENT:** MacKenzie M. Benson

**INSTITUTION:** Wartburg College

**DIVISION:** Psychology

**FACULTY ADVISOR:** Shaheen Munir

**POSTER TITLE:** The Role of Gender in Civic Engagement Among Students Attending Private Colleges

**DISPLAY AREA:** 2E

**FUNDING:** Social Science Department

**ABSTRACT:** Civic engagement is a key indicator of the health of democracy and has largely been deemed a responsibility of higher education. Despite civic engagement's importance, only volunteering has increased within the last 30 years amongst several forms of civic engagement in young adults with at least one year of college experience. The lack of civic engagement could help to illuminate low voting rates, overall disinterest in politics, growing social class divide, and the nonvoting population's dissatisfaction with government. There are gender dissimilarities in the levels of civic engagement which are echoed among the college-aged population. This study examined gender differences within civic engagement among college students attending a small, Liberal Arts College. A 33-item self-report questionnaire was used to measure civic, electoral, and political voice indicators. Results showed that no gender difference exists across civic, electoral, or political voice indicators. Two significant predictors were found for overall civic engagement: graduation year and news access. As participants progressed in their college education they were more likely to engage in civic engagement. While increased education also indicated increasing news access, participants were not more likely to engage in electoral or political voice indicators with more years of education. These results highlight equality within gender among college students and elements which encourage civic engagement. Understanding civic engagement among the college population could have a large impact on policy discussions, education, and the literacy of our nation.

## Kansas

**STUDENT:** Bradley D. Celestin

**INSTITUTION:** Bethel College

**DIVISION:** Psychology

**FACULTY ADVISOR:** Dwight Krehbiel

**POSTER TITLE:** Neural Correlates of Implicit Sexual Identity Bias as a Function of Religiosity

**DISPLAY AREA:** 2F

**ABSTRACT:** How are sexual identity biases processed in mind and brain? Does religious belief affect this processing? In this experiment we explored the priming effects of religiosity on Implicit Association Test (IAT) performance and attempted to identify specific neural correlates of implicit bias via event-related potentials (ERPs). Forty-five participants completed a version of the IAT in which images of heterosexual and homosexual couples were paired with positive and negative adjectives. Prior to each set of trials, participants were primed with four verses of either benevolently themed scripture or persecutory scripture. All participants were exposed to all conditions in counterbalanced orders. Additionally, electroencephalographic (EEG) measurements were recorded during the experiment. Three post-experiment questionnaires were used to obtain personality measures of religious fundamentalism, quest, and explicit attitude towards homosexuality. The results revealed a statistically significant positive correlation ( $r = 0.41$ ) between fundamentalism and enhanced implicit bias, as well as a significant negative correlation ( $r = -0.42$ ) between enhanced bias and quest. As expected, there were significant differences between compatible and incompatible conditions for both benevolent ( $t = -6.27(44)$ ,  $p = .001$ ) and persecutory ( $t = -8.06(44)$ ,  $p = .001$ ) verses. ERPs are currently being extracted from the EEG data to determine whether both N400 and Late Positivity potentials were present during incompatible conditions, as shown in a recent experiment. Such results would lend support to semantic rather than familiarity explanations of IAT results. The possibility that the semantic explanation is partly religious is being investigated through correlations between ERPs and measures of fundamentalism.

## Kentucky

**STUDENT:** Joshua G. Bradley

**INSTITUTION:** Morehead State University

**DIVISION:** Mathematics/Computer Science

**FACULTY ADVISOR:** Sherif S. Rashad

**POSTER TITLE:** Discovering Significant Mobile Patterns From Cell Towers

**DISPLAY AREA:** 2G

**FUNDING:** Morehead State University

**ABSTRACT:** With the advent of the fourth-generation network and increased mobile traffic, it is imperative that novel network models be used which exploit the topological factors that often occur within our communication networks. We introduce the idea of ranking cell towers via combinatorial Hodge theory for the prediction of high-volume traffic paths and patterns we believe are inherent in cellular traffic data throughout different time periods of the day. Modeling mobile user's movements in a network as edge flows in a graph, we are able to unravel ranking information from each edge to determine whether or not a global ranking of the traversed path is significant for a particular time period with respect to the overall network behavior. Knowledge of the ranking of cell towers in a network is directly applicable to load balancing issues and location-based services.

**STUDENT:** Aaron Christopher Bell

**INSTITUTION:** Western Kentucky University

**DIVISION:** Physics/Astronomy

**FACULTY ADVISOR:** Steven J. Gibson

**POSTER TITLE:** Dust Infrared Emission in an H<sub>2</sub>-Forming, Perseus-Arm Cloud

**DISPLAY AREA:** 2H

**FUNDING:** NASA / Kentucky Space Grant program

**ABSTRACT:** The birth of a star is a heavily studied and complex process. Much has been done in the past few decades to outline the steps involved, but there are still crucial gaps in our understanding. An essential step in the formation of new stars is the condensation of ambient neutral atomic hydrogen (HI) into the molecular phase (H<sub>2</sub>). It is well known that molecular clouds collapse to form the precursors to stars, but less understood is how molecular clouds themselves begin to form. The process is difficult to study because the transition from HI to H<sub>2</sub> is not very energetic and is thus difficult to detect. This limits direct observations. We study this process indirectly, by examining the interstellar dust within these H<sub>2</sub>-forming clouds. Although dust absorbs and scatters visible light, it emits infrared heat radiation that we can observe. We use data from NASA's IRAS and Spitzer Space Telescopes to investigate a target cloud in the Perseus spiral arm in the which the HI-to-H<sub>2</sub> transition appears to be underway. We have sampled the dust spectral energy distribution at many positions on and off this cloud in all IRAS and Spitzer wavelengths. We interpret these data by comparing them to data generated by the DustEM computer model, which simulates dust emission according to certain assumptions. We use this information to constrain the composition and evolutionary status of the dust grains in this H<sub>2</sub>-forming cloud and others like it.

## Louisiana

**STUDENT:** Satvika Uppu

**INSTITUTION:** Southern University

**DIVISION:** Chemistry

**FACULTY ADVISOR:** Michelle O. Fletcher Claville

**POSTER TITLE:** A New Use for an Old Method: Nitrite Determination by the Ferrous Oxidation-Xylenol Orange (FOX) Assay

**DISPLAY AREA:** 2I

**FUNDING:** National Science Foundation

**ABSTRACT:** Hydroperoxides such as hydrogen peroxide are important mediators of toxicity. In biological systems, they can be formed as a result of oxidation of lipids, proteins, and nucleic acids; the three most important classes of biomolecules. A number of methods have been reported for the determination of hydroperoxides, including the Fe(II) oxidation-xylenol orange (XO) binding method, popularly referred to as the FOX assay which is known for its robustness, sensitivity, and adaptability for high throughput screening. During the course of customizing this assay, we noticed that nitrite present in certain samples interferes with the determination of hydroperoxides by the FOX assay. The nitrite interference could be abolished by treatment with excess ammonium sulfamate (AS) at the time of Fe(II)-hydroperoxide reaction. While the AS treatment did not affect the yields of the final colored complex, Fe(III)-XO, it was realized that the assay with some modifications could be used to determine nitrite. Similar to hydroperoxides, the formation of Fe(III)-XO complex was linear over a range of nitrite concentrations. Addition of AS abolished the increase in color development at all concentrations of nitrite, indicating the specificity of the newly developed FOX assay for nitrite which uses AS-treated controls. These findings are important and timely in view of an ever increasing interest in the role of nitrite in various pathophysiological states. We are currently developing a strip test so that it can be used for diagnosis of urinary tract infections and pediatric acute kidney injury where a simultaneous determination of nitrite and hydroperoxides is needed.

## Maryland

**STUDENT:** Devon Maurice Taylor

**INSTITUTION:** Johns Hopkins University School of Medicine

**DIVISION:** Health Sciences

**FACULTY ADVISOR:** Jacqueline E. Sharpe | Kathleen C. Barnes

**POSTER TITLE:** Polymorphisms in the Interleukin 33 (IL33) and Interleukin 1 Receptor-like 1 (IL1RL1) Genes are Associated with Elevated Serum IgE Levels in Patients with Atopic Dermatitis

**DISPLAY AREA:** 2J

**FUNDING:** JHU Division of Pulmonary and Critical Care Medicine

**ABSTRACT:** Atopic dermatitis (AD) is a common, chronic allergic inflammatory skin disorder for which a genetic basis has long been recognized. It often progresses to asthma and allergic rhinitis later in life, and patients with AD often have elevated serum IgE levels. Populations with AD exposed to the herpes simplex virus (HSV) 1 or 2 are at risk for developing the severe complication eczema herpeticum (ADEH). The gene encoding Interleukin 33 (IL33) and Interleukin 1 receptor-like 1 (IL1RL1, formerly ST2), which have a ligand-receptor relationship, constitute two of the strongest candidate genes for asthma identified through the Genome Wide Association Study (GWAS) to date. We hypothesize that genetic polymorphisms in both genes may represent risk factors for AD and ADEH. We selected tagging single nucleotide polymorphisms (SNPs) in IL33 (N=7) and IL1RL1 (N=6) with prior evidence for association with asthma. Genotyping was performed in two independent populations recruited through the NIAID-supported Atopic Dermatitis Research Network. Association tests were used to analyze the association between genetic variants and risk of AD and ADEH. They were also used to analyze associations between genetic variants and total immunoglobulin-E levels in serum, and the eczema area severity index (EASI). In the AA patients with AD, an IL33 promoter SNP was significantly associated with tIgE levels (P=0.004; Beta=0.32). In the EA population, an IL1RL1 exon-intron boundary SNP was significantly associated with tIgE levels (P=0.004; Beta=-0.34). These results present evidence of genetic associations between polymorphisms in IL33 and IL1RL1 and tIgE levels in populations with allergic diseases.

## **Maryland continued**

**STUDENT:** Nyshia Garcia

**INSTITUTION:** Towson University

**DIVISION:** Biology

**FACULTY ADVISOR:** Larry E. Wimmers | Roland P. Roberts

**POSTER TITLE:** Genetic Diversity of Seaside Goldenrod Along the Shores of the Chesapeake Bay and Maryland Coast: Implications for Conservation

**DISPLAY AREA:** 3A

**FUNDING:** National Science Foundation

**ABSTRACT:** Seaside goldenrod (*Solidago sempervirens*), is a perennial plant that grows in sandy soils and salt marshes where it is exposed to either salt spray or salt water. This new world species has a patchy distribution along the Atlantic coast, the Gulf of Mexico and the Caribbean. Its distribution in the Mid Atlantic region includes the shores of the Chesapeake Bay and the Atlantic coast of the Delmarva Peninsula. The lack of appropriate habitat on the Peninsula prevents the establishment of inland populations. The exchange of genetic material among these populations can result from pollination and seed dispersal. Insect pollinators and seeds are unlikely to travel long distances. Thus without geographically intervening populations it is likely the Bay and the Peninsula may limit gene flow between populations. Genetic differentiation among populations on different shorelines should occur if gene flow is limited. To test our hypothesis, we have sampled populations along the coasts of the Bay and the Peninsula and have conducted genetic analysis using microsatellites to measure genetic structure and estimate gene flow. Preliminary results show genetic differentiation between populations separated by the Peninsula but no such differences between populations separated by the Bay, indicating the Peninsula acts as a barrier to gene flow. Barriers to genetic exchange present challenges in conservation. In order to conserve a species the full genetic diversity in that species should be protected. The limited gene flow among populations, resulting in genetic differentiation may introduce the need to conserve multiple geographically separated populations.

## **Massachusetts**

**STUDENT:** Diana Mary DeMont

**INSTITUTION:** Bridgewater State University

**DIVISION:** Social Sciences

**FACULTY ADVISOR:** Lucinda King-Frode

**POSTER TITLE:** Overcoming Educational Disadvantage: Shelter Initiatives for Homeless Children

**DISPLAY AREA:** 3B

**FUNDING:** Adrian Tinsley Program

**ABSTRACT:** This project addresses the challenges confronting children living in homeless shelters in Massachusetts, with particular attention to the children's education and the services provided by family shelters to support academic achievement. With 1.35 million homeless children in the United States each year (National Coalition for the Homeless), it is imperative that shelters are well-equipped to complement the schools' efforts to meet their needs. Children who are disadvantaged in the school system because of their housing situations have particular educational needs. This qualitative study involved interviews with eleven shelter employees across Massachusetts. Questions inquired about these children's daily struggles, their educational challenges, and the programs provided by the shelters to support the children's learning. Analysis of the data indicated that the areas of greatest concern are accessing transportation, securing before and after school care, and the quality of parental involvement with the child. Many of the participants cited these issues as significant problems and attest that the shelter programs focused on these concerns are presently inadequate for various reasons, including a lack of funding and staffing. The results of my research could be utilized in policy-making concerning the amount of funding that shelters are given to afford services and staff and through awareness-raising regarding the importance of the valuable services of volunteers.

## Michigan

**STUDENT:** Ian Pendleton

**INSTITUTION:** Eastern Michigan University

**DIVISION:** Chemistry

**FACULTY ADVISOR:** Harriet Lindsay

**POSTER TITLE:** Toward a "Greener" Chemical Reaction for Producing Chemical Building Blocks for Pharmaceuticals and Catalysts

**DISPLAY AREA:** 3C

**FUNDING:** American Chemical Society Petroleum Research Fund

**ABSTRACT:** The growing need for pharmaceutical drugs, catalysts, and other important chemicals and the increasing realization of the need for environmentally friendly ways of producing them have led to the development of "Green Chemistry." This way of performing chemistry encourages chemists to construct new molecules with the focus on producing them efficiently and with as little waste as possible. To this end, our research group has focused on the development of a certain chemical reaction, the aza-Cope rearrangement—Mannich cyclization, as a "greener" method for producing an important chemical building block. Before our intervention, this reaction was known as a highly efficient process that produced very little waste when compared to many other chemical reactions. However, we have made several significant improvements including substantially reducing the amount of chemical initiator required for the reaction, reducing the amount of an extremely difficult-to-remove byproduct that was formed in the reaction of our particular set of molecules, and working toward using easier-to-produce starting materials for the reaction. Details regarding each of these efforts will be described.

## Minnesota

**STUDENT:** Luke Daniel Lundeen

**INSTITUTION:** Bethel University

**DIVISION:** Biology

**FACULTY ADVISOR:** Joyce Doan

**POSTER TITLE:** The Effects of Cholesterol Depletion on Normal and Malignant Macrophages

**DISPLAY AREA:** 3D

**ABSTRACT:** Over 20 million Americans currently take cholesterol-lowering statins, and this number is expected to increase steadily in coming years. While excess cholesterol can be harmful, many studies show that cholesterol depletion alters the way that cells communicate with their environment by disrupting structures called lipid rafts. Therefore, it is important to understand the normal role of cholesterol in cellular communication by studying lipid rafts. Lipid rafts have previously been shown to contribute to the regulation of communication in many types of white blood cells, including macrophages. The aim of the present study was to determine whether lipid rafts control macrophage activation by a critical communication molecule of anti-cancer and anti-parasite immune responses called interferon-gamma (IFN). To accomplish this, both normal and cancerous macrophages were grown under normal conditions, or treated with the raft-disrupting chemical methyl-beta-cyclodextrin. Then, they were left untreated or stimulated with IFN; in some experiments, macrophage activation was further boosted by stimulation with lipopolysaccharide, which comes from bacterial cell walls. Macrophage activation was measured by looking at nitric oxide production, a key marker of inflammation that contributes to normal immune responses and to chronic inflammation such as that found in cardiovascular disease. It was determined that depleting cellular cholesterol decreased the level of inflammation markers in normal macrophages, but increased those same markers in cancerous macrophages. These data suggest that cholesterol reduction and responses to inflammatory signals are linked, and warrant further study due to the enhanced inflammation noted in malignant cells.

## Minnesota continued

**STUDENT:** Stephanie G. Burrows

**INSTITUTION:** University of Minnesota- Institute of Child Development

**DIVISION:** Psychology

**FACULTY ADVISOR:** Arturo Sesma

**POSTER TITLE:** Parental Emotional Representations of their Children and Child Behavior Problems Among Families Experiencing Homelessness

**DISPLAY AREA:** 3E

**ABSTRACT:** Research with families experiencing homelessness seeks to identify protective factors (e.g., IQ, parenting quality) that may buffer the effect of residential instability. Expressed emotion, the emotional valence with which parents talk about their children, is an unexplored factor that may mediate the relation between experiencing homelessness and developmental outcomes. Research with school-aged children suggests that emotional representations are affected by level of adversity, and that more negative and less positive representations are related to poor outcomes in children. The purpose of this study was to examine the relations of parental emotional representations of their children with teacher-rated behavior and peer problems in families experiencing homelessness. Trained researchers interviewed 136 parents (131 mothers; M age= 32.2) at three homeless shelters in a large Midwestern city. Parents' critical and positive statements as well as their general affect were coded during the Five Minute Speech Sample in which they were asked to speak about their child. Teachers completed a rating scale to assess behavior problems and peer difficulties. Hierarchical linear regression analyses indicated that highly critical comments positively predicted higher values of teacher-reported bullying by others in girls but not in boys. Additionally, positive comments served as a protective factor against internalizing behavior, and negatively predicted withdrawn, depressive-type behaviors in girls only. Implications for intervention efforts with families in homeless shelters, as well as how parental emotional representations may differentially affect girls and boys experiencing significant adversity, are discussed.

## Mississippi

**STUDENT:** Matthew S. Planchard | Michael A. Samel

**INSTITUTION:** The University of Southern Mississippi

**DIVISION:** Chemistry

**FACULTY ADVISOR:** Vijay Rangachari

**POSTER TITLE:** The Natural Product Betulinic Acid Promotes Amyloid-Beta Fibrilization at the Expense of Oligomers

**DISPLAY AREA:** 3F

**ABSTRACT:** Alzheimer's Disease (AD) is a progressive neurodegenerative disorder characterized by cognitive decline and memory loss in the elderly. The primary toxic species in AD is a protein called amyloid-beta ( $A\beta$ ) which comes together to form large clumps of protein in a process called aggregation. These clumps deposit in the brains of patients with AD and are known as senile plaques. In this paper, we investigate the interaction of a natural product called betulinic acid (BA) with  $A\beta$ . We were inspired by the use of BA-based herbal remedies to treat CNS disorders in ancient systems of medicine, including Ayurveda. Betulinic acid is also currently used in the treatment of brain cancer. We wanted to learn whether BA has any effect on  $A\beta$  aggregation. If it were to prevent aggregate formation, it could be useful as a therapeutic agent. Using a number of biochemical experiments, we determined that BA actually promotes rapid  $A\beta$  aggregation. This seems at first to negate the therapeutic potential of BA, but recent research shows that the most toxic forms of  $A\beta$  are smaller aggregates called oligomers, while larger forms are significantly less toxic. We found that BA causes  $A\beta$  to form larger aggregates at the cost of smaller aggregate such as oligomers, suggesting that it may be useful in preventing neuronal damage from AD. Based on our experiments, BA may have the potential to be used in medications or supplements to prevent the onset of AD symptoms.

## Missouri

**STUDENT:** Casey Burton

**INSTITUTION:** Missouri University of Science and Technology

**DIVISION:** Chemistry

**FACULTY ADVISOR:** Yinfa Ma

**POSTER TITLE:** A Novel Enzymatic Technique for Determination of Sarcosine in Urine Samples for Potential Early Cancer Screening

**DISPLAY AREA:** 3G

**FUNDING:** Opportunities for Undergraduate Research and Environmental Research Center

**ABSTRACT:** Metabolites impart a significant importance to the understanding of biological reactions, and consequently, to the development of diagnostic and therapeutic techniques for specific diseases. Furthermore, there has been recent interest in metabolic levels present in urine for potential noninvasive disease diagnosis. The detection of specific metabolites, however, presents certain analytical difficulties such as low or ambiguous specificity of the techniques. This study investigated a new technique, utilizing oxidative, enzymatic production of formaldehyde from the metabolite to produce a pH-induced change observed by fluorescein in acetone. This probe displays high sensitivity towards pH imbalances, and coupled with high enzymatic specificity, forms an accurate method to measure metabolite levels. Sarcosine was used as a paradigm in this study due to its potential for serving as a prostate cancer biomarker, by treatment of sarcosine oxidase to generate formaldehyde, which was further oxidized to formic acid, and subsequently measured by fluorescein. A high linearity was revealed with a correlation coefficient of 0.9961 and a detection limit of 20 nmol • nmol L<sup>-1</sup>. This method was applied to urine samples and plotted against a calibration curve from known sarcosine concentrations. The results suggest that this is a viable, cost-effective technique for determination of sarcosine in urine samples without such interferences as alanine.

## Montana

**STUDENT:** Sarah Hamblock

**INSTITUTION:** The University of Montana

**DIVISION:** Chemistry

**FACULTY ADVISOR:** Andrea Stierle

**POSTER TITLE:** Extremophilic Microbes from Acidic Mine Waste Lake Produce Novel Anticancer Compounds

**DISPLAY AREA:** 3H

**FUNDING:** University of Montana

**ABSTRACT:** Berkeley Pit Lake in Butte, Montana is part of the world's largest superfund site. The previously operating open pit copper mine is filled with acidic water, approximately pH 2.5, and high levels of heavy metals. In 1995, the Stierle Lab discovered life in the form of fungi and bacteria in the Pit and has since found over sixty other extremophiles in the lake water and basal sediment. Signal transduction assays have guided the isolation of novel bioactive secondary metabolites from broth cultures of Pit microbes, specifically the actinomycete PS 45A-1. Signal transduction enzymes mediate cellular communication in the metastasis of cancer cells; therefore, inhibition of these enzymes is desired. If metabolites from the microbe demonstrate significant inhibition of the signal transduction pathways matrix metalloproteinase-3 (MMP-3), caspase-1, or caspase-2, they are tested on the National Cancer Institute's human cancer cell line screen and on the inflammasome pathway. Based on the data from similar organisms, the following results are expected for compounds from PS 45A-1: inhibition of cleavage of MMP-3 leading to reduced cancer cell activity, inhibition of caspase-1 and caspase-3 activity leading to apoptosis in leukemia cell lines and mitigation of production of pro-inflammatory cytokines in the inflammasome. Once anticancer activity of a compound is confirmed, the structure of the novel, bioactive metabolites is determined. 1D and 2D proton NMR and mass spectrometry are used to determine the exact structure of the compound. Discovering novel anticancer compounds from biological sources is important to the continuing search for safe and effective cancer treatments.

## Nebraska

**STUDENT:** Merijke Elise Coenraad

**INSTITUTION:** Creighton University

**DIVISION:** Psychology

**FACULTY ADVISOR:** Isabelle D. Cherney

**POSTER TITLE:** Play It Forward: Early Learning and Gender

**DISPLAY AREA:** 3I

**FUNDING:** Graduate School of Creighton University

**ABSTRACT:** We live in a gendered world. However, little research has examined how gender affects childhood development. Children are active learners who acquire knowledge by examining and exploring their environment. Because this environment is gendered, it behooves us to investigate how children think about gender and how it affects their behavior. The current study examined the play patterns of children aged three to five and their categorizations of forty gender-stereotyped, neutral, or ambiguous toys. Specifically, we examined the role of familiarity on children's toy selections and behavior, the reasoning and categorization of toys by gender, and parent predictions. Preliminary results showed that, a) children tended to play longer with familiar toys and their parents were able to predict the toys with which their children liked to play, b) boys tended to justify their gender categorizations using gender roles whereas girls were more likely to use egocentric thinking, c) boys and girls played longer with same-sex stereotyped toys and ambiguous toys, d) boys avoided feminine toys, and e) boys and girls categorized toys similarly as adults. As seen in previous studies, stereotypes are less flexible for boys than for girls, even in a gender "balanced" play lab. These rigid masculine gender-stereotypes have detrimental social consequences that affect the cognitive and social development of both genders. With structured activities taking the place of free play in early childhood, children participate in gender stereotyped activities rather than choosing their own play. We will discuss the implications of these findings to current early childhood policies.

**STUDENT:** Charles E. Sepers

**INSTITUTION:** University of Nebraska at Kearney

**DIVISION:** Health Sciences

**FACULTY ADVISOR:** Roderick T. Bartee

**POSTER TITLE:** Efficacy of Two Theory-Based 12-Week, Internet-Mediated Walking Programs

**DISPLAY AREA:** 3J

**ABSTRACT:** Increased physical activity (PA) has been related to reduced risk of many chronic diseases. Several governmental agencies have focused attention on increasing PA to recommended levels. Previous research has identified several best-practice strategies to increase PA behavior through intervention programs including theory-driven frameworks, computer-tailored messages, internet-based components, and community-focused designs. The purpose of this study was to measure the effects of two, 12-week, internet-mediated walking programs of differing degrees of theoretical fidelity, on behavioral mediating variables, program engagement, and weekly PA. We hypothesized these variables would improve significantly among participants in a high fidelity (HF) group when compared to those in a low fidelity (LF) group. Participants included 52 Caucasian women ( $M = 46.21$  years) from a rural, Midwestern community, recruited through worksite wellness coordinators, and randomized by affiliation. Those in the HF group used steps to report walking pace and set goals, while those in the LF group estimated walking pace. Identical procedures included weekly walking log forms, computer-tailored feedback, theory-based newsletters, and an interactive website. After 12 weeks, participants in the HF group ( $M = 106.40$  min) significantly increased weekly PA from baseline compared to the LF group ( $M = 65.14$  min),  $F(1,50) = 7.383$ ,  $p = .009$ , however, only one mediating variable had significantly improved in the HF group—Walking Self-Efficacy,  $p < .001$ . Engagement and the majority of the mediating variables were not significantly different between groups,  $p > .05$ . These results indicate that pedometer use has the potential to increase Walking Self-Efficacy in walking behavior-change programs.

## **Nevada**

**STUDENT:** Camila Alvarez

**INSTITUTION:** University of Nevada, Las Vegas

**DIVISION:** Social Sciences

**FACULTY ADVISOR:** Robert Futrell

**POSTER TITLE:** New Urbanist Design and Community Health in Las Vegas

**DISPLAY AREA: 4A**

**ABSTRACT:** New Urbanists offer both a framework for understanding community development and an architectural planning program for creating sustainable urban environments. They argue neighborhoods should be compact, pedestrian-friendly, with mixed housing and activities, and have available public spaces. These design elements foster and encourage social interaction among residents, which creates and reinforces neighborhood community and quality of life. I tested New Urbanism by performing ethnographic fieldwork to assess the quality of neighborhoods in Las Vegas. Then I compared neighborhood qualities to residents' responses to their neighborhood, their neighbors, and their quality of life from the Las Vegas Metropolitan Area Social Survey. Overall, I find that neighborhoods with New Urbanist design features exhibit greater community bonds. However, there is also variance in the expected relationship between New Urbanist design and residents' neighborhood experiences. I also, discuss my ethnographic observations of neighborhoods to provide a more comprehensive description of the relationship between design and residents' experiences.

## **New Hampshire**

**STUDENT:** Katie Laro

**INSTITUTION:** Plymouth State University

**DIVISION:** Geosciences

**FACULTY ADVISOR:** James P. Koermer

**POSTER TITLE:** Updating the KSC/CCAFS Warm-Season Convective Wind Climatology

**DISPLAY AREA: 4B**

**FUNDING:** NASA

**ABSTRACT:** My project has been to update the Kennedy Space Center/Cape Canaveral Air Force Station Warm-Season Convective Wind Climatology by adding information for years, 2008 through 2011, from the previous coverage of 1995 through 2007. This work involves identifying convective periods, where thunderstorms and/or other convective showers were present in the area, by reviewing radar and surface-based observations. Next, the 5-minute peak wind observations for these periods from 36 KSC/CCAFS weather towers were collected, quality controlled and analyzed for various characteristics, such wind speeds, heights at which peak winds were recorded, time of peak wind speeds, and direction from which the winds were coming. Numerous radar files were also acquired and analyzed to update the radar characteristics. Some results were further confirmation that the higher convective winds most often come from linear shaped storms and interactions with linear boundaries. Another facet, included in the study, was investigating the overall low level flow regimes on a given day for both convective and non convective days. Flow regimes are classified by the position of the subtropical ridge axis relative to Florida. The results show that there was a solid correlation between flow regimes and convective events. By adding more years of data to the overall study, results more robust and useful. The climatology is used in training of weather forecasters at CCAFS and enhances their ability to forecast convective winds, which can affect KSC/CCAFS range operations.

## **New Jersey**

**STUDENT:** Ramanpreet Kaur

**INSTITUTION:** Kean University

**DIVISION:** Biology

**FACULTY ADVISOR:** Sonia Arora

**POSTER TITLE:** Repurposing Old Drugs for New Uses: Targeting Multidrug Resistance in Cancer

**DISPLAY AREA:** 4C

**ABSTRACT:** This study describes the identification of new uses for FDA approved drugs. The target under investigation is P-glycoprotein (P-gp): a protein pump that transports drugs out of a cell, causing multidrug resistance (MDR) in cancer cells. The primary objective of the study is to identify a new modulator of P-gp that binds and inhibits its activity, thereby reversing MDR and causing successful drug accumulation to kill cancer cells. The approaches used involve integrated techniques in computational chemistry, structural bioinformatics and cell biology. Using computational chemistry tools, a virtual database of 1600 FDA approved compounds was constructed. The database was then screened for binding to P-gp using structural bioinformatics techniques. The docked orientation of each compound was then analyzed to predict the binding affinity and interactions with the P-gp binding pocket. Finally, cell culture and *in vitro* techniques are applied to verify our *in silico* results. The major scope of the project lies in its likely impact on the society by providing a newer treatment option for drug-resistant cancers. Development of multi-drug resistance (MDR) to chemotherapeutic agents is a major problem for successful cancer treatment. MDR is typified by the broad cross-resistance to structurally dissimilar cytotoxic agents – in other words, the development of resistance by a cell to one drug produces similar resistance to other drugs. This project thus addresses the urgent need to discover new therapeutic agents that reverse multi-drug resistance in tumors, thereby increasing therapeutic potential of anti-cancer drugs.

## **New York**

**STUDENT:** Elisabeth Anne Gallant

**INSTITUTION:** Buffalo State College

**DIVISION:** Geosciences

**FACULTY ADVISOR:** Bettina Martinez-Hackert

**POSTER TITLE:** Understanding the Eruptive History of Ilamatepec

**DISPLAY AREA:** 4D

**ABSTRACT:** Mt. Saint Helens' style eruptions (dangerously explosive) are typical for volcanoes abundant in the countries of Central America. In our study we began to unravel the unknown geological history of violent eruptions of El Salvador's largest volcano, Ilamatepec (Santa Ana), that last erupted in 2005. Its immediate surroundings include the country's major economic artery of sugarcane and coffee production, as well as the second and third largest cities of the country; a 25km radius around the volcano is home to nearly half a million people. Historical records and a few scientific inquiries indicate at least 9 moderate to large eruptions since the early 1500's. We initiated an expedition in March 2011 to collect volcanic deposits found layered in the crater scar of Ilamatepec. Expedition participants included the volcanologists of the geological survey of El Salvador, an undergraduate student team from Buffalo State College, a graduate student from SUNY Buffalo, and the National Tourist Police of El Salvador. Data collected were analyzed using optical microscopy methods, grain size distribution techniques, and scanning electron microscopy. Analysis of a 15-layer sequence indicates a very explosive history characterized by smaller steam eruptions, moderate steam and magma eruptions, and large magmatic eruption. The information learned through this process will allow us to address the hazards that account for potential damage to infrastructure and loss of life to the Salvadoran population by applying our understanding of previous events to future eruptions. This work was conducted in conjunction with the Panamerican Institute of Geography and History.

## **New York continued**

**STUDENT:** Jeff Lockhart

**INSTITUTION:** Fordham University

**DIVISION:** Mathematics/Computer Science

**FACULTY ADVISOR:** Gary M. Weiss

**POSTER TITLE:** Smart Phone-Based Sensor Mining for Biometric Identification and Activity Recognition

**DISPLAY AREA:** 4E

**FUNDING:** National Science Foundation

**ABSTRACT:** Cell phones have become ubiquitous and are now packed with many sensors, including accelerometers capable of measuring users' movements. This provides a great opportunity to learn about and improve people's daily lives and health. Our work shows that data mining can be applied to these data to build predictive models that identify users ("hard" biometrics), traits of users such as height and sex ("soft" biometrics), and the physical activities users are performing. We have also worked to automate the process so that data mining and its application can occur in real time. The WISDM (Wireless Sensor Data Mining) platform that we have built will make it easy to investigate relevant research questions. Our current work allows us to identify users and their activities in real time, and makes the results available via a web interface. Our results show we can identify users from only a few minutes of motion data with 100% accuracy, can identify physical activities with 80% to 98% accuracy, and can identify traits such as sex, height, and weight with 71% to 86% accuracy. This research can benefit society. In particular, our activity recognition models can be used to determine the amount of activity a user gets each day and this information can then be used to determine if the user is sufficiently active to maintain proper health. With increases in childhood obesity and an aging population, systems like ours are going to be critical to help individuals monitor their health and make healthy choices.

**STUDENT:** Boris Brimkov | James Kotary | Jing Zheng | Xinwei Liu

**INSTITUTION:** State University of New York University at Buffalo

**DIVISION:** Mathematics/Computer Science

**FACULTY ADVISOR:** Jae-Hun Jung

**POSTER TITLE:** A Novel Hybrid Method and Library Interpolation for Rapid CFD of Vascular Flows

**DISPLAY AREA:** 4F

**FUNDING:** Urge to Compute

**ABSTRACT:** Vascular disease is the primary cause of death in the US; each year about 1 million people die of heart disease, and 17 million are at risk for heart attacks. Current biomedical assessment techniques yield only the averaged blood flow fields with low accuracy and much uncertainty. Alternatively, the 3D computational fluid dynamics (CFD) can highly improve the functional assessment by providing the detailed 3D flow fields. However, CFD typically takes too long to be done in a clinical time frame because of the high computational complexity. The goal of our research is to develop an extremely fast CFD method that can be used even in a clinical time frame by clinicians. The main idea is that we create a vascular library of a large number of pre-computed 3D CFD solutions with a variety of parameters and use an interpolating algorithm to obtain the unknown flow fields without any CFD runs. That is, the unknown solution is given by a linear combination of existing solutions with similar parameters in the library. We also introduce an innovative hybrid method for creating the library between the high-order spectral method – which yields exponential accuracy for smooth blood flows – and the radial basis function method, which does not require a strict grid and is used to model the irregular parts of a blood vessel very efficiently. Our preliminary results are promising. Once achieved, the proposed methods will provide a new hemodynamic assessment method to clinicians, and help save more human lives.

## North Carolina

**STUDENT:** Lauren Wood Stranahan

**INSTITUTION:** Elon University

**DIVISION:** Biology

**FACULTY ADVISOR:** Linda Niedziela

**POSTER TITLE:** Antidepressant Impairs Zebrafish Motor Development and Behavior: Ramifications of Pharmaceutical Drugs in the Environment

**DISPLAY AREA:** 4G

**FUNDING:** Elon University

**ABSTRACT:** Antidepressants are a class of drug used for the treatment of human psychological conditions that work by altering brain chemistry. They are one of the most widely prescribed drugs and have been found contaminating surface water in the US and abroad. Fluoxetine (Prozac™) is one popular antidepressant that increases serotonin levels in the human brain and has been detected in rivers at concentrations in the ng/L range. Previous studies have found that high concentrations of fluoxetine permanently impaired the swimming activity of zebrafish exposed embryonically. In this research, zebrafish larvae were exposed acutely to concentrations similar to previous studies and chronically to several lower concentrations designed to better approximate environmental levels. Swimming activity was monitored by counting number of lines crossed in a testing arena and by using video tracking software (TopScan LITE) to measure total distance traveled. Our data confirmed previous acute studies by demonstrating that larvae (6-14 days post fertilization) crossed significantly fewer lines in the testing arena than did controls. This investigation also revealed that despite an overall suppression in activity levels, larvae are still capable of eliciting a brief but robust escape response to an artificial predator. At lower concentrations, suppression of swimming activity was seen at concentrations as low as 0.2 ug/L beginning after 5 weeks of life. The two methods for assessing activity levels were additionally compared, with the software being far more sensitive to larval movement but with consequently higher levels of variation.

## North Dakota

**STUDENT:** Bethany Davis

**INSTITUTION:** University of North Dakota

**DIVISION:** Biology

**FACULTY ADVISOR:** Van Doze

**POSTER TITLE:** Alpha-1A Adrenergic Receptor Stimulation Improves Mood in Mice

**DISPLAY AREA:** 4H

**FUNDING:** National Science Foundation

**ABSTRACT:** The role of  $\alpha(1)$ -adrenergic receptors ( $\alpha(1)$ ARs) in cognition and mood is controversial, likely due to past use of non-selective agents.  $\alpha(1A)$ AR activation was recently shown to increase neurogenesis, which is linked to cognition and mood. We studied the effects of chronic  $\alpha(1A)$ AR stimulation using transgenic mice engineered to express a constitutively active mutant (CAM). CAM- $\alpha(1A)$ AR mice showed enhancements in several behavioral models of learning and memory. In contrast, mice that have the  $\alpha(1A)$ AR gene knocked-out (KO) displayed poor cognitive function. Hippocampal brain slices from CAM- $\alpha(1A)$ AR mice showed displayed basal synaptic transmission, paired-pulse facilitation and long-term potentiation compared to wild type (WT) mice. WT mice treated with the  $\alpha(1A)$ AR-selective agonist, cirazoline, also showed enhanced cognitive functions. In addition, CAM- $\alpha(1A)$ AR mice exhibited antidepressant and less anxious phenotypes in several behavioral tests when compared to WT. Furthermore, the lifespan of CAM- $\alpha(1A)$ AR mice was 10 percent longer than that of WT mice. Our results suggest that chronic  $\alpha(1A)$ AR stimulation improves synaptic plasticity, cognitive function, mood, and longevity. This may afford a potential therapeutic target for counteracting the decline in cognitive function and mood associated with aging and neurological disorders.

## **Ohio**

**STUDENT:** Calvin Nathaniel Cooper

**INSTITUTION:** Capital University

**DIVISION:** Social Sciences

**FACULTY ADVISOR:** M. Ali Ulku

**POSTER TITLE:** The Impact of Payroll Tax Brackets and Rates on Sustaining a Strong Social Security System in the U.S.

**DISPLAY AREA:** 4I

**ABSTRACT:** The U.S. Social Security Administration was originally formed in 1935 to provide a safety net for elderly citizens in order to reduce poverty amongst the most vulnerable citizens of the U.S. Since then, social security has provided benefits to retirees and significantly reduced homelessness and poverty. However, aggravated by the looming federal budget deficit, lower revenues and a rapidly aging population as the Baby Boomer Generation continues to retire, projections predict that funds available for social security benefits will not be sufficient to sustain future generations. Regardless of social economic status, gender, age or ethnicity, all U.S. citizens will be affected. This is a very alarming problem that requires immediate attention. Reforming the U.S. social security system is not an option; it is an obligation. To that end, this research provides an analytical framework that offers opportunities to raise revenues and to cut unnecessary expenditures. First, a mathematical programming model with the objective of maximizing revenues generated from the social security payroll tax is developed and solved to optimality. The results suggest that, even by including another bracket in the current social security payroll tax structure, revenues can still be raised while allocating benefits fairly and without creating additional tax liabilities for middle- and low-income earners. The mechanics of the mathematical models are illustrated by numerical examples, and sensitivity analyses are conducted to provide more empirical insights for policy makers. Among other cost-saving opportunities, it is recommended that consolidating administrative and logistics operations be thoroughly investigated.

**STUDENT:** Lindsey J. Bowman

**INSTITUTION:** The College of Wooster

**DIVISION:** Geosciences

**FACULTY ADVISOR:** Meagen Pollock

**POSTER TITLE:** Fire and Ice: What Volcanic Relationships Observed in Sveifluhals Ridge Can Tell us About the Eyjafjallajökull Eruption

**DISPLAY AREA:** 4J

**FUNDING:** National Science Foundation, Division of Earth and Ocean Sciences

**ABSTRACT:** The subglacial eruption of the volcano Eyjafjallajökull in April and May of 2010 cost the global economy almost 5 billion dollars and impacted millions of travelers. Understanding geologic natural disasters such as volcanic eruptions is very difficult, and predicting the nature or timeline of the eruptions is even more tenuous. One way to understand the dynamics of volcanic eruptions similar to Eyjafjallajökull is to study an ancient proxy. The Sveifluhals ridge in Southwest Iceland is a subglacial pillow ridge that erupted in a similar manner to Eyjafjallajökull thousands of years ago. To piece together the sequence of magmatic events that occur during a subglacial eruption, an intensive mapping and geochemical study was undertaken at Undirhlithar quarry, which exposes the interior of Sveifluhals ridge. From field observations of the quarry walls, we know that subglacial eruptions consist of multiple extrusive events, which build up the basal pillow units and are marked by stratified layers of yellow, glassy hyaloclastite material. Extrusive pillow units are cut by intrusive dikes that are mineralogically and geochemically different from the pillows. Geochemical and field relationships of the units along the quarry walls suggest a complicated sequence of eruptive and intrusive events, including pauses between eruptions and lateral transport of magma. The relationships between intrusive and extrusive events in an ancient proxy, such as those exposed at Undirhlithar quarry, can be used to reconstruct the 3-D volcanic history of a subglacially-erupted pillow ridge and could eventually help us understand subglacial volcanic dynamics in a modern setting.

## Ohio continued

**STUDENT:** Timothy S. Horton

**INSTITUTION:** Xavier University

**DIVISION:** Physics/Astronomy

**FACULTY ADVISOR:** Heidrun Schmitzer | Steven Herbert

**POSTER TITLE:** Creating and Controlling an Array of Magnetic Nanowires Using Magnetotactic Bacteria

**DISPLAY AREA:** 5A

**FUNDING:** Research Corporation, Tucson, Arizona

**ABSTRACT:** Magnetic Nanowires are important for creating tiny transistors for microchips. We suggest an alternative, inexpensive way to create arrays of magnetic nanowires by using magnetic bacteria. Since their discovery by Richard Blakemore in 1975 magnetic bacteria have attracted attention due to their ability to grow single domain, cuboctahedral iron oxide ( $\text{Fe}_3\text{O}_4$ ) nanoparticles. As biologists unravel the mechanism of magnetosome formation and magnetoreception, physicists become interested in their usefulness in nano-device fabrication. The cuboctahedral, single crystalline structure of the magnetosomes can help to align multiwalled carbon nanotubes during growth. Removed from their host bacteria, they can be placed as single linear chains in peptide nanotubes, where they then act like magnetic nanowires. The magnetosomes inside the bacterium *Magnetospirillum magnetotacticum* are 30-70 nanometers in size and we arranged them into patterns of nanomagnets by trapping the host bacteria with multiple optical traps. In our experiments we generated a 3 X 3 matrix of optical traps (2.3mW each) and used a specially made current carrying coil around the sample to create a uniform magnetic field of about ~1mT. This magnetic field preorients and flips the bacteria and their dipoles into the desired pattern of magnetic nanowires. Once aligned, we used the optical traps to affix the bacteria to the substrate. This work was funded by Cottrell Research Corporation and supported by a grant from the U.S. Government.

## Oklahoma

**STUDENT:** Roscoe Tyler Grimes

**INSTITUTION:** Oklahoma State University

**DIVISION:** Biology

**FACULTY ADVISOR:** Joe Armstrong

**POSTER TITLE:** Glyphosate Resistant Marestalk

**DISPLAY AREA:** 5B

**ABSTRACT:** Glyphosate, a commonly used herbicide in Roundup Ready® crops such as corn, cotton, and soybean, is very effective at controlling a wide spectrum of weed species. However, in recent years, some populations of weeds have become difficult to control due to the development of resistance to glyphosate. Weeds that become resistant to herbicides must be identified so that they can be managed using alternative methods. Horseweed is one of the primary weeds that has developed resistance to glyphosate and has become a troublesome weed in many crops throughout the United States. At this time, glyphosate-resistant horseweed has not yet been documented in Oklahoma. To address this concern, horseweed seed samples were collected from randomly selected fields from north-central Oklahoma counties during Fall 2010. Seed samples were collected from horseweed in 15 naturally-occurring populations. A glyphosate-susceptible sample was also collected from a nearby field where glyphosate had not previously been applied. Samples were grown in a greenhouse and sprayed with glyphosate at rates representing a 1x, 2x, and 4x standard field use rate. At three weeks after treatment, 10 of the 15 horseweed populations were controlled at 50% or less compared to the susceptible population at the standard 1x use rate, confirming the presence of glyphosate-resistant horseweed in Oklahoma. In order to successfully control and prevent the further spread of glyphosate-resistant horseweed, farmers must use additional weed control methods to ensure satisfactory weed control and long-term, profitable crop production.

## Pennsylvania

**STUDENT:** James Michael Goodman

**INSTITUTION:** Drexel University

**DIVISION:** Health Sciences

**FACULTY ADVISOR:** Karen A. Moxon

**POSTER TITLE:** Epidural Electrical Stimulation and Response Mapping for the Restoration of Refined Limb Control after Spinal Cord Injury

**DISPLAY AREA:** 5C

**ABSTRACT:** Spinal Cord Injury (SCI) induces either partial or complete loss of motor function below the site of the lesion. Other studies working toward restorative function in SCI patients have focused on stimulating the spinal cord to activate the spinal central pattern generators to induce stereotypical hindlimb movements for locomotion. However, we were interested in evaluating the utility of epidural electrical stimulation (EES) below, and non-overlapping with, the typical site of stimulation to evoke locomotion. Acute EES experiments were performed on two groups of Long-Evans rat: those with intact spinal cords (N=19) and those with spinal cords chronically transected at the T8/T9 vertebral level (N=12). To map the spinal cord, for each animal, we biphasically stimulated the spinal structures underneath each lumbar vertebra (L1 through L6) and evaluated which stimulus locations gave rise to upward, "lifting" forces and which to downward, "pressing" forces in the ipsilateral hindlimb. Then, for each stimulus location, we evaluated the ability to independently modulate the force or duration of the response by controlling the amplitude or duration of the stimulus, respectively. We demonstrate that EES beneath vertebrae L2 and L3 evokes downward limb forces, whereas EES beneath vertebrae L4 and L5 evokes upward limb forces, regardless of transection status. Additionally, we demonstrate that the magnitude and duration of the generated force are proportional to the stimulus current amplitude and stimulus duration, respectively. Generating this response map is the first step toward restoring controlled motor output post-SCI, either therapeutically or as part of a closed-loop brain-machine interface.

**STUDENT:** Gabriel A. Castro

**INSTITUTION:** Juniata College

**DIVISION:** Social Sciences

**FACULTY ADVISOR:** Bradley Andrew

**POSTER TITLE:** Can you beat the Market? A Further Test of Faber's Tactical Asset Allocation Strategy

**DISPLAY AREA:** 5D

**ABSTRACT:** The recent financial crisis pointed out the weakness in using diversification as a primary means of reducing risk. People possessing well-diversified portfolios still found themselves losing 20-40% of their wealth. Mebane Faber proposed a simple strategy to address this issue in his 2007 article "A Quantitative Approach to Tactical Asset Allocation" in the *Journal of Wealth Management*. While published prior to the crisis and as such not meant as a response to it, the paper proved prescient. Faber found that the strategy improved an investor's risk-adjusted returns in five common asset classes and in an overall portfolio, providing "equity-like returns with bond-like volatility and drawdown." The bond-like drawdown proved the most attractive feature—a simple yet remarkably effective way of addressing risk. We expand upon Faber's findings by testing the strategy on a broader set of asset classes. Our findings are consistent with Faber's, though we are able to generate higher returns and Sharpe ratios. Given trading and taxes, this method is best applied to a tax-advantaged account. We argue that this strategy is particularly attractive for endowments.

## **Pennsylvania continued**

**STUDENT:** Katherine Joy Greco | Alexandra Elizabeth Raeber

**INSTITUTION:** Ursinus College

**DIVISION:** Chemistry

**FACULTY ADVISOR:** Silvia L. Porello

**POSTER TITLE:** Fluorescence Studies of Single-Walled Carbon Nanotube Uptake by *Saccharomyces cerevisiae*

**DISPLAY AREA:** 5E

**ABSTRACT:** Recent advances in drug development aimed at treating a variety of diseases have revolutionized the biomedical field. However, the delivery of drugs to their target cells remains a formidable challenge. This research explores the potential of carbon nanotubes as drug/DNA delivery agents using *S.cerevisiae* as a model organism. Our goal was two-fold: (i) discover whether single-walled carbon nanotubes (SWCNTs) are able to enter yeast cells, and (ii) investigate the mechanism of entry. For this purpose, SWCNTs were oxidized to increase their solubility and labeled with the fluorescent dye fluorescein isothiocyanate (FITC) to provide visual evidence of cellular uptake using confocal microscopy. Incubation of yeast cells with SWCNT/ FITC confirmed the uptake of SWCNTs by *S. cerevisiae*. Flow cytometry results supported this finding. To examine the potential cellular toxicity of SWCNT, growth rates of *S. cerevisiae* were determined in the presence of increasing volumes of SWCNT suspension. Normal growth curves and doubling times were observed, indicating no major toxic effect. In order to determine whether SWCNT enter cells through endocytosis, yeast cells were treated with Latrunculin-A, an endocytosis inhibitor. Fluorescence microscopy images show no changes upon addition of Latrunculin-A, indicating that SWCNT uptake does not occur by endocytosis. Our results suggest that functionalized nanotubes are promising potential transporters for other molecules into *S. cerevisiae* and other species of yeast. Future studies will be aimed at functionalizing SWCNTs for DNA and antifungal drug delivery to yeast cells and analyzing the effects on the cells.

## **Puerto Rico**

**STUDENT:** Natalie Rodriguez-Quintana

**INSTITUTION:** University of Puerto Rico-Rio Piedras Campus

**DIVISION:** Psychology

**FACULTY ADVISOR:** Guillermo Bernal

**POSTER TITLE:** Change Processes in Cognitive Behavioral Therapy for Puerto Rican Adolescents with Major Depressive Disorder

**DISPLAY AREA:** 5F

**ABSTRACT:** Depression in adolescents is a serious mental health problem in the Puerto Rican population (Canino, 2004). Treatments have been shown effective for this condition such as Cognitive-Behavioral Therapy (CBT), but change processes linked to therapeutic improvement have yet to be fully comprehended. In this research, a secondary analysis was made to evaluate these processes in a previous project about therapy effectiveness. In that study, 121 adolescents were randomized to one out of two conditions: CBT or CBT with psychoeducative workshops for parents. For this study, the post-treatment improvement extremes (the ones that improved the most vs. the ones with less or no improvement) were chosen to see which change processes, if any, were involved in the outcomes. The therapeutic alliance, therapist behaviors, therapeutic competence, among other variables were measured. The objective of this study was to identify the change processes that might have mediated the therapeutic outcome with the hope of understanding the mechanisms involved in psychotherapy, and improving this type of therapy in this specific context and culture.

## Rhode Island

**STUDENT:** Stephanie Joy Bouley

**INSTITUTION:** Brown University

**DIVISION:** Biology

**FACULTY ADVISOR:** Aisling Dugan

**POSTER TITLE:** Dissecting the Role of Autophagy in BK Viral Infection

**DISPLAY AREA:** 5G

**FUNDING:** American Society for Microbiology

**ABSTRACT:** BK virus (BKV) is a common pathogen infecting 85% of human adults and the causative agent of polyomavirus-associated nephropathy (PVAN). PVAN occurs in 5-10% of kidney transplant recipients and results in the loss of the new kidney. As BKV is an intracellular pathogen, its lifecycle is intimately connected with the host kidney cell that it infects. To better understand the host factors that contribute to BKV pathology, we examined the role of host cell autophagy in cells that are challenged with BK Virus (BKV). Vero and Hela cells were treated with autophagy inhibitor 3-Methyladenine (3-MA) and infected with BKV. 3-MA-treated cells showed a decrease in BKV infection. Conversely, cells treated with an activator of autophagy, rapamycin, showed an increase in BKV infection. To determine if BKV induces autophagy during the infectious process, host cells were transfected with an autophagy marker, microtubule-associated protein light chain 3 (LC3) fused to green fluorescent protein (GFP), and infected with a high MOI of BKV. BKV infection increased the number of LC3-GFP+ vesicles indicating that BKV induces the formation of autophagosomes. Finally, host cells were treated cells with siRNA directed against LC3 and Beclin-1, both proteins involved in autophagy. A decrease in Beclin-1 protein expression, but not LC3 expression, resulted in a decrease in BKV infection. These data suggest that autophagy occurs in response to BKV infection, and that autophagy helps the virus establish productive infection. Together, these data provide insight into how BKV infects cells and how to combat infection in patients.

## South Carolina

**STUDENT:** Olga Tweedy

**INSTITUTION:** Coastal Carolina University

**DIVISION:** Geosciences

**FACULTY ADVISOR:** Varavut Limpasuvan

**POSTER TITLE:** Wintertime Polar Ozone Evolution during Stratospheric Vortex Break-Down

**DISPLAY AREA:** 5H

**FUNDING:** National Science Foundation

**ABSTRACT:** As envisioned by the Montreal protocol, the banning of chlorofluorocarbons (CFCs) has contributed gradually to ozone recovery. Yet, this past winter, a record ozone loss was observed over the Arctic, resulting in an unprecedented ozone hole that is gaining much public attention. Such unusual occurrence prompts the need to understand other mechanisms that may play a role in ozone variation. In this study, the change in polar ozone is investigated when the stratospheric circumpolar flow ("polar vortex") suddenly breaks down. Using the National Center for Atmospheric Research Whole Atmosphere Community Climate Model, the air circulation and evolution of ozone-destroying species (nitrogen oxides, carbon monoxide, and atomic oxygen) are examined in conjunction with ozone during four realistic vortex break-down events. In comparison with a typical wintertime evolution, the simulated polar ozone during these events exhibits anomalous behaviors in key maxima regions. A "primary" ozone layer (near 40 km) experiences strong fluctuation due to horizontal mixing with low-latitude air. The "tertiary" ozone maximum at 72 km is lifted 5 km by intensified transport above the weakened vortex. The "secondary" layer's (90-110 km) concentration decreases by ~34% due to enhanced descent of nitrogen oxides and carbon monoxide into the vortex. Unusual downwelling of ozone-destroying species permeates into the "primary" layer and potentially contributes to the spring time ozone destruction. These results highlight the impact of vortex dynamics on ozone through the transport of key chemical species. They also help us to better understand natural ozone fluctuation with respect to anthropogenic influence.

## South Dakota

**STUDENT:** Leah C. Miiller

**INSTITUTION:** University of South Dakota

**DIVISION:** Health Sciences

**FACULTY ADVISOR:** Mick Watt | Paula Mazzer

**POSTER TITLE:** Effects of Adolescent Bullying on Adult Cognitive Function and Reward Motivation

**DISPLAY AREA:** 5I

**ABSTRACT:** Adolescent bullying is a severe stressor experienced by many teenagers worldwide, and is associated with greater incidence of psychiatric disorders that can persist into adulthood. Such disorders are characterized by a deficit in executive function, the cognitive processes allowing complex decision making. We showed that adolescent rats exposed to social aggression (a model of human bullying) have decreased dopamine (DA) function in the medial prefrontal cortex (mPFC) of the brain as adults. Other studies have shown mPFC DA function to be vital for executive function. We therefore hypothesized that adolescent defeat would result in deficits in executive function tasks in adulthood. Previously defeated rats and controls were assessed for working memory ability, a component of executive function, using a delayed alternating T-maze task with delay periods of 30, 60 and 90 s. Motivation to seek out and consume the food reward used during task training was evaluated in a separate group of defeated rats and controls using a conditioned place preference (CPP) paradigm. As predicted, adolescent defeat caused deficits in working memory in adulthood, but only when a 90 s delay period was introduced between trials. However, no differences were found in food reward CPP, indicating that decreased working memory performance was not a function of reduced motivation for the reward during alternating T-maze training. Future experiments will investigate whether the cortical DA hypofunction caused by adolescent defeat can be restored using pharmacological treatment, with the aim of reversing executive function deficits seen in psychiatric disorders associated with teenage bullying.

## Tennessee

**STUDENT:** Mandy M. Oaks

**INSTITUTION:** Appalachia Service Project

**DIVISION:** Psychology

**FACULTY ADVISOR:** Joy Drinnon

**POSTER TITLE:** The Impoverished of the Appalachia's: Delving into the Depths of Depression, Quality of Life, and Treatment of Appalachia Service Project Recipients

**DISPLAY AREA:** 5J

**ABSTRACT:** In this study, I sought to determine the extent of depression and the treatments used among recipients of a home-repair ministry in rural Appalachia. Participants were low-income, mostly elderly, and unemployed residents of Kentucky, Tennessee, Virginia, and West Virginia who received home repairs in 2010 by Appalachia Service Project (ASP). During the summer of 2011, I was part of a research team which attempted to contact all 450 recipients. The response rate was high among the 167 who were reached by phone, with 40 men and 100 women completing the survey either face-to-face or by phone. The surveys consisted of 88 questions and included the 20-item Center for Epidemiologic Studies Depression Scale (CES-D) (Anderson, et al., 1994), the 26-item World Health Organization Quality of Life Scale (WHO, 1994), and treatments used for depression and anxiety. Preliminary results indicate relatively high rates of depression (33-40%) among adults living in poverty in Appalachia and, not surprisingly, depression scores are inversely related to quality of life,  $r(114) = -.67, p < .001$ . Furthermore, residents are more likely to use prescriptions (37%) than alternative treatments (33.6% holistic and 17.1% vitamins/supplements) for the treatment of their depression and anxiety. Additional analyses comparing the rates of depression among residents whose homes have not yet been repaired by ASP will be examined within the month. These results will provide ASP with valuable information about the clients they serve, as well as fill a gap in the literature regarding prevalence rates of depression in an underrepresented population.

## Texas

**STUDENT:** Leslie Luna De Lara

**INSTITUTION:** The University of Texas at El Paso

**DIVISION:** Chemistry

**FACULTY ADVISOR:** James Becvar | Lourdes E. Echegoyen

**POSTER TITLE:** Success in Large Introductory STEM Classes from Peer-Led Workshop

**DISPLAY AREA:** 6A

**FUNDING:** National Science Foundation

**ABSTRACT:** Success in first semester general chemistry at the University of Texas at El Paso dramatically improved starting in year 2000 when Peer-Led Team Learning (PLTL) became a required part of this curriculum. The format for the course changed from three one-hour lectures (passive learning) per week to two lectures plus one two-hour workshop (active learning) each week. Every workshop is overseen by a Peer Leader, an undergraduate student who previously has taken the course and excelled in understanding its content. Workshop consists of one hour of problem solving in teams overseen by the Peer Leader, followed by one hour of hands-on explorations. Explorations help the students relate what they are seeing in lecture to the world around them, therefore providing the students with well-rounded and contextual knowledge about the abstract concepts they are learning. Since fall 2000, the C-or-better passing rate for first-time takers in the first course in general chemistry has improved from the historic average near 55% to the current rate near 70%, translating into more than a thousand additional students over this period progressing into their science, engineering, and mathematics majors. The current study has two novel components: self-assessing student understanding at milestones during the semester and identifying the relative importance of workshop to the understanding of specific chemical content.

## Utah

**STUDENT:** Paula B. Fiet

**INSTITUTION:** Weber State University

**DIVISION:** Psychology

**FACULTY ADVISOR:** Lauren Fowler

**POSTER TITLE:** Effects of Computerized Cognitive Training on Working Memory Abilities in School Children

**DISPLAY AREA:** 6B

**FUNDING:** Eccles Foundation

**ABSTRACT:** Growing research provides evidence that poor working memory abilities affect nearly 10% of children (Alloway, 2009). Working memory is a key factor of learning related to math, reading, and other cognitive tasks (Holmes, Gathercole, & Dunning, 2009; Alloway 2008). Early intervention is integral for academic progress and learning capacity. A strong foundation for learning allows children to thrive. Working memory is necessary for cognitive manipulations and learning connections to occur. This study was designed in an attempt to increase the working memory abilities of participants using cognitive training tasks. Participants were public elementary school children ages 7-9. The control group played low level educational games. The experimental group received a five week computerized working memory training intervention based upon a cognitive n-back task that elicits demands upon working memory (Jaeggi, Buschkuhl, Jonides, & Perrig, 2008). It required participants to recall visual and auditory stimuli presented 1, 2, or 3 times back at increased difficulty levels, and or in combination (dual-back). A 2 (experimental/ control) x 2 (pre/post) ANOVA design was used to assess the effects of training on working memory abilities. Results revealed that cognitive training significantly increased working memory abilities. In other words, spending just a few minutes each day on this task significantly increased the children's learning potential. This study makes it known that it is possible to improve the learning abilities of struggling children. A focus on strengthening the working memory foundation in children could lead to greater learning gains for the children of our nation.

## Vermont

**STUDENT:** Moria L. Robinson

**INSTITUTION:** Middlebury College

**DIVISION:** Biology

**FACULTY ADVISOR:** Helen Young

**POSTER TITLE:** How Unique are Populations? Patterns of Host Choice in Two Butterfly Species

**DISPLAY AREA:** 6C

**ABSTRACT:** Insects and plants are among the most species-rich taxa on the planet, and provide fodder for many fundamental theories related to Earth's rich biodiversity and elegantly specialized organisms. In this study, butterflies in the Pacific Northwest were used to investigate the questions, "is specialization evolving at the scale of individual populations? How might plant chemistry be mediating local host plant use?" The ability of high- and low-elevation populations of silvery blues (*Glaucopsyche lygdamus*) to utilize an array of hosts was examined. In addition, ability of the highly specialized greenish blue (*Plebejus saepiolus*) to colonize a novel invasive plant (*Lotus uliginosus*) was tested. Preference of egg-laying adults as well as larval performance was observed for each population; female butterflies were given the choice of both original host and novel species, egg counts used to assess preference, and pupae massed to determine plant suitability. Results indicated that variation between *G. lygdamus* populations is high, and that behavior (preference) may change more quickly than physiological adaptation to host. Trials of *P. saepiolus* indicated preference and utilization of a novel (and invasive) host. It is concluded that specialization may be distinct between discrete populations, and that novel plants sharing "suitability cues" may be readily adopted as hosts despite recent arrival in ecosystems. Findings are examined in the context of theory surrounding local specialization, as well as in relation to management and conservation of species at the scale of unique populations. Potential determinants of invasive plant colonization by native herbivores are also discussed.

## Washington

**STUDENT:** D'Artagnon Reid Womack | Andrew Nichols

**INSTITUTION:** Central Washington University

**DIVISION:** Physics/Astronomy

**FACULTY ADVISOR:** Michael Jackson | Tom Fleming

**POSTER TITLE:** The First Laser Action Observed from Optically Pumped O-17 Methanol

**DISPLAY AREA:** 6D

**FUNDING:** National Science Foundation; Washington Space Grant Consortium

**ABSTRACT:** LASER is an acronym for Light Amplification by Stimulated Emission of Radiation. This instrument is based on the theory of stimulated emission first proposed by Albert Einstein in 1917. While the laser was in its infancy in the 1960s, critics dubbed it as "the solution in search of a problem." Ironically it has become just that. Whether used in medical applications or at the checkout counter at the local supermarket, lasers have continually evolved to find new applications in many of the technological problems we face. The laser project at Central Washington University involves the discovery of new sources of light in the far-infrared region for use in fingerprinting molecules of atmospheric or interstellar interest. In this work, the O-17 isotopic form of methanol has been investigated for the first time as a source of far-infrared radiation using two distinct optically pumped molecular laser systems. With these systems, fourteen far-infrared laser emissions have been discovered, ranging in wavelength from 69.7 to 642.9 micron. The 69.7 micron line was also frequency measured with a fractional uncertainty on the order of a few parts in ten million. This presentation will focus on discussing the experimental systems, the process involved in the discovery and frequency measurement of far-infrared laser lines, and the applications of this research.

## Washington continued

**STUDENT:** James D. Gaynor

**INSTITUTION:** Environmental Molecular Sciences Laboratory at Pacific Northwest National Laboratory

**DIVISION:** Chemistry

**FACULTY ADVISOR:** Charles J. Kunert

**POSTER TITLE:** Immobilized Cerium Oxide Nanoparticles (CNP) on Self-assembled Monolayers of Poly(-4-vinylpyridine) (PVP) for Detection of Hydrogen Peroxide. **DISPLAY AREA: 6E**

**FUNDING:** United States Department of Energy

**ABSTRACT:** Hydrogen peroxide ( $H_2O_2$ ) is a member of a small group of compounds named reactive oxygen species (ROS). Biologically,  $H_2O_2$  is of interest because it decomposes into harmful hydroxyl radicals and generates other highly reactive radical compounds. These compounds create oxidative stress – a condition closely associated with cancer, Parkinson's disease, Alzheimer's disease, and neurodegeneration. Additionally, terrorists have recently made direct use of peroxides by implementing peroxide-based materials into home-made explosives – a popular trend among terrorists due to synthetic simplicity and readily available chemicals. Thus, an urgent need exists to efficiently detect peroxides for biomedical applications and improving national security. This work demonstrates the ability to detect few ppm of hydrogen peroxide from a single monolayer of nanoparticles based on the colorimetric redox reaction of cerium oxide nanoparticles (CNPs) with  $H_2O_2$  which can be quantified spectrophotometrically. The CNP's colorimetric sensitivity towards  $H_2O_2$  enhances with decreasing crystallite size due to increasing specific surface area and surface defects. For detection, a monolayer of CNP was immobilized onto a transparent glass slide modified with self-assembled monolayers (SAMs) of poly(-4-vinylpyridine) (PVP). This slide design maintains high CNP surface area for oxidation and creates highly transparent glass slides for spectrophotometric detection. The PVP-SAM spatial orientation is shown to control surface density of the CNP self-assembly. X-ray Photoelectron Spectroscopy confirmed PVP-SAM orientation and CNP immobilization, and Atomic Force Microscopy verified uniform, cluster-free, immobilization of CNPs. UV-Vis spectrophotometry demonstrated a  $H_2O_2$  concentration-dependent increase in absorbance as the CNPs were oxidized by  $H_2O_2$  at various micromolar concentrations.

**STUDENT:** Sally Judson

**INSTITUTION:** University of Puget Sound

**DIVISION:** Social Sciences

**FACULTY ADVISOR:** Pierre Ly

**POSTER TITLE:** Turkey and EU Accession: A Stalled Process

**DISPLAY AREA: 6F**

**ABSTRACT:** Turkey's long march towards the EU has resulted in the nation becoming the most controversial accession candidate today. An important strand of literature has emerged arguing that due to the slow process of negotiations, Turkey is turning its back on the West and moving its attention to Middle Eastern neighbors. This article takes a closer look at the impediments to Turkish EU accession and concludes that despite the many issues and lack of momentum, neither Turkey nor the EU is likely to halt the negotiation process. It is essential to analyze the relationship between Turkey and the EU, due to the potential model Turkey provides for emerging democracies in the Middle East, which necessitates the maintenance of positive Western relations. It is necessary to investigate the reasons behind the strained negotiation process. This research is based on evidence collected in June 2011 in Istanbul and Ankara, during interviews with key stakeholders, ranging from university professors to members of the EU Secretary General. During these interviews I found four sets of issues. First, the formal issues of the Copenhagen Criteria and Cyprus present the strongest obstacle. Second, the semi-formal obstacles of geo-institutional and security concerns affect the pace of negotiations. Third, informal impediments, mainly religious and cultural differences, have created questions of identity within the EU. Lastly, these concerns have decreased Turkish incentive to reform, as EU hesitancy is perceived as rejection. This research suggests that despite these issues, Turkey and the EU will continue the negotiation process.

## West Virginia

**STUDENT:** Sean David-Andrew Belardo

**INSTITUTION:** West Virginia University

**DIVISION:** Chemistry

**FACULTY ADVISOR:** Mingyang Gong | Xingbo Liu

**POSTER TITLE:** Research on Impurity-Tolerant Alternative SOFC Anode for Coal Syngas Operation

**DISPLAY AREA:** 6G

**FUNDING:** Department of Energy

**ABSTRACT:** Fuel cells provide a cleaner and more efficient solution to power generation, as they only allow oxygen to react with fuel thus eliminating the NOX emissions resulting from direct combustion. Unlike other fuel cells, SOFCs have the ability to utilize a wide variety of fuels, such as coal, to produce coal syngas that can be fed into SOFCs. Our current research studies an alternative ceramic oxide anode with higher impurity resistance in coal syngas than the conventional Ni-based anode. The new SOFC anode material is developed from a conductive lanthanum-strontium-vanadate perovskite, also known as LSV. LSV suffers from poor catalytic activity for fuel oxidation and lower long term chemical stability. The research studies electrical conductivity, catalytic activity and impurity resistance effects of Magnesium doped LSV, LSMV. The LSMV anode materials are manufactured by a solid-state reductive sintering process at  $1500^{\circ}\text{C}\pm 50^{\circ}\text{C}$ . Once obtained, the electrical conductivity of each sample is evaluated with a self-built assembly utilizing the Van der Pauw method at  $800^{\circ}\text{C}$  in wet  $\text{H}_2$ . LSV and LSMV with 20% magnesium showed conductivities of 65 Siemens per centimeter (S/cm) and 25 S/cm respectively, much higher than the 1 S/cm typical requirement. The electrochemical performance and stability of the anode material is investigated by constructing an electrolyte supported SOFC. The cell is tested in a simulative coal gas with  $\text{CO}_2$ ,  $\text{CO}$ ,  $\text{H}_2$ , and  $\text{H}_2\text{O}$  from  $700\text{-}800^{\circ}\text{C}$  and evaluated with presence of sulfur impurity. This research is valuable to finding more efficient ways of energy production, especially from coal.

**STUDENT:** Nikolai Paul Radzinski

**INSTITUTION:** West Virginia University Center for Neuroscience, Department of Human Performance: Physical Therapy Division

**DIVISION:** Biology

**FACULTY ADVISOR:** Valeriya Gritsenko

**POSTER TITLE:** Motion Capture as a Tool for Clinical Assessment of Impairment for Physical Therapy

**DISPLAY AREA:** 6H

**ABSTRACT:** In clinical practice movement impairment due to stroke or spinal cord injury is measured using motor assessment tests. They are fast and easy to administer and are widely used by clinicians. However, they rely on coarse subjective scales and require time of a skilled therapist and travel of the patient. These disadvantages increase the cost and limit the availability of medical care to a large number of people with disabilities. Therefore, there is a critical need for objective, portable, and automated methods of measuring movement impairment. To address this need we are developing an objective quantitative measurement of movement using motion capture. The purpose of our study is to test the feasibility of using a low-cost portable commercially available device to collect detailed body movement data for clinical assessment of impairment. To achieve this goal we have recorded movement of healthy human subjects using both a high-end laboratory system and a low-cost portable system. The accuracy of three-dimensional data from the low-cost system was then compared quantitatively to that of the laboratory system. The results show that the kinematic data captured by the low-cost system is accurate to about 10% of the maximal range of motion. This shows that although the accuracy of motion capture by the low-cost system is less than that of the laboratory system, it is still superior to that of the subjective rating scales. This paves the way for the development of accessible quantitative methodology to be used in clinical practice for measuring movement impairment.

## West Virginia continued

**STUDENT:** Sarah L. Robinson

**INSTITUTION:** West Virginia University

**DIVISION:** Biology

**FACULTY ADVISOR:** Daniel G. Panaccione

**POSTER TITLE:** Diversity in the Ergot Alkaloid Pathway of the Pathogenic Fungus *Aspergillus fumigatus*

**DISPLAY AREA:** 6I

**FUNDING:** NSF DBI0849917

**ABSTRACT:** *Aspergillus fumigatus* is an opportunistic human pathogen that synthesizes a unique group of mycotoxins called ergot alkaloids, which are important in medicine and agriculture. This mold is found all over the world, and previous studies indicate that this fungus interbreeds among isolates. However, previous studies done with ergot alkaloids have only focused on a few isolates that were chemically identical. We hypothesized that *A. fumigatus* harbors variation in chemotype (the types of ergot alkaloids it produces) and in genotype of the ergot alkaloid gene cluster responsible for toxin production. Thirteen isolates of the fungus from different global locations and environmental sources were collected and examined by high performance liquid chromatography. This analysis revealed four distinct ergot alkaloid chemotypes. Five isolates produced fumigaclavine C, the most complex ergot alkaloid observed. Six isolates produced fumigaclavine A, which is missing one of the chemical groups found on fumigaclavine C. One isolate produced chanoclavine, which is typically an intermediate in the formation of the fumigaclavines. The last *A. fumigatus* isolate failed to synthesize any ergot alkaloids. Through polymerase chain reaction (PCR) and DNA sequence analysis, we identified a genetic basis for each of the chemotypes observed. In addition to the genetic and chemotypic differences, the appearance, or phenotype, of the isolates also differed. In conclusion, all of the data collected indicated that ergot alkaloids are widely distributed among isolates from different geographical and substrate sources and that the fungus contains previously undocumented diversity in the types of ergot alkaloids that it produces.

## Wisconsin

**STUDENT:** Heather M. Helminiak

**INSTITUTION:** Univeristy of Wisconsin - Eau Claire

**DIVISION:** Chemistry

**FACULTY ADVISOR:** James A. Phillips

**POSTER TITLE:** Structural Properties of Molecular Complexes with Potential for Nanotechnology Applications

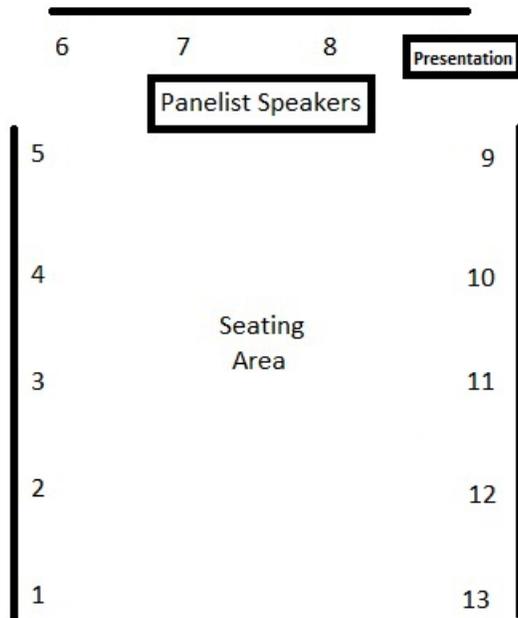
**DISPLAY AREA:** 6J

**FUNDING:** National Science Foundation

**ABSTRACT:** The overall theme of our research is the structure and bonding of molecular complexes, with an eye towards systems that undergo major changes in response to their chemical environment (i.e. gas-phase vs. solutions vs. solid). The term "molecular complex" refers to an association between two otherwise stable molecules, in which the bond connecting these two subunits can range from strong (i.e. chemical bonds) to very weak (i.e. adhesive forces). Differences between gas-phase and solid-state structures offer the most direct illustration of this effect. For example, CH<sub>3</sub>CN–BF<sub>3</sub>, paradigm for much of our work, has a B–N distance of 2.01 Å in the gas-phase, which contracts by about 0.4 Å to 1.65 Å in the solid. Our work has focused on the effect of bulk, inert environments, and we have shown via experiment and theory that the structure of CH<sub>3</sub>CN–BF<sub>3</sub> varies systematically with the charge-stabilizing tendency of the medium. In the present work, we turn to a series of CH<sub>3</sub>CN complexes with Group IV Lewis Acids (MX<sub>4</sub>, M= Si, Ge, Ti; X=F,Cl). Beyond exploring the generality of this behavior, we chose these systems because the geometry of the MX<sub>4</sub> molecules may facilitate the development of nanotechnology applications based on these contracting bonds. Across this series of CH<sub>3</sub>CN–MX<sub>4</sub> compounds, we observe a broad range of interactions strengths, and in one instance (CH<sub>3</sub>CN–SiF<sub>4</sub>), a prime example of a medium-dependent system.

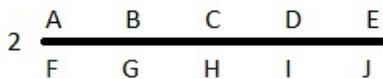
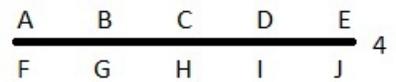
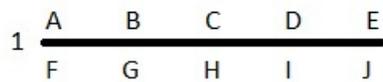
# Rayburn House Office Building

## Rooms 338-B & 339-B – Humanities Luncheon Session

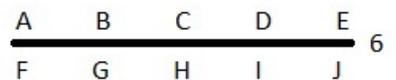
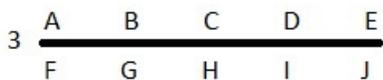
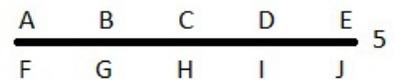


# Rayburn House Office Building

## Rooms 338-B & 339-B & 340-B – Sciences Evening Session



Reception  
Area



Entrance

Entrance

# Participants

## Alabama

University of Alabama

## Arizona

University of Arizona

## Arkansas

Henderson State University  
Ouachita Baptist University  
University of Arkansas at Little Rock

## California

University of California-Santa Barbara and  
California State University San Bernardino

## Colorado

National Institute of Standards and  
Technology  
University of Denver

## Connecticut

Yale University

## Florida

Florida Institute of Technology  
New College of Florida  
University of Central Florida  
University of South Florida-St. Petersburg

## Georgia

Berry College

## Idaho

Idaho State University

## Illinois

Loyola University Chicago  
Southern Illinois University-Carbondale

## Indiana

Indiana University-Purdue  
University-Indianapolis

## Iowa

Wartburg College

## Kansas

Bethel College

## Kentucky

Morehead State University  
Western Kentucky University

## Louisiana

Southern University

## Maryland

Johns Hopkins University School of  
Medicine  
Towson University

## Massachusetts

Bridgewater State University  
College of the Holy Cross

## Michigan

Eastern Michigan University  
Hope College

## Minnesota

Bethel University  
University of Minnesota- Institute of Child  
Development

## Mississippi

The University of Southern Mississippi

## Missouri

Missouri University of Science and  
Technology

## Montana

The University of Montana

## Nebraska

Creighton University  
University of Nebraska at Kearney

## Nevada

University of Nevada-Las Vegas

## New Hampshire

Plymouth State University

## New Jersey

Kean University  
The College of New Jersey

## New York

Buffalo State College  
Fordham University  
State University of New York- University at  
Buffalo

## North Carolina

Elon University

## North Dakota

University of North Dakota

## Ohio

Capital University  
The College of Wooster  
Xavier University

## Oklahoma

Oklahoma State University

## Pennsylvania

Drexel University  
Gettysburg College  
Juniata College  
Shippensburg University  
Ursinus College

## Puerto Rico

University of Puerto Rico-Rio Piedras  
Campus

## Rhode Island

Brown University

## South Carolina

Coastal Carolina University

## South Dakota

University of South Dakota

## Tennessee

Appalachia Service Project

## Texas

The University of Texas at El Paso

## Utah

Weber State University

## Vermont

Middlebury College

## Virginia

Virginia Commonwealth University

## Washington

Environmental Molecular Sciences  
Laboratory at Pacific Northwest National  
Laboratory  
Central Washington University  
University of Puget Sound

## West Virginia

West Virginia University

## Wisconsin

University of Wisconsin - Eau Claire  
University of Wisconsin- Stevens Point