

# MISSISSIPPI EPSCoR Experimental Program to Stimulate Competitive Research



## Students encouraged to pursue STEM careers

Fifth-graders sat together with smiles on their faces, recently in Nancy Sistrunk's class at Ward-Stewart Elementary School.

The group had just completed an experiment to see how high rubber balls with different chemical structures and properties would bounce; then they stretched pieces of plastic, with Jones and Travis rising to their feet and pulling hard until the material broke; finally, they were given little glass jars containing three different types of liquid — oil, water and Karo syrup — and dropped in it items like broken toothpicks, cut-up pieces of a straw and metal BBs to compare their densities with the densities of the liquids. The items floated in the liquids with similar densities.

It was a class full of experiments, which taught students about polymers, the macromolecules that make up things in everyday life, from  
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## NSF's Hall will speak at April EPSCoR annual State meeting

Dr. John Hall, NSF EPSCoR Program Director for the National Science Foundation (NSF), will be the keynote speaker this year at the 2010 EPSCoR State Meeting. Jackson State University (JSU) will host the meeting at the JSU E-Center in Jackson, MS.



Hall received his B.S. in Chemistry from Morehouse College and his Ph.D. in Physical Chemistry from Harvard University. He was a

principle research scientist in the School of Earth and Atmospheric Sciences at the Georgia Institute of Technology for 12 years. He also served for seven years at Ohio State University (OSU) as Associate Vice President for Research and Executive Director of the OSU Research Foundation. Presently Hall is Bruce Raneur Professor of Natural Sciences and Chair of the Department of Chemistry at Morehouse College. In addition, he is President and co-founder of Transformational Consultants Interna-

tional, Inc., a corporation specializing in global diversity and maximizing organizational and personal productivity. His research has included environmental and atmospheric chemistry, in particular the mechanisms of tropospheric and stratospheric chemical reactions, and computer modeling of the electronic structures of molecules. In addition to his scientific endeavors, he has facilitated workshops and executive level courses in global diversity, empowerment for minorities and women, and organizational empowerment.

## UM's Stoddard to attend Meeting of Nobel Laureates

Ms. Shana Stoddard, a graduate student at the University of Mississippi (UM) has been selected as one of only 77 U.S. students to attend

the 2010 Meeting of the Nobel Laureates in Lindau, Germany this summer. In a subset of this group of students, she was also chosen to receive a fellowship to attend the Euroscience Open Forum in Torino, Italy immediately following the Lindau meeting.



Stoddard is a chemistry major working in research under the direction of Dr. Randy Wadkins, associate professor in the Department of Chemistry and Biochemistry at UM.

Stoddard's sponsor for this meeting is the Oak Ridge Associated Universities, who will be covering her travel expenses. Wadkins sends a hearty "thank you" to Sam Held at Oak Ridge for his help in making this happen.

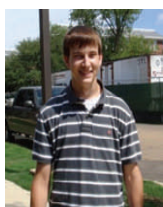
The EPSCoR funded research

that Stoddard has been conducting is on modeling of inhibitors for an enzyme known as carboxylesterase (CE). In collaboration with Dr. Philip Potter at St. Jude Children's Research Hospital in Memphis, TN, Stoddard, Wadkins, and Potter have sought to identify selective inhibitors of hiCE that may have utility in modulating unwanted drug toxicity.

Stoddard was recruited to UM from Prairie View A&M University in Prairie View, TX.

## Six seed grants awarded to faculty

### Harper selected for NASA USRP



Jonathan Harper, a Computer Science undergraduate major, has been competitively selected for a NASA Undergraduate Student Research Program (USRP) internship for the Spring semester at Goddard Space Flight Center in Maryland.

The USRP experience is a NASA internship that places qualified undergraduates with outstanding NASA mentors in a challenging working environment. Students from around the country work on a NASA project developed to meet the needs and goals of the NASA Center and Mission Directorate. USRP is one of the most highly comprehensive internship programs for undergraduate students within the STEM majors.

Harper joined the Computer Science Department in the Fall of 2008 after having completed his high school degree at the Mississippi School for Mathematics and Science in Columbus. His advisor is Dr. Susan Bridges.



The research universities in Mississippi have been awarded a large multi-year EPSCoR grant to build research infrastructure in the state in the area of Modeling and Simulation of Complex Systems.

A seed grant program for funding promising new research projects is one component of the larger grant. Six recipients of the 2010 Seed Grants were chosen by the NSF EPSCoR Steering Committee after careful evaluation of the 25 proposals submitted. "The selection process was very difficult because we had so many outstanding proposals," stated Dr. Susan Bridges, Science Coordinator for Mississippi EPSCoR. "Our goal is to build expertise and collaboration at Mississippi universities in computational modeling of biological and biochemical systems."

The recipients of the 2010 Seed Grants were:

Dr. Annette Wysocki, profes-

sor in the Division of Cardiothoracic Surgery at the University of Mississippi Medical Center in Jackson, Mississippi is collaborating with Hybrid Plastics in Hattiesburg, MS to engineer and test biomaterials that can be used to replace cartilage in joints.

Dr. Xiu-feng (Henry) Wan, assistant professor in the College of Veterinary Medicine at Mississippi State University and Dr. Nan

Wang, assistant professor in the School of Computing at the University of Southern Mississippi are combining computational and biological techniques to elucidate the structural factors that influence influenza infection.

Dr. Jason Ritchie,

associate professor of Chemistry in the Department of Chemistry and Biochemistry at the University of Mississippi and Dr. David Magers, professor of Chemistry in the Department of Chemistry and Biochemistry at Mississippi College, are using both computational and experimental methods to investigate the properties of a new polymer that has many potential applications including fuel cells.

Dr. Mohammed Ali is an assistant professor in the Department of Technology at Jackson State University and is developing improved methods for modeling the deposition of inhaled particles in the lung. This research has important potential applications in the impact of pollution on human health and in aerosol drug delivery.

## Hammer earns NSF CAREER Award

Dr. Nathan Hammer, assistant professor of physical chemistry in the Department of Chemistry and



Biochemistry at the University of Mississippi, is the recipient of a National Science Foundation Faculty Early CAREER Award.

In this CAREER project funded by the Macromolecular and

Nanochemistry Program of the Chemistry Division, Hammer will study the fundamental chemistry of noncovalent interactions in condensed phases. Various sized aggregates of molecules displaying noncovalent interactions will be prepared in a variety of chemical environments, and they will be studied using vibrational spectroscopy and computational modeling. The educational plan focuses on integrating computational methods and experiment in all levels of physical chemistry curricula and includes a sum-

mer research program in physical chemistry. This work will enhance the fundamental understanding of noncovalent interactions in condensed phases. Such weak interactions play important roles in a range of chemical and biological systems and are emerging as central in systems-level control over complex biological processes.





## UM students present research in Puerto Rico

Dr. Nathan Hammer, assistant professor of physical chemistry in the Department of Chemistry and Biochemistry at the University of Mississippi, along with two graduate students, and one undergraduate student traveled to San Juan, Puerto Rico to attend the 61<sup>st</sup> Southeastern Regional Meeting of the American Chemical Society (ACS). The theme of the meeting was "Think Positive, Think Global, Think Chemistry."

Students who presented their research included (l-r) Ashley Wright (3rd year grad student), Matthew McDowell (Junior), Hammer, and Debra Jo Scardino (3rd year grad student). McDowell is an Honors Bachelor of Science in Chemistry major, and both Ashley and Debra are physical chemistry grad students studying Comparisons of Spectroscopic Results to High Level Computational Chemistry Results.



## MS students receive top awards at MCBIOS annual meeting

MidSouth Computational Biology and Bioinformatics Society (MCBIOS) annual meeting was held in Arkansas State University on February 18-19 with a record attendance of over 200 scientists. Attendees came from 15 states stretching from Texas and South Dakota to Tennessee and Kentucky. Dr. Andy Perkins of Mississippi State University (MSU) served as Poster Chair and managed the setup and judging of over 100 posters. Dr. Dawn Wilkins of the University of Mississippi (UM), MCBIOS Past President, managed judging of 25 student oral presentations. Dr. Susan Bridges of MSU was elected President-Elect for the coming year. Awards were presented for the top three student talks, three best posters based on Biological Merit and three best posters based on Computational Merit. All of the presentation winners were from Mississippi universities and four of the six poster awards went to Mississippi students.

### Oral Presentation Award Winners

In the oral presentation category, the first place winner was Heidi Pagan, a Ph.D. student in Biochemistry at MSU working under the direction of Dr. David Ray. The title of her talk was "Lineage Specific Activity from Novel Piggyac Elements and Evidence of Horizontal Transfer in Mouse Lemurs (*Microcebus*)."

Heidi's research focuses on transposable elements, which are repetitive DNA sequences whose presence and movement within a host genome can introduce genetic variation. The recent activity and horizontal transfer found in mouse lemurs is of interest for understanding the role of transposable elements in mammalian evolution, and may also aid in increasing their efficiency in gene therapy applications. The second place oral presentation award winner was Juliet Tang, a



Ph.D. student in the Department of Forest Products at MSU. The title of her talk was "Assembling A Novel Fungal Genome from Short Read Sequencing Data." Juliet is sequencing the genome of a copper-tolerant brown rot fungus. She hopes to describe as many genes as possible so that we can better understand how the fungus aggressively breaks down cellulose to sugar and how the fungus can survive the high levels of copper found on pressure-treated lumber. Her work has potential applications for the production of bioethanol from woody biomass and for wood preservative development. Her major professor is Dr. Susan Diehl. Aleksandra Markovets of Mississippi Valley State University won the third place oral presentation award. She is a Master's student in the Department of Natural Sciences and Environmental Health at



MVSU working under the direction of Dr. Abigail Newsome and Dr. Charles Bland. The title of her talk was "Promoter Prediction in *Halothiobacillus Neapolitanus* C2 based on stress-induced DNA duplex destabilization." She is investigating methods to identify the signals in the genome that determine if genes important for carbon dioxide sequestration by bacteria are turned on or off. This information will help enhance our understanding of the carbon fixation process and may help to build new technologies that will decrease the carbon dioxide concentration in the atmosphere.

### Poster Award Winners

#### Biological Merit

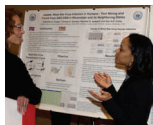
The first place poster award winner for Biological Merit was Neal Platt, a Ph.D. student in the Department of Biochemistry and Molecular Biology.



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## MS MCBIOS student awards (Continued from page 3)

Working under the direction of Dr. David Ray. The title of Neal's poster was "Recognition, Categorization, and Characterization of Transposable Elements in a Non-muroid Rodent: *Spermophilus Tridecemlineatus*." Neal's research investigates the dynamics of transposable element mobilization in a squirrel genome. In rodents, very little is known about these elements in species other than rat and mouse and even less is known about the potential role of transposable elements in generating diversity. Neal is from White Oak, TX. He received his BS in Biology from Abilene Christian University and his MS in Biology from Texas Tech University. Gabrielle Cooper, an undergraduate student in the Department of Biology at Jackson State



### EPSCoR Project Personnel:

#### **Project Director:**

Dr. Sandra Harpole  
sharpole@research.msstate.edu

#### **Project Administrator:**

Dr. Teresa Gammill  
tgammill@research.msstate.edu

#### **Science Coordinator:**

Dr. Susan Bridges  
bridges@cse.msstate.edu

#### **Education and Outreach Coordinator:**

Ms. Katie Echols  
kechols@research.msstate.edu

#### **Research Focus Area Leaders:**

##### *Computational Biology*

Dr. Raphael Isokpehi, JSU  
Raphael.isokpehi@jsums.edu

##### *Computational Chemistry*

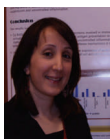
Dr. Greg Tschumper, UM  
tschumpr@olemiss.edu

##### *Computational BioSimulation*

Dr. Keith Walters, MSU  
walters@me.msstate.edu

University, won the second place poster award for biological merit. Gabrielle's poster was entitled "West Nile Virus Infection in Humans: Trends from 2003-2008 in Mississippi and its Neighboring States." Her major professor is Dr. Raphael Isokpehi. The purpose of her work was to analyze the trends of the number of human infections in Mississippi and its neighboring states of Alabama, Arkansas, Louisiana and Tennessee. The third place winner for biological merit was

Mais Ammari of MSU. She is a Ph.D. student in the Department of Basic Sciences in the College of Veterinary Medicine and her major professor is Dr. Lesya Pinchuk. The title of her poster was "Computational Analysis of Bovine Viral Diarrhea Virus Infected Monocytes: Identification of Cytopathic and Non-Cytopathic Strain Differences." Bovine Viral Diarrhea Virus (BVDV) infection is widespread in cattle worldwide causing important eco-



nomical losses. Mais and Dr. Pinchuk used a proteomics approach to assess differences in effects on the immune responses of infected hosts by two viral strains that cause acute and persistent infection.

#### **Computational Merit**

The first place award for computational merit went to Vijender Chaitankar of the University of Southern Mississippi. He is a Ph.D. student in School of Computing. Dr. Chaoyang Zhang is his advisor and he is being co-advised by Dr. Preetam Ghosh. The title of his poster was "Transcriptional time lagged information approach to improving the accuracy of gene regulatory network reconstruction". Vijender is developing algorithms that learn models of how some genes regulate the actions of other genes (gene regulatory networks). He has developed an improved information theoretic algorithm for inferring these models. His new method addresses problems related



to dealing with large numbers of genes by using the concept of time lag. The major aim is to improve the accuracy of the inference algorithm. The second place winner for computational merit was Lakshmi Pillai of MSU. She is a Ph.D. student in the Department of Basic Sciences in the College of Veterinary Medicine and her major professor is Dr. Shane Burgess. The title of her poster was "GORIF: A Tool for Generifs to Gene Ontology." GeneRIFs (Gene Reference Into Function) are English language statements that describe the function of genes. The GORIF tool matches these statements to controlled vocabulary terms from the Gene Ontology. GORIF uses scoring system that evaluates genes based on their involvement in certain immune processes. The tool allows the user to get a species-specific, comprehensive and a 'at-a-glance' view of all the genes involved in specific biological processes.



## Students encouraged (continued from Page 1)

the students' desks to their jackets to rubber on the soles of their shoes.

The lesson was taught by Dr. Keisha Walters, an assistant engineering professor at Mississippi State University, and the stu-



dents' reactions were exactly what Walters was hoping for. Walters taught the class as part of a cooperative effort with EPSCoR — the National Science Foundation's Office of Experimental Program to Stimulate Competitive Research .



Fifth-grader Aika Temu examines physical properties of water, canola oil, and corn syrup during a science lab in Nancy Sistrunk's classroom.

