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ACADEMY OF SCIENCES

EIGHTY SECOND ANNUAL MEETING

February 22-23, 2018

University of Southern Mississippi Thad Cochran Convention Center

Hattiesburg, MS

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Contents

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GENERAL SCHEDULE

MISSISSIPPI ACADEMY OF SCIENCE
Eighty First Annual Meeting
February 21-23, 2018

WEDNESDAY, FEBRUARY 21, 2018

TIME	EVENT	LOCATION
3:00 PM to 6:00 PM	Registration	Lobby
6:30 PM to 9:00 PM	Board of Directors Meeting/Dinner	Ballroom I

THURSDAY, FEBRUARY 22, 2018

TIME	EVENT	LOCATION
7:30 AM to 5:00 PM	Registration	Lobby
8:00 AM to 3:00 PM	Exhibits	Lobby
5:00 PM to 8:00 PM	Exhibits	Lobby
8:00 AM to 3:00 PM	Divisional Programs	See program for rooms
10:00 AM to 12:00 PM	Health Science Symposium	Ballroom II/III
12:00 PM to 1:30 PM	Seminar sponsored by ThermoFisher	Union D
1:00 PM to 3:00 PM	Cellular and molecular (BioInformatics)	TC 214
1:00 PM to 2:30 PM	Science Education Workshop	TC 210
2:00 PM ro 2:30 PM	Psychology Workshop	TC 229
1:30 PM to 2:45 PM	Population Health Symposium	Ballroom II/III
3:30 PM to 5:00 PM	2017 Dodgen Lecture &	Ballroom II/III
	Presentation of Awards	Ballroom II/ III
5:00 PM to 7:30 PM	Reception and Poster Session	Ballroom I

FRIDAY, FEBRUARY 23, 2018

TIME	EVENT	LOCATION
7:30 AM to 8:15 AM	Past-Presidents' Breakfast	TBA
8:00 AM to 2:00 PM	Registration and Exhibits	Lobby
8:00 AM to 11:30 AM	Agriculture	Union C
8:00 AM to 11:30 AM	Ecology/Zoology	Union D
10:00 AM to11:50PM	STEMI Symposium	TC 210
8:00 AM to 3:00 PM	Divisional Programs	See program for rooms
10:00AM to 11:55AM	Interactive Workshop (Health Sciences)	Ballroom I
10:00 AM to 12:00 PM	Graduate Symposium, Sponsored by Mississippi INBRE-Workshop	Ballroom I and Ballroom II/III
12:00 PM to 1:00 PM	Mississippi INBRE & HHMI Plenary	Ballroom II/III
	Speaker (Boxed Lunch Provided)	Ballroom II/III
1:00 PM to 3:00 PM	HHMI Undergraduate Symposium	Ballroom II/III
3:00 PM	MAS Business Meeting	Ballroom II/III

Thad Cochran Convention Center, Hattiesburg, MS

DRIVING DIRECTIONS

If Coming from the South on I-59:
Take Exit 67A
At bottom of ramp turn right
At first traffic light turn left

If Coming from the North on I-59:
Take Exit 67A
At bottom of ramp merge into Hwy 49 South
At first traffic light turn left

If Coming from the South on Highway 49:
Take Highway 49 North to Hattiesburg
Continue on Hwy 49 through Hattiesburg
Just before Intersection of I-59 and Hwy 49 there will be a traffic light
Turn right at traffic light

If Coming from the North on Highway 49:
Take Highway 49 South to Hattiesburg
Pass the intersection of I-59 and Hwy 49
Turn left at first traffic light past intersection

If Coming from the East on Highway 98:
Take Highway 98 to I-59
Take I-59 North to exit 67A
Take Hwy 49 south to first traffic light
Take left at first traffic light

If Coming from the West on Highway 98:
Take Highway 98 to I-59
Take I-59 North to Exit 67A
Take Hwy 49 south to first traffic light
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Mississippi Gulf Coast Community College
Mississippi Museum of Natural Sciences
Mississippi State University
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MISSISSIPPI ACADEMY OF SCIENCES AWARD WINNERS 2018

Contribution to Science

Sukumar Saha, PhD

USDA/ARS Research Geneticist

Sukumar Saha is working as a Research Geneticist with the Genetics and Sustainable Research Unit, USDA/ARS, Mississippi State, MS. He is internationally recognized as an authority in cotton genomics and cytogenetics. He has developed genetic resources used by the scientists all over in the world.

Dr. Sukumar Saha, a USDA/ARS Research Geneticist, is well known as an international authority in cotton cytogenetics and genomics publishing over 100 peer-reviewed articles. He also received the "2010 Cotton Genetics Research Award" by the U.S. Commercial Cotton Breeders, the "2011 Cotton Researcher of the Year award" by ICAC and the "2016 CSSA International Service Award". He made major impacts in three areas: 1) interspecific chromosome substitution line development; 2) international agricultural research and 3) DNA marker development. He was the lead scientist to demonstrate for the first time that interspecific chromosome substitution line is a novel way for Upland cotton improvement by targeted introgression of desirable traits from wild species. He also patented a RNAi-*Phytochrome A* cotton line with early flowering, high yield, and superior fiber qualities in collaboration with other scientists. Currently the Proloq cotton lines using this technology are cultivated over 60,000 hectares in Uzbekistan.

Dudley Peeler Award

Contribution to the Mississippi Academy of Sciences

Ralph Didlake, MD

Associate Vice Chancellor for Academic Affairs
University of Mississippi Medical Center

Dr. Ralph Didlake was appointed chief academic officer in 2013. A native of New Mexico, Didlake is a graduate of the University of Mississippi and the University of Mississippi School Of Medicine. He trained in general surgery at UMMC, including two years in the study of transplantation research in the experimental surgery laboratory founded by Dr. James Hardy. He later completed a surgical fellowship in organ transplantation at the University of Texas Health Science Center in Houston.

After practicing transplant, general and vascular surgery for 23 years, Didlake developed a compelling interest in the human context of modern medical and surgical care. This interest led him to pursue a master's degree in bioethics and health policy from the Neiswanger Institute for Bioethics at Loyola University, Chicago. In 2008, he was appointed director of the UMMC's newly established Center for Bioethics and Medical Humanities, a position he continues to hold. He is also professor of surgery. Dr. Didlake is a life member of the Academy and has been supporter of both our state and national academy of sciences.

Didlake is a fellow of the American College of Surgeons and is a member of the American Society for Bioethics and Medical Humanities, among many other organizations. He is the author of numerous peer-reviewed articles, book chapters and abstracts and has been principal investigator or co-investigator on a number of National Institutes of Health and foundation grants.

Didlake has shepherded the Medical Center's long-range, interdisciplinary commitment to enhancing professionalism.

In his spare time, he enjoys restoring antique radios and has an interest in poetry criticism, especially20th century Russian poets. He and his wife Millie are enjoying their first grandchild.

2018 Dodgen Lecture

Thursday, February 22, 2018
3:30 p.m.

The Rise of the Machines and the Impact on Mississippi

Given by

Duane Armstrong

Duane Armstrong is the Chief of the Advanced Technology & Technology Transfer branch at NASA's John C. Stennis Space Center in Hancock County, Mississippi. An electrical engineering graduate of Mississippi State University, he has worked for NASA for thirty-one years. Mr. Armstrong is a recipient of NASA's Exceptional Service Medal and numerous other honors. During his tenure at Langley Research Center in Hampton, Virginia, and Goddard Space Flight Center in Greenbelt, Maryland, Mr. Armstrong helped create science instruments that flew on the space shuttle, research aircraft and multiple satellites for NASA and the Department of Defense. These instruments conducted research in Earth science (atmospheric chemistry), space science (mapping micrometeoroids and orbital debris), heliophysics (Earth-Sun interaction), and missile defense. Mr. Armstrong also conducted research in fields such as precision measurement quantum sensors, radiation-hardened electronics for space systems, the fault tolerance of nanoelectronic computing architectures, and novel nanophotonic detectors.

Mr. Armstrong manages NASA's technology development program at Stennis Space Center. Stennis engineers are developing new valves that are more reliable and more cost effective that commercial options, energy harvesting techniques to enable economical monitoring of large systems, novel propulsion systems to enhance the capabilities of small satellites, computational modeling techniques to predict the effects of rocket fuel detonations, and intelligent, autonomous systems to safely and efficiently operate critical systems without human intervention.

Mr. Armstrong also manages NASA's technology transfer program at Stennis Space Center to ensure that technologies developed for NASA missions are broadly available to the public, maximizing the benefit to the nation. Over the last two years Mr. Armstrong negotiated more patent licenses for Stennis technologies than were licensed in the previous twenty years combined. Under his leadership, the intellectual property created by Stennis is now licensed in thirty states across the country and twenty countries around the world. Furthermore, Mr. Armstrong has created a network of over 500 institutions across Mississippi and Louisiana to inform the public about the benefits of NASA research and development in daily life, and to educate students and industry about the opportunities to utilize NASA intellectual property in business.

Finally, Mr. Armstrong serves as a strategist to help Stennis Space Center solve difficult problems and adapt to changing market conditions so the center can thrive for decades to come. His recent team generated new partnerships with Hancock County and the Mississippi Wireless Communication Commission, provided a framework to solve problems that have lingered for decades, and significantly improved critical services while saving approximately $10M over ten years.

Abstract

Machine learning has emerged as an increasingly powerful force that will transform society in ways unprecedented in the 10,000 year history of human civilization. It will drive market forces that determine which jobs are available and how that work is done. There will be significant benefits; however, Mississippi is vulnerable to the disruptions that will occur. This presentation will provide a brief history of machine learning from its humble beginnings to the powerful systems available today and a look ahead to the next generation of intelligent systems. It will explore the fundamental impact of machine learning and autonomous systems on employment, education, industry, government, medicine and public health, with an emphasis on the potential impacts to Mississippi. Change is coming.

Plenary Speaker

Sponsored by HHMI and Mississippi INBRE

Friday, February 23, 2018
12:00 p.m.

Indispensable strategies to be a standout student: Going back to basics

Given by

Babu P. Patlolla, PhD
Dean, School of Arts and Sciences
&
Professor
Department of Biology
Alcorn State University

Dr. Babu Patlolla was appointed Dean of Arts and Sciences at Alcorn State University in 2013. In addition to his current position as a dean, he also is a professor in the biology department at Alcorn State University. Dr. Patlolla received his Bachelor of Science in Biology and Chemistry and a Master of Science in Genetics from Osmania University, India. He received a second Master of Science in Biology and his PhD in Environmental Sciences from Jackson State University. Dr. Patlolla joined Alcorn State University in 1997 as an assistant professor in the Department of Biology and by 2004, he was appointed as Chair. His leadership capability was recognized by the school's administration, and in 2009, he was appointed associate dean of the School of Arts and Sciences. During his tenure at Alcorn State University, he has secured over 1.7 million dollars in external funding. He has conducted four-week summer workshops for K-12 math and science teachers from neighboring school districts for eight years. With funding from the Mississippi Institutions of Higher Learning, he was able to establish a '**Teacher Resource Center',** which lends instructional equipment such as laptops, LCD projectors, digital cameras, scanners, and research experimental kits to K-12 teachers, students and faculty at Alcorn State University.

Dr. Patlolla's life is dedicated to educational service in our state. He serves or has served on prestigious committees at Alcorn State University (Academic Priorities Committee of Presidential Transition Team, Faculty focus group for strategic planning, faculty senate, Chair of the Research Council, NCATE standards committee, and Chairman for the Institutional Review Board (IRB)) and at the state level (Mississippi University Research Authority (MURA) Board and Mississippi K-12 Science Framework Revision Team). On the national level he serves as a peer reviwer for various science journals and as a reviewer for human anatomy and physiology, biostatistics and zoology text books. Dr. Patlolla is a long-time life member, contributor, and supporter for the Mississippi Academy of Sciences.

In his spare time, he enjoys spending time with his wife, Dr. Anita Patlolla, and their children, Shiva and Sapna.

82nd Annual Mississippi Academy of Sciences Meeting

February 22-23, 2018
The University of Southern Mississippi
Thad Cochran Center
Hattiesburg, MS

The MAS, in its commitment to recognize and promote novel student research, would like to announce the following prestigious awards:

1. Millsaps Undergraduate Scholars Symposium

Honoring Excellence in Science in Mississippi
Symposium Chairman: Dr. Timothy J. Ward | Associate Dean of Sciences, Millsaps College
Event Coordinator: Dr. Gerri Wilson | MAS Executive Assistant
Millsaps College, Jackson, MS

This symposium, established with support from the Howard Hughes Medical Institute (HHMI), is intended to expand the scope and depth of opportunities for undergraduate student researchers to meet other student researchers and to provide a dedicated venue to disseminate and present their research activities. Participation in undergraduate research increases self- confidence, independence, and critical thinking skills. Disseminating one's results by participating in conference symposia develops communication and presentation skills. These experiences create and foster a life-long quest for research and discovery. The symposium seeks to promote all levels of science education and is dedicated to increasing the number of people who pursue science-related careers and to broadening access to science for all. Student researchers who have shown outstanding achievement in science and engineering research may be selected by their division chairs to compete for these outstanding symposium awards.

Criteria for Selection of recipients:

1. Each division chair(s) and vice chair(s) of the 13 divisions will select the **top 20% of undergraduate student abstracts** to represent their division and present in the Millsaps/HHMI sponsored lunch award symposium, "Honoring Excellence in Science in Mississippi," on Friday February 23rd from 12:00 pm – 3:00 pm. Student's name must appear as first author in both abstract and poster.
2. After presenting in their division, the nominated students will agree to present their posters in the poster symposium following the provided lunch on Friday from 1:00 pm – 3:00 pm. Failure to physically present at their respective division the day prior will disqualify the selected presenters from competing in the symposium. First author must be present to compete and presentation by a co-author will not be accepted.
3. Award prizes will be presented immediately at the end of event as follows:

   1st Place: Certificate plus $250; 2nd Place: Certificate plus $200; 3rd Place: Certificate plus $150; 4th Place: Certificate plus $100; and honorable mention for 5th – 6th winners. Each selected presenter will receive a MAS certificate of achievement.

2. Mississippi INBRE Graduate Scholars Symposium

Honoring Excellence in Science in Mississippi
Symposium Chairman: Dr. Glen Shearer | Program Coordinator, Mississippi INBRE
Event Coordinator: Mrs. Jamie Lott | Events and Public Relations Coordinator
The University of Southern Mississippi, Hattiesburg, MS

Sponsored by Mississippi IDeA Network of Biomedical Research Excellence (INBRE), this symposium is intended to promote and recognize meritorious research conducted by graduate students. Mississippi INBRE is a network of colleges and universities throughout Mississippi with the goal of enhancing biomedical research infrastructure, funding, and training opportunities to better the development of the next generation of researchers in Mississippi. Funded by the National Institutes of Health and housed at The University of Southern Mississippi, the mission of Mississippi INBRE is to reach out to Mississippians in order to improve health throughout the state and to engage talented researchers and students in biomedical research projects that will increase the state's research competitiveness as well as impact the health of citizens of Mississippi.

Criteria for Selection of recipients:

1. Each division chair(s) and vice chair(s) of the 13 divisions will select the top **20% of graduate student abstracts** to represent their division and present their work in the Mississippi INBRE sponsored lunch award symposium, "Honoring Excellence in Science in Mississippi," on Friday, February 23rd at 10:00 am – 1:00 pm. Student's name must appear as first author in both abstract and poster.
2. After presenting in their division, the nominated students will agree to present their posters in the poster symposium on Friday from 10:00 am – 12:00 pm. Lunch will be provided from 12:00pm – 1:00pm. Failure to physically present at their respective division the day prior will disqualify the selected presenters from competing in the symposium. First author must be present to compete and presentation by a co-author will not be accepted.
3. Award prizes will be presented immediately at the end of event as follows:

   1st Place: Certificate plus $250; 2nd Place: Certificate plus $200; 3rd Place: Certificate plus $150; 4th Place: Certificate plus $100; and honorable mention for 5th – 6th winners. Each selected presenter will receive a MAS certificate of achievement.

82nd Annual Mississippi Academy of Sciences Meeting

Mississippi INBRE Graduate Scholars Symposium

Honoring Excellence in Research in Mississippi
Symposium Chairman: Dr. Glen Shearer | Program Coordinator of Mississippi INBRE
Event Coordinator: Mrs. Jamie Lott| Events and Public Relations Coordinator
University of Southern Mississippi, MS

Symposium Program: All posters have to be assembled by **Thursday 2/22/2018 no later than 12:00 PM** and dismantled after **after 3:00 PM on Friday 2/23/2018**. All students **must be present** on both days and lack of adherence with this schedule will result in disqualification from the competition.

Thursday

5:00-7:00	**Judging of students posters will begin immediately after Dodgen Event.**

Friday

12:00-1:00	**Symposium Plenary Speaker and Lunch**
1:00-1:20	**Opening and Introduction Remarks, Dr. Glenn Shearer; Symposium Chair**
1:30-1:40	**President's Remarks, Kenneth Butler; MAS President**
1:40-2:25	**Poster competition (Visit to Posters- if the Judges have not finished)**
2:25-2:55	**Presentation of Awards: Drs. Shearer and Kenneth Butler**
2:55-3:00	**Closing Remarks: Dr. Glenn Shearer: Chair of the Symposium**

(Times subject to change- announcements of any changes to the schedule will be made by the Symposium Chair-following the plenary speaker)

Awardees must be present at the awards event and monitory award will not be honored for no show by the student winners at the awards ceremony

82nd Annual Mississippi Academy of Sciences Meeting

Millsaps Undergraduate Scholars Symposium - Honoring Excellence in Science in Mississippi

Symposium Chairman: Dr. Timothy J. Ward | Associate Dean of Sciences
Millsaps College, MS
Dr. Gerri Wilson: MAS Executive Assistant

Symposium Program: All posters have to be assembled by **Thursday 2/22/2018 no later than 12:00 PM** and dismantled after **after 3:00 PM on Friday 2/23/2018**. All students **must be present** on both days and lack of adherence with this schedule will result in disqualification from the competition.

Thursday

5:00-7:00	**Judging of students posters will begin immediately after Dodgen Event and will continue on Friday.**

Friday

12:00-1:00	**Symposium Plenary Speaker and Lunch**
1:00-1:20	**Opening and Introduction Remarks, Dr. Tim Ward; Symposium Chair**
1:20-1:30	**President's Remarks, Kenneth Butler; MAS President**
1:30-2:15	**Poster competition (Visit to Posters- if the Judges have not finished)**
2:15-2:25	**Dr. Hamed Benghuzzi: MAS Executive Director**
2:25-2:55	**Presentation of Awards: Drs. Ward and Sukumar Saha**
2:55-3:00	**Closing Remarks: Dr. Tim Ward: Chair of the Symposium**

(Times subject to change- announcements of any changes to the schedule will be made by the Symposium Chair-following the plenary speaker)

Awardees must be present at the awards event and monitory award will not be honored for no show by the student winners at the awards ceremony

DIVISIONAL SYMPOSIA AND WORKSHOPS
Thursday, February 22, 2018

ECOLOGY AND EVOLUTIONARY BIOLOGY
8:30 AM-12:00 PM
Room: TC 226

SYMPOSIA ON ECOLOGICAL DIVERSITY AND THE ENVIRONEMNT
***Organizers*: Dr. AHM Ali Reza and Dr. Nina Baghai-Riding**
Delta State University

Mac H. Alford, Ph.D., Professor, Department of Biological Sciences, University of Southern Mississippi, Hattiesburg, MS 39406.

Title: **'Project *Magnolia Grandiflora*, Mississippi's Digital Herbarium and Plant Atlas'**

Dr. Alford will discuss efforts of universities and museums in Mississippi in digitizing (photograph, database, and georeference) their plant collections, and how the digitized records are being used for education and to generate an updated checklist and atlas of vascular plants.

Dr. Alford is a native of Liberty, Mississippi, and developed an early interest in plants from his parents and from 4-H activities. He studied biology and chemistry at Mississippi College, earned an M.S. in botany from Duke University, and then completed a Ph.D. from Cornell University studying the systematics of tropical relatives of willows and cottonwoods. After teaching one year at the Ohio State University, he returned to Mississippi in 2005 to teach at the University of Southern Mississippi, where his research continues to focus on plant systematics.

Dr. Cathy Shropshire, Retired Wildlife Biologist from Mississippi

Title: **'Pursuing A Dream - Protecting Mississippi's Natural Resources'**

Dr. Shropshire's presentation will be a portrayal of Fannye Cook, who helped establish the Mississippi Game and Fish Commission in 1932. She founded and became the director of the agency's first museum and is responsible for much of the comprehensive research and for many of the first publications concerning the plants and animals of Mississippi.

Dr. Shropshire is a wildlife biologist, retired from the Mississippi Department of Wildlife, Fisheries, and Parks. Following retirement she served for over 11 years as Executive Director of the Mississippi Wildlife Federation, and is now the theatrical incarnation of Fannye Cook. Dr. Shropshire is the author of "Pursuing a Dream – Protecting Mississippi's Natural Resources" and she is the costume designer and tailor for her Cook portrayal. She resides in Terry, Mississippi.

Dr. Libby Hartfield, Mississippi Museum of Natural Science

Title: '**Pursuing A Dream - Protecting Mississippi's Natural Resources'**

Libby Hartfield has spent forty years introducing nature to children and adults through hands-on programs and exhibits. Hartfield joined the staff of the Mississippi Museum of Natural Science and spent a decade as Education Coordinator. She developed science education programs for families, scouts, and schools with an emphasis on the conservation of native plants and animals. In 1988 she stepped up to the directorship of the Museum of Natural Science and began planning the museum's new home in Le Fleur's Bluff State Park. The building was opened to the public in 2000.

Hartfield soon began raising funds for a research addition that was dedicated in 2012. After serving as Director of Mississippi State Parks for one year, Libby Hartfield retired in 2015 after 37 years of service to the Mississippi Museum of Natural Science. She currently cohosts the popular radio show Creature Comforts for Mississippi Public Broadcasting.

Donald A. Yee, Ph.D., Associate Professor, Department of Biological Sciences, University of Southern Mississippi, Hattiesburg, MS 39406.

Title: **'Vectors from Space. How Nutrient Stoichiometry Can Help Us Understand the Ecology and Evolution of Mosquitoes'**

Mosquitoes are one of the most important vectors of human and animal disease, however we lack basic knowledge on the ecology of most species. His presentation will focus on how the allocation of nitrogen and carbon (stoichiometry) varies across species and genera of mosquitoes from the United States.

Dr. Yee was born and raised in Michigan and received his B.S. in Biological Sciences from the University of Michigan-Dearborn, his M.S. in Zoology from Texas Tech University, and his Ph.D. in Biological Sciences from Illinois State University. He then completed his post doctoral training at the University of Calgary before joining the faculty in the Department of Biological Sciences at the University of Southern Mississippi. His lab focuses on the ecology of medically important mosquitoes, including their spatial and temporal patterns, interactions with native species, how nutrient stoichiometry affects their ecology and disease, larval feeding behavior, and phylogenetic relationships among species.

Dr. Diana Outlaw, Associate Professor, Department of Biological Sciences, Mississippi State University, Mississippi State, MS 39762

Title: **'Evolution and Diversification of Malaria Parasites'**

Dr. Outlaw will discuss the ongoing search to understand the breadth of diversity in malaria parasites found in wildlife. She will elaborate on some of the possible mechanisms of speciation that are responsible for this diversity.

Dr. Outlaw is a native of California, and graduated with a Bachelor's of Science in Biology from Sonoma State University in northern California. She earned her Master's in Biology also from Sonoma State University, and then completed a Ph.D. in Biology at the University of Memphis. She conducted a postdoctoral fellowship focusing on systematics of avian malaria parasites with Dr. Robert Ricklefs at the University of Missouri-St. Louis. Dr. Outlaw was hired in 2009 to the faculty of Biological Sciences at Mississippi State University, and currently works on questions about malaria parasite diversity, host-vector-parasite transmission and adaptive molecular evolution of hosts and parasites.

HEALTH SCIENCES
10:00 AM-12:00 PM
Room: TC Ballroom I

Population Health Symposium I

MENTAL HEALTH AND DISEASE

9:45-10:10 AM **James E. Keeton, MD**
University of Mississippi Medical Center

Title: "Mississippi Health Care. Present and Future"

Dr. James E. Keeton will discuss current prospective of health care in Mississippi, the impact on population health including pediatric health care and future outlook. Dr. James Keeton is an emeritus professor of surgery and pediatrics.

He served as UMMC's Vice Chancellor for health affairs and Dean of the School of Medicine from July 2009 to February 2015. He retired in January 2017 and holds emeritus status in these roles. Dr. Keeton is a fellow of the American Academy of Pediatrics and certified by the American Board of Urology.

During his tenure, Dr. Keeton oversaw planning of and secured funding for a new, state-of-the-art School of Medicine building on the UMMC campus that is allowing UMMC to expand its medical class to train more doctors for Mississippi.

Dr. Keeton was instrumental in planning the construction of the University Heart Center, the Translational Research Center and the future planning for expansion of the Blair E. Batson Children's Hospital that will significantly advance pediatric health care in the state of Mississippi.

Dr. Keeton guided the UMMC through a multi-year effort to implement an enterprise electronic health record that culminated in conversion from paper to computer records in a single day in June 2012. In addition, Dr. Keeton was instrumental for the UMMC's liver transplant program which was re-established after a 22-year interruption, and the UMMC surgeons performed Mississippi's first pancreas transplant.

He was named the 2014 Distinguished Medical Alumnus for his distinctive contributions to the field of medicine. Additionally, in 2017 Dr. Keeton was inducted to the "Alumni Hall of Fame".

10:15-10:40 AM **Julie A. Schumacher-Coffey, PhD**
University of Mississippi Medical Center

Title: "Patient-Provider Communication Science and Art"

Dr. Schumacher-Coffey will discuss how evidence-based communication strategies developed in the area of substance use disorders are being applied to a broad range of public health issues. Dr. Schumacher-Coffey is an Associate Professor of Psychiatry and Human Behavior and Vice Director of the Clinical Psychology Training Consortium.

Dr. Schumacher, is a licensed clinical psychologist who practices cognitive behavioral therapy and motivational interviewing. Dr. Schumacher-Coffey joined the UMMC faculty in July 2004.

Dr. Schumacher, received her PhD. in clinical psychology from the State University of New York at Stony Brook in 2001, then postdoctoral training at the National Institute of Alcohol Abuse and Alcoholism. She continued her fellowship in Alcohol Etiology and Treatment at the University, at Buffalo's Research Institute on Addictions and then remained at RIA as a Research Scientist.

Dr. Schumacher's primary research interests are in the areas of drug and alcohol abuse, violent behavior, and motivational interviewing. Her research and educational activities have been funded by the National Institute on Alcohol Abuse and Alcoholism and the National Institute on Drug Abuse.

10:45-11:10 AM **Kevin Freeman, PhD**
University of Mississippi Medical Center

Title: "Beyond prescription opioids: Novel pain therapeutics with reduced abuse liability"

Dr. Freeman will discuss new strategies in drug development aimed at decreasing abuse of prescription opioids.

Dr. Freeman received his PhD. in Psychology from American University in Washington, DC in 2007, then completed a postdoctoral fellowship in Behavioral Pharmacology at University of Mississippi Medical Center in Jackson, MS. He is currently an Associate Professor in the Department of Psychiatry and Human Behavior at UMMC.

Dr. Freeman's primary research interests are the development of novel abuse-deterrent formulations for prescription opioids and the study of environmental and biological determinants that increase maladaptive decision-making processes that lead to and maintain drug addiction.

11:15-11:40 AM **S. H. Subramony, MD**
University of Florida

Title: " Approaches to treating genetic neuromuscular disorders"

Dr. Subramony is Professor of Neurology at the Center for Neuro-Genetics at University of Florida, Gainesville, FL. He was trained in Neurology and Electromyography/Neuromuscular diseases at the Cleveland Clinic, Cleveland, OH.

He joined the faculty at the University of Mississippi Medical Center from 1980 to 2007, where he was named the Billy Guyton Distinguished Professor of Neurology. Later, at University of Texas Medical Branch in Galveston where he was appointed the Charlotte Warmoth Professor of Neurology (2007 to 2009), before moving to University of Florida in 2009.

His investigative interests have been in the field of inherited ataxias and he brings a wealth of experience in evaluating and managing patients with ataxias. He was involved in the identification and characterization of many families with spinocerebellar ataxias for gene discoveries such as SCA 1, SCA 3 and SCA 6. He has also been involved in identifying novel mutations in some muscle diseases such as central core disease and Bethlem myopathy. He continues to have an active research role in natural history studies of spinocerebellar ataxias and Friedreich ataxia.

Dr. Subramony is involved in ongoing research in muscular dystrophies such as myotonic dystrophy and Duchenne muscular dystrophy. As a founding co-member of the Center for Neurogenetics he actively interacts with scientists that have cutting edge lab programs in myotonic dystrophy and spinocerebellar ataxias. He is an active collaborator with *the Powell Gene Therapy Center* at the University of Florida.

CELLULAR AND MOLECULAR
1:00 -3:00 PM
Room: TC 229

BIOINFORMATICS SYMPOSIUM

INBRE Symposium: Metagenomics to Functional Microbiome

Organizer: Dr. Shahid Karim, Biological Sciences
The University of Southern Mississippi
(Shahid.Karim@usm.edu)

The Mississippi Academy of Sciences annual meeting brings together life and natural sciences from the entire state of Mississippi, and Gulf-South region of the United States to connect, brainstorm, and collaborate. The proposed symposium will provide a platform to discuss advances in bioinformatics analysis of non-model organisms. Although, the focus of our proposed symposium will be on the "biomedical sciences", many of the bioinformatic tools can be applied to a much larger audience of the MAS community. This forum will provide an opportunity to researchers to discuss and cross-cultivate ideas with experts. We expect that the proposed symposium might attract more researchers working with non-model organisms at the annual meeting, as well as expand the current research forum for an increased exchange of ideas across research disciplines within biomedical sciences and computational biology. The symposium will consist of 20 minutes talk with an additional 5 minutes for Q & A session; the full ssymposium lasting approximately 120 minutes.

HEALTH SCIENCES
1:00-3:00 PM
Room: TC Ballroom II/III

POPULATION HEALTH II

PRECISION/PERSONALIZED MEDICINE

1:00 PM **Dr. D. Olga Mcdaniel,**
University of Mississippi Medical Center
Brief Introduction

1:05-1:30 PM **Robert Hester, PhD**

University of Mississippi Medical Center

Title: "Mathematical model of integrative physiology"

Dr. Robert Hester will discuss mathematical model of physiological processes that are useful in understanding physiological mechanisms and physiological interactions that can be used to predict clinical and experimental responses in a biologic system.

Dr. Hester is Professor of Physiology, Interim Chair of the Department of Data Sciences and the Director of Center for Computational Medicine, at the University of Mississippi Medical Center.

Dr. Hester's educational background is in Biomedical Engineering. He received his PhD in Biomedical Engineering in 1982 from the University of Mississippi Medical Center.

Dr. Hester's current research is focusing on the computational simulation of human physiology started by Drs. Guyton and Coleman in the 1970s. HumMod is the latest version of Dr. Coleman computer simulation software. For the last 15 years Dr. Hester has been leading the Center for Computational Medicine in the development of HumMod and other integrative physiological models. HumMod is being used for education, research and clinical trials. Dr. Hester is a member of American Physiological Society, Microcirculatory Society, and Biomedical Engineering Society.

1:35-2:00 PM **William Andrew "Drew" Pruett, PhD**

University of Mississippi Medical Center

Title: "HumMod: A tool for understanding and predicting individual response to therapy"

HumMod is an integrated model constructed from multiple simple models. The feedback between these simple models allows unexpected, but observed, phenomenon to occur, including resistance to pharmaceutical or device interventions. Understanding the interaction of these simple models is key to understanding system behavior. In this talk, Dr. Pruett will discuss physiological modeling with HumMod and the simulation of clinically significant populations as a means of delivering personalized care to patients.

Dr. Pruett is Assistant Professor of Physiology and Biophysics. His educational background is in Mathematics. Dr. Pruett received his PhD in Mathematics, 2010 from Baylor University, Waco, TX. Dr. Pruett is a mathematician trained in representation theory, geometry, and combinatorics with a broad knowledge base in numerical analysis and algorithms. Additionally his training is in cardiovascular, renal, and endocrine physiology. He has in depth knowledge of mathematical modeling of physiological systems in an integrative setting.

Dr. Pruett is active member of the Center for Computational Medicine at UMMC. As a member of Dr. Robert Hester's laboratory he has been integral in the development of HumMod and other physiological models utilized in research and clinical trials.

2:05-2:30 PM **Paul Byers, MD**
Mississippi State Epidemiologist, Director

Title: "Vaccines, Population Diversity and Compliance"

Dr. Byers will discuss the vaccine effects and population diversity, such that factors that influencing heterogeneity in the immune responses induced by vaccines may relate to genetic background. Such integral association could contribute to the development of novel vaccines that could be more at personalized/population level instead of a one size fits all approach.

Dr. Byers is a Jackson native and resident. He earned his Bachelor of Science degree from Millsaps College in Biology and Medical Degree from the University of Mississippi Medical Center in 1992.

During his tenure at the Mississippi State Department of Health (MSDH), Dr. Byers has served as a staff physician in Public Health District V, Medical Director of the Office of Epidemiology, Acting State Epidemiologist, and has filled in as acting District Health Officer in several districts. Dr. Byers has been employed with the Mississippi State Department of Health since 1993 in the position of Medical Director for the Copiah County and Hinds County Health Departments. He has previously served as the Deputy State Epidemiologist and Acting State Epidemiologist.

Dr. Byers has been an essential part of the Office of Epidemiology since 2005, investigating outbreaks and responding to all kinds of public health emergencies, said Dr. Mary Currier, the Mississippi State Department of Health Officer. Dr. Byers was "Keynote Speaker" in Population Health Symposium at the 81st Annual Mississippi Academy of Sciences Meeting, 2017.

CHEMISTRY
2:05 -3:05 PM
Room: TC 210

CHEMISTRY ENTREPRENEURS

Moderator: Victor Ogungbe
Jackson State Univeristy

2:05 – 2:25 PM

Samuel H. Lahasky, PhD, R&D Specialist at Oxiteno USA

http://www.oxiteno.com

"**AVOIDING THE *VALLEY OF DEATH* FOR EMERGING MATERIALS SCIENCE-BASED COMPANIES**"

Samuel Lahasky will discuss the challenges and obstacles that await the entrepreneurial scientist as he/she ventures into the sector of research-based, start-up companies. This presentation will encompass the hurdles associated with small and large businesses, focusing on the issues that pertain to both.

Samuel Lahasky is currently a research and development specialist at Oxiteno USA, one of the world's leading manufacturer of ethoxylated materials and surfactants. His career focus has mainly been associated with the design and manufacture of materials and coatings. After receiving a Bachelor's degree in chemistry from Tulane University, Samuel attended Louisiana State University, where he was awarded a PhD for his work in the production of stimuli-responsive peptidomimetic polymers. From there, he did his post-doctoral research in the Materials Engineering department at the University of Delaware, where he worked on nanoscale assembly of peptide–containing multiblock polymers. After his post-doctoral fellowship, he worked in the small business sector, where his research was funded up to nearly a million dollars in military SBIR grant funding, for which he guided the development of personal protective equipment for the wartime fighter. Recently, Samuel took his expertise in small-business start-ups to Oxiteno USA, which is a world leader in the alkoxylation of raw and synthetic materials. Though being a major competitor in the global surfactant industry, Oxiteno is new to the US market, forcing them to adapt the same obstacles as any start-up would. Coupling his past small business experience with his recent move to Oxiteno, his expertise in tech-oriented, start-up companies (large and small) has afforded him a unique vantage point to the obstacles that await entrepreneurs in the materials science sector.

2:25 – 2:45 PM

Jerome Hamilton, CEO Open Therapeutics
https://opentherapeutics.org/

Scientific Collaboration for Therapeutic discovery, development, and delivery: Open Science has no Borders

In the first quarter of 2018, Open Therapeutics plans to launch Therapoid™ a new crowdsourcing collaboration platform created by a group of entrepreneurs led by Jason E. Barkeloo and myself. Therapoid.net is an international scientific platform to develop new drugs and therapies.

For decades, two facts have reigned supreme when it comes to drug development: drug development is slow and it is expensive. A 2014 report from Tufts University found that it costs $2B and takes more than 12 years to bring a pharmaceutical to the market. Further compounding the challenge is that 93% of drugs that start development never make it to market -- placing tremendous pressure on the drugs that do make it to pay for the investment in the ones that don't.

Our passion is bringing drug and therapy costs down and making healthcare available to all people regardless of geography. We believe strongly that scientific collaboration free of constraints is paramount to promoting diversity in research and reducing the cost of healthcare. This new web platform — Therapoid — will enable scientists engaged in similar research to collaborate with other researchers in an open environment. Collaborators can then pre-publish their results to a preprint server for publishers to access. Open Therapeutics seeks to enable researchers to provide underserved markets with novel therapeutics. It does this by breaking down silos of knowledge through a copyleft sharing economy, which as many of you know, refers to the practice of offering people the right to freely distribute copies and modified versions of a work with the stipulation that the same rights be preserved in derivative works down the line.

Therapoid's mission is to make healthcare more accessible and affordable by pioneering new approaches to therapeutic research and development, and Open Therapeutics is answering the call.

2:45 – 3:05 PM

Monica Tisack, Ph.D., Director of The Mississippi Polymer Institute (MPI)

https://www.thepolymerinstitute.com/

YOU, ENTREPRENEURIALISM, AND SCIENCE = YES

Dr. Tisack will discuss local capabilities available to scientists and entrepreneurs and other items of consideration for budding entrepreneurs and science-based start-ups: Agenda items include the current state of MS start-ups, common terminology, funding sources, business resources, common pitfalls, and tips on getting started.

Monica is the director of the Mississippi Polymer Institute (MPI), working at the intersection of academia, entrepreneurism, and commercial industry. The non-profit Institute catalyzes and supports the growth of advanced materials at all stages of business maturity, and assists in workforce training and educational outreach. Work at MPI allows collaborative interaction with cutting-edge polymer research at the School of Polymer Science and Engineering, with start-ups located on-site at The Accelerator, local inventors and well-established multinational companies.

Monica has a Ph.D. in Polymer Science from the University of Southern Mississippi and a passion for commercialization of new products. She was born in Columbus, MS and raised near Leaf, MS. Prior to joining MPI at the University of Southern Mississippi in January 2017, she spent 20 years in the polymer industry working with nylon, Nafion™, ETFE, PTFE, Teflon™, and Tedlar™ polymer products with DuPont and its subsequent spin-off, The Chemours Company. Before graduate school, she interned as a technician at Eastman Chemical Company in their polyester division.

A polymer science background has allowed her to work across many different market spaces, including but not limited to Consumer Packaging, Industrial and Apparel Fibers, Fuel cell Batteries, Pharmaceutical and Agricultural Active Ingredients, Industrial and Consumer Coatings, Chloralkali membrane chemical production, Medical Products, and Solar Energy. Previous roles include R&D principle investigator, technical service scientist, market and business development managers, sales manager, growth leader, platform pricing and competitive intelligence leader, and business and product manager. Her work has taken her all over the world to interface with customers and plant operations.

SCIENCE EDUCATION
2:00 -3:00 PM
Room: TC 210

WORKSHOP: STEMI

Tony Beck, Ph.D.
Science Education Partnership Award (SEPA)
Center for Research Capacity Building
Natcher, Building 45, Room 2AS53A
National Institute of General Medical Sciences
National Institutes of Health

DIVISIONAL SYMPOSIA AND WORKSHOPS
Friday, February 23, 2018

AGRICULTURE
8:00 -11:30 PM
Room: Union C

WORKSHOP

Organizers: Dr. Raja Reddy and Dr. Nacer Bellaloui

THE USE OF COTTON MUTANTS AND NEAR ISOGENIC LINES TO ENHANCE NUTRITION AND PRODUCTION OF COTTONSEED AND LINT

This workshop will be led by Dr. Rick Turley, USDA-ARS, Stoneville, MS

Rick Turley received his B.S. degree in botany with a minor in chemistry from Brigham Young University in 1983. He spent the next two years at Michigan State University studying the biochemistry of plant peroxisomes with Dr. Ed Tolbert. In 1985, he transferred to Dr. Richard Trelease's lab at Arizona State University and investigated the biogenesis of specialized oilseed peroxisomes, called glyoxysomes, with a focus on the enzymes malate synthase and isocitrate lyase. Rick completed his Ph.D. in 1990 then accepted a position as a Research Physiologist in the Cotton Physiology and Genetics Research Unit (now the Crop Genetics Research Unit) at the USDA-ARS in Stoneville, MS. His primary research interest is focused on understanding the development of cottonseed fibers (trichomes) with an emphasis on fiber initiation. Rick has characterized the genotypes of three different lines of fiberless cotton determining the number of loci in each responsible for fiber initiation. He also evaluated differences in the protein profiles and cell wall complex carbohydrates epitopes between fiberless and wild-type cottons, and developed the experimental line, MD 17, the fifth fiberless seed line reported in the literature. Recently, Rick has established a genetic linkage between the initiation of cotton leaf and cottonseed trichomes. His work is expanding to characterize fuzzless and fiberless diploid mutants. Dr. Turley has provided numerous groups with cotton fiber mutants and is presently collaborating with different groups on mapping and elucidating the transcription factors involved. Dr. Turley has served as an adjunct professor in the Biology Department of Delta State University, Cleveland, MS, and as Assistant Editor of the Journal of Cotton Science. He has been a member of American Society of Plant Biologists (previously the American Society of Plant Physiologists) since 1986.

APPLICATION OF SENSORS IN IRRIGATION MANAGEMENT, WATER CONSERVATION, AND CROP PRODUCTION

This workshop will be led by Dr. Daniel (Ken) Fisher, USDA-ARS, Stoneville, MS

Dr. Fisher serves as a Research Agricultural Engineer with the USDA Agricultural Research Service's Crop Production Systems Research Unit in Stoneville, Mississippi. He received a BS degree in Mechanical Engineering from the University of Central Florida, an MS in Agricultural and Irrigation Engineering from Utah State University, and a PhD in Biosystems and Agricultural Engineering from Oklahoma State University. He has worked in the private sector in the aerospace, electromechanical equipment, and agricultural instrumentation industries, and in university and government research institutions.

Dr. Fisher is part of an interdisciplinary team responsible for development and evaluation of technologies for agricultural chemical application, irrigation water management, and improved crop production systems. He is part of a research project entitled "Development of Water Management Technologies for the Mid-South," where his role is to develop and implement novel sensor-based systems for monitoring water resources and detecting crop stress, and to apply improved techniques to aid in irrigation scheduling and water management. His interests include evapotranspiration estimation, irrigation scheduling, microcontroller and sensor circuit design and development, and open-source hardware and software.

ECOLOGY AND EVOLUTIONALY BIOLOGY
Co sponsors-AGRICULTURE/ZOOLOGY
11:00 AM-1:00 PM
Field Trip

FIELD TRIP TO THE LAKE THOREAU ENVIRONEMTNAL CENTER

***Organizers*: Dr. AHM Ali Reza and Dr. Nina Baghai-Riding, Delta State University**
***In collaboration with*: Dr.** Mac Alford, University of Southern Mississippi

Lake Thoreau Environmental Center

The Lake Thoreau Environmental Center (LTEC) is a vital part of the function of the University of Southern Mississippi. It is ideally located just a few miles west of campus and is connected to campus by the Longleaf Trace. The property is rich in history, culture and philanthropy.

The mission of the Lake Thoreau Environmental Center is dual-purposed. First, the Center strives to provide an environment that inspires people of all ages to explore their connections with the natural world. Second, the Center provides a model for protection and stewardship of longleaf pine forests.

The guiding principles for the development of the LTEC are education, research, recreation, and conservation. These guiding principles are intended to direct the development of programs and the allocation of physical spaces as they relate to the Center's role and impact.

The Field Trip

The 2-hours field trip to the LTEC will involve a walk through longleaf pine savannah, a mixed hardwood seepage area, and a small lake as well as a tour of the museum facility that houses the USM herbarium and the fish collection.

- A sign up sheet to participate in the field trip will be provided on Thursday morning.
- Lunch will be arranged with a minimum cost and will arranged by our LTEC host.
- Free transportation will be provided by the organizers.
- We recommend all participants to have comfortable walking shoes and a bottle of drinking water.

SCIENCE EDUCATION
8:00 AM -4:00 PM
Room: 153 Walker Science Building

WORKSHOP- Wolbachia Rodeo

Roping the Future –
Using Competition and Biotechnology to Engage Students in STEM
5 Contact Hours (0.5 CEUs)

Organizer: **Dr. Robin Rockhold**
University of Mississippi Medical Center,
Jackson, MS 39216

The University of Mississippi Medical Center Science Teaching Excites Medical Interest (STEMI) project is supported by a five-year Science Education Partnership Award (SEPA) from the National Institute of General Medical Sciences to promote high school teacher professional development. Developed by one of the master teachers for STEMI, Ms. Kathy McKone, the ***Wolbachia*** **Rodeo** program engages high school students in teams to conduct an inquiry-based, hands-on learning event in which student teams incorporate elements of insect identification, DNA extraction and PCR amplification in a friendly competitive activity. Coupled to the Woods Hole Marine Biological Laboratory's *Discover the Microbes Within* project and with assistance from the Princeton Molecular Biology Training Center (http://hhmi.princeton.edu/satellite-learning-centers), the ***Wolbachia*** **Rodeo** has brought high school students together from schools across central Mississippi to engage in rewarding, scientifically productive, and meaningful biomedical education. **Roping the Future**, hosted by the Division of Science Education, and co-sponsored by the Mississippi INBRE program, the Mississippi Science Teachers Association, as well as the Center for Science and Mathematics Education and Biology Department of the University of Southern Mississippi, is the first formal training event for teachers in the techniques and pedagogy used to support student teams for a *Wolbachia* Rodeo.

Agenda

Wolbachia **Rodeo Timeline for February 23, 2018**	**Time**
-Examine/photograph ants and mosquitoes using dissecting scopes; prepare macerators; review pipetting basics	10:00-10:30
- Insect DNA extraction and purification	10:30-11:20
- Add primers and template DNA to PCR Ready tubes; start PCR	11:20-12:00
MAS Plenary Session: lunch provided during the session	**12:00-1:00**
- Presentation by Dr. S. Stray and Dr. D. Sullivan	1:00-2:00
- Load and run amplified insect DNA into e-Gels	2:00-2:30
- Analyze electrophoresis results to determine *Wolbachia* infection rates in local insect pests	2:30-3:00

This workshop is funded by a Science Education Partnership Award (SEPA) grant, Grant Number 8 R2 5GM129212-03 from the National Institutes of General Medical Sciences (NIGMS), National Institutes of Health (NIH), and by the Mississippi INBRE, funded by an Institutional Development Award (IDeA) from the National Institute of General Medical

Sciences of the National Institutes of Health under grant number P20GM103476. Its contents are solely the responsibility of the authors and do not necessarily represent the official views of the NIGMS or NIH.

Lucy (Kathy) McKone, NBCT is currently a part-time instructor at Copiah-Lincoln Community College. Having taught chemistry and biological sciences in the Lincoln county school district for 30 years, Kathy retired from full time teaching in 2016. She earned a BS and MS degree in science education from the University of Southern Mississippi and obtained National Board Certification in AYA Science in 2003. Attending molecular biology workshops at Cornell, Harvard, and Princeton Universities, empowered her to expand her school district's curriculum by implementing a biomedical research course. In the fall of 2009, Kathy became a host for one of only eleven Princeton Satellite Learning Centers in the nation. Participating in the 2009 Woods Hole Marine Biological Lab's workshop on *Wolbachia*, and working with the University of Mississippi Medical Center in developing a *Wolbachia* module (part of "The Muse of Fire" curriculum) inspired her vision of the ***Wolbachia* Rodeo**. The rodeo, a high-tech competition between high school teams, results in data collection of infection rates in Mississippi's mosquitoes, fleas and red imported fire ants. The first rodeo was held at Copiah-Lincoln Community College in Wesson during December of 2011. During that same year, she received the Presidential Award for Excellence in Mathematics and Science Teaching.

Dr. Betsy Sullivan earned her PhD in Science Education / Biology from the University of Southern Mississippi. She has 33 years of experience in the formal and informal science classrooms. She also adjuncts at Mississippi College in both biology and education departments. She was awarded the Presidential Award for Excellence in Science and Mathematics (PAEMST) in 2013 and has been honored as the 2010 Mississippi Outstanding Biology Teacher of the Year, a 2012 District Teacher of the Year, a 2012 Metro Teacher of the Year, and the 2016 Mississippi Science Teachers Association (MSTA) Distinguished Science Teacher of the Year. She is an active board member of the MSTA. Dr. Sullivan is a lead teacher in the University of Mississippi Medical Center STEMI NIH SEPA grant program.

Denise Thibodeaux earned a BSE in Biology and Chemistry and an MS in Biology from Delta State University. She has taught 24 years on the secondary and community college levels and currently serves as science department chairperson at Cathedral High School and Adjunct Anatomy and Physiology Instructor at Copiah Lincoln Community College in Natchez, MS. She is a lead teacher in the University of Mississippi Medical Center STEMI (Science Teaching Excites Medical Interest) NIH SEPA grant program. Ms. Thibodeaux has been honored as Cathedral STAR Teacher three times, was a state finalist for the PAEMST Award in 2013, and received the Lockheed Martin National Science Olympiad Coaching Excellence Award and the National Association of Biology Teachers Outstanding Biology Teacher Award in 2017. She serves on the Board of Directors of the Mississippi Science Teachers Association.

Dr. Stephen Stray received his undergraduate training at the University of Melbourne (Australia), majoring in Chemistry and Biochemistry, and earned a PhD in Microbiology from the University of Alabama at Birmingham. Following Postdoctoral training in Immunology at the Oklahoma Medical Research Foundation, and in Biophysics and Biochemistry at the University of Oklahoma Health Sciences Center, he joined the faculty of the University of Mississippi Medical Center, where he is now an Associate Professor of Microbiology and Immunology. Dr Stray's current research interests include evolution of viruses, particularly influenza, and developing new virus-based therapies for cancer. Dr Stray has a keen interest in education at all levels, and is the Director for Medical and Dental School courses in Microbiology and Immunology at UMMC.

Dr. Donna Sullivan earned a BS in biology and chemistry at Millsaps and the PhD in microbiology/immunology from Louisiana State University School of Medicine, with postdoctoral training from that latter institution. She is currently Professor Emeritus of Medicine at the University of Mississippi Medical Center (UMMC) and a co-Principal Investigator on the UMMC STEMI NIH SEPA grant. She served as co-director of the UMMC Howard Hughes Medical Institute Base Pair biomedical research mentorship program from 2005 until 2013. She has contributed to development of droplet digital PCR assays for infectious agents, SNPs, and copy number variants, and developed a Molecular Epidemiology Laboratory in conjunction with the Infection Control Office and Clinical Pathology Department at UMMC to identify and track hospital acquired infections employing DNA sequencing.

Dr. Marie Barnard is an Assistant Professor in Pharmacy Administration at the University of Mississippi. Trained as an epidemiologist, her research interests and expertise include social/behavioral determinants of health, program evaluation, and research methodology. She has been the lead evaluator on over 30 projects and participated in more than 40 federal, state, and foundation grants and contracts for evaluation and social/behavioral research initiatives. She currently is the lead evaluator for the UMMC STEMI project.

HEALTH SCIENCES
10:00-11:55 AM
Room: TC Ballroom II

Population Health Interactive Workshop
Workshop Coordinators and Associates:
D. Olga McDaniel, PhD, George Moll, MD, PhD
Jana Bagwell, PhD, Gouri Mahajan, PhD
Jennifer Price, PhD, Raymond Grill, PhD, Frank Spradley, PhD

10:00-10:45

Speaker: Josie Bidwell, DNP, RN, FNP- C
University of Mississippi Medical Center

Title: "Mobile Clinic"

Dr. Josie Bidwell will discuss Mobile Clinic in emergency department use and the association with lowering the health care cost, avoiding ED visits providing health care service to needy population. Dr. Josie Bidwell is an Associate Professor of Nursing and Preventive Medicine at the University of Mississippi Medical Center, where she teaches, Pathophysiology, Pharmacology and Child/Adolescent Health in the undergraduate program. She received her Master of Science degree in Nursing from University of Mississippi Medical Center in 2006, and Doctor of Nursing Practice Degree from UMMC-SON in 2013. Currently, Dr. Josie Bidwell specializes in family medicine, preventive medicine, and school-based health care.

Dr. Bidwell has worked with Southern Remedy since 2012. Dr. Bidwell is the lead author of the Southern Remedy Fitness Prescription. She serves as a Community Health Advocate Master Trainer to provide nutrition, physical activity, and healthy living training to laypersons and health professional students. Dr. Bidwell is the full-time host of Southern Remedy Healthy and Fit on Mississippi Public Broadcasting Think Radio.

10:50-11:35 **Title: "Controlling Diabetes Mellitus - Telemedicine Monitoring and Compliance Enhancement"**

Speakers: George Moll MD, PhD, Keisha Luckey RN, CDE, Mary K Armstrong FNP-CDE
University of Mississippi Medical Center

George Moll MD, PhD

Keisha Luckey RN, CDE

Mary K Armstrong FNP-CDE

Dr. Moll will discuss Diabetes mellitus type 1 (T1DM) patient care for long-term survival and introduce progress with patient telemedicine monitoring presented by Keisha Luckey and Mary K Armstrong UMMC Pediatric Diabetes Coordinators/Educators.

Dr. George Moll is Professor of Pediatrics and Pediatric Endocrinology at University of Mississippi Medical Center. He served as UMMC Chief of Pediatric Endocrine Division for 25 years and stayed on to complete 30 years UMMC service and assist expansion of the Division to now include 4 additional Pediatric Endocrinologists.

Dr. Moll received his Biochemistry PhD and his MD from the University of Chicago, Pritzker School of Medicine. He has diverse co-authored publications and practice experience in endocrinology, diabetes mellitus and Pediatric medicine. He has published 50 peer reviewed papers and 100 abstracts with interests in all areas of Pediatric Endocrinology and over 40 years of diverse practice experience in endocrinology and Pediatric medicine. Dr. Moll actively worked to continue UMMC Sigma XI sponsorship of MAS.

Dr. Moll has co-authored papers regarding hormone receptor and neuroendocrine associated genetic mutations and autoimmune endocrine disorders including T1DM. He has strong interest in childhood obesity quality control projects & research.

Keisha Luckey and Mary K Armstrong have contributed greatly to our UMMC Pediatric Diabetes Care & Teaching Center now recognized as an American Diabetes Association Center of Excellence. Their support of Telemedicine diabetes patient home monitoring has added to UMMC Telemedicine excellence.

HEALTH SCIENCES /CHEMISTY
9:30-10:30 AM
Room: TC Ballroom II

High School Poster Session

SCIENCE EDUCATION
10:00 -11:30 AM
Room TC 210

WORKSHOP: Advanced Teaching Methodologies

INCORPORATING ACTIVE LEARNING IN THE SCIENCE CLASSROOM - METHODOLOGY WORKSHOP FOR TEACHING

Organizers: **Dr. Elizabeth Prewitt, Dr. Virginia Moore, and Dr. Amber McCoulough**

Numerous active learning strategies for the science classroom at all levels of instruction will be and discussed during this workshop. We will also model the use of Team-Based Learning and Problem-Based Learning during this time. Finally, we will talk about strategies to improve engagement in online courses.

Seating is limited to 50 participants. Pre-registration fee of $25 guarantees admission and official certificate of training. On-site registration available until workshop is full.

SCIENCE EDUCATION
1:00 -2:00 PM
Room: TC 210

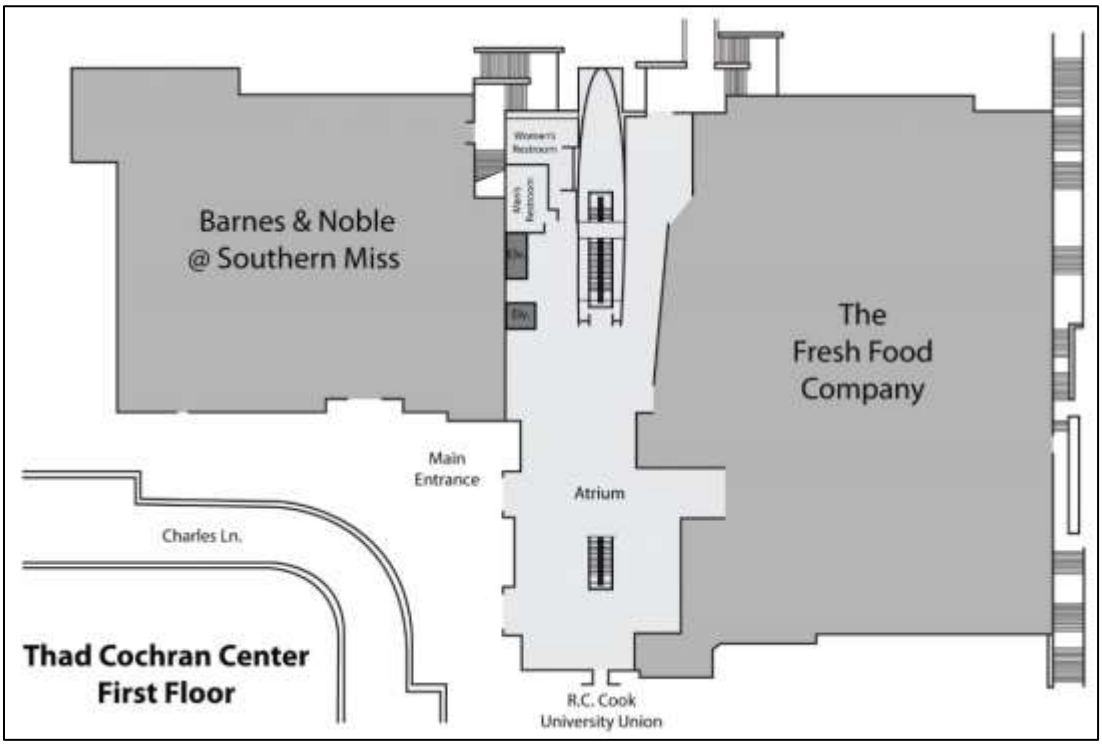
WORKSHOP

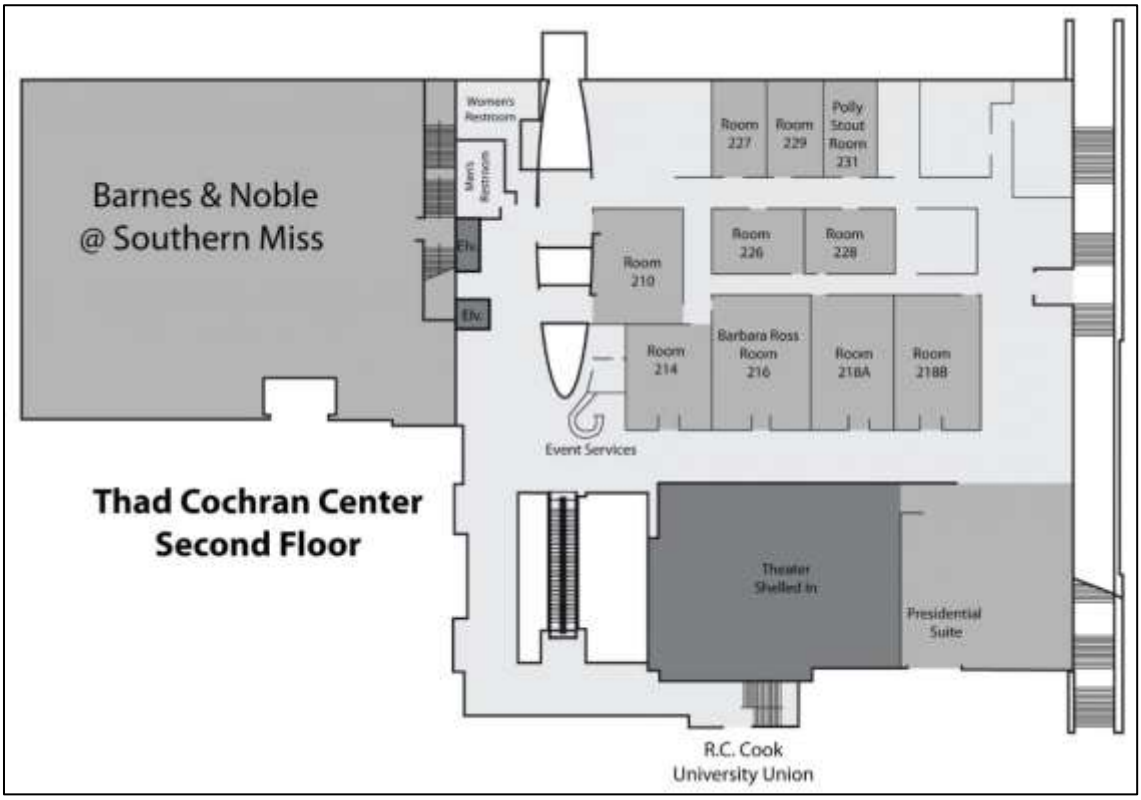
MS COLLEGE AND CAREER READINESS WORKSHOP

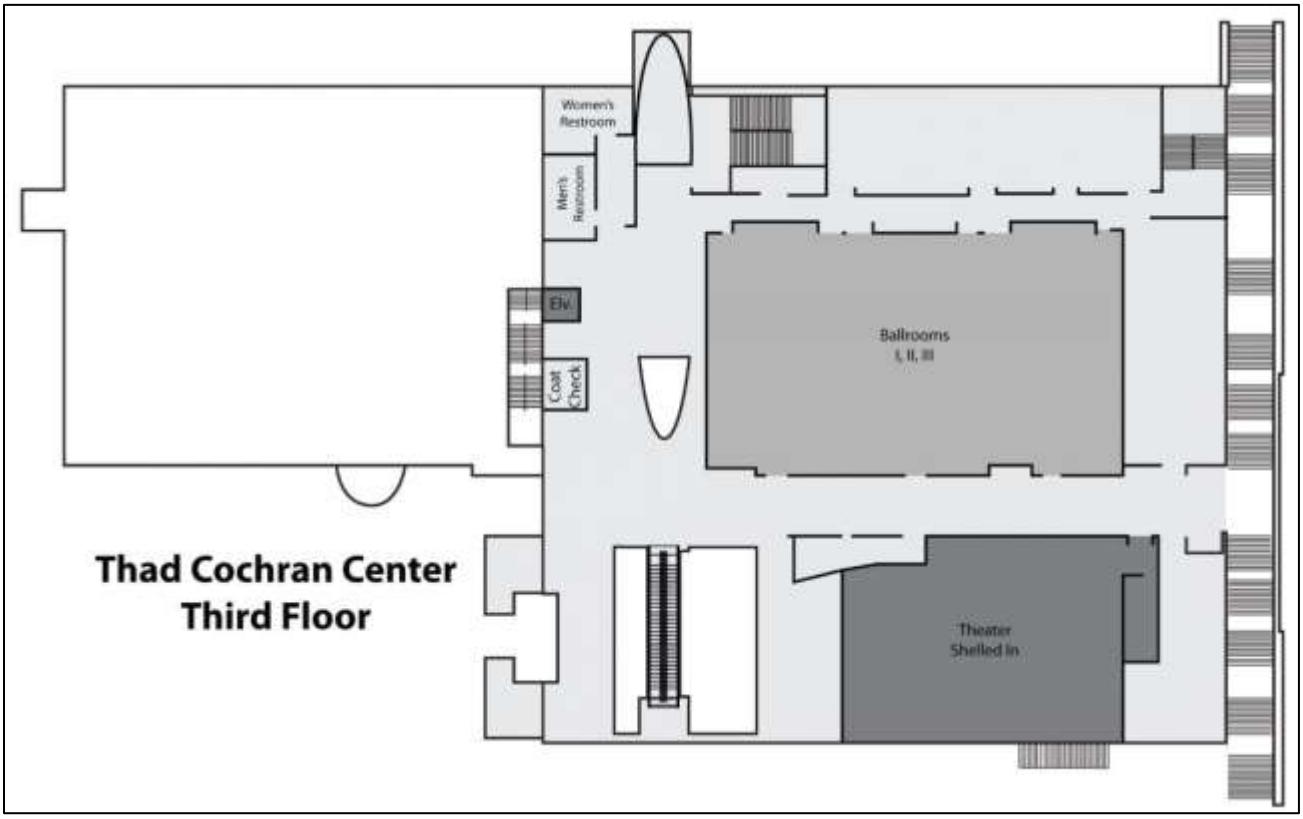
Organizer: **Dr. Jackie Sampsell, Mississippi Department of Education**

During this workshop, an overview of the 2018 Mississippi College and Career Frameworks for Science Education will be discussed.

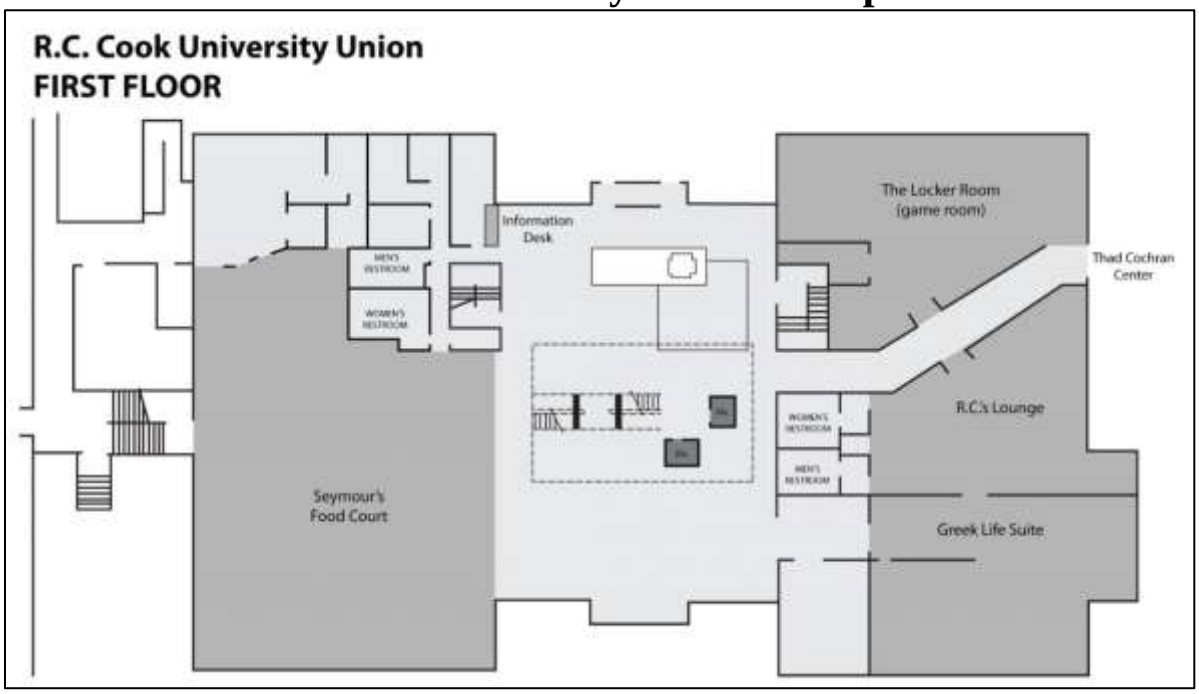
Thad Cochran Center Floorplans

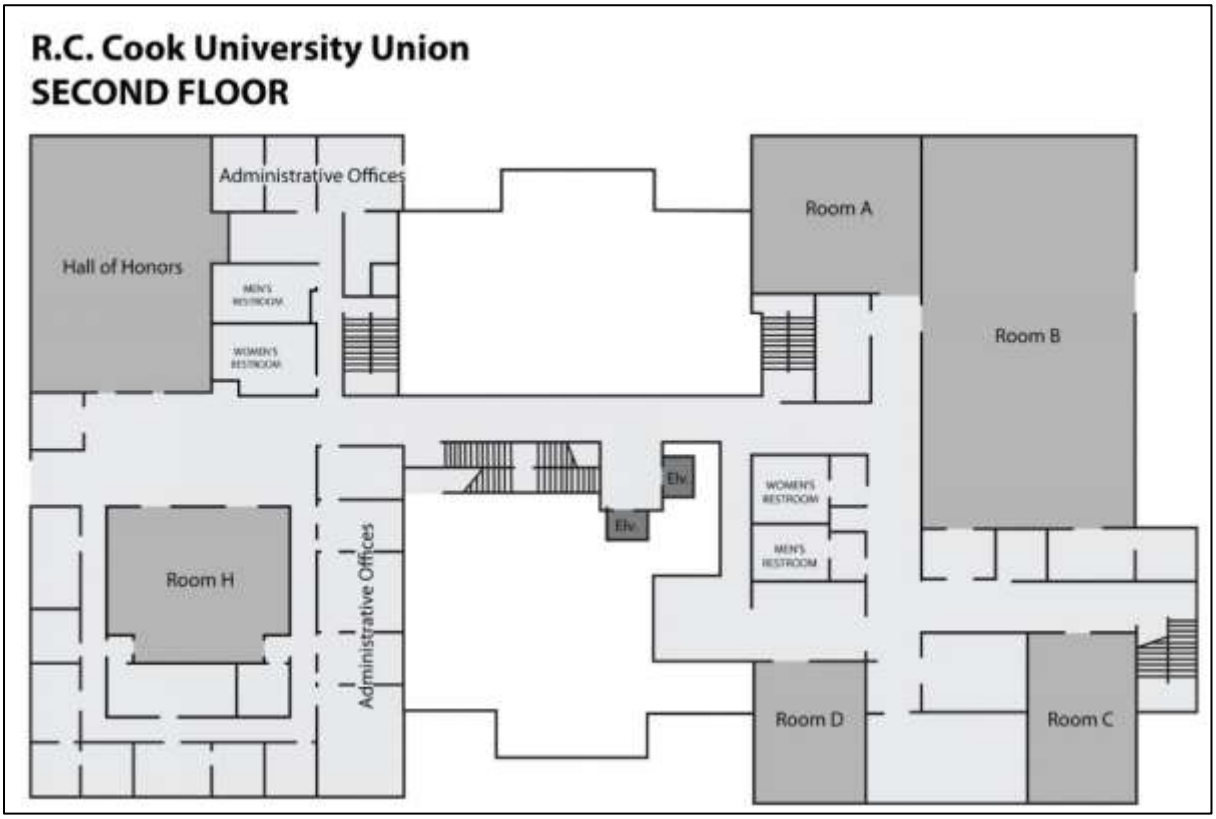





Women's Restroom
Men's Restroom
Elv.
Coat Check
Ballrooms
I, II, III
Thad Cochran Center
Third Floor
Theater
Shelled In

R.C. Cook University Union Floorplans





NOTES

Key to Abbreviations

O = Oral Presentation
P = Poster Presentation
1st number is Division

1	**Agriculture and Plant Science**
2	**Cellular, Molecular, and Developmental Biology**
3	**Chemistry and Chemical Engineering**
4	**Ecology and Evolutionary Biology**
5	**Geology and Geography**
6	**Health Sciences**
7	**History and Philosophy of Science**
8	**Marine and Atmospheric Sciences**
9	**Mathematics, Computer Science, and Statistics**
10	**Physics and Engineering**
11	**Psychology and Social Sciences**
12	**Science Education**
13	**Zoology and Entomology**

2nd number is Abstract Number within oral presentations or poster session
Eg., O3.04 = oral presentation (O) number 4 in the division of Chemistry and Chemical Engineering (3)

Agriculture and Plant Science
Chair: Raja Reddy
Mississippi State University
Vice-Chair: Nacer Bellaloui
USDA-ARDS

Thursday, February 22, 2018
MORNING
Room Union C

7:50 WELCOME

O1.01

8:00 IMPACT OF PARENTAL SOIL MOISTURE STRESS TREATMENTS ON PHENOTYPIC PLASTICITY OF THE OFFSPRING

Chathurika Wijewardana, Firas Alsajri, K. Raja Reddy

Mississippi State University, Starkville, Mississippi State, MS, USA

Stressful parental environments can vividly influence expression of traits in offspring resulting poor seed germination and seedling establishment. The objective of this study was to determine the effect of soil moisture stress during reproductive stage on soybean seed yield, individual seed weight, and the subsequent germination, and seedling vigor of the next generation. Two soybean cultivars were exposed to five levels of evapotranspiration (ET) (100, 80, 60, 40, and 20% ET) of irrigation treatments under sunlit environmental conditions at flowering stage. Seeds obtained from these treatments were tested for seed vitality traits at five different in-vitro osmotic stress treatments using polyethylene glycol which mimics water potentials ranging from 0.0 to -0.9 MPa with -0.2 MPa increments at 25 °C. Maximum seed germination and seed germination rate were derived by using appropriate regression analysis. Afterwards, the seeds from parental treatments were subjected to three different soil moisture stress conditions (100%, 66%, and 33% field capacity) under pot culture in rain-out shelters. Several morpho-physiological parameters including root traits were measured at 25 days after planting. Soil moisture stress caused a substantial effect on seed vigor resulting shriveled, shrunken, and miss-shaped seeds with reduced seed weight. The parental moisture stress environment significantly influenced seed and seedling vigor of the next generation. The results suggest that soil moisture stress induced irreversible change in seed vitality traits and seedling vigor of the offspring of stressed individuals when their parents were exposed to soil moisture stress which could lead to low quality offspring in the successive generations.

O1.02

8:15 UNDERSTANDING GRASS-DARK SEPTATE ENDOPHYTIC (DSE) FUNGAL SYMBIOSES USING NON-NATIVE GRASS HOST, MISCANTHUS SINENSIS

Anna Kazarina, Keerthi Mandyam, Ananda Nanjundaswamy

Alcorn State University, Lorman, MS, USA

Plant microbiomes are made up of a variety of microbes and their services can be exploited to improve plant growth and productivity. One of the future goals of next-generation agriculture is to develop artificial or synthetic microbiota that can offer a suite of services to enhance plant health and/or productivity. Dark septate endophytic (DSE) root colonizing fungi are a significant component of the root microbiome with potential roles in plant protection or growth. Recently, we isolated from non-native sterile bioenergygrass *Giant miscanthus* (*Miscanthus giganteus*) at least 600 root colonizing fungi of which at least 30% of fungi were putative DSE fungi like Periconia macrospinosa and *Darksidea* species. The goal of this study was to identify the impact of our DSE fungal isolates on host biomass. Preliminary screening for DSE status of *Periconia* and *Darksidea* species was conducted using leek (Allium porrum) and confirmed by presence of characteristic DSE structures like melanized hyphae and microsclerotia in the leek roots. Confirmed DSE isolates were then subjected to grass symbiosis with *Miscanthus sinensis*, a non-native grass and parent of the sterile hybrid *M. giganteus*. The plants were incubated in a growth chamber and data collected after four weeks of symbiotic growth. The outcome of the DSE symbioses will be discussed from the point of host biomass. We expect to see the symbiosis outcome to be along the mutualism-parasitism continuum. The DSE isolates that enhance growth will be further characterized and discussed from the perspective of plant growth, health and/or productivity.

O1.03

8:30 STRAIN DIFFERENCES OF HEAT ADAPTED L. MONOCYTOGENES CELLS EXPOSED TO CARVACROL, ALKALI, H2O2, AND LAURIC ARGINATE (LAE)

Nitin Dhowlaghar, Wes Schilling, Ramakrishna Nannapaneni

Mississippi State University, Mississippi State, MS, USA

The objective of the present study was to investigate the differences in survival of heat stressed L. monocytogenes strains ScottA, NRRL B-33157 and F4260 in lethal levels of LAE (Lauric arginate), carvacrol essential oil, NaOH and H2O2 at 22°C and 4°C. The survival of heat stressed L. monocytogenes cells was higher by 1-2 logs in 33 ppm of LAE at 22°C as compared to the non-heat stressed cells. On the other hand, there was no change in the survival of heat stressed cells in 44 ppm of LAE at 4°C. The survival of all the three strains of heat stressed L. monocytogenes cells was higher by 1.5-2.5 log CFU/ml in 428 ppm of carvacrol at room temperature and 2.5-4.5 log CFU/ml in 535 ppm of carvacrol at 4°C. Strain differences were observed when exposed to lethal level of pH 12.5 NaOH. The heat stressed L. monocytogenes ScottA and NRRL B-33157 strains showed higher survival by 2.5 log CFU/ml and strain F4260 did not show any change in the survival pH 12.5 NaOH at 22°C. On the other hand, the survival of all the three strains of heat stressed L. monocytogenes cells decreased after exposure to 1000 ppm of H2O2 at 22°C and 4°C as compared to non-heat stressed cells. Therefore, this study indicate that the heat stressed cells of L. monocytogenes are not easily killed by LAE, carvacrol and alkali based antimicrobials.

O1.04

8:45 SOYBEAN GROWTH AND PHYSIOLOGICAL RESPONSES TO FLOODING AND RECOVERY DURING REPRODUCTIVE STAGE

Grace Adegoye[1], Firas Alsajri[2], Chathurika Wijewardana[2], Swathatra Kethireddy[1], Raja Reddy[2]

[1]Mississippi Valley State University, Itta Bena, MS, USA, [2]Mississippi State University, Starkville, MS, USA

Crops grown in the US Midsouth are vulnerable to flooding at all stages, which substantially hampers their growth and yield. An outdoor pot experiment was conducted to investigate flooding and recovery response of soybean [*Glycine max* (L.) Merr.] cultivar, Asgrow AG5332, during reproductive stages. There were two treatments,

control and flooding. Flooding were imposed at flowering (R1 stage, 34 days after planting) and continued for 16 days. Each treatment had 15 replicates. Then, both the treatments were irrigated under optimum water conditions for 32 days. During the flooding and recovery time period, soil oxygen concentrations were monitored continuously while physiological parameters were measured several times. At the final harvest, 66 days after sowing, plant growth and developmental parameters were recorded on all plants. Soil oxygen concentration in the control treatment stayed at 18% throughout the experimental period, but in the flooding treatment, it declined at 3.5% d^{-1} during initial flooding and reached zero levels by 4.4 days. Soil oxygen concentration, however, recovered at 1.8% d^{-1} from 16 to 20 days and further recovery was slow at 0.23% d^{-1} and did not reach to the levels similar to the control. Decreased oxygen concentrations during flooding impaired photosynthesis, increased leaf temperatures, and decreased several mineral contents. Impaired physiological functions caused 69% decline in whole plant leaf area and plant dry weight and by 80% decline in pod numbers and weights. Future studies are needed to understand genotypic variability in response to flooding at specific growth stages to help assist improving soybean productivity.

O1.05

9:00 DIETARY METHIONINE DEFICIENCY MAY NEGATIVELY AFFECT PIG ANTIOXIDANT CAPACITY AND HEALTH IN ADDITION TO GROWTH PERFORMANCE

Zhongyue Yang[1], M. Shamimul Hasan[1], John Htoo[2], Mark Crenshaw[1], Shengfa Liao[1]

[1]Mississippi State University, Starkville, USA, [2]Evonik Nutrition & Care GmbH, Hanau-Wolfgang, Germany

Methionine, typically the second limiting amino acid (AA) in swine diets, plays important roles in promoting animal protein synthesis and growth. This study was to investigate how dietary methionine deficiency affects plasma AA concentrations in growing pigs. Twenty individually penned barrows (23.6 ± 2.41 kg) were randomly assigned to 2 dietary treatments according to completely randomized design with pigs being experiment units (n = 10). A corn-soybean meal based diet (Diet 1) was formulated to meet or exceed the energy and nutrient requirements, except for methionine (NRC, 2012; AminoDat® 5.0). Diet 2 was formulated by adding crystalline DL-methionine to Diet 1 to meet methionine requirement. Therefore, Diets 1 and 2 were methionine-deficient and -adequate, respectively. After 4 weeks of *ad libitum* feeding, blood was sampled for plasma free AA analysis. Data were analyzed with Student's T-test. Methionine and taurine concentrations were lower, while glycine and histidine concentrations were higher in pigs fed Diet 1 than 2 ($P < 0.05$). There were no differences ($P > 0.05$) in other AA concentrations between the two treatments. A high glycine concentration indicated less glycine was utilized for glutathione synthesis. Given the fact that both glutathione and taurine (derived from cysteine) are essential antioxidants in animal body, the reduced plasma concentrations of methionine, taurine, and possibly glutathione, might be the major factors responsible for the reduced growth performance of pigs fed the methionine-deficient diet, which was reported previously. In short, dietary methionine deficiency may negatively affect swine antioxidant capacity, health, and growth performance.

O1.06

9:15 FERMENTATION OPTIMIZATION AND NUTRITIONAL PROFILING OF RED YEAST PHAFFIA RHODZYMA USING SWET POTATO AS FEEDSTOCK

Lydia Batey, Ananda Nanjundaswamy, Keerthi Mandyam, Victor Nijiti

Alcorn State University, Lorman, MS, USA

Carotenoids are natural colorants used in various food and feed application. Carotenoids are known for their health benefits such as antioxidants, serve as pro-vitamin A, and oxidation prevention of milk and meat. Carotenoids are produced by fungi, bacteria, and yeast. Commercially two most important carotenoids available in the market are astaxanthin and β-carotene. Red yeast *Phaffia rhodozyma* is an important yeast known to produce Astaxanthin. Sweet potato, an important southern crop was used as feedstock for production of Astaxanthin with an objective to produce Astaxanthin enriched sweet potato. Astaxanthin enriched sweet potato has potentially application in animal and fish feed. The overall objective of the experiment was to develop fermentation optimization and use it at larger scale such as in bench-top bioreactors. Our experimental data suggest that the lower the percent of sweet potato in the fermentation medium the better the production of Astaxanthin. Our Response Surface Methodology indicated optimal level of sweet potato was 5%. Astaxanthin level in Red yeast fermented sweet potato was 9.00 mg/kg. Fermented sweet potato also showed two and ten increases in protein and fat, respectively at 13.2% and 5.70%. The presentation will discuss the optimization process along with the nutritional characterization of Astaxanthin enriched sweet potato.

O1.07

9:30 EFFECT OF TEMPERATURE AT REPRODUCTIVE GROWTH STAGES ON SOYBEAN SEED YIELD AND QUALITY TRAITS

Firas A. Alsajri[1], Chathurika Wijewardana[1], Nacer Bellaloui[2], K. Raja Reddy[1]

[1]Mississippi State University, Starkville, MS, USA, [2]USDA-ARS,Crop Genetics Research Unit, Stoneville, MS, USA

Temperatures during seed growth and development will not only affects seed yield, but also impacts seed quality. The objective of this study was to investigate temperature effects on soybean [*Glycine max* (L.) Merr.] yield and quality under optimum water and nutrient conditions. Two soybean cultivars grown outdoors in sunlit in pots were moved into the sunlit plant growth chambers prior to flowering. Five day/night temperatures treatments were imposed at initial flowering stage. Total biomass, seed yield, and quality were assessed at maturity. Seed yield differed significantly between the cultivars and temperatures. Quadratic functions best described the response of yield to temperature in both cultivars; optimum temperature was 26°C for Asgrow AG5332 and 23°C for Progeny P5333RY. Seed decline was much steeper in Progeny P5333RY than Asgrow AG5332. Temperature affected all seed quality parameters in both cultivars. Even though, protein content was unaffected by temperature and cultivars, seed oil increased up to 25°C and declined at higher temperatures. Pamitic and stearic acids showed a quadratic response to temperature while linoleic and linolenic acids declined linearly with temperature. Oleic acid, on the other hand, was not different at three lower temperatures, but increased at higher temperatures. Sucrose, raffinose, and stchyose

contents declined with increase in temperature. Soybean models with integrated seed quality modules would be useful not only for production optimization of natural resources such as water and nutrients, but also useful in assisting for planting and policy decisions in both the current and projected warmer future environments.

O1.08

9:45 DEVELOPMENT OF BIOTECHNOLOGICAL APPROACHES FOR IMPROVING SWEETPOTATO WITH MULTIPLE VIRAL DISEASE RESISTANCE

Kyler Holmes, Yan Meng, Chunquan Zhang, Victor Njiti

Alcorn State University, Lorman, MS, USA

Sweet potato (*Ipomoea batatas* L.), belongs to *Convolvulaceae* family, is an important crop for food security. As one of the top three vegetable crops grown in Mississippi, one major limitation to sweet potato production is the cumulative effect of virus infection causing cultivar decline and yield losses. Sweet potato feathery mottle virus (SPFMV) and Sweet potato leaf curl virus (SPLCV) are two of the most prevalent sweet potato viruses that cause devastating diseases and yield reductions in Mississippi. In this study, we explore novel biotechnological methods to develop transgenic sweet potato plants with resistance to these two viruses. Coat protein gene segments of SPFMV and SPLCV were engineered in an expression vector and used to induce gene silencing in transgenic sweet potato. Expression of foreign genes has been achieved by using *Agrobacterium tumefaciens* strain EHA105 harboring the expression cassette; Calli induced from transformed leaf and petioles showed positive signs of foreign genes expression by Polymerase chain reaction detection. Plant transformation and regeneration protocols were optimized for the production of value-added sweet potato lines using popular production lines. Biotechnological approaches of gene delivery appear to have potential for generating transgenic sweet potato with useful agronomic traits. These results warrant further investigation on transgenic plants resistance to virus infection under field conditions.

10:00 BREAK

O1.09

10:15 EFFECT OF SALT STRESS ON RICE GENOTYPES AT SEEDLING STAGE

Naqeebullah Naqeebullah[1], Edilberto D Redoña[2], K. Raja Reddy[1]

[1]Mississippi State University, Starkville, MS, USA, [2]Delta Research and Extension Center, Stoneville, MS, USA

Rice is one of the most important food crops in the world, consumed by more than 3 billion people. Salinity is an important stress factor in the rice growing areas and rice is very sensitive to salt stress particularly at early vegetative stages causing yield reductions. The objectives of this study were to determine the effect of salt stress at seedling stage. 74 rice genotypes were grown in PVC pots, filled with sandy soil and irrigated through an automated computer controlled system. The treatments imposed included control, medium salt stress (EC 6 dS m-1) and high salt stress (EC 12 dS m-1). The results showed significant decrease in most of the traits like shoots, roots and physiological growth with increasing salt stress. The 12 dSm-1EC caused the highest decline of shoot and root growth. The CSRI varied between 12 and 25.5 among the genotypes tested. Based on CSRI and standard deviation values, genotypes were classified in different categories with varying salt stress responses. Most of the genotypes (56%) showed moderate response to salt stress. 12 genotypes were classified as salt sensitive with IR85, PH127 and IR86 as least salt tolerant respectively. 14 genotypes were classified as salt tolerant with Nona Bokra, CT182, IRRI 154 and FED473 as high salt tolerant genotypes respectively. Root traits were found more important in identifying salt tolerant genotypes. The genotypes identified as salt tolerant based on morphological parameters can be used in rice breeding programs to develop new genotypes best suited for salt stress conditions.

O1.10

10:30 CHARACTERIZATION OF *ROTYLENCHULUS RENIFORMIS* RESISTANT COTTON LINES BASED ON GROWTH, DEVELOPMENT, AND YIELD RESPONSES IN THE NEMATODE-INFESTED FIELDS

Bhupinder Singh[1], Daryl Chastain[1], John Snider[2], K. Raja Reddy[1], Larry Krutz[1], Salliana Stetina[3]

[1]Mississippi State University, Starkville, MS, USA, [2]University of Georgia, Tifton, GA, USA, [3]United States Department of Agriculture, Stoneville, MS, USA

Reniform nematode has been identified as one of the major biotic factors limiting yield, exceeding 8% on average, in the Mississippi Delta. Recently, experimental crossing with *Gossypium barbadense* resulted in advanced *G. hirsutum* breeding lines exhibiting resistance to reniform nematode infection. An experiment was conducted to evaluate these new resistant cotton lines (08SS110-NE06 and 08SS100) along with commercial susceptible cultivars (Deltapine 16 and PHY 490 W3FE) to reniform nematode infection based on plant growth, development, and yield responses. All four genotypes were grown in the soils naturally infested with reniform nematode exceeding or at economic thresholds for Mississippi. Classical growth analysis was conducted for a two-meter row length at every 1-2 week interval following emergence and was used to derive crop growth responses. Significant genotypic variability was observed for: (1) classical growth traits such as plant height, leaf area, and dry biomass, (2) derived crop growth indices such as crop growth rate and leaf area index, (3) physiological traits such as net photosynthesis, and (4) lint yields. Resistant line 08SS110-NE06 and susceptible cultivar PHY 490 W3FE showed significantly highest and lowest values for most of the measured and calculated traits throughout the growing season. Further, resistant lines had greater lint yields than susceptible cultivars. A significant decline in reniform nematode populations was observed at the end of the season in plots cultivated with resistant lines than preplant populations. The results indicate that inherit resistance mechanism against reniform nematode in the resistant lines reduces infestation and reproduction potential of reniform nematode.

O1.11

10:45 GREENHOUSE STUDY OF SWITCHGRASS SEEDLING TRANSPLANT ESTABLISHMENT IN LOWER MISSISSIPPI RIVER SOILS

LaShunda Anderson Hodges[1], Krishna Reddy[2], Efren Ford[2]

[1]Alcorn State University, Lorman, MS, USA, [2]USDA-ARS, Stoneville, MS, USA

The overall goal of this greenhouse study was to evaluate the ability of three switchgrass transplant seedling varieties to establish in two Southern U.S. Lower Mississippi River Soils. The three switchgrass varieties are (1) Arkansas Grand Prairie, (2) Cave-In-Rock, and (3) Alamo. The two soils are (1) Tunica Clay (Lowland/Delta) and (2)

Memphis Silt Loam (Upland/Loess Bluff). The objectives of this study are (1) to evaluate the ability of three switchgrass transplant seedling varieties to establish in two Southern U.S. Lower Mississippi River Soils, and (2) to evaluate the effect of soil type upon the establishment of three switchgrass variety direct-seeded transplants. The varieties of switchgrass seedlings were grown to 30.48 cm (1ft tall) under direct-seeded greenhouse conditions. Two seedlings of each switchgrass variety were then transplanted to 6 inch pots containing the respective Lower Mississippi Soil types. This was replicated 4 times. Plant height, tiller production, and plant dry weight were evaluated to determine establishment potential in each soil type. Soil type and switchgrass variety play a role in transplant seedling establishment in Lower Mississippi River Soils.

O1.12

11:00 GROWTH RESPONSES AND METAL BIOACCUMULATION OF COFFEEWEED (*SESBANIA EXALTATA*) EXPOSED TO VARIOUS LEVELS OF LEAD UNDER HYDROPONIC CONDITIONS

Stephanie Agusiegbe, Vernaldo Wilson, Gloria Miller, Maria Begonia, Gregorio Begonia

Jackson State University, Jackson, MS, USA

Lead (Pb) is one of the heavy metals with a long history of toxicity. Exposure to Pb is of a great concern because of its toxic nature, widespread occurrence in the environment, and long life in biological systems. One way of remediating Pb-contaminated soil or water is by the use of living plants, a process known as phytoremediation. This study was carried out to assess the effects of Pb on the growth, Pb uptake and translocation of hydroponically-grown *Sesbania* plants exposed to lead nitrate [$Pb(NO_3)_2$]. *Sesbania* plants were grown at the Jackson State University greenhouse in 15 mL styrofoam cups containing different concentrations of Pb (0, 0.1, 1.0, 5.0, 10.0, 20 µM) in the form of $Pb(NO_3)_2$. Plants were harvested at 0, 2, 5, 8, 12, 15 days after exposure. The shoots and roots were separated, oven-dried at 75 ℃ for at least 24 hours and then weighed for dry tissue biomass. Plant tissues were then acid digested and Pb accumulation was quantified by ICP-OES. Our results indicated that Pb-tissue uptake increased with increasing concentration of Pb (i.e., 20 µM versus 1.0 µM). However, plant roots and shoots displayed symptoms of toxicity (at 15 µM and 20 µM) and root and shoot biomass decreased with increasing Pb concentration. Furthermore, plants exposed to higher Pb concentrations exhibited leaf chlorosis. Overall, *Sesbania* was tolerant to relatively lower levels of Pb which may aid in their establishment in Pb-contaminated environments.

O1.13

11:15 METAL BIOACCUMULATION AND MORPHOLOGICAL RESPONSES OF HYDRO-PONICALLY-GROWN WHEAT (*Triticum aestivum*) AT VARIOUS CADMIUM CONCENTRATIONS

Zakaria Gary, Tyeisha Matheney, Gloria Miller, Maria Begonia, Gregorio Begonia

Jackson State University, Jackson, MS, USA

Cadmium (Cd) contamination of the environment resulting from anthropogenic activities is a serious concern due to its deleterious impact on human health, food supply chain, and ecosystems. Phytoremediation is cost-effective alternative to remediate cadmium-contaminated soil and water. The objectives of this study were to evaluate the growth and uptake of cadmium in wheat (*Triticum aestivum* L.) plants exposed to various levels of cadmium. Wheat seeds were sown in a sand medium and plants were maintained in a greenhouse. The 30-day old plants were then exposed to different concentrations of Cd (0, 0.1, 1.0, 5.0, 10.0, 15.0, and 20.0µM) in a hydroponic solution. Plants were harvested at 0, 2, 5, 8, 12, and 15 days after Cd exposure, separated into roots and shoots and oven-dried at 75° C for 2 days. Dried tissues were weighed and then acid-digested for cadmium uptake determinations. Cadmium uptake was quantified by ICP-OES. Our results indicated that the shoot and root biomass decreased as the concentration and exposure time increased. The highest Cd shoot concentrations were observed at day 12 in plants that had been exposed to 15µM of Cd. Root uptake was highest at day 12 in plants that had been exposed to 20µM of Cd. Although wheat plant growth and uptake were affected, the plants demonstrated tolerance to moderate levels of cadmium contamination, which may aid in their establishment in cadmium-polluted environments.

11:30 Divisional Business Meeting

12:00 -1:00 General Sessions

Thursday, February 22, 2018
AFTERNOON
Room Union C

O1.14

1:00 EVALUATING EARLY-SEEDLING VIGOR VARIABILITY OF 100 ELITE RICE LINES USING MORPHO-PHYSIOLOGICAL TRAITS

Salah Jumaa, Edilberto Redoña, K. Raja Reddy

Mississippi State University, Starkville, MS, USA

Early-season vigor is important for plants to develop canopy development for optimum light interception. Developing screening tools to assess root and shoot system variability will be useful for rice breeder to develop new genotypes with superior performance during the juvenile stage. A 3-year study was conducted under optimum water and nutrient conditions in a sunlit pot-culture. Several shoot, root, and physiological parameters were in all experiments, 25-30 days after seeding. No significant year or experimental time period interaction was recorded for the measured parameters. Therefore, the results were combined to assess genetic variability among the rice lines from all the three studies. Individual responses index, maximum value for each trait divided by all rice lines, was first developed and summed all trait values to derive cumulative vigor response indices (CVRI) for all rice lines. Using means and standard errors, rice lines were classified into different groups. The CVRI values varied from 9.502 (RU1504156) to 16.165 (N-22) among the 100 rice lines. Majority of the rice lines were exhibited low (42) and moderately (42) CVRI and 11 and five were classified as high and very high CVRI values, respectively. The identified rice lines will be a valuable resource for breeders to develop new genotypes best suited for early-season vigor. The newly developed rice with improved vigor during early-season will be more productive in developing robust canopy for optimum radiation interception and outcompete weeds, and thus yield better in Midsouth US conditions.

O1.15

1:15 SEED GERMINATION RESPONSES TO OSMOTIC STRESS IN CORN CULTIVARS

Hunt Walne, Chathurika Wijewardana, K. Raja Reddy

Mississippi State, Mississippi State, MS, USA

Seed germination, controlled by both genetics and the environment, is an important process in the life cycle of corn (Zea mays L.). Drought is one major environmental factor influencing both germination rate, and maximum germination. An in vitro experiment was conducted using polyethelene glycol (PEG 8000) to examine the impact of osmotic stress on the germination properties of six commercially available corn hybrids. Three hybrids contained a known drought tolerant gene package, advertised to perform better under rain fed conditions (P1498, DKC 65-81, and N59B-3111A), while the other three hybrids contained no reported drought tolerance mechanisms (P1319, DKC 66-97), and N61X-3110). Time series data for seed germination was generated at various osmotic potentials from 0 to -0.9MPa, at -0.2 MPa intervals while the seeds incubated at 25°C. Maximum seed germination, time to 50% germination, and seed germination rate were derived by using appropriate regression analysis. A cumulative drought response index (CDRI), developed by summing individual response index of parameters, was used to classify corn hybrids into three drought-tolerant groups. The identified tolerance among hybrids could help producers select the best hybrids suited for suboptimal water conditions.

O1.16

1:30 WHOLE GENOME SEQUENCING AND THE CONSTRUCTION OF INFECTIOUS POPLAR MOSAIC VIRUS CLONES

Daniela Adjaye, Yan Meng, Victor Njiti, Chunquan Zhang

Alcorn State University, Lorman, MS, USA

Poplar, cottonwood, and aspen trees are all members of the *Populus genus* that has about 25-35 species of deciduous flowering plants in the family *Salicaceae*. Many species within the genus are important for paper industry, construction, packaging and other industrial applications. The western balsam poplar (*Popular trichocarpa*) was the first tree whose whole genome is sequenced making it a model for tree genomics studies. Poplar mosaic virus (PopMV), is known to naturally infect species within the genus *Populus* causing foliar mosaic, vein necrosis, leaf petiole deformation or stem lesions. PopMV distributes world widely where susceptible poplar species occurs. PopMV belongs to the genus Carlavirus with a typical single stranded positive sense RNA genome about 8.7kb in length. PopMV forms filamentous virions with the size of 675 x 13 nm. In this study, we cloned and sequenced the whole genome of a PopMV isolate. Upon biolistic inoculation of *Nicotiana megalosiphon* of multiple PopMV infected constructs, plants showed typical yellow spot lesions similar to those induced by wild type PopMV infections. The high infectivity of the newly developed infectious PopMV clones shows that they can be engineered as virus gene expression and silencing vectors for functional genomics studies of *Populus* species.

Thursday, February 22, 2018
AFTERNOON
Room Union B

DIVISIONAL POSTER SESSION

P1.01

IMPACT OF WATER STRESS ON SOYBEAN SEED PHYSIOLOGY, QUALITY, AND CHEMICAL COMPOSITION

Chathurika Wijewardana[1], Firas Alsajri[1], Nacer Bellaloui[1], K. Raja Reddy[2]

[1]Mississippi State University, Starkville, MS, USA, [2]USDA-ARS, Stoneville, MS, USA

Soybean seed quality is often determined by proteins, fatty acids, carbohydrates, isoflavones, and minerals. Thus, maintaining an improved seed quality is imperative to sustain overall human and animal nutritional aspects. The objective of this study was to investigate the effects of water stress during reproductive stage on seed yield components, composition, and minerals using two soybean cultivars grown under sunlit controlled conditions. Plants grown in pots were subjected to five levels of water stresses, 100, 80, 60, 40, and 20% of daily evapotranspiration of the control at flowering and continued until maturity. Plants were harvested 126 d after planting and seed vigor, quality, and mineral traits were examined. Results of the analysis of variance showed significant effects of cultivar, water stress, and their interactions on the studied traits. Seed weight of both cultivars was negatively impacted by soil moisture stress. Seed protein, ash, palmitic and linoleic acids, sucrose, raffinose, stachyose, N, P, K, and Ca significantly decreased whereas oil, fiber, stearic, oleic and linolenic acids, Fe, Mg, Zn, Cu, and B increased in response to soil moisture deficiency. The relationship between seed protein and oil was negatively correlated while seed dry weight exhibited strong positive correlations between seed protein, sucrose, and N content. The changes in seed constituents could be due to changes in nutrient accumulation and partitioning in soybean seeds under water stress. This information suggests the requirement of adequate soil moisture condition during flowering and seed formation stages to obtain higher nutritional value of soybean seeds.

P1.02

PLFA PROFILING OF SOIL BACTERIAL AND FUNGAL COMMUNITIES DURING 4000 YEARS OF PEDOGENESIS

Shankar Shanmugam, William Kingery

Mississippi State University, Mississippi State, MS, USA

Soil bacterial and fungal community composition is a key component of plant community structure and diversity because of its key role in nutrient cycles in the soil. Studies conducted on microbial diversity in relation to soil development could provide insight on how changes in microbial community structure influence ecosystem functions. Soil chronosequences are excellent tools for evaluating soil genesis, nutrient availability and biologically significant elements and their implications for ecosystem functioning. This study was conducted to assess the changes in soil bacterial and fungal communities associated with the dynamics of soil physico-chemical and vegetative characteristics along a sand chronosequence by using phospholipid fatty acid (PLFA) profiling. Soil samples were collected and analyzed from developmental chronoseqeunces with ages ranging from 105 years to 4010 years. The results showed that soil microbial biomass PLFAs changed significantly with increasing soil age. There was higher bacterial

biomass PLFAs in younger soils while the old soils had higher fungal PLFAs. Correlation analysis showed that plant community distribution had the strongest effect on the PLFA profile distribution of soil microbial communities followed by soil pH. This could be attributed to shift in nutrient concentration and quality of the litter inputs along the chronosequence. The results showed that there was a close relationship between plant succession and pH in shaping the soil microbial communities along the soil development gradient.

P1.03

THE COMPENSATORILY-GAINED PIGS PRODUCED FROM FEEDING A METHIONINE-DEFICIENT DIET HAD MORE FAT AND LESS LEAN BODY MASS

Rebecca Humphrey[1], Zhongyue Yang[1], Shamimul Hasan[1], Mark Crenshaw[1], Derris Burnett[1], John Htoo[2], Shengfa Liao[1]
[1]Mississippi State University, Starkville, MS, USA, [2]Evonik Nutrition & Care GmbH, Hanau-Wolfgang, Germany

Compensatory gain implies the increased average daily gain seen in re-alimented animals following a nutrient restriction period. Methionine (Met) is the second limiting amino acid in typical swine diets. This study was conducted to see (1) if a Met-deficient diet can cause growth retardation in growing pigs, (2) if re-alimentation can yield compensatory gain in the pre-Met-deficient pigs, and (3) if there are any differences in carcass characteristics between the pre-Met-deficient pigs and their counterparts. Twenty crossbred barrows were individually penned and randomly allotted to two dietary treatments (n=10). One Met-deficient (D1) and one Met-adequate (D2) diets were formulated based on corn and soybean meal (NRC, 2012) and fed to respective pigs for 31 days. After that, all pigs were fed the same non-nutrient-deficient commercial diets until reaching market weight, and then they were harvested and the carcass characteristics measured. The D1 and D2 pigs began with similar body weights (P=0.935), but after 31-day dietary treatments, D1 pigs were lighter (P=0.102) than the D2 pigs. After re-alimentation for 55~62 days, D1 and D2 pigs ended up with similar body weights (P=0.989). In terms of carcass characteristics, however, D1 pigs had thicker back fat (P=0.015), heavier belly weight (P=0.005), lighter ham weights (P=0.016~0.043), lighter picnic weight (P=0.041), lighter total lean cut weight (P=0.055), and lower lean cut percentage (P=0.012). These results indicated that a Met-deficient diet produced growth-retarded pigs, which experienced compensatory gain after re-alimentation. However, at harvest, these compensatorily-gained pigs had more fat and less lean than their counterparts.

P1.04

QUANTIFYING FLOODING RESPONSE OF SOYBEAN DURING SEEDING AND SEEDLING STAGES

Grace Adegoye[1], Firas Alsajri[2], Swathatra Kethireddy[1], Raja Reddy[2]
[1]Mississippi Valley State University, Itta Bena,MS, USA, [2]Mississippi State University, Starkville, MS, USA

Flooding affects several million hectares globally every year. The frequency of severe storms and extreme precipitation rates are expected to increase in some regions during the next decades due to changes projected in climate. An experiment was conducted to investigate flooding duration on soybean [*Glycine max* (L.) Merr, cultivar Asgrow AG5332] during seeding and early stages of growth. The treatments included were six levels of flooding (0, 1, 2, 4, 8, and 16 days) imposed at five growth stages, seeding, emergence, first, second, and third leaf stages in pots filled with 3:1 top-soil and sand mixture grown outdoors. There were four replications in each treatment that were arranged in a completely randomized block design. All treatments received complete Hoagland's nutrient solution during the experimental period. Plant growth and development, including root morphology using winRHIZO root optical scanner, were measured on all plants 32 days after sowing. To assess flooding damage at each growth stage, individual flooding stress response indices were estimated as the ratio of treatment over all treatments. Then, cumulative flooding stress response indices (CFSRI) were calculated by summing individual responses for total, shoot, root, and physiological traits. Flooding significantly affected soybean growth and development at all stages. Flooding beyond four days favored shallow root systems. The damage to roots systems, however, was more severe at all stages than shoot traits. Further studies are needed to quantifying and developing cultivar-dependent flooding tolerance scores will help producers select the cultivars that are best suited for a given production environment.

P1.05

EFFECTS OF L- VS DL-METHIONINE ON PLASMA CONCENTRATION OF NUTRIENT METABOLITES IN YOUNG GROWING PIGS

M. Shamimul Hasan[1], Zhongyue Yang[1], Mark Crenshaw[1], John Htoo[2], Rebecca Humphrey[1], Shengfa Liao[1]

[1]Mississippi State University, Starkville, MS, USA, [2]Evonik Nutrition & Care GmbH, Hanau-Wolfgang, Germany

Methionine (Met) plays important roles in health maintenance and muscle growth of pigs, but its presence in typical pig diets is limited. Thus, dietary Met supplementation is common practice for a pigs diet. Currently on the market are DL-Met and L-Met products. Based on biochemistry, only L-Met can be used by pigs for protein synthesis and the 50% D-Met in DL-Met product need to be enzymatically converted to L-Met before its utilization. Therefore, we hypothesized that the nutritional efficacy of L-Met is higher than DL-Met, which would be reflected on their effects on plasma metabolite concentrations. To test this hypothesis, 20 individually penned barrows (21.2±2.66 kg) were assigned to 2 dietary treatments according to a completely randomized design with pigs being experiment units (n = 10). Two diets (D1 and D2) were formulated to meet or exceed the recommended nutrient requirements (NRC, 2012; AminoDat® 5.0). Crystalline L-Met and DL-Met were supplemented to D1 and D2 (both at 0.13% level), respectively. Before and after the 4-week *ad-libitum* feeding trial, blood samples were collected for determination of plasma concentrations of glucose, albumin, total protein, urea nitrogen, total cholesterol, and triglycerides. Data were analyzed with Student T-test. Results showed that there were no differences (P = 0.10~1.00) between the two treatments in the concentrations of the 5 metabolites either before or after the feeding trial, which indicated that the enzymatic conversion of D-Met to L-Met by pigs had been highly efficient and there had been no difference in the nutritional efficacy between the two products.

P1.06

EFFECT OF TEMPERATURE AT REPRODUCTIVE GROWTH STAGE ON SOYBEAN SEEDLING SHOOT AND ROOT MORPHOLOGY OF THE OFFSPRING

Firas A. Alsajri, Chathurika Wijewardana, K. Raja Reddy

Mississippi State University, Starkville, MS, USA

Understanding how the environmental factors effect seed production is the key to having a greater quality seeds and successful crop in the next season. An experiment was conducted in sunlit control environmental facilities to understand the effect of temperature on soybean offspring. Seeds from two soybean [*Glycine max* L.] cultivars were grown in wide range of day/night temperature regimes, 21/13, 25/17, 29/21, 33/25 and 37/29°C from initiation of flowering to harvest. Completely Randomized Design with three factors applied for the experiment. Then, the seeds collected from these temperatures were exposed to five day night temperatures 20/12, 25/17, 30/22, 35/27, and 40/32 °C 10 days after planting (DAP). Plants were harvested 24 DAP. Morphological traits including shoot and root and physiological parameters were measured either before or during the harvest. The results indicated that temperature and cultivars affected on most the parameters significantly. The parent temperature treatments (PTT) were affected significantly on most of soybean offspring seedling morphological and physiological parameters. PTT 25/17 °C gave highest leaf area, leaf dry weight, stem dry weight, root dry weight, plant dry weight, and root volume and it was significantly different with other PTT; however, PTT 37/29 °C gave the lowest plant height, leaf number on main stem, leaf area, leaf dry weight, stem dry weight, root dry weight, plant dry weight, and root volume. This documentation will be useful to improve soybean seed production for seed purpose, and will be useful to improve the crop management practices during the production season.

P1.07

EFFECTS OF DROUGHT AND ELEVATED ATMOSPHERIC CO2 ON SEED NUTRITION IN SOYBEAN UNDER CONTROLLED ENVIRONMENTS

Nacer Bellaloui[1], Alemu Mengistu[2], Hamed Abbas[3], Kassem My[4]

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Drought and elevated CO_2 are two major environmental factors affecting yield and seed quality of crops. The objective of this research was to investigate the effects of drought and elevated carbon dioxide concentration on seed nutrition under controlled conditions. Soybean cultivars of maturity group V were subjected to ambient (360 µmol mol^{-1} CO_2) and elevated (700 µmol mol^{-1} CO_2) concentrations, and irrigated and drought (about -199 kPa) conditions. The results showed that drought or drought with elevated CO_2 resulted in high protein and oleic acid, but low in oil and linoleic and linolenic acids. Sucrose, glucose, and fructose concentrations decreased, but raffinose and stachyose increased. Drought or drought with ambient or elevated CO_2 resulted in decreases in N, P, K, and some micro-nutrients. Seed ^{15}N and ^{13}C natural abundance isotopes were altered under drought or drought with ambient or elevated CO_2. This research demonstrated that drought and elevated CO_2, due to global climate changes, may lead to changes in seed nutrition and nitrogen and carbon metabolism. The increase in protein could be due to the small size of seed and decrease in oil is due to the genetically inverse relationship between protein and oil. The high oleic fatty acid and low linolenic fatty acid are desirable traits for oil stability and shelf-live. The research provides a new knowledge on understanding of the effects of drought and elevated CO_2 on seed nutrition and creates opportunities to breeders to select for drought and elevated CO_2 tolerant varieties to maintain high seed nutritional qualities.

P1.08

EFFECT OF DROUGHT ON RICE GENOTYPES AT SEEDLING STAGE

N Naqeebullah, Edilberto D Redoña, K. Raja Reddy

Mississippi State University, Mississippi, MS, USA

Drought stress is one of the major abiotic stresses affecting rice crop at all stages, but the wide inherent morpho-genetic variability could be used to identify drought tolerant lines for breeding. An experiment was conducted to evaluate 74 rice breeding lines for tolerance to drought stress under pot-culture. The rice seedlings were subjected to two different soil moisture regimes, 100 and 50% field capacity, from 10 to 30 days after sowing (DAS). Several morpho-physiological parameters including root traits were measured at the end of the experiment. Significant moisture stress × cultivar interactions were found for most of the parameters measured. Both root and shoot parameters were found important in studying drought tolerant lines during the seedling establishment stages in rice, but shoot parameters were more affected. A cumulative drought response index (CDRI) was developed by summing the individual response indices of all cultivars. The CDRI varied between 13.5 and 27.5 among the cultivars tested. Based on CDRI and standard deviation values, five and 15 lines were identified as most sensitive and sensitive to drought, respectively, 35 as moderately sensitive, and 13 and seven as most tolerant and highly tolerant, respectively. BR47 and Rex were identified as the least and most tolerant to drought among 75 lines tested. The lines identified as drought tolerant based on morphological parameters, further need to be confirmed by molecular analysis and can be used as a valuable resource in rice breeding programs to develop new genotypes best suited for drought conditions.

P1.09

ROLE OF LPCAT1/2 IN ARABIDOPSIS

Kimberton Mai, Phillip Bates, Nischal Karki

University of Southern Mississippi, Hattiesburg, MS, USA

The way to meeting the growing demand for vegetable oils, whether foods or biodiesel, can be through a biological engineering approach. Foods such as vegetable oil are made of storage lipids called triacylglycerols (TAG) which is made of a glycerol esterified with three acyl chains (fatty acids). More oil per acre of land can be produced by engineering plants to accumulate oil not only in seeds but also in leaves. But first we must understand the roles of leaf membrane lipid synthesis which have an overlapping metabolic pathway to TAG. To study the pathways of lipid synthesis we analyze the accumulation and fatty acid composition of different membranes lipids across plant development in wild-type and three different enzyme mutants (act1, lpcat1/2, and act1/lpcat1/2) in *Arabidopsis thaliana*. For each plant line, the lipids were extracted with organic solvents; separated by thin layer chromatography; transmethylated to fatty acid methyl esters (FAME); and then quantified against a 17:0 FAME standard by gas chromatography. The results were similar between wild-type and lpcat1/2 for all lipids, and between act1 and act1/lpcat1/2 for all lipids except phosphatidylcholine. This explains LPCAT1/2 was not necessary in the final membrane accumulation of fatty acid composition in the wild-type background but may be important for phosphatidylcholine synthesis in the act 1 background. However, the lipid composition does not indicate the complete pathway of lipid synthesis, therefore further studies will be required to understand the effect of each of these enzymes on other aspects of leaf lipid biosynthesis.

P1.10

EVALUATION OF TWO RICE CULTIVARS BASED ON SUB- AND SUPRA-OPTIMAL DAY/NIGHT TEMPERATURE RESPONSES OF CARBON ASSIMILATION AND PHOTOSYSTEM

Bhupinder Singh[1], Salah Jumaa[1], Chathurika Wijewardana[1], Daryl Chastain[2], Ed. Redona[2], K. Raja Reddy[1]

[1]Department of Plant and Soil Sciences, Mississippi State University, Starkville, MS, USA, [2]Delta Research and Extension Center, Mississippi State University, Stoneville, MS, USA

The projected increase in nighttime air temperatures (T_N) of 20% and 40% by 2100 in the US could reduce rice yields through impairing biochemical and physiological processes. An experiment was conducted to quantify the effects of projected day/night temperatures on carbon assimilation and photosystem response mechanisms in two genetically diverse rice cultivars during reproductive growth. Two rice cultivars, IR6 and Rex, were grown in total of 240 PVC pots containing soil medium of pure fine sand under uniform natural conditions until flowering. At flowering, nine different day/night temperature treatments (TTs) namely 33.4/21.4 (control), 33.4/23.6, 33.4/25.7, 36.4/24.4, 36.4/26.9, 36.4/29.3, 30.4/18.4, 30.4/20.3, 30.4/22.1 ºC, were imposed to each of 12 plants per cultivar, and maintained until harvesting using nine controlled sunlit growth chambers (SPAR units). The LiCOR 6800 and 6400 photosynthesis systems were used to determine carbon dioxide and light response functions from 1000-1400 hours between 7-15 days after the start of TTs initiation. In addition, net photosynthesis (A_N), gross photosynthesis (A_G), mid-day dark respiration (R_D), maximum quantum yield (F_vF_m), leaf thickness, pigment content, relative injury (RI), and cell membrane thermostability (CMT) were also determined. The maximum rate of Rubisco carboxylation (V_{cmax}) and maximal rate of electron transport (J_{max}), derived from response functions, and were declined with increasing T_N. A significant decline in A_N, R_D, and A_G was also observed with increasing T_N under control and supra-optimal TTs. Cultivar Rex exhibited significantly higher J_{max}, R_D, and pigment contents than IR6 across TTs. The study could be used to enhance temperature tolerance in rice.

P1.11

STAND-ESTABLISHMENT OF COMMERCIAL CULTIVAR OF BIOENERGYGRASS FREEDOM® GIANT MISCANTHUS IN MISSISSIPPI AND ITS ASSOCIATED SOIL CHEMICAL PROPERTIES

Michael Felton, Kenneyon Webb, Margeria Smith, Ananda Nanjundaswamy, Keerthi Mandyam, Victor Njiti

Alcorn State University, Lorman, MS, USA

Cultivating dedicated energy grasses is vital in achieving annual biomass production of billion tons required by 2030 for fulfilling the U.S. bioenergy vision for energy independence. Energy grasses *Giant miscanthus* and switchgrass are perennial C4 grasses and their long-term and large-scale cultivation necessitates investigation of their associated soil properties. Freedom *Giant miscanthus* (FGM) is a commercial variety with drought and heat tolerance, low or no nitrogen fertilization, with stand life up to 20 years and bred for highest biomass yield especially in southeastern U.S. The first four years of grass cultivation is considered as the stand-establishment period. The overall objective of this study was to compare the seasonal and temporal variations of soil properties associated with FGM stand-establishment at three geographical locations in Mississippi. At all three locations, FGM was cultivated without any nitrogen amendment or weed control, and biomass was harvested once each year after the frost. Soil samples were collected in spring, summer and fall from plots in Lorman, Mound Bayou and Preston in 2016. Statistical analyses indicated that the soil properties varied in locations, with significant changes over seasons. Also, the soil parameters were compared from 2013 to 2016 over the seasons for Mound Bayou. Total organic matter and total C increased over the years whereas total N remained unchanged. Since future large-scale feedstock production will see the adoption of commercial, high biomass yielding, region-specific energy grass cultivars, data from this study will provide practical and valuable insights into soil characteristics of a commercial energy grass variety.

P1.12

MACROMORPHOLOGICAL AND MICROMORPHOLOGICAL DIVERSITY OF ROOT-ASSOCIATED FUNGAL ENDOPHYTES OF GIANT MISCANTHUS AND SWITCHGRASS

Anna Kazarina, Keerthi Mandyam, Ananda Nanjundaswamy

Alcorn State University, Lorman, MS, USA

Fungi are important components of the plant microbiome and among fungal symbionts, root colonizing dark septate endophytes (DSE) are known to colonize majority of plant species, are globally distributed with likely roles in enhanced plant resistance to biotic and abiotic stressors. A small number of fungal species are involved in this symbiosis with distinct species seen in grasslands. North American and European native grasslands seem to be dominated by few species of DSE fungi like *Periconia macrospinosa*, *Microdochium* sp., and *Darksidea* sp. In this study, we isolated DSE fungi from a non-native grass, *Giant miscanthus* (three locations in MS), and from four varieties of native switchgrass cultivated organically (one location in MS) for soil conservation, and switchgrass from native tallgrass prairie (KS). The overall aim was to compare DSE macro- and micromorphologies, to ascertain if a common set of grass DSE exist. We expected to isolate a variety of *Periconia*, *Microdochium* and *Darksidea* species. To maximize diversity of our fungal isolates, we utilized at least seven different isolation media with varying compositions. More than 3000 cm of roots were plated and at least 600 fungi were isolated. Periconia macrospinosa and putative *Darksidea* species were isolated. DSE fungal morphologies from all three grass hosts were similar. Macro- and micromorphologies of DSE fungi will be presented that supports the presence of core grass DSE fungi.

P1.13

USING PHYSIOLOGICAL AND YIELD-RELATED CHARACTERIZATIONS TO EVALUATE 100 ELITE RICE GENOTYPES

Salah Jumaa, Edilberto Redoña, K. Raja Reddy

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Rice is the most important cereal crop to over half of the global population. Identifying genetic variability for physiological and yield traits will have implications for selecting lines for improving yield traits through breeding. An experiment was conducted to investigate morpho-physiological traits at 90 days after sowing and yield and yield-related traits at maturity for 100 elite rice genotypes comprised of advanced breeding lines and released varieties. All plants were grown in a sunlit, pot-culture facility with optimum water and nutrient conditions throughout the experiment. The

individual vigor response index estimated for a given trait was calculated as the ratio of the trait values by maximum value among the lines. Cumulative vigor response index (CVRI) was calculated by summing up all indices of measured traits for each rice line. Cumulative vigor response index and one standard deviation were used to classify the rice lines into different groups. Based on this method, four groups were identified; two as very low, 30 as low, 32 as moderately low, 28 moderately high, and 7 as high vigor groups among the 100 lines tested. The significant and positive correlation between final harvest CVRI and physiological trait vigor index (r^2 = 0. 88) measured a few days after flowering implies that physiological traits could be used to characterize vigor indices among the rice genotypes. The identified CVRI values for various lines will be useful in rice breeding programs to select and develop new genotypes with greater vigor and yield.

P1.14

ASSESSING GENETIC DIVERSITY OF IMPROVED *GOSSYPIUM HIRSUTUM* AND *G. BARBADENSE* LINES USING FIBER ASSOCIATED NUCLEAR SSR AND NEWLY DEVELOPED CYTOPLASMIC SSR AND INDEL MARKERS

Mirzakamol Ayubov[1*], Sukumar Saha[2], Tokhirbek Norov[1], Dewayne Deng[2], Sheron Simpson[3], Brian Scheffler[3], Johnnie N. Jenkins[2], Zabardast Buriev[1] and Ibrokhim Abdurakhmonov[1]

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Cotton is the leading textile fiber and the second most important oilseed crop in the world generating over $100 billion in USA national economy and directly support about 500,000 jobs. Upland cotton (*Gossypium hirsutum* L., AD_1, 2n = 52) is the most widely grown cotton species worldwide because of its superior yield potential, whereas *G. barbadense* L. (AD_2, 2n = 52), the only other cultivated tetraploid species, grown in some areas because of the price advantage due to superior fiber quality. The genetic improvement of any crop species depends on the extent of genetic variation for desirable alleles and the accurate characterization of the variability among germplasm accessions. Breeders normally select genotypes based on morphological characters, primarily regulated by nuclear genome. However, cytoplasmic genome, including mitochondria and chloroplast genomes, plays also an important role to perform many biological functions. The narrow genetic base of cultivated cotton germplasm is the primary impediment in its genetic improvement. The characteristics and mode of genetic inheritance of cytoplasm and nuclear genome provide complementary valuable information to study gene flow, evolution, and population history in any cotton breeding program. Unfortunately limited information is available on the genetic variation especially on cytoplasmic genome of the improved cotton lines of *G. hirsutum* and *G. barbadense*. The objectives of this research was to: 1) develop cytoplasmic DNA markers as a tool for genetic studies and 2) use the DNA markers as a tool to detect genetic variation in the cytoplasmic and nuclear genome in a set of improved *G. hirsutum* and *G. barbadense* lines. We used 61 SSR primer pairs associated with important fiber specific traits of the nuclear genome and 49 primers specific to the cytoplasmic genome to screen 20 *G. hirsutum* and 74 *G. barbadense* improved lines from diverse geographical locations. We used the overall methods of standard PCR technique and gel analysis using an ABI 3730xl with a 96-capillary system for molecular analysis. The nuclear SSR primer pairs were selected based on the previous studies considering their presence covering almost the whole genome and association with important fiber traits. We scored the molecular marker data as a dominant marker to avoid ambiguous scoring for allelic relationship without pedigree data of the cotton lines in this experiment. The marker data were analyzed to estimate genetic similarity between cultivars based on the simple matching coefficient (SI) and constructed phylogenetic trees using JMP Genomics software (SAS^{TM}). Using a cost-effective data mining strategy we detected 27 CPSSR and 22 indel specific primer pairs from the cotton chloroplast genome using NCBI database. Results from the hybrids (F_1) of the reciprocal crosses between *G. hirsutm* (TM-1) and *G. barbadense* (Pima 3-79) confirmed the association of these markers specific only to the cotton cytoplasmic genome. We also observed that cytoplasmic indel markers are more polymorphic compared to the cytoplasmic SSR markers among the lines. The overall results from the dendrogram revealed that the selected 94 lines could broadly be divided into two broad groups of *G. hirsutum* and *G. barbadense*. However, the dendrogram results also showed that two accessions of *G. hirsutum* and two accessions of *G. barb*adense clustered with different species group respectively suggesting the interspecific introgression of gene pool in the development of these lines. The overall results suggested that the genetic diversity in this group of *G. hirsutum* is narrower in both cytoplasmic and nuclear genome compared to this group of *G. barbadense*. The average coefficient of similarity based on IBD value (identical alleles) in the cytoplasmic genome is 0.48 (S.E. ± 0.005). However, the nuclear genome average IBD value is 0.44 (S.E. ± 0.005) suggesting the genetic diversity in the cytoplasmic genome is little more conserved compared to the nuclear genome among the lines. The average IBD value is 0.42 (S.E. ± 0.005) combining both of the cytoplasmic and nuclear markers among the lines. Results from the dendogram pattern showed that the accessions in some cases from the similar breeding sources or geographic locations clustered together suggesting the use of similar in house gene pool in the breeding program. Genetic variation for desirable alleles for fiber traits and the accurate characterization of the variability in the targeted lines of interest are the foundation for any successful breeding program. This research provided for the first time a genetic tool to study cotton cytoplasmic genome and reported comparing the genetic diversity in the cytoplasmic and nuclear genomes of improved *G. barbadense* and *G. hirsutum* lines. Our research will help breeders to develop a breeding strategy maximizing the effects of genetic diversity to improve cotton lines.

Thursday, February 22, 2018
EVENING
Ballroom
3:30 Dodgen Lecture and Awards Ceromony
General Poster Session
Immediately Following Dodgen Lecture

Friday, February 23, 2018
MORNING
Room Union C

9:00-11:00 **WORKSHOPS**

(see highlights in Divisional Symposia and Workshops Section of the Journal)

THE USE OF COTTON MUTANTS AND NEAR ISOGENIC LINES TO ENHANCE NUTRITION AND PRODUCTION OF COTTONSEED AND LINT

This workshop will be led by Dr. Rick Turley, USDA-ARS, Stoneville, MS

APPLICATION OF SENSORS IN IRRIGATION MANAGEMENT, WATER CONSERVATION, AND CROP PRODUCTION

This workshop will be led by Dr. Daniel (Ken) Fisher, USDA-ARS, Stoneville, MS

Friday, February 23, 2018

AFTERNOON

12:00-1:00 Plenary Speaker
1:00-3:00 Mississippi INBRE/ Millsaps HHMI Symposia

CELLULAR, MOLECULAR AND DEVELOPMENTAL BIOLOGY

Co-Chair: Donna M. Gordon
Mississippi State University
Co-Chair: James A. Stewart, Jr.
University of Mississippi

Thursday, February 22, 2018
MORNING
Room TC 214

7:50 WELCOME

O2.01

8:00 CONNECTING THE DOTS BETWEEN TICK SALIVA AND RED MEAT ALLERGY

Gary Crispell and Shahid Karim

The University of Southern Mississippi, Hattiesburg, MS, USA

In the United States, the Lone Star tick (*Amblyomma americanum*) has been uniquely linked to the development of an unusual delayed allergic reaction to a glycan commonly found in non-primate mammalian meat products. Sensitization to the oligosaccharide galactose-α-1,3-galactose (α-Gal) following tick bites has been speculated to be the source of delayed-type anaphylactic reactions in response to consumption of red meat products. Hypersensitivity to α-Gal can lead to hives, gastrointestinal distress, and even life-threatening anaphylactic reactions upon exposure to the antigens. In this study, an immuno-proteome approach was utilized to identify tick salivary antigens of interest. Western blotting was used to identify proteins containing α-Gal, in-gel trypsin digestions and LC-MS/MS identified multiple glycoproteins from tick salivary glands, and N-linked glycosylations of the identified immunogenic carbohydrates were removed using Peptide:N-Glycosidase F (PNGase F). An artificial membrane feeding system was used to feed ticks on α-Gal lacking human blood which provided additional evidence that α-Gal synthesis is induced upon blood feeding in the tick salivary glands. N-glycan profiling utilizing NSI-FTMS/MS revealed the identities and percentage of composition of the glycoforms found in the tick saliva and salivary glands at various feeding stages. Combined, this data assists in understanding more about the newly discovered red meat hypersensitivity phenomenon that hasn't yet been well described in literature.

O2.02

8:15 THE ROLE OF PHOSPHODIESTERASE PDED IN REGULATING INTRACELLULAR CONCENTRATIONS OF CYCLIC DI-GMP UNDER ANOXIC CONDITIONS IN *LISTERIA MONOCYTOGENES*

Sally White[1], Daniel McClung[2], Hossam Abdelhamad[2], Janet Donaldson[1]

[1]The University of Southern Mississippi, Hattiesburg, MS, USA, [2]Mississippi State University, Mississippi State, MS, USA

The foodborne pathogen *Listeria monocytogenes* survives exposure to a variety of biological stressors encountered throughout the gastrointestinal tract. Previous work from our laboratory has shown anaerobic conditions increase survival of *L. monocytogenes* through

an unknown mechanism. Additionally, secondary messengers, such as cyclic di-GMP, have been known to regulate bacterial pathogenesis and fitness in response to environmental signals. Therefore, the hypothesis of this study is that oxygen availability impacts the intracellular regulation of cyclic di-GMP of *L. monocytogenes*, resulting in altered regulation of invasiveness and biofilm formation. To examine the regulation of c-di-GMP, the phosphodiesterase *pdeD* gene was deleted from the *L. monocytogenes* 4b strain F2365 and confirmed through gene sequencing. The effects of the mutation on survival, cyclic di-GMP levels, cellular invasion potential, and biofilm formation were examined following exposure to aerobic or anaerobic environments. The F2365Δ*pdeD* showed higher survival in comparison to the wild-type F2365 strain following anaerobic exposure in stressful conditions. The data also indicate that the F2365Δ*pdeD* mutant displayed decreased invasiveness under anaerobic conditions as well as inhibited biofilm formation under aerobic conditions. Together, these data suggest that *L. monocytogenes* utilizes phosphodiesterases, such as PdeD, to influence many cellular functions, including invasion potential and biofilm formation. Variations in growth, invasion potential, and biofilm formation between aerobic and anaerobic conditions suggest a connection to oxygen availability. This could indicate that PdeD, as part of a two-component system responding to an oxygen sensing histidine kinase, could influence the progression of disease.

O2.03

8:30 MSAABCR OPERON REGULATES PROGRAMMED CELL DEATH IN *STAPHYLOCOCCUS AUREUS*

Bibek G C, Gyan S. Sahukhal, Mohamed O. Elasri

The University of Southern Mississippi, Hattiesburg, MS, USA

Key problem with *S. aureus* as a pathogen is the acquisition of antibiotic resistance which is further worsened by their ability to produce biofilm. Studies indicates that a subpopulation in *Staphylococcus aureus* also undergo tightly regulated process called Programmed cell death (PCD) in biofilm condition which are thought to benefit the surviving population by releasing extracellular DNA, proteins and carbohydrates in biofilm extracellular matrix. Previously, we showed that deletion of msaABCR operon causes increased cell death during biofilm development leading to defective biofilm formation. However, trigger for unregulated cell death in msaABCR mutant biofilm is still unknown. To understand mechanism for cell death in msaABCR mutant biofilm, we followed survival of the wild-type strain (USA300 LAC) and the msaABCR mutant in stationary phase growing them in TSB supplemented with 35mM glucose. Under excess glucose condition, *S. aureus* culture supernatants are acidic due to buildup of acetic acid which eventually leads to generation of reactive oxygen species (ROS) and the potentiation of PCD. Acidic PH microenvironment within biofilm is also thought to be trigger for PCD. Indeed, the msaABCR mutant exhibited an increased rate of cell death in the presence of 35 mM glucose compared to that in the wild-type strain suggesting role of msaABCR regulating programmed cell death. Major overflow metabolic pathways involving cidABC, alsSD and lrgAB operons, were shown to regulate PCD within a biofilm microenvironment. Some of genes (CidA, lrgA) were differentially expressed in msaABCR mutant in our transcriptomes. Thus, we'll further confirm expression of these genes by qRT-PCR.

O2.04

8:45 THE MSAABCR OPERON IS INVOLVED IN DEFENDING OXIDATIVE STRESS IN *STAPHYLOCOCCUS AUREUS*

Shanti Pandey, Gyan Sahukhal, Mohamed Elasri

The University of Southern Mississippi, Hattiesburg, MS, USA

Staphylococcus aureus, a notorious human pathogen, has a complex regulatory network that controls multitude of defense mechanisms to withstand the deleterious effects of the oxidative stress inside host immune cells leading to persister formation and recalcitrant infections. We characterized msaABCR operon that regulates virulence, biofilm development, antibiotic resistance and tolerance. Transcriptome data shows downregulation of more than 10 oxidative stress protective genes in the operon mutant. This led us to hypothesize that the operon is involved in oxidative stress defense mechanism and intracellular persister formation. Here, we report that overnight growth of ΔmsaABCR stationary phase cells were abolished with 25mM hydrogen peroxide (H_2O_2) while isogenic wild type USA300 LAC and complementation could grow as comparable to the unstressed cells. Chromatin Immunoprecipitation assay revealed that MsaB protein directly binds the promoter region of OsmC/Ohr family protein (SAUSA300_0786) that is involved in resisting the oxidative stress. Moreover, significantly downregulated transcript of OsmC/Ohr family protein in ΔmsaABCR suggests MsaB as an activator of this protein. Taken together, these results suggest that msaABCR operon is involved in oxidative-stress-defense mechanism possibly via regulation of OsmC/Ohr family protein facilitating intracellular persister formation and recurrent infections. Further, we plan in-vivo study for understanding this mechanism underlying intracellular persister development and consequently overcome treatment failures of staphylococcal infections.

O2.05

9:00 THE ROLE OF THE MSAABCR OPERON IN REGULATING VIRULENCE OF *STAPHYLOCOCCUS AUREUS*

Justin Batte, Mohamed Elasri

The University of Southern Mississippi, Hattiesburg, MS, USA

Staphylococcus aureus is the causative agent of many nosocomial and community acquired infections worldwide. This pathogen possesses many virulence factors that allow it to successfully colonize and infect the host. *S. aureus* has developed a complex regulatory network responsible for the control of these virulence factors. We have identified the msaABCR operon and the MsaB transcription factor of the operon and have shown that it is involved in the regulation of virulence. One of these major factors includes the production of capsular polysaccharide (CP). CP has been shown to play a major role in the virulence response during infection as an antiphagocytic factor providing the pathogen protection against phagocytosis. We have identified MsaB as a transcription factor that directly controls CP in a nutrient-dependent manner. Additionally, we have also found that the msaABCR operon is regulating the immune evasion cluster (IEC) virulent genes. The IEC of *S. aureus* is composed of genes responsible for many immune evasion tactics utilized by the bacterium including, phagocytosis inhibition, chemotaxis inhibition, complement inhibition, PMN lysis, netosis activation, and adherence. This arsenal of immune evasion mechanisms allows the pathogen to successfully compete with the immune system during colonization and infection processes. We

have shown that deleting the msaABCR operon results in the mutant being significantly more susceptible to immune clearance compared to wild type *S. aureus* in ex-vivo studies. As a result, we are exploring targeting and inhibiting MsaB or the msaABCR operon's regulation as a potential novel therapeutic target in combating *S. aureus*.

O2.06

9:15 THE *HISTOPLASMA CAPSULATUM* STRESS-RESPONSE PROTEIN *DDR48* IS REQUIRED FOR STRESS RESPONSE AND ANTIFUNGAL DRUG RESISTANCE

Logan Blancett, Paige Braddy, Gabriella Reyes, Glen Shearer

The University of Southern Mississippi, Hattiesburg, MS, USA

Histoplasma capsulatum (Hc) is a systemic, dimorphic, fungal pathogen. *Hc* grows as a multicellular mold at environmental temperatures (25°C) whereas, upon inhalation into a human or other mammalian host (37°C), it transforms into a unicellular, pathogenic yeast. Our research aims to elucidate the numerous stress response pathways (e.g., oxidative stress and DNA damage) that *Hc* utilizes to survive in the ever-changing environment. Specifically, we are characterizing the DNA damage-responsive protein *DDR48*, an *Hc* homolog sharing sequence similarity to *C. albicans DDR48p*. Previously in our lab an allelic replacement deletion-mutant was generated (*ddr48*Δ) to allow functional analysis of Hc*DDR48*. We found that *DDR48* is required for resistance to numerous cellular stressors such as oxidative stress, DNA damage, heat shock, and antifungal drugs. We also performed RNAseq analysis of the deletion mutant, which showed that a majority of down-regulated genes are involved in cell signaling of the various cellular stress response pathways. Interestingly, many genes that were up-regulated in the deletion mutant are involved in cysteine/sulfur metabolism as well as carbohydrate and nitrogen metabolism. We are also analyzing a *DDR48:GFP* fusion protein to determine the cellular localization of DDR48p under optimal conditions and conditions of stress. Research is ongoing to unveil the intricate role *DDR48* is playing in sensing and responding to cellular stress and its role as a global regulator.

O2.07

9:30 REGULATION OF MSAB EXPRESSION AND ITS ROLE IN BIOFILM DEVELOPMENT AND VIRULENCE

Gyan S. Sahukhal, Mohamed O. Elasri

The University of Southern Mississippi, Hattiesburg, MS, USA

Staphylococcus aureus causes a wide range of acute and chronic infections in humans. The *msaABCR* operon is a four-gene operon that include a transcription factor (MsaB), noncoding RNAs (msaA and msaC) and antisense RNA (*msaR).* The *msaABCR* operon regulates the fundamental phenotypes of *S. aureus*, including biofilm development, antibiotic resistance and virulence. Transcription of *msaABCR* generates several sub-transcripts including one that translates MsaB. However, the regulatory mechanism of this operon and the role of the sub-transcripts is not yet understood. In this study, we investigate the role of 5' and 3' end of the *msaABCR* transcript in the production of MsaB. We performed several mutagenesis analyses and constructed a series of truncated *msaABCR* operon transcript constructs (TC-1 to TC-12) and studied MsaB production and its role in biofilm development and virulence factors. Our results showed that full *msaABCR* operon transcript complemented to the wild type level in terms of all *msaABCR* phenotypes and MsaB production. Two constructs, TC-5 and TC-9, complemented the *msaABCR* mutant back to wild type level and lead to over-production of MsaB. The constructs TC-1, TC-2, TC-3 and TC-4 did not complement the *msaABCR* mutant and did not produce MsaB. Interestingly, TC-3 and TC-4 complemented biofilm formation suggesting a role for the 3' end in biofilm formation that does not require MsaB. In conclusion, this study defines the regulatory functions of the 5' and 3' ends of the *msaABCR* transcript in the production of MsaB, biofilm development and regulation of virulence factors.

9:45 BREAK

O2.08

10:00 MOLECULAR CHARACTERIZATION OF A-D-GALACTOSIDASE IN THE LONE-STAR TICK, *AMBLYOMMA AMERICANUM*

Cameron Cox[1], Joshua Lange[1], Gary Crispell[1], Shahid Karim[1]

[1]The University of Southern Mississippi, Hattiesburg, MS, USA, [2]MS-INBRE, Hattiesburg, MS, USA

Red meat allergy is an emergent allergy, increasingly widespread in tick endemic areas in the United States of America. Intriguingly, research has shown that tick bites, specifically by the lone-star tick (*Amblyomma americanum*), are possibly responsible for triggering an increase in IgE-mediated allergic reactions to the immunogenic glycan, galactose-α-1,3-galactose (α-gal) within the United States. The objective of this study is to functionally characterize lone-star tick α-D-Galactosidase (AGS) enzyme and assess its potential role glycan metabolism. In our previous study, AGS was identified, which cleaves terminal α-linked galactose sugars from larger glycan structures. This enzyme is part of a pathway that can lead to the production of UDP-galactose, which is necessary for the synthesis of precursor glycan structures that can be capped with a terminal galactose. Therefore, we hypothesize that silencing of AGS by RNA interference approach will alter the overall salivary glycan profile. The time and tissue-dependent transcriptional expression of the AGS reveals up-regulated expression in slow feeding phase on the host. Silencing of the target gene has interfered with other genes involved in tick glycan metabolism and synthesis pathways, leading to the transcriptional down-regulation of 6 7 genes in the salivary glands. Silencing of AGS lead to an increased localized reaction on the host skin after attachment when compared with control. We are beginning to understand the molecular process of the breakdown of host carbohydrates occurring within ticks, the importance of AGS in evading host immunity, and with the tick's success in hematophagy.

O2.09

10:15 CHARACTERIZING THE IMPACT OF THE ANTIFUNGAL OCCIDIOFUNGIN ON THE PATHOGENIC YEAST *C. ALBICANS*

Aaron Albee, Donna M. Gordon

Mississippi State University, Mississippi State, MS, USA

Candida albicans is a medically significant polymorphic fungal pathogen. Occidiofungin is a cyclic glyco-lipopeptide shown to have antifungal properties against this yeast, however its molecular target is not known. Past work focused on the yeast form of *C. albicans*, however a switch to a filamentous morphology is required for pathogenesis. Therefore, the aim of this work was to determine whether occidiofungin was effective against cells undergoing morphogenic switching. Known triggers for inducing hyphal

formation were utilized to switch cells immediately prior to the addition of occidiofungin. Cell morphology and cell viability were determined by microscopy, CFU analysis, viability, and spotting assays. Data support a 25-45% decrease in live cells following occidiofungin exposure with cells prevented from morphogenic switching. To examine the impact of occidiofungin on cell wall components, Calcofluor white and concanavalinA staining was carried out. No changes to the distribution of chitin or cell wall glycoproteins were found. Actin has been linked to the establishment of cell polarity crucial for hyphae formation. To determine whether actin organization was altered in occidiofungin treated cells, phalloidin-TRITC was used in fluorescence microscopy and compared to that of untreated cells. As previously reported, actin localized to cortical patches at the apical tip of elongating hyphae in untreated cells, however no such localization for occidiofungin treated cells was found. This disruption in actin structures may explain the lack of switching and suggests that the molecular target for occidiofungin activity is likely involved in actin organization.

O2.10

10:30 ANTIVIRAL RNA INTERFERENCE IN MOUSE EMBRYONIC STEM CELLS IS VIRUS-DEPENDENT

Chandan Gurung, Biswas Neupane, Fengwei Bai, Yan-Lin Guo

The University of Southern Mississippi, Hattiesburg, MS, USA

Differentiated somatic cells in vertebrates mainly use the protein-based interferon (IFN) system as innate immunity against viral infection. Since the IFN system is underdeveloped in mouse embryonic stem cells (mESCs), we studied whether RNA interference (RNAi) serves as an alternative antiviral defense mechanism in these cells. RNAi is the predominant antiviral defense system in non-vertebrate animals and other eukaryotes, but evidence for RNAi in mammalian cells is controversial. RNAi uses short interfering RNAs derived from processing of viral double stranded RNA intermediates by the cytoplasmic RNaseIII enzyme dicer to limit viral infection. In order to test whether RNAi is functional in mESCs, we used dicer knockout (DKO) mESCs and an IFNβ-neutralizing antibody to negate RNAi and IFN systems (respectively) in mESCs. When challenged with Chikungunya virus (ChikV), DKO mESCs were less susceptible to viral infection compared to wild-type mESCs. This seems to be due to an increased basal level of IFNβ in DKO mESCs, as the IFNβ-neutralizing antibody increased the susceptibility to ChikV infection. RNAi hence did not have any role against ChiKV infection in mESCs. However, upon infection with La Crosse virus (LACV), DKO mESCs were found to be more susceptible than wild-type mESCs, and the IFNβ-neutralizing antibody did not have any effect on susceptibility, suggesting that RNAi could be an antiviral defense mechanism against LaCV infection. Our results indicate that RNAi as an antiviral mechanism in mESCs could be virus-dependent.

O2.11

10:45 VIRUS CAPSID BASED METAL COMPLEXES FOR CANCER CHEMOTHERAPY

Amber Gardner[1], Stephen J. Stray[2]

[1]Alcorn State University, Lorman, MS, USA, [2]University of Mississippi Medical Center, Jackson, MS, USA

Despite the many cancer drugs on the market, there is still a need for safe and effective methods of killing cancer cells. Cancer drugs that kill malignant cells unfortunately kill normal host cells as well. Cisplatin is limited in usefulness, due to its level of toxicity. We aim to develop a technique that allows toxic cargo, platinum ions, to target malignant cells without affecting normal host cells. Our aim is to use non-replicating virus-like particles designed so that toxic cargo is carried by the viral capsid protein. Our protein carrier, Cp149, is derived from hepatitis B Virus (HBV) and is expressed in *E. coli*. To purify Cp149, it is run over a series of columns that separate based on molecular size. To test whether the Cp149 protein is able to carry toxic cargo, we will incubate Cp149 with a platinum donor, K_2PtCl_4. We then run a series of column fractionation experiments that will allow the protein- platinum mixture to pass through. We will then test for the presence of platinum in protein-containing fractions to determine whether the platinum has bound to the protein. Cp149 expressed in *E. coli* is easily manipulated and may provide a cost effective therapy. Ongoing research by others in our laboratory is -aimed at finding methods to specifically target these platinum-containing complexes to cancer cells.

O2.12

11:00 A PLANT EXTRACT PROTECTS MICE FROM ZIKA VIRUS CAUSED EYE DAMAGES

Gabriel Gonzalez-Fernandez[1], Biswas Neupane[1], Federico Gonzalez-Fernandez[2], Fengwei Bai[1]

[1]The University of Southern Mississippi, Hattiesburg, MS, USA, [2]University of Mississippi Medical Center, Jackson, MS, USA

Zika virus (ZIKV) causes congenital abnormalities, most notably microcephaly and eye diseases that could result in blindness. There is no approved vaccine or specific therapeutics available against ZIKV-caused diseases in human. Here, we evaluated if a plant extract (HTLOO4), which has been shown to inhibit replication of ZIKV and dengue virus *in vitro*, has therapeutic effects to protect mice from ZIKV-caused eye damages. We infected immunocompetent mice lacking the type I interferon receptor ($Ifnar1^{-/-}$) with 1×10^5 PFU of ZIKV through footpad inoculation. Starting from day (D) 1 post infection (p.i.), mice were orally fed with HTLOO4 (1.5 g/kg body weight) or the same volume of sterile water (100µl) as control twice a day for 5 days. Blood samples were collected on D2 and 4 p.i. to measure viral burden by QPCR. The PCR results showed that HTL004 treated mice had reduced viral burden in the blood samples compared to the controls. On day 9 p.i., the mice were euthanized and eyes were collected in 4% PFA for histopathology studies. Compared to the controls, the HTL004 treated mice showed less severe inflammation and damages in the cornea and lacrimal gland in the eyes. These preliminary results suggest HTL004 has therapeutic effects to inhibit ZIKV replication and protects mice from ZIKV-caused eye damages.

O2.13

11:15 IL17A SIGNALING FACILITATES CHIKUNGUNYA VIRUS-INDUCED FOOTPAD SWELLING IN MICE

Biswas Neupane[1], Dhiraj Acharya[2], Gabriel G. Fernandez[1], Elizabeth Ashley Thompson[1], Fengwei Bai[1]

[1]The University of Southern Mississippi, Hattiesburg, MS, USA, [2]University of Chicago, Chicago, IL, USA

Chikungunya virus (CHIKV) is a mosquito-borne alphavirus that has been associated with arthritis and arthralgia, which can cause long-term effects in patients. There is no approved vaccine and specific therapeutics against CHIKV-caused diseases in humans and its pathogenesis is not completely understood. We studied the roles of an inflammatory cytokine interleukin 17A (IL17A) in the pathogenesis of CHIKV in mouse models. Our results indicate that

mice that are deficient in IL17A (*Il17a*$^{-/-}$) and in IL17A receptor (*Il17ra*$^{-/-}$) are relatively resistant to CHIKV-induced symptoms including lower levels of viral burden in blood and footpad swelling compared to wild-type control mice. These results suggest that IL17A signaling contributes CHIKV-induced diseases in mice.

O2.14

11:30 THE EFFECTS OF MiRNA-9 AND -21 ON ZIKA VIRUS INFECTION

E. Ashley Thompson, Britton Strickland, Alex Flint, Fengwei Bai

The University of Southern Mississippi, Hattiesburg, MS, USA

Zika Virus (ZIKV) is a mosquito-transmitted, positive sense RNA flavivirus that is known to cause congenital developmental abnormality including microcephaly in infants whose mothers were infected with the virus during pregnancy. MicroRNAs (miRNAs) are small, non-coding regulatory RNAs that bind to the 3' untranslated region (UTR) of RNAs and are primarily active in early development, cell cycle signaling, and cancer pathogenesis. While the exact mechanism is unknown, recent studies have hypothesized that microRNAs have roles in effecting different viral infections, such as influenza and Human Immunodeficiency Virus (HIV). In this study, we infected mouse neuroblasts Neuro-2a cells with ZIKV and found that the expression of miRNA-9 and -21 were up-regulated by RNA sequencing. We confirmed tghat inhibition of these two miRNAs by miRNA sponges leads to inhibition of ZIKV replication in Neuro-2a and human SH-SY5Y cells. These results indicate that these microRNAs may facilitate ZIKV infection in both murine and human brain tissues.

12:00 GENERAL SESSIONS

Thursday February 22, 2018
AFTERNOON
Room TC 214

O2.15

1:00 IDENTIFICATION OF NOVEL REGULATORS OF SELECTIVE AUTOPHAGY IN TETRAHYMENA THERMOPHILA

Michael Patterson, Brianna McField and Sabrice Guerrier

Millsaps College, Jackson, MS, USA

Selective autophagy provides a mechanism by which cells can specifically target material for degradation and/or recycling. However, the mechanisms that target the autophagosome (the degradative organelle), to specific cargo remain unclear. The objective of this study was to use mating in the ciliate, Tetrahymena thermophila, as a tool to identify novel regulators of selective autophagy. Importantly, Tetrahymena generate up to five macronuclei, with only one, being selected for degradation. Using GFP tagging and knockout approach we have identified two genes, SNX4 and Reticulon that seem to regulate aspects of this degradation. Future studies will focus on identifying the mechanism for this regulation in addition to identifying potential interacting partners. Important, this work was supported by the Mississippi INBRE, funded by an Institutional Development Award (IDeA) from the National Institute of General Medical Sciences of the National Institutes of Health under grant number P20GM103476.

O2.16

1:15 THE LACK OF INNATE IMMUNITY - A POTENTIAL SELF-PROTECTIVE MECHANISM IN MOUSE EMBRYONIC STEM CELLS

Bohan Chen, Yan-Lin Guo

The University of Southern Mississippi, Hattiesburg, MS, USA

Innate immunity, an organism's first line of defense against pathogens, is well-developed in most somatic cells. However, recent studies from our lab demonstrated that embryonic stem cells (ESCs) are deficient in innate immune responses to viral/bacterial infections and inflammatory cytokines. This raises a fundamental question: why is such a vital defense mechanism lacking in ESCs? Inflammatory cytokines generally inhibit cell proliferation, which could be detrimental to ESCs, since cell proliferation is their dedicated task during early embryogenesis. Therefore, we hypothesize that the lack of innate immunity could be a self-protective property of ESCs to avoid the inhibition of cell proliferation. To test this, we first compared the effects of inflammatory cytokines (TNFα and IFNγ) on ESCs and ESC-differentiated fibroblasts (ESC-FBs), which have partially developed innate immunity. Our results indicated that these cytokines caused drastic cell proliferation inhibition in ESC-FBs, but not in ESCs. We then treated the cells with conditioned medium (CM) collected from lipopolysaccharide (LPS)-stimulated macrophages (LPS-CM), mimicking the inflammatory conditions induced by bacterial infection. When exposed to LPS-CM, ESC-FBs, but not ESCs, showed significantly reduced cell proliferation and increased cell death. We further demonstrated that NFκB and STAT1, the transcription factors that mediate that effect of TNFα and IFNγ, respectively, are activated only in ESC-FBs, not in ESCs. These findings support our hypothesis that the lack of innate immunity could be a protective mechanism for ESCs from potential damage associated with inflammatory response during the early stages of development.

O2.17

1:30 EFFECT OF DCLK1 ON THE PROLIFERATION AND STEMNESS OF COLORECTAL CANCER CELLS

Abednego Commey, Lianna Li

Tougaloo College, Tougaloo, MS, USA

Colorectal cancer (CRC) is the leading cause of cancer-related deaths in the United States. Accumulated mutations in the stem cells of the rectum/colon can cause colorectal cancer. Targeting and killing the stem cells, especially the cancer stem cells, has been a challenge to scientists. Doublecortin like kinase 1 (DCLK1), a putative marker for gastrointestinal stem cells, has been identified and might specifically label cancer stem cells with conflict findings. DCLK1 functions in the regulation of microtubule polymerization and mediation of multiple protein-protein interactions. Further identifying the identity of DCLK1, its functions, and whether DCLK1 can be an effective therapeutic target for the treatment of colorectal cancer has become urgent. Our aim is to determine how DCLK1 overexpression affects the proliferation and stemness of CRC cells. In order to achieve this goal, we established stable DCLK1 overexpression cell lines using HCT116 cells by transfecting human DCLK1 variant 1 cDNA. Spheroid-Formation Assay was applied to evaluate whether DCLK1 is associated with stemness of CRC cells. Cologenic assay was applied to measure clonal generation capacity. Cell viability and proliferation was

measured using the MTT (3-(4, 5-dimethylthiazolyl-2)-2, 5-diphenyltetrazolium bromide) assay. Our results demonstrated that DCLK1 overexpression: 1) increased cell proliferation rate under both stem cell and normal cell culture conditions; 2) increased self-renewal capability, which indicates stronger stemness of the cells; 3) increased colony generation capacity. Our results identified that DCLK1 over expression increases proliferation and stemness of colorectal cancer cells, indicating it might be a novel therapeutic target for the CRC patient treatment.

O2.18

1:45 PKC-DEPENDENT PHOSPHORYLATION OF MUNC18A AT SER313 IN MAST CELL DEGRANULATION

Pratikshya Adhikari, Hao Xu

The University of Southern Mississippi, Hattiesburg, MS, USA

Mast cell exploits multiple sets of exocytic SNAREs to release a wide range of mediators of immuno-importance. These SNAREs operate with specific Munc18 isoforms that are known to undergo reversible phosphorylation in various secretory cells. In this study, we show for the first time that Munc18a is phosphorylated at Ser 313 in mucosal mast cell line RBL-2H3, in response to IgE/antigen-dependent activation. PKC inhibitor R0-03-0432, which inhibits RBL-2H3 exocytosis/degranulation in a concentration-dependent fashion, prevents Munc18a phosphorylation at Ser 313. Phosphomimetic mutations of Munc18a cause a significant reduction in Munc18a's capacity to promote VAMP2/syntaxin4/SNAP23-mediated lipid mixing, suggesting that signaling-triggered phosphorylation of Munc18a likely contributes to the intricate regulation of exocytic fusion in activated mast cells.

O2.19

2:00 EFFECT OF DIETARY CARBOHYDRATES ON PUPATION AND ECLOSION OF *DROSOPHILA MELANOGASTER*

Khoula Saleem, Jerry Reagan

Mississippi College, Clinton, MS, USA

High-carbohydrate diets have been shown to retard growth and development in *Drosophila melanogaster* larvae (Musselman, et al., (2011) Dis Models Mech, 4:842-849). This phenotype may be linked to insulin resistance, but a definitive molecular mechanism has not been established (Kim and Neufeld (2015) Nature Comm 6:6846). To examine potential mechanistic links between carbohydrate metabolism, insulin-resistance, and various developmental parameters, we maintain a colony of wild-type (Oregon R strain) *D. melanogaster* on a chemically defined diet, which allows precise manipulation of individual dietary components. The standard diet contains 11.5 g/L essential amino acids, 8.12 g/L nonessential amino acids, 78.4 g/L carbohydrates (sucrose, glucose, trehalose, lactose), 0.872 g/L lipids, 1.00 g/L RNA, 0.500 g/L DNA, and 3.20 g/L micronutrient mix. To examine the effect of carbohydrate concentration on growth and development parameters, larvae were reared on diets containing carbohydrate concentrations ranging from 0-3 times that of the standard diet. There was a positive correlation between dietary carbohydrate concentration and pupation and eclosion half-times (i.e. length of time required for one-half of the larvae to pupate or eclose, respectively). This demonstrated that elevated carbohydrate concentrations induce a developmental delay during the larval phase of the *D. melanogaster* life cycle. Furthermore, dietary carbohydrate concentration was inversely related to average body size and larval life-span. These phenotypic changes establish a clear link between dietary carbohydrates and *D. melanogaster* growth and development, perhaps as a secondary response to the induction of an insulin-resistant phenotype.

O2.20

2:15 SYNERGISTIC EFFECTS OF PROTEASOMAL AND LYSOSOMAL ENZYME INHIBITORS ON PLASMA MEMBRANE CFTR

Shreya Ghimire[1,2], Ghanshyam Heda[1]

[1]Mississippi University for Women, Columbus, MS, USA, [2]College of Medicine, The University of Tennessee Health Sciences Center, Memphis, TN, USA

BACKGROUND AND OBJECTIVES: A mutated CFTR (Cystic Fibrosis Transmembrane-conductance Regulator) impairs chloride ion channel, and is responsible for causing the genetic disease cystic fibrosis. Our laboratory has shown that the plasma membrane half-life of the most common of CFTR mutations (DF508) is much shorter (~4 h) than that of wild-type CFTR (>48 h). [Heda et al, *Am J Physiol*, 280, C166-C174, 2001]. We hypothesize that this reduced DF508-CFTR half-life may be due to the distinct role of proteasomes, lysosomes and/or CFTR-protein(s) interactions. In this study we present the effects of some potent inhibitors of proteasomes and lysosomes and their synergistic effects in rescuing the CFTR from degradation. **METHODS:** Epithelial cell lines from human lung (CFBE) stably transfected with DF508 or wild type CFTR were pre-treated with 5 mM sodium butyrate at 27ºC for 60 hrs to up-regulate the plasma membrane CFTR expression. Cells were then "chased" at 37ºC in the presence of protein synthesis inhibitor (cycloheximide) and/or inhibitors of proteasomes (MG132, lactacystin, ALLN, leupeptin), or lysosomal enzymes (E64, EST, chloroquine). Cell lysates were immunoblotted with anti-CFTR antibody and CFTR-specific signal was detected by chemiluminescence using c300 image analyzer (Azure Biosystems). **RESULTS:** All inhibitors with the exception of chloroquine partially rescued the degradation of plasma membrane DF508-CFTR in CFBE cell line. There is little or no synergistic effects was observed when these inhibitors were used in combination. **CONCLUSIONS:** Our data suggests that CFTR degradation is partially controlled by proteasomes and lysosomal enzymes.

O2.21

2:30 OPTIMIZATION OF WESTERN BLOTTING FOR THE DETECTION OF CFTR EXPRESSION IN HUMAN PANCREATIC CELL LINES

Lisa Shrestha[1], Jamie Avery[3], Rajiv Heda[2], Ghanshyam Heda[1]

[1]Mississippi University for Women, Columbus, MS, USA, [2]The University of Tennessee Health Sciences Center, Memphis, TN, USA, [3]The University of North Alabama, Florence, AL, USA

BACKGROUND AND OBJECTIVES: Western blotting is a common procedure for the detection of specific proteins in a complex mixture. SDS-PAGE, transfer of proteins to a solid membrane surface using Towbin's transfer buffer (TTB), and detection of proteins using specific antibodies are major steps in this technique. Some of the key factors in obtaining optimum protein-specific signal includes, type of membrane, blocking agent, and concentration of methanol used in TTB. Aim of this study is to obtain optimal signal for a protein called CFTR using combination of these variables. A mutated CFTR is responsible for causing the genetic disease cystic fibrosis, and is focus of our ongoing

research. **METHODS:** Cell lysates prepared from a lung epithelial cell line (CFBE) were subjected to SDS-PAGE and transferred to nitrocellulose (NC) or PVDF membrane as per the standard procedure. These membranes were blocked with a variety of blocking agents (BSA, gelatin, non-fat dry milk, FBS, or their equimolar mixture). Optimum conditions were identified, and subjected to another set of experiments to determine the effects of methanol concentration (0-20%) in TTB on CFTR signal. **RESULTS:** Optimum CFTR signal can be obtained when NC membrane was used and blocked with a mixture of various blocking agents. Presence of methanol in TTB appears to have little or no effect on the optimized CFTR signal. **CONCLUSIONS:** NC membrane and mixture of blocking agents can provide the optimal CFTR signal. Further, methanol, a toxic substance, can be removed from TTB without compromising the enhanced CFTR signal.

O2.22

2:45 HV AND I MTDNA HAPLOTYPE ANALYSIS BY PCR RESTRICTION ANALYSIS AND PRIMER BINDING METHODS WITH CREATION OF AN ONLINE D ATABASE

V. L. Hodges, L. C. Bowlin, C. M. Cruz Rivera, T. Dondla, C. D. Huynh, C. J. Jago, A. A. Whittom Reiken

Mississippi College, Clinton, MS, USA

The maternally inherited human mitochondrian has its own 16,569 nucleotide genome, mtDNA. Changes in mtDNA sequence over time are used to trace maternal lineages and population migrations over thousands of years. Detection of single nucleotide polymorphisms (SNPs) is a common method of mtDNA analysis. Nucleotide sequence variations, haplotypes, are used to define specific haplogroup populations. As a learning experience, we performed HV and I haplogroup analysis of mtDNA from students interested in the procedure. The common HV haplogroup migrated from the Western Europe and Middle East regions. The I haplotype is extremely rare, found in 2% of Europeans, <1% of Near Easterners, and very low frequencies in Eurasia and parts of Northern Africa. HV and I haplotypes were detected using PCR restriction analysis and the PCR primer binding methods, respectively. Diagnostic SNPs for HV and I were C14766C and G16391A, respectively. Our mtDNA samples represent diverse backgrounds, but due to small sampling size and known haplotyping frequencies, we did not expect to identify the very rare I haplotype. Surprisingly, we detected both the HV and I haplotypes. Of 32 samples tested, 68% were the HV haplotype and 3% were the I haplotype. To organize data, a protected online database was created using Sodadb (Simple Online Database, https://sodadb.com/). HV and I haplotypes have separate database sheets containing anonymous sample numbers, retrieval dates, ethnicity backgrounds, haplotype results, and gel figures. The database assists student learning since it allows viewing of all acquired data in one place with easy future updating capabilities.

2:55 CONCLUDING REMARKS

Thursday, February 22, 2018

EVENING

Ballroom

3:30 Dodgen Lecture and Awards Ceromony

General Poster Session

Immediately Following Dodgen Lecture

P2.01

IDENTIFYING A ROLE FOR MITOCHONDRIA IN AGE-RAGE SIGNALING

Shannon Ballard[1], Meghan O'Brien[1], James A. Stewart, Jr.[2], Donna M. Gordon[1]

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Over time, elevated blood glucose levels lead to the accumulation of advanced glycation-end products, or AGEs. These non-enzymatic modifications contribute to cellular dysfunction and in the heart may reduce the overall elasticity of extracellular matrix proteins leading to cardiac dysfunction. In addition, extracellular AGEs are recognized by RAGEs, transmembrane receptors whose activation leads to increased RAGE expression, further contributing to cellular stress. Observational data from our labs suggest that mice harboring a deletion of RAGE (R-/-) have a longer lifespan than their wild type (WT) littermates. Microarray data found these mice had elevated transcript levels of genes involved in mitochondrial biogenesis. Given the association between cellular aging and mitochondrial function, the aim of this project is to compare the levels of mitochondrial and stress-related proteins in heart tissue isolated from WT and R-/- mice. Based on our preliminary data, we hypothesize that knocking out RAGE will stop downstream signaling activities resulting in higher mitochondrial activity relative to wild type littermates. To test this hypothesis, protein extracted from heart tissue will be analyzed by Western blot analysis using antibodies directed against mitochondrial proteins. Identifying differences between WT and R-/- animals may shed light on a potential role for AGE/RAGE signaling in organismal aging. This work was supported by the Mississippi INBRE, funded by an Institutional Development Award (IDeA) from the National Institute of General Medical Sciences (NIGMS) of the National Institutes of Health (NIH) under grant number P20GM103476.

P2.02

THE STRESS-RESPONSE PROTEIN *DDR48* IS REQUIRED FOR COMBATTING OXIDATIVE STRESS IN BOTH MORPHOTYPES OF THE FUNGUS *HISTOPLASMA CAPSULATUM*

Logan Blancett, Paige Braddy, Glen Shearer

The University of Southern Mississippi, Hattiesburg, MS, USA

Histoplasma capsulatum is a pathogenic fungus that is the etiologic agent of histoplasmosis, a respiratory disease affecting humans and other mammals. *H. capsulatum* is dimorphic – growing as a multicellular mold at 25ºC and a unicellular yeast at 37 ºC. The morphologic shift from mold (environmental) to yeast (tissue form) is critical for the pathogenesis of the organism. Our research aims to elucidate the numerous stress response pathways (e.g., oxidative stress and DNA damage) that *Hc* utilizes to survive in the ever-changing environment. Specifically, we are characterizing the DNA damage-responsive protein *DDR48*, an *Hc* homolog sharing sequence similarity to *C. albicans DDR48p*. It has been established that *DDR48* is essential

for survival under oxidative stress conditions and DNA damage in *C. albicans*. We asked if *DDR48* plays a similar role in *Histoplasma*, which could provide helpful insight into how the fungus is surviving in both the environment and the host. This study investigates the role *DDR48* plays, if any, in the oxidative stress response in *Histoplasma*. We performed a survival assay in both mold-phase and yeast-phase *Histoplasma* in optimal cell culture conditions as well as various concentrations of paraquat, which generates reactive oxygen species (ROS). We found that there is a 35% decrease in survival in the *ddr48D* strain compared to the wildtype, *DDR48*-expressing strain, in both mold-phase and yeast-phase *Histoplasma* cells when exposed to paraquat. These results indicate that a functional copy of *DDR48* is required to counteract oxidative stress.

P2.03

IDENTIFICATION AND QUANTIFICATION OF *TRICHOMONAS VAGINALIS* VIRUSES IN ATCC STRAINS OF TRICHOMONAS VAGINALIS

Rachel Bravenec[1], Jacob Mardick[1], Cory Toyota[1], John Meade[2]

[1]Millsaps College, Jackson, MS, USA, [2]University of Mississippi Medical Center, Jackson, MS, USA

The flagellated protozoan *Trichomonas vaginalis* parasite is the cause of trichomoniasis, the most common nonviral sexually-transmitted infection in the world, and contributes to the risk of prostate and cervical cancer. The current study seeks to qualitatively and quantitatively characterize the *T. vaginalis* parasite. The *T. vaginalis* parasite may be infected with up to four strains of *Trichomonas vaginalis* virus (TVV 1-4). To qualitatively identify the presence of TVVs in *T. vaginalis* isolates, primers designed by Goodman et al. are used to amplify virus-specific regions. *T. vaginalis* isolates are determined to be virus-positive or virus-negative with agarose gel electrophoresis, and typed as TVV1-4 by RT-PCR using the aforementioned primers. Previously, there was no quantitative method of evaluating viral RNA in the T. vaginalis cells. To determine the copy number of viral RNA, a two-step qRT-PCR based assay was developed. The assay utilized vectors constructed to include cloned TVV-specific regions as standards. 21 ATCC isolates common in other studies, 5 MS isolates, and one historic strain are analyzed. Data regarding copy number in ATCC isolates suggests that TVVs are only present in a low percentage of isolate cells, which may evidence the theory of vertical transmission of *T. vaginalis* virus.

P2.04

***LACTOBACILLUS FERMENTUM* CAUSES PRECOCIOUS CONFLUENCY AND PROTECTS FROM AN INFLAMMATORY SIGNAL IN THE CACO-2 IN VITRO MODEL OF TRANSEPITHELIAL RESISTANCE**

Kellie Brue, Suwaira Iqbal, Hannah Smith, John Piletz

Mississippi College, Clinton, MS, USA

Objectives: In inflammatory bowel disease (IBD), pro-inflammatory cytokines are involved in the pathology of compromised gut epithelial permeability. This present study tested the probiotics *Lactobacillus fermentum* (LF) and *Lactobacillus rhamnosus* (LR) to gauge protective measures by these bacteria on gut epithelial barrier function damaged by inflammation in an in vitro model. **Methods:** Human cell line Caco-2 cells were studied in two ways: (1) in mid-growth on plates and, (2) as 17-day monolayers on filter inserts that model small intestine endothelium. Varying doses of LF and LR were added to the media for up to 60 hours. Caco-2 cell numbers and size were measured by cellometry and metabolic activity was measured by MTT (3-(4,5-Dimethylthiazol-2-yl)-2,5-Diphenyltetrazolium-Bromide) method. Caco-2 monolayer permeability was assayed via TransEpithelial Electrical Resistance (TER) with and without preincubation with probiotics and challenge (TNFα). **Results**: LF alone led to dose-dependent increased proliferation rate of Caco-2 cells grown between 4-6 days, with an inverted pattern for the MTT assay, representing a precocious plateau of confluency compared to controls. LR also increased growth rate but at different doses compared to LF. Combined LF+LR treatment attenuated the effects of LF alone. Then, in the 17-day-old confluent cell experiment on inserts, LF pretreatment (3 h) diminished TNFα's anti-TER effects after 60 hours. **Conclusion**: The combined abilities of LF to promote Caco-2 cell growth and diminish TNFα's anti-TER effects, suggests it should be an effective cytoprotective probiotic on the gut epithelial permeability in the presence of inflammatory cytokines.

P2.05

THE EFFECTS OF THE ENVIRONMENTAL PESTICIDE IMIDACLOPRID (IMID) ON MACROPHAGE POLARIZATION *IN VITRO*.

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Macrophages are immune cells capable of great diversity in structure and function. While current convention identifies functionally active macrophages as either M1 (classically activated) or M2 (alternately activated), research shows that a more accurate model may be a spectrum which often recognizes macrophage activation as intermediate between the M1 and M2 states proper (Mosser and Edwards 2008). TNF-α is a pro-inflammatory cytokine usually produced by M1-polarized macrophages, while RELM-α is widely believed to be an anti-inflammatory cytokine made by M2-polarized macrophages (Davis et al. 2013). In this work, we used immunofluorescence microscopy to identify the effects of the insecticide and environmental pesticide imidacloprid (IMID) on the production of TNFα and RELM-α in the RAW 264.7 cell line. The data suggests that there is more RELM-α specific staining after treatment with IMID than the controls. There was no change in the amount of TNFα staining. Additional investigation using qPCR to analyze expression of M1 and M2 markers *NOS2* and *Arg1*, respectively, will enable further localization of the effects of IMID on the spectrum of macrophage activation. Preliminary data suggests that there is an increased expression of *NOS2* upon IMID exposure. Further, the expression of *Arg1* appears to decrease in a dose-dependent manner. Future work identifying the cytokines released by the IMID-exposed macrophages will allow a refinement of the placement of IMID-stimulated macrophages on the polarization spectrum. Since IMID is a common environmental pesticide, understanding its effects on the immune response, particularly the innate immune response, is important to understanding human disease.

P2.06

IDENTIFICATION OF NOVEL HOST ASSOCIATION FACTORS ENCODED BY *XENORHABDUS NEMATOPHILA*

Lauren Carney, Elizabeth Hussa

Millsaps College, Jackson, MS, USA

The bacterium *Xenorhabdus nematophila* and the nematode *Steinernema carpocapsae* have a tripartite symbiotic relationship with Lepidopteran insect larvae, including those of the species

Manduca sexta (tobacco hornworm). *X. nematophila* and *S. carpocapsae* have a mutualistic symbiotic relationship that provides nutrients and transportation, respectively, for the survival and reproduction of each party. Together, the two organisms parasitize insects, including the tobacco hornworm (*Manduca sexta*). Many studies have been conducted to identify the bacterial genes necessary for the complex symbiosis among these three species. Most of the important genes discovered so far encode regulatory proteins that are necessary for mutualism, virulence, or both processes. In this work, we sought to further these studies by conducting random transposon mutagenesis of *X. nematophila* and screening to identify novel host-association factors that are involved in mutualism and/or virulence. One mutant strain, A5, was discovered to differ significantly from the wild type strain in both virulence and colonization (mutualism). Another mutant strain, F2, was found to differ significantly from the wild type in colonization. Time constraints prevented further testing of this mutant in virulence. The effects of A5 on virulence and colonization could suggest that it behaves much like some of the mutants tested in previous studies, such as CpxR (a regulatory protein). Future work will focus on further characterization of host association phenotypes, as well as identification of the mutated genes in each strain of interest.

P2.07

EXPRESSION OF *STREPTOCOCCUS PNEUMONIAE* SURFACE PROTEINS FOR INDENTIFICATION OF HOST CELL LIGANDS

Mary Carr[1], Lindsey Brown[2], Josi Lott[2], Leah Drumheller[2], Yoonsung Hu[2], Justin Thornton[2]

[1]Mississippi INBRE - Mississippi University for Women, Columbus, MS, USA, [2]Mississippi State University, Mississippi State, MS, USA

Streptococcus pneumoniae is a Gram-positive colonizer of the human nasopharynx, sometimes causing sinusitis and otitis media or invasive infections such as pneumoniae, bacteremia, and meningitis. Colonization is made possible by the binding of bacterial surface proteins to host cell receptors on the epithelium. Our lab has previously identified that the zinc-binding surface protein AdcAII plays a role in colonization by *S. pneumoniae*. Therefore, we hypothesized that AdcAII and related zinc-binding proteins PhtD and PhtE could interact with specific host cell proteins on the epithelium. To test our hypothesis, we used a staphylococcal expression system to produce each protein fused to a staphylococcal Hla signal sequence for secretion into the medium for purification. We utilized splicing by overlap extension (SOEing) PCR to fuse the genes to the Hla signal sequence. Once fused, the PCR products were cloned into plasmid PMin166 transformed into *S. aureus*. Recombinant proteins, expressed by *S. aureus* were purified by affinity chromatography and will be used for far-western blotting with the potential pneumococcal adhesions. Additionally we have designed a second set of vectors that already contain genes for staphylococcal signal sequences. These new vectors will not require SOEing PCR to create fusion products, thereby allowing for direct cloning of genes into the vectors. Characterizing such interactions will be an important first step in developing vaccines or drugs that block colonization.

P2.08

NEUROPROTECTIVE EFFECTS OF ESTRADIOL AND GENISTEIN IN ZEBRA FINCH CEREBELLUM

Sarah Chong, Ethan Zadrozny, Estelle Blair, Lainy B. Day

University of Mississippi, University, MS, USA

Our objective was to examine the effects of estradiol (E_2) and the phytoestrogen, genistein, on secondary waves of neurodegeneration. Aromatase, which converts testosterone into E_2, and E_2 are neuroprotective and neurogenerative. In the zebra-finch's highly steroidogenic and plastic cerebellum, constitutively low aromatase is upregulated by cerebellar lesions, which impair cognitive and motor functions. Although E_2 improves cognition post-lesions, the aromatase inhibitor, letrozole, reduces E_2-induced recovery. Genistein, which is less carcinogenic than E_2, may play a role in cerebellar neuroprotection, as it acts potently on ERβ, the primary estrogen receptor in the cerebellum. In our study, male zebra finches received E_2 (500µg) and genistein (1000µg), or the vehicle (silastic adhesive) via subcutaneous implants, followed by unilateral cerebellar puncture lesions accompanied by intracerebellar injections of letrozole or saline. TUNEL and Fluoro-Jade will be used to label apoptotic and degenerating cells, respectively. Apoptotic and degenerating cell counts surrounding the lesion will be compared across treatments to measure neurodegeneration. Testis size and activity will be examined to determine effects of estrogens on male reproduction and verify implant effectiveness. Similarly, we will use HPLC to determine serum estrogen and genistein levels pre-implant and days 6, 13, and 15 post-implant. If E_2 and aromatase have additive effects in neuroprotection, cell death will be highest in the Silastic+Letrozole group, and smallest in the E_2+Saline group. Results thus far suggest implants were effective at time of sacrifice; E_2, but not genistein, reduced testis mass. Unexpectedly, E_2+saline birds lost weight across the study, but genistein birds did not.

P2.09

EVALUATING EFFECTS OF CELL MEMBRANE LIPID COMPOSITION ON THE RESISTANCE TO BILE INDUCED DAMAGE IN AVIRULENT STRAINS OF *LISTERIA MONOCYTOGENES*

Amber Coats, Oindrila Paul, Janet Donaldson

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Listeria monocytogenes is a gram-positive, foodborne pathogen that causes listerosis. When this bacterium enters the gastrointestinal tract, it encounters stressors such as bile. Previous studies have shown that exposure to bile changes the membrane thickness of avirulent strains but not virulent strains. We have shown that fatty acids were incorporated into the membrane of *Listeria*, but these fatty acids only aided in the bile survival of the avirulent strain. It was hypothesized that the incorporation of fatty acids improves bile survival of avirulent strains of *Listeria*. For the four strains used, the fatty acid profiles were determined after exposure to bile using Fatty Acid Methyl Esters (FAME) analysis. The survival assay cultures were pretreated with a lipid mixture, before exposure to bile. The rigidity of the membrane was measured through anisotropy using a florescent dye, DPH (1,6-diphenyl-1,3,5-hexatriene). FAME analysis showed that each of these strains incorporated oleic acid and stearic acid into the membrane. There was an increase in the survival for these strains after bile exposure when pretreated with the lipid mix, thus indicating a trend that these fatty acids improved bile survival. The results suggest that avirulent strains may

incorporate fatty acids to survive bile, but that this may come at the expense of a loss in fitness in other stressors. Further research is needed to determine if this mechanism of bile survival impacts the expression of efflux pumps involved in the resistance to stressors.

P2.10

UTILIZING MOLECULAR BEACONS TO IDENTIFY *TRICHOMONAS VAGINALIS* VIRUS 1 (TVV1) IN *T. VAGINALIS* CULTURES

Hunter Cooper[1], Grant Kalil[1], John Meade[2], Stephen Stray[2], Cory Toyota[1]

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Trichomonas vaginalis is a flagellated protozoan parasite that infects the genitourinary tract in humans leading to trichomoniasis, the most common non-viral, sexually transmitted disease (STD) in the world with upwards of 250 million new cases each year. *T. vaginalis* infection is responsible for a range of severe complications, ranging from premature birth and increased HIV transmission, to an increased risk of cervical neoplasia and prostate cancer. Many isolates of *T. vaginalis* are consistently infected with double-stranded RNA (dsRNA) viruses, from genus *Trichomonasvirus*, family *Totiviridae.* These viruses have been shown to intensify the disease by signaling immunoinflammatory responses from human epithelial cells. Molecular beacons are dual-labeled, hairpin oligonucleotide probes, possessing a fluorophore at one end and a quencher at the other; they only fluoresce when hybridizing to a correlative target. In this study, 6-FAM-TVV1-IBQFQ specific to Trichomonas vaginalis virus 1 (TVV1) was used to identify the presence of TVV1 in cultures of *T. vaginalis*. To prove the effectiveness of the molecular beacon, cultures of *T. vaginalis* not possessing TVV1 were also analyzed. We found that the MB signal could be detected in living cells of *T. vaginalis* utilizing fluorescence microscopy and appeared specific to TVV1. In order to avoid false-positive fluorescence results, dead cells identified by staining with a 0.2% trypan blue solution. Making use of MBs for live viral imaging is not only an effective method for visualizing TVV1 through fluorescence, but also for studying various facets of viral pathogenesis.

P2.11

GENOMIC ANALYSIS OF GENES IMPORTANT FOR CRASSULACEAN ACID METABOLISM IN KALANCHOE LAXIFLORA

Clara Diekman, Jiaxu Li

Mississippi State University, Mississippi State, MS, USA

Crassulacean acid metabolism (CAM) is a carbon assimilation pathway that evolved in some plants like cacti as an adaptation to hot and dry conditions. By only requiring the stomata to be open during the night for carbon dioxide uptake and keeping stomata closed during the day, the CAM plants lose much less water. The inherently high water-use efficiency of plants with CAM highlights their potential as a model for improving production of crops in warmer and drier environments. The recently sequenced genome of the model CAM plant Kalanchoe laxiflora provides an excellent opportunity for systematic analyzing genes key to crassulacean acid metabolism. We examined seven gene families that are critical for CAM: beta carbonic anhydrase, phosphoenolpyruvate carboxylase, phosphoenolpyruvate carboxylase kinase, NAD(P)-dependent malate dehydrogenases, NAD(P)-dependent malate enzymes, phosphoenolpyruvate carboxykinase, and pyruvate orthophosphate dikinase. The CAM plant Kalanchoe laxiflora has increased copy numbers of genes in the gene families except the pyruvate orthophosphate dikinase family when compared with C3 (Arabidopsis and rice) and C4 (sorghum and maize) plants. These results suggest that CAM in Kalanchoe laxiflora is regulated by gene dosage or gene duplication. Furthermore, we found the upstream regulatory regions of certain CAM genes in Kalanchoe laxiflora are enriched in circadian clock cis-regulatory elements, which is consistent with diurnal changes in gene expression. Comparative genomic analysis of CAM genes in CAM plants is an important step for introducing crassulacean acid metabolism into C3 crop plants for improved water-use efficiency and drought tolerance via genetic engineering.

P2.12

DIFFERENTIAL ROLES OF HYDROXYFLAVONES AGAINST NICOTINE INDUCED OXIDATIVE STRESS IN MAMMALIAN CELLS

Jerrica Gibson, JaNautica Bee, Bidisha Sengupta

Tougaloo College, Tougaloo, MS, USA

The polyhydroxy flavonoids are ubiquitous in plant of higher genera. They are widely studied for their potential to treat or even prevent a broad spectrum of free radical mediated diseases, which include neurodegenerative disorders, cancer, atheloscleros is. Although several studies had been conducted on flavonoids and oxidative stress, the mechanism of the protective pathways are not fully understood. Here, we present studies on antioxidant properties of two mono-hydroxyflavone isomers, 3-hydroxyflanove (3HF)- and 7-hydroxyflavone (7HF), against nicotine (NIC) associated oxidative stress and injury in cultured renal proximal tubule cells and correlate their antioxidant properties with their chemical structure. Our data clearly demonstrates, for the first time, that while both 3HF and 7HF protects renal cells from NIC-associated cytotoxicity, the mechanism of their action is different: 3HF elicits protective activity via the PKA/CREB/MnSOD pathway while 7HF does so via the ERK/Nrf2/HO-1 pathway. Furthermore, preliminary studies have been conducted on two natural flavone isomers morin or quercetin in human lymphoblast TK6 cells against NIC. Phase contrast imaging and light scattering studies were performed on the cells. Results indicated that morin is more effective than quercetin against stress induced by NIC. Further studies are underway.

P2.13

THE SUBCLONING AND EXPRESSION OF ALPHA-TUBULIN IN *ESCHERICHIA COLI* FOR USE IN MAST CELL DEGRANULATION REACTIONS

Brandi Goble, Cheri Voth, Hao Xu

The University of Southern Mississippi, Hattiesburg, MS, USA

Mast cells are secretory cells responsible for fighting off infection through the early recognition of pathogens. This process is completed through the secretion of inflammatory mediators that are stored in secretory granules within the cytoplasm of the cell. The degranulation and secretion process relies on regulated fusion of secretory granules to the cell membrane via the SNARE complex that bridges two opposed membranes using four coiled protein helices. The regulation of the assembly and disassembly of SNARE-mediated fusion is still unclear due to its extreme complexity. The goal of this research is to show that alpha-tubulin interacts with the Munc18-b accessory protein to accelerate the fusion reaction needed for mast cell degranulation to occur. This is being tested by the amplification and isolation of the gene encoding alpha-tubulin,

subcloning it in bacterial expression vector pMBP-parallel, and expressing it in *E. coli* bacterium. In collaboration with others in the Xu lab, the isolated alpha-tubulin protein will be used to test alpha-tubulin and Munc18-b in reconstituted degranulation reactions to unravel its function in mast cell degranulation.

P2.14

THE STRESS-RESPONSE PROTEIN *DDR48* IS REQUIRED FOR THE CELLULAR STRESS RESPONSE IN THE PATHOGENIC FUNGUS *HISTOPLASMA CAPSULATUM*

Mallory Harmon[2], Paige Braddy[1], Gabriella Reyes[1], Logan Blancett[1], Glen Shearer[1]

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Histoplasma capsulatum (Hc) is a systemic, dimorphic, fungal pathogen. *Hc* grows as a multicellular mold at environmental temperatures (25°C) whereas, upon inhalation into a human or other mammalian host (37°C), it transforms into a unicellular, pathogenic yeast. Our research aims to elucidate the numerous stress response pathways (e.g., oxidative stress and DNA damage) that *Hc* utilizes to survive in the ever-changing environment. Specifically, we are characterizing the DNA damage-responsive protein *DDR48*, an *Hc* homolog sharing sequence similarity to *C. albicans DDR48p*. Previously in our lab an allelic replacement deletion-mutant was generated (*ddr48*Δ) to elucidate the function of Hc*DDR48*. Upon analysis, we found that *DDR48* is required for resistance to numerous cellular stressors such as oxidative stress, DNA damage, heat shock, and antifungal drugs. RNAseq analysis of the deletion mutant showed that a majority of down-regulated genes are involved in cell signaling of the various cellular stress response pathways. Interestingly, many genes that were up-regulated in the deletion mutant are involved in cysteine/sulfur metabolism as well as carbohydrate and nitrogen metabolism. Research is ongoing to unveil the intricate role *DDR48* is playing in sensing and responding to cellular stress.

P2.15

EXPRESSION ANALYSIS OF MICRORNAS AND MICRORNA-LIKE RNAS IN *ASPERGILLUS FLAVUS*-INFECTED RESISTANT AND SUSCEPTIBLE MAIZE INBRED LINES

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Corn is frequently infected by a soil fungal pathogen *Aspergillus flavus* at both pre- and post-harvest stages. *A. flavus* strains can produce aflatoxins B1 and B2, and ingestion of contaminated corn can damage the liver and suppresses the immune system. One of the strategies in reducing aflatoxin contamination is to breed maize lines with resistance to *A. flavus*. Several resistant maize inbred lines have been developed, and maize lines that are resistant and susceptible to *A. flavus* would provide excellent models for studying molecular mechanisms of maize resistance to the fungus. Understanding the mechanisms of maize resistance to *A. flavus* is the key to develop resistance management strategies. MicroRNAs (miRNAs) have been shown to play a role in gene regulation in plants and animals, and microRNA-like RNAs (milRNAs) have been identified in some fungal species. Over 135 milRNAs had been identified in *A. flavus*, and their expression was found to be correlated with aflatoxin production conditions. This suggested that the milRNAs might play an important role in regulation of aflatoxin production and accumulation. In this research, *A. flavus* NRRL 3357 producing high levels of aflatoxin and *A. flavus* NRRL 21882 with no aflatoxin production was used to inoculate kernels of resistant (Mp719) and susceptible (Va35) maize lines, and small RNAs were isolated from infected kernels and subjected to next generation RNA sequencing. From the sequence data, 69 *A. flavus* milRNAs and 691 *Z. mays* miRNAs were identified, analyzed for differential expression, and further validated by quantitative reverse transcription PCR.

P2.16

IDENTIFICATION OF FUNCTIONAL CATHEPSIN B ANTIBODIES IN ZEBRAFISH

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Early embryonic processes are regulated by maternal factors. These processes include cleavage, epiboly, and dorsoventral patterning. Previous research has identified a role for the maternal factor, Cathepsin B, in dorsoventral patterning, however, its localization within the embryo is unknown. Therefore, we screened human and zebrafish Cathepsin B antibodies to identify an antibody expressed in zebrafish embryos. Of the three antibodies screened only the zebrafish Cathepsin B antibody was expressed in zebrafish embryos. In wildtype embryos Cathepsin B was localized to the marginal cells of mid to late gastrulation stage embryos. We also looked at Cathepsin B localization in split top embryos, which have reduced Cathepsin B expression. In split top mutants Cathepsin B was reduced in the marginal cells at mid to late gastrulation stages relative to wildtype expression levels. This work was supported by the Mississippi INBRE, funded by an Institutional Development Award (IDeA) from the National Institute of General Medical Sciences of the National Institutes of Health under grant number P20GM103476.

P2.17

EVALUATION OF BONE MARROW AND SUBCUTANEOUS FAT IN OVARIECTOMIZED RATS FOLLOWING SUSTAINED DELIVERY OF ESTROGEN OR NPY – 1RECEPTOR ANTAGONIST

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The hormones estrogen, leptin, and Neuropeptide Y (NPY) are known to influence body fat distribution and adipocyte differentiation. Our aim was to characterize these hormone levels in women at menopause and evaluate the characteristics of size and distribution of the fat in the bone marrow and subcutaneous tissue surrounding a sham, estrogen, or NPY-1 receptor antagonist tricalcium phosphate (TCP) drug delivery device. Forty female Sprague Dawley rats were divided into five equal groups. Animals in group 1 served as ovariectomized control, Animals in Groups 2-4 received a non-drug loaded TCP capsule (SHAM), or an implant containing 5 mg or either estrogen benzoate or a NPY-1Receptor antagonist for 4 weeks. Animals in Group 5 were naïve females with ovaries intact. Body weights, blood, and tissues were collected and the analysis of estrogen, leptin, NPY, and fat distribution was determined and compared to group 1 animals. Animals in the OVX and SHAM groups had body weights significantly higher than naïve control. Animals in the estrogen and NPY-1RA treated groups had body weights which were lower than OVX and Sham animals, but

still higher than naïve control after 4 weeks. Estrogen had the most effects on the size and number of fat droplets in both the subcutaneous tissue and bone marrow when compared to the other groups and the OVX and intact control animals. The size of the adipocyte was substantially smaller. The adipocytes in sham and OVX groups were larger than those in estrogen, and smaller than those in NPY-1RA treated animals.

P2.18

SCREENING OF PHYTOCHEMICALS FOUND IN *PSEUDOGNAPHALIUM OBTUSIFOLIUM* EXTRACTS FOR HYDROGEN PEROXIDE RADICAL SCAVENGING ACTIVITIES USING *SACCHAROMYCES CEREVISIAE* HBO STRAIN CELLS

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In our related studies, extracts derived by dichloromethane, ethanol, and hexane solvents from the traditional medicine plant, *Pseudognaphalium obtusifolium*, exhibited 50X, 25X, 6.6X, and 1.9X more H_2O_2 radical scavenging activity relative to ascorbic acid, respectively. The model organism, *Saccharomyces cerevisiae*, shares similar metabolic pathways with all eukaryotes. Strain HBO was chosen to screen for H_2O_2 radical scavenging abilities of phytochemicals in the different extracts based on proliferation changes. HBO cells were treated with extracts using media only, the extract solvent dimethyl sulfoxide (DMSO), and ascorbic acid as controls. Each condition was treated with or without H_2O_2. After 24hr, HBO cells/ml were approximated using a chart based on optical density readings at 660nm. Relative to media only without H_2O_2, all controls had equal proliferation, dichloromethane showed decreased proliferation, and other extracts cause drastically decreased proliferation. In contrast, relative to media only with H_2O_2, all controls plus dichloromethane had increased proliferation. Comparing each H_2O_2 condition to itself without H_2O_2, media only was decreased, ascorbic acid and hexane were slightly decreased, ethanol was slightly increased, and DMSO and dichloromethane were drastically increased. Various studies (including our own) have shown that low concentrations of DMSO increase cell proliferation. Although DMSO is the extract solvent, all extracts decrease HBO proliferation, demonstrating the anti-proliferative effects of *P. obtusifolium* flavonoids and other small molecules reported in the literature. However, dichloromethane appears to have a protective effect in the presence of H_2O_2. These *in vivo* results directly correspond to our *in vitro* assay in the presence of H_2O_2.

P2.19

INVESTIGATING A ROLE FOR THE RETROGRADE SIGNALING PROTEIN, RTG2P, IN ITS OWN TRANSCRIPTION

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In eukaryotic cells, retrograde signaling is used to communicate organellar dysfunction to the nucleus which leads to altered target gene expression to accommodate specific dysfunctions. In the yeast, *S. cerevisiae*, the retrograde signaling protein Rtg2p has been shown to be a key cytosolic sensor for detecting mitochondrial dysfunction. Recent work in the lab identified a single amino acid deletion in Rtg2p that results in defects in retrograde signaling (Jiang, J., unpublished data). Western blot analysis showed decreased Rtg2p steady-state levels possibly due to enhanced protein turnover. Interestingly, qPCR analysis found no detectable levels of *RTG2* mRNA for this mutant. As Rtg2p has been identified as a member of the SLIK (SAGA-like) transcriptional complex, this finding suggests that Rtg2p may have a role in influencing its own transcription. To investigate this, we used restriction-based cloning to replace the *RTG2* promoter with the constitutive GPD promoter in plasmids containing the wild type and mutant versions of *RTG2*. Once confirmed by restriction analysis, these plasmids were introduced into three yeast strains to test for Rtg2 protein levels by Western blot analysis, activation of retrograde signaling using a yeast colony color assay, and *RTG2* mRNA levels by qPCR analysis. If Rtg2p is involved in transcriptional self-activation, then promoter replacement should remove this regulatory step and return mRNA transcript levels for the mutant *RTG2* to that of wild type. Ultimately, results from these assays will be used to broaden our understanding of the many biological roles carried out by the mitochondrial retrograde sensor, Rtg2p.

P2.20

CYTOADHERENCE OF THREE *TRICHOMONAS VAGINALIS* MLST GENOTYPES

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Trichomoniasis is the most common nonviral sexually transmitted disease (STD) in the world. The protozoan *Trichomonas vaginalis* causes trichomoniasis. *T. vaginalis* infection can lead to a higher risk of HIV infection and adverse pregnancy outcomes. Increased cytoadherence leads to a higher infectivity in the urogenital tract. *T. vaginalis* has been divided into three MLST genotypes: GT1A, GT1B, and GT2. Here, the cytoadherence of, GT1A (strains W047, W060B, T009, W046), GT1B (strains 50167, PA, W091, T132), and GT2 (strains PRA98, T095, T182, T007, C8) were compared. Cervical (HeLa) and ectocervical (Ect 1) monolayers were exposed to aliquots of *T. vaginalis* cultures (~10^5 parasites) and cytoadhesion was assayed using an automated cell counter (TC20 Bio-Rad). Preliminary results show that there was no significant difference between the cytoadherence of the three MLST genotypes of *T. vaginalis* and HeLa cells. Further investigation into counting the cells using qRT-PCR is being done, and housekeeping genes for T. Vaginalis [Y-tubulin] and Ect 1 [tRNA Leu(UUR)] cells are being tested. Acknowledgment: This work was supported by the Mississippi INBRE, funded by an Institutional Development Award (IDeA) from the National Institute of General Medical Sciences of the National Institutes of Health under grant number P20GM103476.

P2.21

DIFFERENTIAL REGULATION OF THE THIOL-SPECIFIC ANTIOXIDANT GENE (TSA1) IN YEAST AND MOLD MORPHOTYPES OF THE PATHOGENIC FUNGUS *HISTOPLASMA CAPSULATUM*

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Histoplasma capsulatum (Hc) is a pathogenic fungus that is the etiologic agent of the respiratory disease histoplasmosis in mammals. Histoplasma undergoes a dimorphic shift from mold to

yeast which is crucial to pathogenesis of the organism. In *Candida albicans*, another dimorphic fungus, the gene TSA1 was found to be involved in cell wall synthesis and protecting the cell from oxidative stress. HcTSA1 is strongly upregulated in the yeast (pathogenic) morphotype. To analyze the regulation of TSA1 in response to oxidative stress, expression will be quantified by qRT-PCR before and after exposure to hydrogen peroxide and paraquat dichloride. These chemicals form reactive oxygen species and thus emulate oxidative stress similar to that Histoplasma would encounter in the environment and host. Hc strain G186AS mold and yeast will be grown to mid-log phase then inoculated in Histoplasma macrophage media (HMM) with varying concentrations of either hydrogen peroxide or paraquat dichloride. RNA will then be extracted at time intervals ranging from 0 to 45 minutes for qRT-PCR analysis. Work is in progress to construct a TSA1 knockout cassette to create a TSA1 loss-of-function mutant, tsa1Δ. The tsa1Δ strain, as well as a complemented strain, will be used to elucidate the role of the thiol specific antioxidant gene in oxidative stress resistance in Histoplasma.

P2.22

POSITIONAL SIGNIFICANCE OF BRANCH POINT IN MATURATION OF TAILED MIRTRONS

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microRNAs have been well established as a potent regulator of the gene expression and are generated through a number of pathways. Mirtrons are the class of non-canonical microRNAs produced via splicing during which a lariat intermediate is formed, which is critical for its biogenesis. A lariat is generated when Guanine at the 5'end of the intron is attached to the Adenine residue downstream, this point of attachment is known as Branch point. In this study, we focus on the significance of branch point location for the production of mature tailed mirtron miR-1017. Mutant mirtrons were generated through site directed mutagenesis, cloned and transfected into Drosophila S2 cells. The effects of the mutations on the miR-1017 were observed by northern analysis. We observed that in mutated branch point there is an increased production of mature miR-1017 as compared to the wild type miR-1017, and the mutant with no adenine residue had no mirtrons. The results suggested that the production of mature mirtrons is affected by the position of the branch point in tailed mirtrons.

P2.23

USING MODELING TO IDENTIFY POINT MUTATIONS FOR INCREASEING THE SUBSTRATE PROMISCUITY IN *SULFOLOBUS TOKODAII* HEXOKINASE

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Phosphorylation of glucose by hexokinase is highly specific in mesophiles. Hexokinase from the archaeon *Sulfolobus tokodaii* is a promiscous enzyme that can also phosphorylate mannose, glucosamine and N-acetylglucosamine. Using models from previous *S. tokodaii* hexokinase (StHex) protein structures in complex with glucose we began modeling using Rosetta to identify potential mutants that could alter the active site to would extend this promiscuity to disaccharides. Using the Rosetta Backrub program developed by the Kortemme Lab we were able to identify residues His94 and Asp140 that both bind a monosaccharide substrate and have some degree of sequence tolerance. His94Ser and Asp140Gly mutants are proposed to maintain the overall structure of StHex while enlarging the active site of the enzyme to accommodate larger substrates. A third residue (Tyr189) that binds to the monosaccharide was not predicted by Rosetta but forms a hydrogen bond with the 2'-OH of glucose. A Y189F mutation is a conservative mutation that may additionally open the active site to more substrate possibilities.

P2.24

ROLE OF MSAABCR OPERON IN *STAPHYLOCOCCUS EPIDERMIDIS* BIOFILM DEVELOPMENT

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Staphylococcus epidermidis is an important nosocomial pathogen that causes infections primarily related to those of indwelling medical devices. Their ability to form biofilm and evade host immune defense systems allow for this opportunistic pathogen their increased survivability and antibiotic resistance. A newly described operon, *msaABCR* operon has recently been linked to biofilm development and virulence regulation in *Staphylococcus aureus*. While *msaA*, *msaC*, and *msaR* are thought to be regulatory genes, MsaB is the only putative protein transcribed from this operon. Bioinformatics analysis showed a good homology between the MsaB in *S. aureus* and *S. epidermidis*. Therefore, we hypothesized that *msaABCR* operon will play a similar role in the regulation of biofilm development in *S. epidermidis* strains. To study this, we deleted *msaABCR* operon gene from *S. epidermidis* RP62A strains. We performed in-vitro microtiter based biofilm assay. We observed that the *msaABCR* deletion mutant is defective in late stages of biofilm, but not the initial biofilm stages of biofilm development. The mechanism of biofilm development between the two species is different. RP62A develops PNAG-mediated biofilm, whereas, *S. aureus* develops biofilm independent of PNAG. In *S. aureus*, *msaABCR* has been shown to regulate biofilm development via extracellular proteases, however, in RP62A, deletion of *msaABCR* operon doesn't have any effect on the regulation of extracellular proteases. In future, we seek to define the mechanism of biofilm regulation via *msaABCR* operon in S. epidermidis RP62A. The findings may be therapeutically relevant to control the biofilm-associated infections in both *S. aureus* and *S. epidermidis* strains.

P2.25

INVESTIGATING THE FUNCTIONAL ROLE OF B-1,4-GALACTOSYLTRANSFERASE IN THE LONE-STAR TICK, *AMBLYOMMA AMERICANUM*

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The lone-star tick (*Amblyomma americanum)* bites have been implicated in a rare allergy to red meat. This allergy is caused by an Immunoglobulin E sensitization to the carbohydrate galactose-α-1,3-galactose (α-gal) found in most mammals. The aim of this study is to assess the functional role of β-1,4-galactosyltransferase in the synthesis of α-gal in the lone-star ticks. In our previous study (Karim and Ribeiro 2015), β-1,4-galactosyltransferase was identified, which attaches a free galactose sugar and transfers it to a glycan structure. Therefore, we hypothesized that β-1,4-galactosyltransferase plays a key role in α-gal synthesis responsible for red meat allergy. The temporal and spatial transcriptional expression provided an insight into the bloodmeal-induced 2-9-fold up-regulation of β-1,4-galactosyltransferase.

Additionally, the knockdown of target gene by RNA interference provided an insight into the functional role of β-1,4-galactosyltransferase in α-gal synthesis and its impact on tick blood feeding. Knockdown of β-1,4-galactosyltransferase resulted in a 42% mortality of the ticks and a significant decrease in average tick weights of 9 and 67 g when compared to 5 and 9 day wild-type samples respectively. These results provide a platform for future research investigating the occurrence of α-gal and carbohydrate metabolism in the Lone-Star tick.

P2.26

CORRELATION OF DOUBLE CORTIN LIKE KINASE 1 (DCLK1) WITH COLORECTAL CANCER

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Colorectal cancer is the fourth most common cancer diagnosed in the United States having an estimated mortality of 50,000 each year. The current treatment is effective, but 50% of the patients will have recurrence within 5 years. The recurrence is believed to be due to the existence of tumor stem cells (TSCs). TSCs have become very important in the cancer biology world because they can become potential therapeutic targets for the treatment of cancer patients. Double cortin like kinase1 (DCLK1) is a specific stem cell markers has been identified for the stem cells in the gastrointestinal tract. To determine the correlation of DCLK1 with the tumor genesis of colorectal cancer, we established a DCLK1 over-expressing cell line with HCT116 cells, which is a colorectal cancer cell line. We confirmed over-expression of DCLK1 with Western Blot. To assess whether DCLK1 affected growth of HCT116 cells, we measured cell growth using MTT assay over a time course study. To evaluate whether DCLK1 is correlated with chemoresistance of colorectal cancer cells, we treated cells with 5-fluoriuracil (5-Fu) at different dosages. Our results demonstrated that DCLK1 over-expressing cells do show a much higher level of DCLK1. DCLK1 over-expression inhibited growth of the cells, indicated by a lower OD value than the wild type. Wild type and DCLK1-over-expressing cells demonstrated different viability after 5-Fu treatment at different dosages. In conclusion, DCLK1 affects the cell growth of colorectal cells, and it might correlate with chemo resistance of colorectal cancer cells making it a potential therapeutic target for the treatment of colorectal cancer patients.

P2.27

PROTEOMIC ANALYSIS OF SILICATE-RESPONSIVE PROTEINS IN LEAVES OF CROP PLANTS

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Drought is a major environmental factor limiting crop productivity. Considering a significant area of crop production under water-limited rain-fed conditions, there is a great need to develop production systems to sustain yield potentials under water deficit stress. Silicon has recently been recognized as an important element in plant nutrition. We have shown that supplying soybean and corn with soluble silicon in the soil could improve vegetative growth and biomass production under water limiting conditions. However, the mechanism how silicon alleviates water deficit stress is not understood. In this study, we examined the effects of silicon application on protein expression and photosynthetic enzymes. Soybean plants were grown in soil-containing pots supplied with 2 millimolar solution of sodium silicate. To cancel the effect of sodium, same amount of sodium chloride was used along with control plants. Total proteins were isolated from the leaves of silicon-treated and control plants subjected to water deficit stress. Two-dimensional gel electrophoresis and mass spectrometry approaches were used to identify differential leaf proteins in response to silicon application under water deficit stress. Proteins that shown differential expression in response to silicon application included metabolic enzymes and photosynthetic proteins. These results suggest that silicon application could affect enzymes important for carbohydrate metabolism and stabilize photosynthetic proteins under water deficit stress.

P2.28

AN ANALYSIS OF SURFACE PROTEINS IN THREE GENOTYPES OF *TRICHOMONAS VAGINALIS*

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Trichomonas vaginalis is a flagellated protozoan parasite that colonizes the human genitourinary tract and causes trichomoniasis, the most common non-viral sexually transmitted disease in the world. Using multilocus sequence typing (MLST), this protozoan has been classified into three genotypes, known as 1A, 1B, and 2. Previous reports have demonstrated that some strains exhibit varying cytoadherance and cytotoxicity phenotypes. *T. vaginalis* strains W060B, PA, and PRA98 (1A, 1B, and 2 respectively) were cultured and the surface proteins were isolated by biotinylation and subsequent capture on streptavidin magnetic beads. Samples were trypsinized and analyzed using liquid chromatography-tandem mass spectrometry (LC-MS/MS; Institute for Genomics, Biocomputing and Biotechnology at Mississippi State University). A total of 32 unique proteins were identified by comparison with the *T. vaginalis* G3 genome, including enolase 3 (XP_001315627.1), detected in all three samples, and an a-agglutinin attachment subunit precursor (XP_001281006.1), found in PA and PRA98.

P2.29

CAMKII ACTIVITY IN THE AGED HIPPOCAMPUS

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CaM Kinase II (Ca2+/calmodulin-dependent protein kinase II) is a serine/threonine-specific protein kinase enzyme that acts as a critical regulator of learning and memory. It has previously been shown that the inability of CaMKII to maintain activation is connected to memory deficits within the aging brain. While the connection between CaMKII dysfunction and learning and memory impairments is well-established, little is known about the changes that cause CaMKII dysfunction. Our research set out to investigate if CaMKII is altered during the process of aging. Specifically, we looked at activity, regulation, and stability by conducting experiments to quantify CaMKII levels in young and old mouse hippocampi and to quantify the post-translational modifications of CaMKII. Our preliminary data exhibits that CaMKII phosphorylation is reduced in old mouse hippocampi than in young mouse hippocampi. The impact of our research lies in the illumination of the mechanisms causing CaMKII dysfunction. By casting light on the process of CaMKII dysfunction, we will help future researchers to establish a possible therapeutic target in the fight against learning and memory impairments.

P2.30

OVERCOMING RNAI BARRIERS TO RECALCITRANT INSECTS USING NEXT-GEN APPROACHES

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RNA interference (RNAi) was developed as an excellent reverse-genetics tool, however, has emerged as a desirable pest control strategy lately that can be used to affect gene expression in a single, targeted species. RNAi can be initiated by double-stranded RNAs that is processed into small-interfering RNAs (siRNAs) and guide cleavage of complementary transcripts. Currently, RNAi is being used in agriculture through transgenic plant strategies, and is extremely promising as crop sprays. However, dissimilarities in RNAi biology among invertebrate groups imposes major obstacles to delivering dsRNAs to many pests. Though RNAi is highly effective in coleopterans, still a huge challenge in lepidopterans and hemipterans species. High gut pH, gastric dsRNA degrading nucleases, as well as blocks to endosomal escape limit the efficiency of RNAi in these recalcitrant species. This weighs with tactics that avoid gut absorption, such as coelomic injection, which can initiate RNAi in refractory species. Thus, RNAi could be successful if the blockades to oral RNAi could be bypassed. To this end, we have established a cationic polymeric transport vehicle that overcomes these issues. We have effectively knocked down specific genes in *Spodoptera frugiperda* (fall armyworm) in both a cell line (Sf9) and larva. Critically, the polymer itself is non-toxic and thus has outstanding promises for environmentally favorable implementation of RNAi.

P2.31

A PATHOGENIC NONCODING RNA INTERACTS WITH RIBOSOMAL PROTEIN L5 TO MODULATE THE ALTERNATIVE SPLICING OF TRANSCRIPTION FACTOR IIIA FOR REPLICATION

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Emerging evidence began to illustrate regulatory roles of some noncoding RNAs (ncRNAs), but the functional mechanisms of most ncRNAs are overlooked, in contrast to the explosive discoveries of such noncoding sequences in many organisms. Potato spindle tuber viroid (PSTVd) is a pathogenic circular non-coding RNA that resembles endogenous ncRNAs for function via interacting with cellular proteins. Recent research illustrated that PSTVd utilizes a special splicing form of plant Transcription Factor IIIA (TFIIIA-7ZF) to enhance its replication. However, it is unclear how PSTVd manipulates the alternative splicing of TFIIIA gene to favor its replication. Interestingly, a recent report discovered ribosomal protein L5 (RPL5) as a specific regulator of TFIIIA gene. Here, we first confirmed the direct affinity of RPL5 with TFIIIA intron, PSTVd, and the well-established substrate (5S rRNA). We further showed that RPL5 interacts with PSTVd in vivo. Interestingly, RPL5 displayed a reduced affinity to PSTVd mutant with a disruptive RNA motif residing in the central regions, but showed similar affinities to mutants with disruptive RNA motifs at either one of the terminal regions. Because RPL5 represses TFIIIA-7ZF, we over-expressed RPL5 and observed significant reduction in PSTVd accumulation, which is attributable to the affected expression of TFIIIA-7ZF. Together, our results provide novel insights into the functional mechanisms for circular ncRNAs regulating gene expression at the post transcription level and point to a novel means to combat viroid.

P2.32

A FLUORESCENT SENSING PLATFORM USING APTAMER-ANTISENSE OLIGO INTERACTION

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Nucleic acid-based aptamers are biomolecule-derived receptors that provide an alternative to antibodies for specific binding. Nucleic acids offer facile, wholly synthetic fabrication and a means to quickly develop competitive inhibitors through use of complementarily base-pairing oligonucleotides (oligo). In this study, we are developing an aptamer based sensing approach that takes advantage of the fluorescence resonance energy transfer (FRET) between fluorophores (FL) to detect analytes in solution. Detection of analyte binding will be transduced by modulating Carboxyfluorescein (FAM) fluorescence through differential binding of a complementary oligo bearing a black hole quencher moiety. Presence of analyte in the aptamer binding site will compete with the quencher bearing oligo, providing a differential response. The sensitivity and specificity of this method was validated using three aptamer systems for detection of Adenosine Triphosphate (ATP), Cellobiose and L. Argenine. With this, we were able to establish a simple aptamer based sensing method that uses fluorescence signals to detect molecules in solution.

P2.33

THE *HISTOPLASMA CAPSULATUM* STRESS RESPONSE PROTEIN *DDR48* IS REQUIRED FOR ANTIFUNGAL DRUG RESISTANCE

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Histoplasma capsulatum (Hc) is a systemic, dimorphic, fungal pathogen. *Hc* grows as a multicellular mold at environmental temperatures (25°C) whereas, upon inhalation into a human or other mammalian host (37°C), it transforms into a unicellular, pathogenic yeast. Our research aims to elucidate the numerous stress response pathways (e.g., oxidative stress and DNA damage) that *Hc* utilizes to survive in the ever-changing environment. Specifically, we are characterizing the DNA damage-responsive protein *DDR48*, an *Hc* homolog sharing sequence similarity to *C. albicans DDR48p*. Although both the mold morphotype and yeast morphotype expresses *DDR48*, expression in the mold is 6-fold greater than the yeast. When yeast cells are stressed (e.g., with oxidants, antibiotics, DNA damage or heat shock), however, *DDR48* is upregulated approximately 4 to 6-fold – equivalent to that seen in non-stressed mold. The major goal of this study is to further analyze the impact of antifungal antibiotic resistance in relationship to *DDR48* expression. The antifungals investigated in this study are 5-fluorocytosine, ketoconazole, amphotericin-B, and caspofungin. We have found, via qRT-PCR analysis, that the addition of LD_{50} concentrations of each of these antifungals up-regulates *DDR48* expression by at least 4-fold in yeast-phase *Histoplasma*. As expected, there was no significant difference in expression of *DDR48* in mold-phase *Histoplasma*, given that *DDR48* is already expressing at higher levels than that of the yeast-phase. Research is ongoing to investigate any differences in survival of *Histoplasma* cells in the presence of the aforementioned antifungals with and without a functional copy of *DDR48*.

P2.34

NEUROTOXICITY OF *ASIMINA TRILOBA*

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Neurodegenerative diseases are thought to be brought on by genetic and environmental factors, including exposure to compounds and extracts found in plants. Many compounds extracted from plants have been shown to induce cell death in neurons. We are particularly interested in whether compounds and extracts from *Asimina triloba*, a plant that has been associated with Parkinson's like effects, produces neurotoxic effects. It is unclear as to what degree that *Asimina triloba* induces neurotoxicity. In this experiment, we tested *Asimina triloba* extracts and compounds to determine if they induce death in cultured murine cortical and hippocampal neurons. We treated neurons with six different concentrations of the extracts and compounds. Our results show that two extracts and 3 compounds are significantly neurotoxic, exhibiting a dose-dependent increase in toxicity. These data may shed insight into which components of *Asimina triloba* induce the Parkinson's-like symptoms. Future application of these findings would include administering the neurotoxic extracts and compounds to animals to potentially model disease degeneracy.

P2.35

***ADIPOR1* RS2275737 MODIFIES THE EFFECT OF *PNPLA3* RS738409 ON NON ALCOHOLIC FATTY LIVER DISEASE IN AFRICAN AMERICANS**

Hannah Scott[1], Stanford Mwasongwe[1], Clifton Addison[1], Brenda Jenkins[1], Solomon Musani[2], Marinelle Payton[1]

[1]Jackson State University, Jackson, MS, USA, [2]University of Mississippi Medical Center, Jackson, MS, USA

Background: Prevalence of Non-alcoholic Fatty Liver Disease (NAFLD) is rapidly increasing in the United States and worldwide. NAFLD is a moderately heritable complex trait expected to be under the influence of many genes acting singly, and also interacting with other genes and with environmental factors. We hypothesized that the effect of rs738409 single nucleotide polymorphism (SNP) on liver fat is modified by rs2275737 in a sample of African Americans. **Methods**: Fat content in the liver was scanned in a subset of Jackson Heart Study participants (n=2884, mean age 60 years and 65% women) using multi-detector computed tomography. Of this sample, 55% (n=1,583) had their 1000 genomes imputed. We analyzed the joint effects of the SNPs using multiple linear regression model while controlling for the relevant covariates and confounders. SNPs were coded based on the number of G and C alleles, where the group with zero alleles was regarded as the reference. **Results**: The median (25, 75 percentiles) of liver fat content was 60.4 (55.0, 66.7) HU and the mean in individuals with G/G and C/C genotypes at the rs738409 and rs2275737 were 48.7±16.1 and 58.6±10.3 HU, respectively. We observed that a model including interactions between polymorphisms was significantly ($p<0.01$) a better fit than one without. We also found that individuals with G/G at rs738409 and C/C at rs2275737 had significantly ($p<0.001$) lower mean liver fat content than the reference group. **Conclusion**: The effect of the rs738409 SNP on liver fat is modified by the rs2275737 SNP encoding for ADIPOR1 gene.

P2.36

SPECIES-SPECIFIC DICER-LIKE PROTEINS CONTRIBUTE TO PLANT DEFENSE AGAINST A PATHOGENIC NONCODING RNA

Heather Smith[1], Yi Zheng[2], Zhangjun Fei[2], Ying Wang[1]

[1]Mississippi State University, Mississippi State, MS, USA, [2]Boyce Thompson Institute, Ithaca, NY, USA

Eukaryotic organisms evolve RNA silencing machinery for regulating gene expression and combating invasive RNAs. A core component in RNA silencing machinery is ribonuclease III enzymes, termed DICER in animals or Dicer-like proteins (DCL) in plants, that dice various double-stranded RNA substrates to different sizes of small RNAs (sRNAs). A recent study showed that tobacco utilizes DCL2 and DCL3 for defending potato spindle tuber viroid (PSTVd), which is a circular noncoding RNA that causes plant diseases. Strikingly, tomato plants have four DCL2 homologs that is in distinct contrast to vast majority of plants, including tobacco and potato, which contain only one DCL2 gene. The conventional DCL2 (designated as DCL2a) in tomato resides in chromosome 6 while recently duplicated DCL2 homologs (designated as DCL2b, DCL2c, and DCL2d) are clustered in chromosome 11. Our RNA-seq analysis showed that PSTVd-infection triggers greater than 25 folds induction in the expression of DCL2b, DCL2c and DCL2d while DCL2a expression remains largely unaffected. This induction is likely specific to PSTVd-infection because our control treatment using tobacco rattle virus (TRV)-infection did not significantly induce expression of any DCL2 homologs in tomato. Interestingly, we also observed a unique PSTVd-derived sRNA size distribution pattern when compared with the TRV-derived sRNAs, implying activities from distinct DCL proteins. Our data may help mechanistically understand evolutionary and functional dynamics of species-specific RNA silencing components that may be of critical agricultural values. We are further testing the function of tomato DCL2 homologs by establishing DCL2a and DCL2b/DCL2c/DCL2d knockout plants using CRISPR/Cas9 technology.

P2.37

RAGE SIGNALING IS INTERSECTED BY RAP1A CROSSTALK IN FIBROBLASTS IN DIABETIC HEARTS

Stephanie Burr, Jaslyn Langford, Jia Zhao, Rebecca Worsham, James Stewart

University of Mississippi School of Pharmacy, University, MS, USA

Rap1a is a member of the Ras GTPase superfamily that acts as a molecular switch coupling extracellular events to intracellular signaling. The purpose of this study was to identify a role for Rap1a in the AGE/RAGE signaling cascade. We hypothesized that Rap1a GTPase intersects the downstream signaling modulators of the AGE/RAGE signaling cascade to promote extracellular remodeling and fibroblast function in the diabetic heart. Initial observations demonstrated significantly elevated Rap1a protein expression levels in cardiac fibroblasts isolated from diabetic hearts. Therefore, a series of studies were performed to alter Rap1a activity and protein levels to determine the influence of Rap1a in AGE/RAGE signaling cascade. Cardiac fibroblasts were isolated from diabetic (db/db) fibroblasts and non-diabetic (het) fibroblasts. A Rap1a-EPAC agonist was used to increase Rap1a activity and protein levels resulting in elevated AGE/RAGE signaling markers, such as PKC-ζ and ERK1/2 phosphorylation, α-SMA, and RAGE protein levels. Furthermore, silencing Rap1a protein expression decreased PKC-ζ

and ERK1/2 phosphorylation, α-SMA, and RAGE as a result of Rap1a siRNA treatment. These studies demonstrated that Rap1a crosstalk occurred in the AGE/RAGE cascade. Rap1a involvement in the AGE/RAGE cascade identifies a new molecular mechanism, which could further potentiate fibroblast differentiation and ECM remodeling in diabetes. Deactivation of this mechanism represents a potential therapeutic approach to regulate fibroblast phenotype changes, collagen accumulation, and RAGE expression.

P2.38

CURRICULUM ENHANCEMENT OF THE BIOINFORMATICS PROGRAM AT MISSISSIPPI VALLEY STATE UNIVERSITY UTILIZING A BACTERIAL SYSTEM EXPOSED TO ENGINEERED NANOPARTICLES

Chelsea Tate, Melvin Johnson, Abigail S. Newsome, Mark A. Dugo

Mississippi Valley State University, Itta Bena, MS, USA

The production of engineered nanoparticles (NPs) (particles <100nm in any one direction) has steadily increased over the past several decades. Various applications utilize nanoparticles, such as drug delivery systems and bioremediation treatments. While NPs hold great promise for improved and new systems of applications, there is remains numerous questions as to how the use of these NPs impacts the environment in which they are being used. With MS INBRE Curriculum Development support, we have incorporated experiential investigations of microbial nanoparticles as they related to gene expression into MVSU's Bioinformatics graduate course, Genomes and Genomic Technologies. We are exposing pure cultures of the coliform bacteria, *Escherichia coli*, to titanium dioxide nanoparticles that are used as agents of bioremediation. Following acute exposure trials across various doses of titanium, the production of reactive oxidative species, a commonly reported marker of metal toxicity and oxidative stress, will be assessed via the lipid peroxidation system. Select detoxification enzymes of the lipid peroxidation system will be investigated at the mRNA transcript level using real time PCR and sequencing to identify any genomic changes of these same enzymes that might be altered during NP exposure.

P2.39

THE ROLE OF MSAABCR OPERON IN *STAPHYLOCOCCUS EPIDERMIS* BIOFILM FORMATION

Haley Utman, Jordan Wildhaber, M. Erin Riggins

Mississippi Gulf Coast Community College, Gulfport, MS, USA

A newly described operon, *msaABCR*, has been linked to biofilm development, virulence and antibiotic resistance in *Staphylococcus aureus*. Bioinformatics analysis showed good homology between *msaABCR* in *S. aureus* and *S. epidermidis.* Bioinformatics also shows that MsaB is a transcription factor that binds DNA. Therefore, we hypothesized that *msaABCR* will play a similar role in the regulation of *S. epidermidis* biofilm development and virulence factors. The *msaABCR* operon was deleted from *S. epidermidis* RP62A by allelic gene replacement method to study its role in biofilm development. We studied the biofilm formation by the msaABCR mutant in presence of several compounds and enzymes and compared with its isogenic wild type strain, RP62A, to understand the mechanism of biofilm regulation by msaABCR operon. We used compounds like sodium metaperiodate (NaMp), and enzymes like (proteinaseK, DNaseI, and Dispersin B), which were known to target the biofilm matrix. We also tested the effect of several clinically important antibiotics to study the effect of *msaABCR* deletion in the antibiotic susceptibility. The *msaABCR* mutants' biofilm was significantly reduced relative to wild type. In addition, dispersin B and NaMp significantly affected wild-types' biofilm relative to *msaABCR* mutant thus suggesting a PNAG-dependent nature of biofilm matrix. Deletion of *msaABCR* operon also led to increased susceptibility towards several antibiotics like levofloxacin, cefazolin, tigecycline, and linezolid. This study may help define the role of *msaABCR* in *S. epidermidis* biofilm development, virulence, and antibiotic resistance and could be therapeutically relevant to control biofilm-associated infections by *S. epidermidis* and *S. aureus.*

P2.40

IMMUNOLOCALIZATION OF SELENOPROTEINS IN THE GULF-COAST TICK (*AMBLYOMMA MACULATUM*) TISSUES

Nancy Vu, Gary Crispell, Shahid Karim

The University of Southern Mississippi, Hattiesburg, MS, USA

The gulf-coast tick (*Amblyomma maculatum*) is competent for a variety of microbes, including Rickettsia parkeri, a causative agent of Spotted Fever Rickettsiosis. Ticks experience a variety of oxidative stress conditions while on and off the vertebrate host. To counteract the deleterious effects of reactive oxygen species, ticks have many antioxidant molecules in their repertoire, including a robust selenoproteome system (Karim et al., 2011). These selenoproteins play significant biological role in mitigating the elevated levels of ROS by detoxifying and reducing free radicals that generates within the tick host upon blood digestion. The objective of this study is to determine the expression and localization of select selenoproteins in tick tissues by immunoblotting and immunofluorescence approach. We hypothesize that the expression of selenoproteins increases upon blood feeding on the vertebrate host. To test the hypothesis, unfed and partially blood fed tick tissues (midgut and salivary glands) are used to determine the expression of selenophosphate synthetase 2 (SPS2), and selenocysteine binding protein 2 (SBP2). Western blotting demonstrated the expression of SPS2 and SBP2 in both midgut and salivary glands. Additionally, confocal imaging showed the distinct localization of selenoproteins within the salivary acini. Our results support the up-regulation of selenoproteins upon tick's blood feeding, and unfolds a new avenue of research to study the protein expression in pathogen-infected tick tissues.

P2.41

ASTROCYTE AND MICROGLIA MORPHOLOGIC CHANGES IN THE NUCLEUS OF THE SOLITARY TRACT IN A RAT MODEL OF THORACIC LEVEL SPINAL CONTUSION

Julius Wells[1], Kwamie Harris[2], Alexandra Himel, Raymond J. Grill[2] Bernadette E. Grayson[2]

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Injury to the spinal cord results in long-term, debilitating sequelae to individuals. Spinal cord injured patients have increased risk for the development of metabolic disease which could further hinder the effectiveness of treatments to rehabilitate the cord and improve quality of life long-term. Here we sought to determine whether microglial and astrocytic morphologic changes exist in the

brainstem, particularly the nucleus of the solitary tract, which is strongly involved in the control of food intake. Adult, male, Long Evans rats received either thoracic level contusion of the spinal cord (tSCI) or sham laminectomy (Sham) or were naïve to both procedures (Naïve) and then were allowed to recover for 4 weeks. Body weight, food intake and adiposity was measured. Brainstems were harvested after 4 weeks, and processed for immunohistochemical (IHC) detection of microglia (IBA1) and astrocytes (GFAP). tSCI rats exhibited reduced of IBA1 positive microglia in the nucleus of the solitary tract (NTS), $*p < 0.05$, Naïve vs. tSCI. In addition, tSCI animals exhibited reduced density of GFAP positive astrocytes in the NTS in comparison to either Naïve or Sham rats $*p < 0.05$, Naïve vs. tSCI. $*p < 0.05$, Sham vs. tSCI. Taken together, these data suggest that the NTS may be protected from immune perturbations after the first weeks of recovery from thoracic spinal contusion. Reduced presence of microglia and astrocytes may be in response to short-term remodeling of neural networks in the NTS of the brainstem. Further work is needed to establish the cause of these changes.

P2.42

IMMUNOFLUORESCENCE ANALYSIS OF THE BLOOD-BRAIN BARRIER IN IMMUNOCOMPROMISED MICE

Makayla Wiley[1], Chinyere Kemet[2], Gozde Uzunalli[2], Tiffany Lyle[2]

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The blood-brain barrier (BBB) is the tightest and most effective biological barrier in the body. This barrier protects the brain from pathogens and toxins by controlling the efflux and influx of nutrients and waste products into and out of the neuroparenchyma. We aim to evaluate the functional components of the BBB using immunofluorescence analysis in two immunocompromised mouse models, athymic nude mice and NOD-SCID-IL2 receptor γ^{null} (NSG) mice. Our findings will determine the most suitable model for analysis of BBB alterations in experimental models of brain metastasis. Athymic nude mice are T-cell deficient and commonly used as xenograft models. NSG mice, which lack B, T, and natural killer (NK) cells, permit engraftment of human immune cells, and facilitate rapid growth of human tumor cells. We evaluated functional components of the BBB, including endothelial cells, pericytes, basement membranes, and astrocyte endfeet, of five 6-week old (2 male, 3 female) athymic nude mice and NSG mice using indirect immunofluorescence staining. Following immunofluorescence staining, images were procured using a Zeiss M2 fluorescence microscope and positive stained areas was measured using ZEN analysis software. No significant difference in immunofluorescence expression was identified in our preliminary evaluation of the BBB functional components in athymic nude mice compared to NSG mice. Our findings support the use of NSG mice in analysis of the blood-tumor barrier in analysis of brain metastases of lung cancer. Use of NSG mice will facilitate the development of a reliable model system to understand changes to the blood-brain barrier in neoplastic disease.

P2.43

IMPLICATING RIBONUCLEASES IN MAMALIAN TAILED MIRTRON BIOGENESIS

Mohammad Farid Zia, Alex S. Flynt

The University of Southern Mississippi, Hattiesburg, MS, USA

Mirtrons are small RNAs which bypass Drosha cleavage and they are classified in three categories of 5' –tailed, 3' –tailed and conventional. Though many tailed mirtrons have been recognized in recent years, their biogenesis particularly removal of tail residues have not been studied well. This is due to low abundance of these small RNAs and absence of an experimental system to directly examine their expression. In this study, we have focused on biogenesis of two tailed mirtrons miR-668 (mouse 3') and miR-5010 (human 5'). To achieve this, at first we have detected the expression of these two mirtrons in Hela cells. Next we performed structure and function tests using different constructs of the miR-668 and miR-5010. Through these minigenes will be able to examine the basic processing of tails as well as the sequence requirements.

P2.44

THE STRUCTURE-ACTIVITY RELATIONSHIP OF GINSENOSIDES ON HYPOXIA-REOXYGENATION INDUCED APOPTOSIS OF CARDIOMYOCYTES

Ruiqi Feng[1], Jia Liu[1], Zhenhua Wang[2], Jingwen Zhang[2], Courtney Cates[1], Thomas Rousselle[1], Qingguo Meng[2], Ji Li[1]

[1]University of Mississippi Medical Center, Jackson, MS, USA and Universities of Shandong, Yantai, China

Ginsenosides have been studied extensively in recent years due to their therapeutic effects in cardiovascular diseases. While most studies examined the different ginsenosides individually, few studies compare the therapeutic effects among the different types. This study examined how effective protopanaxadiol, protopanaxatriol ginsenosides Rh2, Rg3, Rh1, and Rg2 of the ginsenoside family are in protecting H9c2 cardiomyocytes from damage caused by hypoxia/reoxygenation. In the current study, a model of myocardial ischemia and reperfusion was induced in H9c2 cardiomyocytes by oxygen deprivation via a hypoxia chamber followed by reoxygenation. Our data show that structures similar to that of protopanaxadiol, which lacked the hydroxide group at C6, were more effective in lowering apoptosis than structures similar to protopanaxatriol with a hydroxide group at C6. As the compounds increased in size and complexity, the cardioprotective effects diminished. In addition, the S enantiomer proved to be more effective in cardioprotection than the R enantiomer. Furthermore, the immunoblotting analysis demonstrated that ginsenosides activate AMPK but suppress JNK signaling pathways during hypoxia/ reoxygenation. Thus, ginsenosides treatment attenuated hypoxia/reoxygenation-induced apoptosis via modulating cardioprotective AMPK and inflammation-related JNK signaling pathways.

Friday, February 23, 2018

MORNING

TC214

7:50 WELCOME

O2.23

8:00 TRANSCRIPTOMIC EFFECTS OF DISPERSED OIL IN A NON-MODEL DECAPOD CRUSTACEAN

Brent Thoma[1], Hernan Vazquez-Miranda[3], Juliet Wong[4], Darryl Felder[2], Keith Crandall[5], Heather Bracken-Grissom[3]

[1]Jackson State University, Department of Biology, Jackson, MS, USA, [2]University of Louisiana at Lafayette, Department of Biology, Lafayette, LA, USA, [3]Florida International University, Department

of Biological Sciences, North Miami, FL, USA, [4]University of California, Santa Barbara, Department of Ecology, Evolution, & Marine Biology, Santa Barbara, CA, USA, [5]George Washington University, Computational Biology Institute, Ashburn, VA, USA

Oil spills are major environmental disasters. Dispersants are used to help control spills by emulsifying oil into droplets to speed bioremediation. Although dispersant toxicity is controversial, the genetic consequences and damages of exposure to dispersed oil are poorly understood. RNA-Seq was used to measure gene expression of flatback mudcrabs (*Eurypanopeus depressus*, Decapoda: Brachyura: Panopeidae) exposed to dispersed oil. Experimental design included three treatments with three replicates each. Treatments included: negative controls, oil-only, as well as oil and dispersant. One hundred base pair-ended libraries were prepared from total RNA and sequenced in 1 Illumina HiSeq2000 lane. A reference transcriptome was assembled with all replicates and treatment, assessed quality with novel metrics, identified transcripts, and quantified gene expression with open source software. The resulting mudcrab transcriptome included 500,008 transcripts from 347,082,962 pair-end raw reads. In oil-only treatments, few significant differences were found. However, in oil-dispersant treatments, over 4,000 genes involved with cellular differentiation, primordial cellular component upkeep, apoptosis, and immune response were downregulated; also, a few muscle structure and development genes were upregulated. These results provide evidence that exposure to chemically dispersed oil causes a generalized cellular shutdown and muscular repair attempts suggesting current oil-spill treatment procedures could be detrimental to crustaceans and additional research is needed to evaluate the impact of oil spills in gene expression.

O2.24

8:15 REDUCTION OF THE IGF-1 RECEPTOR IN THE ADULT HIPPOCAMPUS IMPAIRS LEARNING AND MEMORY

Cellas Hayes, Jessica Posey, Erik Hodges, Nicole Ashpole

University of Mississippi, University, MS, USA

Age-related loss of growth factors, such as IGF-1, leads to cognitive impairment in the advanced aged. IGF-1 is known to regulate many cell types in brain, thus studies in IGF-1 knock-out mice cannot differentiate whether the observed impairments in advanced age are due to changes in neurons, astrocytes, other glial cells, or the vasculature. We hypothesized that the direct regulation of neurons by IGF-1 was necessary for proper learning and memory to maintain essential cognition, even in adulthood. To address this, we utilized IGF-1 Receptor flox mice and controlled the knock-down of the receptor in neurons and astrocytes at three months of age (post-puberty). Two months following knock-down, learning and memory was tested in multiple mazes: Barnes maze, radial arm water maze, and the novel object/novel location task. We observed that neuronal IGFR knock-down led to reduced learning and memory in several components of the mazes. Further studies are now aimed at identifying which signaling cascades are disrupted when neuronal IGF-1 signaling is reduced. Together, these studies will highlight potential areas for therapeutic treatment of age-related cognitive decline.

O2.25

8:30 CANNABINOID SENSITIVITY WITH ADVANCED AGE

Katherine Blackburn, Jessica Posey, Nicole Ashpole

University of Mississippi, University, MS, USA

It is understood that cannabinoids affect the CB pathways in mice in correlation to their age. We sought to explore just how sensitivity in mice changes as they age. Past studies have shown inconclusive results between age and CB receptors, which led us to explore the correlation between sensitivity and age. We conducted a tetrad assay using young and old mice to examine their response to pain, anxiety, locomotion, and temperature before and after being administered the drug CP55,940, which is a potent agonist of CB receptors. We compared the mice's behavior after drug administration to their normal responses. Our studies show that the younger mice could tolerate a higher concentration of CP55,940 before exhibiting behavioral changes compared to the aged mice. Together, these data indicate that aged mice exhibit increased sensitivity to the effects of cannabinoids. After behavioral testing, we then tested the hippocampus for the presence of the receptor, along with G proteins and beta-arrestin by conducting a qPCR. After running qPCR analysis, we observed that the CB1 receptors were primarily expressed as opposed to the CB2 receptors, with no significant age-related changes in expression of any of the CB-related machinery. The mechanism underlying the increased sensitivity in aged animals is still not understood. We will continue examining CB regulation in the aged tissue to potentially lead to further discoveries on the effects of cannabinoids on humans.

O2.26

8:45 THE USE OF FETUIN-A TO ATTENUATE CALCIFICATION OF SMOOTH MUSCLE CELLS

Jenna Mosier[1], Rachel Hybart[1], Amber Kay[2], James A. Stewart, Jr.[2], C. LaShan Simpson[1]

[1]Mississippi State University, Mississippi State, MS, USA, [2]University of Mississippi, University, MS, USA

Vascular calcification is an active process related to cardiovascular disease resulting from the osteoblastic differentiation of smooth muscle cells (SMCs). It results in the calcification of the medial and intimal layers of the arterial wall. In order to inhibit and potentially reverse this process, research has focused on a naturally occurring protein, Fetuin-A, that binds to free calcium and phosphate in the serum. Studies report that dialysis strips the body of fetuin. Our goal is to understand the mechanisms behind this protein and determine how it can be utilized as a therapeutic agent for calcification. In this study, we cultured and treated human vascular SMCs to induce calcification and determine the level of fetuin required to reverse it. Cells were cultured in calcifying media, treated with bovine fetuin, and analyzed with a calcification kit, PCR, western blots, and staining. Preliminary western blot data showed that under calcifying conditions, SMCs lose their native α-SMA marker, representing a change from the SMC phenotype to bone-forming osteoblasts. In PCR results, groups that lost α-SMA markers in western blots expressed RUNX2 in 2 fold expression, a gene only found in bone cells. On day 14, treating the cells with high fetuin (15 μM) produced significantly lower calcium/protein (μg/mg) content, with a p-value < 0.05, confirmed through staining. In future research, we want to formulate a uremic in vitro model observe and manipulate

the effects of fetuin in sites of calcification conditions to determine whether this therapy is effective.

O2.27

9:00 HISTOMORPHOMETRIC ANALYSIS OF THE KIDNEY OF OVARIECTOMIZED RATS FOLLOWING THE RELEASE OF AN NPY -1 RECEPTOR ANATGONIST

Zachariah Bashir[1], Joseph Cameron[1], Michelle Tucci[2], Hamed Benghuzzi[2], Zelma Cason[2]

Jackson State University, Jackson, MS, USA, University of Mississippi Medical Center, Jackson, MS, USA

BACKGROUND: Neuropeptide Y (NPY) is a 36-amino acid neuropeptide that acts as a neurotransmitter in the brain and in the autonomic nervous system of humans. In the autonomic system it is produced mainly by neurons of the sympathetic nervous system and can activate at least 5 subtypes of receptors (Y1-Y5). The goal of our study was to evaluate the kidney of ovariectomized rats and determine the role of the NPY 1 receptor in the kidney by using sustained delivery of a selective Y1 receptor antagonist. **METHODS**: Twenty female Sprague Dawley rats were divided into four equal groups (intact control, OVX control, SHAM (non-drug loaded TCP capsule), and TCP+NPY-1RA (implants containing 5 mg of NPY receptor antagonist). Body weights, organ weights, and kidney tissues (glomeruli length, width and area) were measured, evaluated, and the results were compared for statistical differences. **RESULTS:** Overall, body weight and kidney wet weights were increased in SHAM and OVX control animals when compared to intact control animals, for the duration of the study. Whereas in the glomerular area in the NPY-1RA treated animals were statistically smaller than all treatment and intact control animals. **CONCLUSION:** NPY-1RA treatment was capable of reversing OVX associated weight gain for the duration of the study. NPY-1RA resulted in a time dependent decrease in glomerular cross sectional area which may result in modulation of glomerular filtration rate, and additional studies are need to determine if the changes are due to changes in intra-renal hemodynamics.

O2.28

9:15 ROLE OF IGF-1 IN ASTROCYTIC REGULATION OF LEARNING AND MEMORY

Disha Prabhu, Jessica Posey, Cellas Hayes, Katherine Blackburn, Nicole Ashpole

University of Mississippi, University, MS, USA

Advancements in healthcare have increased the average life span of people all over the world, thereby making them susceptible to disorders of aging. Aging of the brain is associated with a decline in learning, memory and cognition, affecting the ability to lead an independent life and posing an enormous economic burden. However, we still do not have an effective therapy for treating the cognitive impairment. Insulin-like Growth Factor (IGF)-1, known to promote learning and memory, decreases with age. Majority of the studies have focused on the effects of IGF-1 on neurons, and not on astrocytes, despite the fact that it is the astrocytes that are the predominant cell type in the brain. This project aims at investigating the effect of IGF-1 on the ability of astrocytes to release and recycle signaling molecules that transmit signals to nearby neurons as well as astrocytes. We have measured the amount of glutamate released by cultured rat astrocytes under basal and stimulated conditions, in response to exogenous IGF-1 or PPP- which is an antagonist of IGF-1, with short-term and long-term treatments, using the glutamate assay. Additionally, we have measured the ATP released in response to IGF-1 and PPP, under basal and stimulated conditions. Furthermore, we will look at the changes in gene and protein expression of several key transporters associated with the transport of glutamate in astrocytes. Overall, this project will help uncover the role of IGF-1 in astrocytic regulation of learning and memory.

O2.29

9:30 NEUROPROTECTIVE EFFECTS OF ESTRADIOL, GENISTEIN, AND AROMATASE ON CEREBELLAR LESIONS

Ethan Zadrozny[2], Lainy Day[1], Sarah Chong[1], Estelle Blair[1]

[1]The University of Mississippi, University, MS, USA, [2]Hinds Community College, Raymond, MS, USA

Brain injury induces upregulation of aromatase, converting testosterone to estradiol (E_2). Exogenous E_2 has also shown to be neuroprotective. It is unclear whether the neuroprotective roles of E_2 and aromatase are independent. Cerebellums have little constitutive aromatase, are steroidogenic, and post-lesion recovery is improved by E_2 administration and aromatase, which make them excellent models for steroid related neuroplasticity. Estrogen Receptor beta, is abundant in cerebellums and phytoestrogens, like genistein, bind mainly to ERb, making cerebellums prime models for comparing effects of E_2 to genistein, which is less reproductively and carcinoginically harmful. Our objectives are to examine (1) whether exogenous E_2 affects neuroprotection, (2) whether Genistein shares E_2's neuroprotective role, and (3) whether E_2 and aromatase confer neuroprotection independently or concomitantly. We used zebra finches as models; their brains are more plastic than mammals. Male zebra finches (6-40) months old were balanced across groups for age and weight. Groups were given subcutaneous implants containing silastic adhesive, E_2 (500 µg), or genistein (1000 µg), and weighed at 5 days. Seven days later, birds weighed and given unilateral puncture lesions (26g needle), counterbalancing left and right sides, and paired with intracerebellar injections containing letrozole or saline. Birds were sacrificed after 48 hours and serum, brains, and gonads were collected. We expect E_2 and genistein implants, without letrozole administration, allows the least cellular damage post lesion. We found when given E_2 or genistein, testis shrink due to imbalance of hormone levels. We are still investigating whether E_2 and aromatase work independently.

9:45 BREAK

10:10 Divisonal Business Meeting and Cellular, Molecular, Developmental Biology Division Awards- **Student oral and poster awards are sponsored by the School of Arts and Sciences Mississippi State University and the School of Pharmacy, University of Mississippi**

O2.30

11:00 PLANT FLAVONOID XANTHOHUMOL INDUCES HUMAN LEUKEMIA HL-60 CELLS DEATH

Maricica Pacuari

Jackson State University, Jackson MS, USA

Background. Acute myeloid leukemia (AML) occurs when the bone marrow begins to make blast cells that have not completely matured. AML affect both kids and adults, but more common in adults and affects males at higher rates than females. The most widely used treatment for AML is chemotherapy. Although 2 out of 3 patients that receive chemotherapy go into remission, leukemia causes yearly ~ 250,000 deaths, and is associated with resistance to chemotherapy. In order to overcome chemoresistance, novel

therapeutic approaches, particularly, phytochemicals, are currently considered. Xanthohumol (XN) is a natural polyphenol in plant hops (*Humulus lupulus* L). **Hypothesis:** In this study, we examined antileukemic effects of XN on HL-60 cells. We tested the hypothesis that XN inhibits HL-60 growth through apoptosis. **Materials and Methods.** HL-60 cells were purchased from ATCC, grown, and exposed to different concentrations of XN (μM) for 24 h. Cell viability, cell morphology, the expression of $p21^{WAF1/Cip1}$ and CYP24A1 were analyzed. **Results.** XN reduced HL-60 cell viability in a dose-dependent manner. At 5, 12.5, 25, and 50 μM, cell viability was reduced to 98, 84, 83, and 53 % vs control. XN induced a dose-dependent profound morphological changes including cell size change from large and clustered to smaller and less clustered and with blebbings. XN induced the expression of $_{p21}^{WAF/CIP}$ and Cyp24A1. These data indicates that XN induces HL-60 cells death by regulating cell cycle progression and apoptosis. This study also suggests that dietary supplements with XN may have antileukemic preventive effects.

O2.31

11:15 IDENTIFICATION OF NOVEL HOST ASSOCIATION FACTORS IN *XENORHABDUS NEMATOPHILA*

Elizabeth Hussa, Alycee Moity, Lauren Carney

Millsaps College, Jackson, MS, USA

The bacterium *Xenorhabdus nematophila* engages in a mutualistic relationship with *Steinernema carpocapsae* nematodes, and together these partners invade and kill a variety of insect larvae, mostly of the Lepidopteran order. Though some microscopic data has suggested that *X. nematophila* and related species form aggregated communities called biofilms inside the nematode host, the role of biofilm formation in host association and/or transition between hosts is unknown. The global regulatory protein Lrp is required for biofilm formation, and increased *lrp* expression correlates with increased biofilm mass. Lrp is also required for optimal nematode colonization and virulence against insects, suggesting a positive association between biofilm formation and symbiotic activities. We are continuing to characterize Lrp-mediated biofilm formation, however the pleiotropic effects of Lrp manipulation make it difficult to establish a causal relationship between biofilms and host association. In an attempt to more directly investigate the role of biofilm formation on mutualism and pathogenesis by *X. nematophila*, we screened a library of random transposon mutants for differences in biofilm formation relative to the wild-type strain. We obtained and examined one such transposon mutant with putative enhanced biofilm phenotypes, and preliminary results indicate that biofilm formation may be detrimental to both colonization of nematodes and virulence against insects.Another mutant strain, F2, was found to differ significantly from the wild type in colonization. Time constraints prevented further testing of this mutant in virulence. The effects of A5 on virulence and colonization could suggest that it behaves much like some of the mutants tested in previous studies, such as CpxR (a regulatory protein). Future work will focus on further characterization of host association phenotypes, as well as identification of the mutated genes in each strain of interest.

O2.32

11:30 SPLIT TOP REGULATES DORSAL-VENTRAL PATTERNING AND CELL MIGRATION IN ZEBRAFISH

Yvette Langdon[1], Ricardo Fuentes[2], Mary Mullins[2]

[1]Millsaps College, Jackson, MS, USA, [2]University of Pennsylvania, Philadelphia, PA, USA

Little is known about the maternal factors that function in body axis formation during vertebrate embryonic development. To identify these factors, a recessive maternal-effect mutagenesis screen was performed in the zebrafish Danio rerio. One such mutant, split top exhibits a dorsalization of the embryonic axis. Clutches of embryos from split top mutant mothers are characterized by the five classic dorsalized phenotypic classes, as well as some additional defects. The mutant embryos show an expansion of dorsal markers and a corresponding reduction in ventral markers during gastrulation indicative of dorsalization. The dorsalization defects can be rescued by misexpression of either BMP2 or BMP7 ligands, or by derepression of BMP signaling by knockdown of BMP antagonists. The additional defects appear to be the result of altered morphogenesis, including defects in epiboly progression, the process by which the blastoderm cells migrate over and surround the yolk. Mutant embryos display altered microtubule and actin cytoskeletal networks in the yolk cell, which can account for the epiboly defects observed. split top mutant embryos also appear to be defective in the cell movement process of convergence and extension. We mapped the split top mutation and identified cathepsin B, a as the gene disrupted in split top mutants. This work was supported by NIH grant R01-GM56326, NIH training grant T32HD007516, the PENN-PORT training program, and by the Mississippi INBRE, funded by an Institutional Development Award (IDeA) from the National Institute of General Medical Sciences of the National Institutes of Health under grant number P20GM103476.

O2.33

11:45 IDENTIFICATION OF TRANSCRIPTOME CHANGES BY DCLK1 OVER-EXPRESSION IN COLORECTAL CANCER CELLS USING THE NEXT GENERATION SEQUENCING

Lianna Li

Tougaloo College, Tougaloo, MS, USA

Next generation sequencing (NGS), referred as the massively parallel or deep sequencing, has revolutionized genomic and molecular biology research in the last decades. RNA sequencing (RNA-Seq) applying NSG platform has been proven to be a powerful tool to reveal the transcriptome changes in biological samples. Doublecortin like kinase 1(DCLK1) is a putative marker for gastrointestinal stem cells and it might specifically label cancer stem cells. It has been proven to play critical roles in the oncogenesis, progression and metastasis of colorectal cancer (CRC). In our research, we aim to use RNA-Seq technology to monitor transcriptome changes due to DCLK1 over-expression in the colorectal cancer cells. In order to achieve our goal, we established stable DCLK1 over-expression cell lines using the HCT116 cells. Total cell RNA was extracted from quadruplicate samples from wild type HCT116 cells and two clones of DCLK1 over-expression cells. RNA-Seq was carried out on the Illumina NextSeq500 platform. Differentially expressed (DE) genes were evaluated by t-test [$p<0.05$ and fold-change ±1.5 or greater] using two methods: (1) FWER; and (2) Benjamani and Hochberg FDR (false discovery rate) which corrects for multiple comparisons. Gene networks and functional analysis were evaluated using Ingenuity Pathways Analysis. We identified over 4000 DE genes in the DCLK1 over-expression cells, and found out that several canonical pathways were

modified by DCLK1 over-expression. Our findings shed light on the molecular mechanism of DCLK1 function and will be of great benefit for the discovery of novel therapeutic target for the treatment of colorectal cancer patients.

Friday, February 23, 2018

AFTERNOON

12:00-1:00 Plenary Speaker

1:00-3:00 Mississippi INBRE/ Millsaps HHMI Symposia

CHEMISTRY AND CHEMICAL ENGINEERING

Chair: Julie Pigza
University of Southern Mississippi
Vice-Chair: Ifedayo Victor Ogungbe
Jackson State University

Thursday, February 22, 2018

MORNING
Room TC 218A

8:10 Welcome

Oral Session 1: Synthesis of Biologically Relevant Targets, Moderator: Nick Jentsch

O3.01

8:15 SYTHESIS OF ENANTIOENRICHED (R)-A-METHYLSELENOCYSTEINE AND ITS ENANTIOMER

Robert Wehrle[1], Robert Hondal[2], Douglas Masterson[1]
[1]University of Southern Mississippi, Hattiesburg, Mississippi, USA, [2]University of Vermont, Burlington, Vermont, USA

Replacement of the α-hydrogen with a methyl group has found increasing use in synthetic peptides due to the increased stability and resistance to enzymatic degradation due that α-methyl substitution affords. There is interest in synthesizing unnatural selenocysteine analogues because of its unique antioxidative properties and potential anti-cancer uses and, up to this point, published protocols for synthesizing α-methyl selenocysteine (α-MeSec) result in low yield. Initial attempts at synthesizing α-MeSec in our lab also resulted in poor yields. We relied on the nucleophilic attack on the side chain methylene of an α-methylserine derivative by an appropriate selenolate. The reason for the low yield was most likely due to the steric hindrance at the α-carbon. A different synthon was developed using an enolate to attack a seleno-alkylating agent forming a *tert*-butyl protected selenomalonate. By employing pig liver esterase on this selenomalonate, a highly enantioenriched (>90% ee, 75% yield) *tert*-butyl protected seleno-half ester was synthesized, and by comparing to previously synthesized cysteine analogues, polarimetry suggests the (S) enantiomer was made. Through additional synthetic steps, the seleno-half ester was converted to a protected version of α-MeSec in moderate yields (36%) while preserving the stereocenter. A similar approach can be utilized to synthesize the opposite enantiomer as well as the β-amino acid analogues.

O3.02

8:30 SYNTHESIS OF A THIAZOLE SULFONAMIDE AS A POTENTIAL HIV INTEGRASE INHIBITOR

Andrea Briscoe, Jacques Kessl, Matthew Donahue, Julie A. Pigza
University of Southern Mississippi, Hattiesburg, MS, USA

HIV integrase is an ideal target for potential therapeutics due to the potential to prevent HIV replication. HIV integrase is a retroviral enzyme that incorporates DNA derived from the virus into the host cell's chromosomes. Drug targets for the integrase enzyme essentially bind through noncovalent interactions and cause the domains of the enzyme to aggregate, which is known as multimerization. This process of multimerization prevents the HIV enzyme from being able to reach the desired conformation necessary to enter the nucleus of the host cell and therefore prevents replication of the virus. This project will describe the two main routes attempted for the synthesis of a target sulfonamide compound containing a thiazole backbone that was identified via a high throughput screening process. Challenges in the synthesis of the target will be described as well as its inhibition assay data for integration and multimerization. The authors acknowledge the Dr. Ronald E. McNair Post-Baccalaureate Achievement Program for partial funding of this project.

O3.03

8:45 THE USE OF CHIRAL, NON-RACEMIC HOMOALLYLIC AMINES AS BUILDING BLOCKS FOR PIPERIDINE SYNTHESIS

Hayley Allen, Matthew Donahue
University of Southern Mississippi, Hattiesburg, MS, USA

Chiral, non-racemic piperidines are found in natural products such as alkaloids and are important building blocks for the construction of prescription drugs. Stoichiometric chiral ammonia equivalents such as R-tert-butanesulfinamide developed by Ellman provide access to enantiopure *R*- or *S*-*N*-sulfinyl imines. A series of ortho, meta, and para substituted benzaldehydes were treated with R-tert-butanesulfinamide and tri-isopropyl borate to afford homochiral imines in high yield without need for further purification. Allylation with stoichiometric powder indium metal and allyl bromide in tetrahydrofuran or *N*,*N*-dimethylforamide at 70 °C afforded homoallylic amines in high yield and high diastereoselectivity. Based on Ellman's cyclic transition state model and prior work by Yus, allylation occurs from the *si* face to give the *S*-diastereomer at the benzylic carbon. The amine free base was isolated after deprotection of the *N*-sulfinyl chiral auxiliary under acidic conditions with 4 M HCl in dioxane. Treatment of the homoallylic amine with phthalic anhydride furnished the phthalimide that was reduced sodium borohydride to the aminal. Under acidic conditions the aminal underwent intramolecular cyclization to afford the isoindolone. The structure was fully elucidated using two-dimensional nuclear magnetic resonance experiments including HSQC, HMBC, and NOESY. We are examining a series of benzaldehyde and aliphatic derived chiral imines to prepare enantioenriched homoallylic amines to carry through this sequence. These piperidine ring derivatives are a common heterocyclic structure found in numerous alkaloid natural products and some FDA approved drugs.

O3.04

9:00 EXPLORATION OF PYRROLE SIDE GROUPS ON THE ENANTIOSELECTIVITY OF PIG LIVER ESTERASE

Brian Long, Douglas Masterson
University of Southern Mississippi, Hattiesburg, MS, USA

Pig Liver Esterase (PLE) is a highly explored enzyme that has impressive capabilities to hydrolyze esters. The enantioselectivity of the hydrolysis of these esters is of interest to our laboratory. While the active site of PLE has often been thought of as hydrophobic, the exploration of more hydrophilic side groups has indicated the possibility of a more hydrophilic active site. In this research, we want to see how pyrrole side groups affect the enantioselectivity of PLE hydrolysis. To do this, we will use 2-pyrrole and 3-pyrrole side groups on dimethyl malonate. To synthesize these, we will use dimethyl malonate and pyrrole carboxaldehydes in the 2 and 3 positions. This will create an alkene, where the two molecules are connected. This will be reduced and then methylated. PLE hydrolysis of the dimethyl malonate on this molecule will create a chiral center on the molecule, and whether this hydrolysis gives a racemic mixture or gives an enantioselective product is important. Being able to isolate one enantiomer could be beneficial in making amino acids from this molecule. Through testing how different side chains affect the enantioselectivity of the active site of PLE, we can help identify the types of residues in the active site.

O3.05

9:15 INVESTIGATION OF SYNTHETIC STRATEGIES FOR THE DEVELOPMENT OF HETEROCYCLIC SMALL MOLECULE HIV-1 INTEGRASE INHIBITORS

Nicholas Jentsch, Jian Sun, Jacques Kessl, Matthew Donahue
University of Southern Mississippi, Hattiesburg, MS, USA

HIV-1 integrase (IN) is essential for virus replication and represents an important multifunctional therapeutic target. Allosteric IN inhibitors (ALLINIs) have recently been established as an effective class of antiretroviral agents due to their potent ability to inhibit viral replication. Pursuant of our endeavors to further develop a library of heterocyclic candidates for IN inhibition, we have implemented synthetic strategies for the preparation of tri-substituted quinoline scaffolds. Quinoline-based ALLINIs have shown to effectively impair HIV-1 replication highlighting the importance of these heterocyclic scaffolds. The preparation can be achieved via acylation of active methylene compounds with isatoic anhydrides followed by dehydrative intramolecular cyclization. The isatoic anhydride is readily accessed by treatment of anthranilic acid with triphosgene. Conversion to the tri-substituted quinoline is then accomplished by employing the sodium enolate of ethyl acetoacetate in DMA providing a robust method that can be carried out without rigorous exclusion of moisture or degassing protocols. This presentation will further elaborate on the late stage transformations as well as next generation approaches for the development of the desired libraries. Additionally, inhibition assays utilizing the prepared candidates and the respective results will be discussed.

9:30 BREAK

9:45 – 10:45 a.m. Oral Presentations (2 concurrent sessions)

Thursday, February 22, 2018

MORNING
Room TC 218A

Oral Session 2: Medicinal Applications,

Moderator: Sharon Hamilton

O3.06

9:45 SYNTHESIS OF BIFUNCTIONAL DNA-CLEAVAGE REAGENTS BASED ON N-SUBSTITUTED QUINOLINES

Taylor Sledge, Reagan McGuffee, Shizhe Zhang, Leon Karekezi, Wolfgang Kramer
Millsaps College, Jackson, MS, USA

Photochemically induced DNA damage allows for control of the reaction in time and space. Traditional photodynamic cancer therapy uses sensitizers to generate singlet oxygen. The photoinduced cleavage of a nitrogen-oxygen bond of *N*-methoxy substituted aromatic heterocycles also generates reactive species that can induce biomolecule damage and thus cell death. In combination with a DNA-binder, 1,8-naphthalimide, which itself is photochemically active, the efficiency of the compounds has been increased dramatically. Extended conjugation will push the absorption maximum to more applicable wavelengths. In this project, the goal is to synthesize aminoalkylquinolines for conjugation to naphthalimide. The synthesis starts with methylquinolines which are brominated. The amino function is introduced by either Gabriel Synthesis or substitution and reduction with azide. This work was supported by the Mississippi INBRE, funded by an Institutional Development Award (IDeA) from the National Institute of General Medical Sciences of the National Institutes of Health under grant number P20GM103476.

O3.07

10:00 SYNTHESIS OF META-TRISUBSTITUTED QUINOLINES AS DRUG CANDIDATES FOR HIV-1 INTEGRASE INHIBITION

Alison Hart, Nicholas Jentsch, Jared Hume, Julie Pigza, Jian Sun, Jacques Kessl, Matthew Donahue
University of Southern Mississippi, Hattiesburg, MS, USA

HIV-1 integrase (IN) is a key component in virus replication and has been established as an excellent multifunctional therapeutic target. Allosteric IN inhibitors (ALLINIs) have recently been classified as an effective class of antiretroviral agents. Particularly, quinoline-based ALLINIs have shown to effectively impair HIV-1 replication highlighting the essential nature of these heterocyclic scaffolds. In this endeavor, we have developed a synthetic strategy for the preparation of trisubstituted quinoline scaffolds, that enables us to access a library of substituents. This presentation will focus on the development of meta-trisubstituted quinolines as drug candidates, highlighting the synthetic route, and how synthetic issues were addressed. Additionally, a brief comparison to other quinoline based ALLINIs will be discussed regarding the inhibition of IN.

O3.08

10:15 DIASTEREOSELECTIVE SYNTHESIS OF 2,4,6-TRISUBSTITUTED PIPERIDINES VIA AZA-PRINS CYCLIZATION

John Hood, Matthew G. Donahue

University of Southern Mississippi, Hattiesburg, MS, USA

The nitrogenous ring is shared amongst 59% of FDA approved small molecule pharmaceuticals with the six-membered piperidine representing the most common moiety. Given its versatility and potential to yield derivatives with broad biological activities, the discovery of new chemical methods to generate these heterocycles in a more time and cost-efficient manner is desired. While there are known methods to access this class of molecule, the objective of this research is to pioneer a new novel six-step method to generate 2,4,6-trisubstituted piperidines with stereoselective control. The first step is a condensation between a nonenolizable aldehyde and (*R*)-2-methylpropane-2-sulfinamide to create the Ellman *N*-sulfinyl imine. Carbons C3-C5 of the nascent ring can be installed at the *si* face of the imine via stereoselective allylation that is coordinated by transition metals such as magnesium, indium, or zinc to generate a homoallylic amine. The sulfinyl group is then removed via acidic conditions to afford the primary amine that is subsequently acylated with succinic anhydride to access an *N*-succinimide via a thermal condensation. A reduction of the cyclic imide via sodium borohydride accesses the vinylogous amide. The ring closure is initiated by acidic activation of the enamine to the *N*-sulfinyl iminium ion. This positions the substrate into a kinetically favorable six-membered chair conformation that places the nucleophilic alkene to intercept the iminium carbon stereoselectively affording the tri-substituted piperidine. We are investigating this strategy as a tunable method to prepare a variety of stereochemically diverse piperidine derivatives.

O3.09

10:30 THERAPEUTIC ELECTROSPUN NATURAL POLYMER-BASED FIBERS FOR BIOMEDICAL APPLICATIONS

Kathryn Penton, Amber Wilson, William Weeks, Zachary Kinler, Ana Daisy Camarillo, Tia Brown, Melody Lyon, Virginia Baker, Sharon Hamilton
Delta State University, Cleveland, MS, USA

Recent evolutions in the field of biomaterials have focused on developing materials that can facilely interface with biological systems to treat or replace tissues or functions of the body. Natural polymers, including polysaccharides, have been investigated as suitable biomaterials to mimic the environment of body tissues and facilitate tissue regeneration. Electrospinning natural polymers yields nanofibers that have shown promise in many biomedical applications including drug delivery. However, little research has been published on the controlled delivery of drugs from polymeric nanofiber dressings. The lack of studies in this area is due in part to the difficulty of electrospinning charged polymers, like alginate and chitosan. This research has taken a three-pronged approach towards the investigation of natural polymer-based fibers and the development of a catalog of small molecule release profiles from natural polymer-based nanofiber scaffolds. One facet focuses on the development of novel alginate-based, degradable nanofibers. Another facet focuses on the preparation of drug- loaded, alginate- and chitosan-based fibers via electrospinning and the exploration of the release profiles of these novel scaffolds that have incorporated other synthetic and natural polymers as well as carbon nanotubes. A third facet investigates covalently modified alginate- and chitosan-drug conjugate nanofibers and the hydrolytic release profile of these novel innately therapeutic scaffolds. Studies from all approaches will lead to improved understanding of alginate- and chitosan-based fibers towards furthering the development of materials that can be used in a variety of biomedical applications including modern wound healing dressings and drug delivery.

Thursday, February 22, 2018

MORNING
Room TC 218B

Oral Session 3: Radicals and Antioxidants,

Moderator: Wolfgang Kramer

O3.10

9:45 UNDERSTANDING ELECTROCHEMICAL PERFORMANCE OF BIOSENSORS FOR OIL LEAK DETECTION

Hariteja Nandimandalam, Veera Gnaneswar Gude
Mississippi State University, Mississippi State, MS, USA

Early detection of small oil leaks or spills can help avoid occurrences of major spills, thus eliminating environmental disasters related to marine environments and coastal communities. Organic contaminant sensors are difficult to employ under certain settings due to the material or function related limitations. In this research, a microbial biosensor cell was developed exploiting the benefits of microbial biodiversity and their metabolic functions. The biosensor is essentially created using exoelectrogenic bacteria in an anode that survive on organic matter and a photo or autotrophic, or sulfur reducing bacterial consortium in the cathode which will enable continuous transfer of electrons from one compartment (anode) to the other (cathode). This will create a voltage across a resistor which can be detected to identify possible contamination. The microbial biosensor cell will generate high voltage spikes when availability of organic compounds increases. In this study, a variety of hydrocarbons were used as substrates to understand the voltage generation potentials and to optimize and stabilize the sensor operations. We will discuss the development of millimeter scale microbial biosensor suitable for marine, soil and surface environmental settings and their performance using different combinations of exoelectrogenic and auto and phototrophic microbial consortia in terms of voltage generation potentials using various hydrocarbon and petroleum based compounds under the influence of environmental stressors including pH, water depth, temperatures and substrate and nutrient concentrations.

O3.11

10:00 2,2'-DIPHENYL-1-PICRYLHYDRAZYL RADICAL SCAVENGING ASSAY REVEALS ANTIOXIDANT POTENTIAL OF PSEUDOGNAPHALIUM OBTUSIFOLIUM PHYTOCHEMICALS SURPASSING THAT OF L-ASCORBIC ACID

Navpreet Kaur, Leah Bowlin, Claudia Cruz Rivera, Victoria Hodges, Carson Huynh, Navjot Kaur, Angela Whittom Reiken
Mississippi College, Clinton, Mississippi, USA

Free radicals cause cellular damage and antioxidants that reduce free radicals are important pharmaceuticals that also naturally occur in high concentrations in plants. Pseudognaphalium obtusifolium, a traditional medicine plant, produces many phytochemicals having antioxidant activities. To explore P. obtusifolium phytochemical antioxidant potential, separated extracts were prepared according to their chemical properties using a solvent mixture of dichloromethane, hexane, and ethanol followed by rotary evaporation and suspension in dimethyl sulfoxide. Extract radical scavenging activities were determined by the in vitro 2,2'-diphenyl-1-picrylhydrazyl (DPPH, $C_{18}H_{12}N_5O_6$) assay. The DPPH nitrogen

electron receives hydrogen from antioxidants and is reduced to hydrazine. Due to its delocalized spare electron, DPPH is a stable free radical having a deep violet color in methanol solution with 517nm absorption. When reduced, the violet color decreases. Serial dilutions of L-ascorbic acid were prepared as a standard. DPPH and methanol were added, mixtures having a final concentration range of 5-50µg/ml were incubated in the dark, vortexed, and absorbance was read at 517nm. The same reaction used for the standard was performed for each extract. Scatter plots with trends for standard data were used to compare extract data to the standard. DPPH radical scavenging activities were expressed as ascorbic acid equivalents (AE) which were used to calculate the extract percent activity relative to ascorbic acid (%A). All extracts had greater radical scavenging activity than ascorbic acid with a range of 627-922%. These experiments show the pharmaceutical potential of phytochemicals in the extracts lending credence to its use in traditional medicine.

O3.12

10:15 FLUOROMETRIC AND COLORIMETRIC SENSING OF CITRATE WITH A MACROCYCLE-BASED DINUCLEAR COPPER COMPLEX IN WATER

Md Mhahabubur Rhaman[1], Mohammad H. Hasan[2], Azmain Alamgir[1], Ritesh Tandon[2], Md. Alamgir Hossain[1]
[1]Jackson State University, Jackson, MS, USA, [2]University of Mississippi Medical Center, Jackson, MS, USA

Selective sensing of citrate by synthetic receptors is important due to its critical role in human health. For example, a low amount of citrate in urine is linked with the risk of kidney stones. During this study, a macrocycle-based dinuclear copper complex has been synthesized, and studied for its anion binding properties by fluorescence and colorimetric titrations in an indicator displacement method using an external dye (eosin Y) in water at pH 7.0. The gradual addition of citrate to receptor-dye adduct led to a large fluorescence enhancement, displaying a sharp colour change under both visible and UV lights. The results reveal that the receptor selectively binds citrate over a wide range of inorganic and carboxylate anions. The cytotoxicity assay of the receptor performed on primary human foreskin fibroblasts (HF) cells, suggests that the receptor is non-toxic to the cells up to 100 micromole. Acknowledgment: This work was supported by the National Institutes of Health (G12RR013459). M.H.H. and R.T. are supported by American Heart Association (Award No. 14SDG20390009).

O3.13

10:30 SPECTROCOPY OF HETEROAROMATIC SALTS AS PRECURSORS OF REACTIVE SPECIES

Wolfgang Kramer[1], Courtney Mullins[1], Melinda Solomon[1], Luaren Hoth[1], Anna Allred[1], Irene Corrao[1], Ian Gould[2]
[1]Millsaps College, Jackson, MS, USA, [2]Arizona State University, Tempe, AZ, USA

N-alkoxy substituted heteroaromatic compounds based on pyridine, quinoline, isoquinoline and phenanthridine allow the photochemical generation of transient species that can be used to damage biomolecules and induce controlled cell death. The transient species, heteroaromatic radical cations and a methoxy radical are produced with a quantum yield of about 0.55 as determined by trapping experiments.vLaser flash photolysis was used to analyze the photophysical properties of the bifunctional compounds. Interestingly, the 1,8-naphthalimide radical cation was formed and confirmed.
The N-methoxy substituted heterocycles produce a radical cation and a methoxy radical, each of which can initiate DNA cleavage. By comparison with restriction endonuclease, cleaving assays indicates that both transient species might be involved in the cleaving process. DNA double strand cleavage is desired for efficient cleavage. The bifunctional compounds presented in this project have the ability to induce DNA damage by two different mechanisms, thus showing potential for double strand cleavage. This work was supported by the Mississippi INBRE, funded by an Institutional Development Award (IDeA) from the National Institute of General Medical Sciences of the National Institutes of Health under grant number P20GM103476.

10:45 BREAK

11:00 a.m. – 12:00 p.m. Oral Presentations

Thursday, February 22, 2018

MORNING
Room TC 218A

Room 1 – Oral Session 4: Electronics and Computational Chemistry, Moderator: Colleen Scott

O3.14

11:00 EFFECT OF THE PROTONATION ON THE STABILITY OF POLYrA DUPLEX: COMPUTATIONAL STUDIES

Anastasiia Golius[1], Leonid Gorb[2], Margarita Zarudnaya[2], Andriy Potyahaylo[2], Jerzy Leszczynski[1]
[1]Jackson State University, Jackson, MS, USA, [2]Institute of Molecular Biology and Genetics, Kyiv, Ukraine

The formation of intra- and intermolecular double oligo(A)-helices of different stability is considered as a possible physical mechanism of mRNA poly(A) tail functioning in a number of biological processes. The formation of double helices is induced by intermolecular proton transfer from proteins specifically interacting with Poly(A) to the N1 nitrogen atom of adenine residues. The main purpose of this research was to study the structure of double-stranded and single-stranded Poly(rA) using computational methods. Molecular Dynamics (MD) simulation were used to study complexes on atomistic level under different conditions: ionic strength, temperature and protonation level. Calculations have been done with NAMD2.11 program package and two force field parameters: CHARMM36 and Amber. Following levels of protonation were considered: fully protonated complex; unprotonated; 60% protonation; 40% protonation; 30% protonation and 25% protonation. 100 ns trajectories were calculated for six complexes consisting of 15 adenine pairs. Simulations were performed at a temperature of 10 C and ion concentration 50 mM/L, based on previous experimental data and corresponds to conditions in which transition from one form to another occurs. Analysis of the geometry for different protonation levels revealed that the presence of protonation adenine helps stabilize Poly(rA) duplex. Comparison of the two force fields on the example of unprotonated duplex has shown that structure estimated with Amber is similar to the structure obtained with CHARMM. More studies have to be done, but at this stage we can see that those two force fields produce similar results.

O3.15

11:15 COMPUTATIONAL CHEMISTRY APPROACHES TO INVESTIGATE CONTAMINANTS FATE AND DEVELOPMENT OF POLYMER NANOCOMPOSITE MATERIALS

Manoj Shukla
US Army Engineer Research and Development Center, Vicksburg, MS, USA

This presentation is devoted to discuss how computational chemistry approaches can be reliably used to predict fate of munitions compounds in the environment and in the development of multifunctional polymer nanocomposite materials for various applications. Manufacturing, transportation, and application of munitions compounds may find their way to the environment. Adsorption of high energy military contaminants on different surfaces is an important area of research since such studies can provide significant information on fate and effects of these contaminants in the environments. In the present talk we will focus on application of Density Functional Theory based methods to predict fate of munitions compound in different environments. For the development of multifunctional polymer nanocomposite materials, the discussion will focus on interaction of carbon nanoparticles such as graphene, graphene oxide and carbon nanotube with the nylon 6 polymer and computation of mechanical properties of polymer nanocomposites. Most of the computations were performed at the plane-wave Density Functional Theory level using the van der Waals functional (vdW-DF2). However, for larger polymeric system force filed level of calculations were also considered. It was revealed that some of munitions compounds can undergo photodegradation. The addition of carbon nanomaterials in the polymer matrix was found to significantly improve the mechanical properties of the nanocomposites.

O3.16

11:30 DIRECTLY MEASURING THE COMPLETE STRESS−STRAIN RESPONSE OF ULTRATHIN ORGANIC ELECTRONIC FILMS

Xiaodan Gu
University of Southern Mississippi, Hattiesburg, MS, USA

Printed wearable electronics routinely involve bending, twisting and stretching of the ultra-thin organic film during the roll-to-roll manufacture and under use. To date, the most widely adopted method to measure the mechanical property of thin film relies on a buckling metrology developed by Stafford et al. The Young's modulus is simply linked to the wrinkling phenomenon of the polymeric thin film on elastomer substrate under compression. In this talk, we will discuss an alternative route to use a pseudo-free standing tensile tester to directly measure the full stress-strain curve for an ultra-thin film (i.e., film thickness less than 50nm). At this length scale (i.e., < 50nm), the mechanical property of the thin polymeric film is known to deviate from its bulky due to the free polymer/air interface or polymer/substrate interaction. This study is aiming to provide a direct insight into the mechanical property for flexible electronics at the nanoscale.

O3.17

***11:45 POLYRHODAMINE:* TOWARDS THE DESIGN OF A POLYANILINE MIMIC**

Colleen Scott, Ranganath Wahalathantrige Don, Brandon Butler
Mississippi State University, Mississippi State, MS, USA

Polyaniline (PANI) stands out as one of the most widely employed polymer, with commercial applications in printed circuit board manufacturing, antistatic and electrostatic dispersive (ESD) coatings, and corrosion protection. PANI also has great potential for applications in many other fields such as supercapacitors and batteries, electronic devices as hole-injection layers, solar cells, biosensors, and toxic metal recovery. Unfortunately, practical applications of PANI in these fields are limited by the material's electrochemical instability, and the lack of standard/optimized deposition methods. We present a new conducting polymer based on the rhodamine dye as a model system towards the development of a series of new conducting polymer to mimic PANI. Our model polymer (polyrhodamine, PRho) was prepared from a Buchwald/Hartwig synthesis of fluorescein ditrifalte with p-phenylenediamine to give the polymer in good yield (80 %) and high molecular weight ((Mn = 47000). The polymer was shown to have good optoelectrical properties consistent with the rhodamine dye and good chemical and electrical stability. The polymer can be cycled between acid (pH ~1) and base (pH ~12) solution without any noticeable change in the absorption spectrum. The cyclic voltammogram of a 100 cycle scan shows two redox peaks that were reversible even after 100 scan, with only a small change in the current for the second redox cycle. Amazingly, the polymer was found to have a conductivity of $\boldsymbol{5.27x10^{-5}}$ ***S/cm***, which is in the range of semiconductors. This is the first report to our knowledge of a rhodamine backbone polymer with semiconducting properties.

12:00 – 1:00 p.m. Lunch

AFTERNOON

1:00 – 2:00 p.m. Oral Presentations (2 concurrent sessions)

Thursday, February 22, 2018

AFTERNOON

Room TC 218A

Oral Session 5: Biologically Active Targets, Moderator: Prasanta Das

O3.18.

1:00 DRUG-RELEASE STUDIES FOR ALGINATE- AND CHITOSAN-BASED NANOFIBERS FOR MODERN WOUND HEALING

Kathryn Penton, Amber Wilson, Melody Lyon, William Weeks, Zachary Kinler, Tia Brown, Sharon K. Hamilton
Delta State University, Cleveland, MS, USA

Electrospinning natural polymers is a developing interest in the field of biomaterials. Electrospun nanofibers have been shown to facilitate tissue regeneration and emulate body tissue, making it ideal for modern wound healing dressings. Several water soluble natural polymers, including alginate and chitosan, show promise as drug delivery vehicles. However, these biopolymers are inherently charged, making the formation of nanofibers via electrospinning difficult. To facilitate electrospinning of natural polymers, co-polymers such as poly(vinyl alcohol) and agarose, were spun with alginate and chitosan to overcome the innate charges. A small drug molecule was then incorporated into previously established alginate- and chitosan-based nanofibers. In this project, release study data of the drug-loaded alginate nanofibers has been investigated. The release rate data of these and other drug-loaded fibers will be

consolidated to create a catalog of small molecule release profiles. The catalogued profiles can be applied in the further development of biomaterials used in drug delivery and modern wound healing dressings.

O3.19

1:15 DISCOVERY OF A PENTACYCLIC TRITERPENOID FROM *TABERNAEMONTANA LONGIPES* AS AN ANTITRYPANOSOMAL AGENT

Ifedayo Victor Ogungbe, Simira Carothers, Huaisheng Zhang, Jasmine Collins
Jackson State University, Jackson, MS, USA

Neglected tropical diseases caused by protozoans remain significant burden to public health systems in many developing countries. One of such diseases is human African trypanosomiasis (HAT). It is endemic to sub-Saharan Africa. In recent years, most clinical cases were reported in central Africa, especially in DR Congo. African trypanosomiasis is caused by *Trypanosoma brucei*. Current treatment options are ineffective, and they cause adverse health effects. Safer medications are needed. In this work, the Latin American plant *Tabernaemontana longipes* was studied as a potential source of antitrypanosomal agents. The pentacyclic triterpenoid bauerenol acetate was isolated, characterized, and identified as the antitrypanosomal agent in *T. longipes*. Using metabolic prolifing, the triterpenoid was found to impact the levels of cholesterol in *T. brucei*. Future studies will focus on synthesis of structural analogues that have better physicochemical properties and druglikeness.

O3.20

1:30 ASYMMETRIC SYNTHESIS OF NITROGEN HETEROCYCLES VIA IMINIUM ION TRIGGERED INTRAMOLECULAR CYCLIZATIONS

Matthew G. Donahue
University of Southern Mississippi, Hattiesburg, MS, USA

Nitrogen heterocycles are prevalent scaffolds in alkaloid natural products, pharmaceutical active ingredients, agrochemicals and fine chemicals. Specifically, piperidine is the most common nitrogen ring system found in FDA approved prescription drugs. This talk will focus on a strategy to synthesize multisubstituted piperidines from enantiopure homoallylic amines via intramolecular iminium ion induced cyclizations. Chiral, non-racemic homoallylic amines are readily prepared via the metal mediated allylation of enantiopure *N*-sulfinyl imines derived from stoichiometric chiral ammonia reagents. In particular, finely powdered indium metal has been shown to allylate such imines with allyl bromide in THF or DMF. The technical ease of operation is dutifully noted in that air and moisture sensitive reagents are avoided. The role of solvent choice will be discussed in relation to the diastereoselectivity of addition and the ease of work-up. The talk will explore the conditions necessary to form iminium ions that are primed to undergo intramolecular cyclization to construct six-membered nitrogen heterocycles. The role of Lewis and Brønsted acids utilized to induce iminium ion formation and the ensuing plausible transition states will be analyzed to predict final substituent stereochemistry about the ring. The final aspect of the talk will examine the application of the strategy toward the synthesis of biologically active complex molecules.

O3.21

1:45 HALO-PEROXIDATION MEDIATED THREE STEP SYNTHESES OF NOVEL SPIRO-PEROXO-ISOXAZOLINES: POTENTIAL ANTI-CANCER AND ANTI-MALARIAL AGENTS

Prasanta Das, Ashton T. Hamme II
Jackson State University, Jackson, MS, USA

The O-O bond, known as peroxide, the simplest unit of hydrogen peroxide, is mostly used as an oxidizer, bleaching agent, and disinfectant. However, the natural occurrences of peroxide within organic frameworks and their synthetic analogues have been of great interest for their widespread biological properties; particularly, antimalarial activity of peroxides is well understood and richly documented. The most complex artemisinin and its related peroxide analogues earned much compliment for their synthetic challenge and biological activities, which has also been the spontaneous source of inspiration for mounting new synthetic methodologies to develop organic peroxides as novel leads for potential anti-malarial and anti-cancer agents. This context of interest and our success in the field of spiro-isoxazoline containing natural and unnatural analogues prompted us to develop a unified strategy to synthesize a library of spiro-peroxo-isoxazolines for investigating their biological properties. In this report, the spiro-peroxides are furnished in three steps involving 1,3-dipolar cycloaddition, hydro-peroxidation, and halo-peroxidation. The efficacy of our strategy is also examined by incorporating various substitutions (alkyl, aromatic, and ester) on isoxazole ring. The transformation of ester functionality to its corresponding amide is also highlighted to diversify this strategy. Our strategy could be a potential lead to generate a library of compounds efficiently for biological investigation. The project described was supported by NIH/NIGMS (Award Number: 2SC3GM094081-05) and the Analytical and NMR CORE facilities were supported by NIH/NCRR (Award Number: G12RR013459) and NIH/NIMHD (Award Number: G12MD007581).

Thursday, February 22, 2018

AFTERNOON

Room TC218B

Oral Session 6: The Environment and Remediation, Moderator: Zikri Arslan

O3.22

1:00 CHARACTERIZATION OF MERCURY-CONTAMINATED SOILS FROM OAK RIDGE TN FOR METHYLMERCURY BY COLD VAPOR GENERATION ICP-MS

Zikri Arslan[1], Iris Denmark[1], Ermira Begu[1], Fengxiang Han[1], Jennifer Seiter-Moser[2]
[1]Jackson State University, Jackson, MS, USA, [2]U.S. Army Engineer Research and Development Center, ERDC, Vicksburg, MS, USA

Determination of trace amounts of methylmercury in mercury-contaminated soil and sediments requires removal of Hg(II) matrix prior to measurement. In this study, an analytical approach was developed for selective determination of CH_3Hg from contaminated soils and sediments with elevated levels of Hg(II). Methylmercury was extracted in diluted nitric acid. Agitation via ultrasounds provided rapid extraction of CH_3Hg in minutes from soils as opposed to prolonged mechanical shaking. Of the total Hg(II), only about 5% was extracted from soil matrix with 5% nitric acid under

same conditions. Coprecipitation was performed to eliminate the residual Hg(II) from soil extracts via hydroxide and sulfide precipitation. Among various coprecipitation schemes, ammonium sulfide was most conducive to precipitate Hg(II) effectively without impacting CH_3Hg levels. Measurements were made with cold vapor generation (CVG) inductively coupled plasma mass spectrometry (ICP-MS). Potential interferences were studied from ammonium sulfide on CVG of CH_3Hg in 5% HNO_3. Calibration curves were established with aqueous CH_3Hg standards matched with ammonium sulfide. Linearity was achieved between 0 to 25 µg/L CH_3Hg levels. The procedure was validated by analyses of a methylmercury sediment reference material (SQC1238) and an estuarine sediment (ERM – CC580) that contained trace levels of CH_3Hg in Hg(II) matrix.

O3.23

1:15 PHOTOELECTROCHEMICAL STUDIES ON ELECTRODEPOSITED Fe_2O_3/FeSe PHOTOANODES FOR SOLAR WATER OXIDATION

Arun Siddarth Sridhar, Wujian Miao
University of Southern Mississippi, Hattiesburg, MS, USA

The present contribution reports results from photoelectrochemical studies on Fe_2O_3 photoanodes for solar water oxidation in the presence of iron selenide thin films as co-catalysts. Robust Fe_2O_3/FeSe thin films were prepared in-situ on fluorine-doped tin oxide glass (F:SnO_2 or FTO) by potentiostatic electrodeposition and thermal annealing. The as-prepared films were characterized by scanning electron microscopy, energy dispersive X-ray analysis, and UV-vis spectroscopy. Under simulated solar irradiation, a maximum photocurrent of -0.28 mA/cm^2 was obtained from Fe_2O_3/FeSe photoanodes in 0.050 M pH 9 borate buffer electrolyte at 0.70 V vs Ag/AgCl (3.0 M KCl), which was a 2.8 times increase in photocurrent as compared to that from the electrode without using the FeSe. The use of the catalyst also significantly shifted the onset potential of water oxidation to a much negative potential value. As verified by electrochemical impedance spectroscopy, the above increase in photocurrent and shift in onset potential could be attributed to electrocatalytic activity and the effect of catalyst on decreasing electron-hole recombination and facilitating the hole utilization rate on the semiconductor Fe_2O_3-electrolyte interface upon light illumination. Transition metal chalcogenides have been one of the key areas of research in the field of water oxidation and reduction catalysis and electrocatalysis, but reports on their application as co-catalysts for solar water splitting have been relatively limited. This is the first report on the use of FeSe as the oxidation co-catalyst for photoelectrochemical water oxidation with Fe_2O_3 thin film photoanodes.

O3.24

1:30 ELECTROCHEMICAL PERFORMANCE OF ANAMMOX BIOELECTROCHEMICAL SYSTEMS

Umesh Ghimire, Veera Gnaneswar Gude
Mississippi State University, Mississippi State, MS, USA

This paper will describe the use of an autotrophic microorganism, Anammox bacteria, as a sustainable biocatalyst/biocathode in Microbial desalination cells (MDCs) to provide for an advanced, energy-positive wastewater treatment. Our preliminary research has shown that using an autotrophic microbial culture containing anammox bacteria as the biocathode or biocatalyst for simultaneous energy generation and wastewater treatment is a feasible option. Batch experiments improved the coulombic efficiency of the system as well as the nitrite and ammonium removal of the wastewater. A maximum power of 0.114 W/m3 with more than 90% removal of ammonium was achieved in this system. We will present the microbial population dynamics, wastewater treatment performance trends and energy and resource recovery capacities of anammox bioelectrochemical systems from a long term operation and process control point of view. A detailed account of electrochemical performance of both anode and cathode, process benefits through mass (carbon, nitrogen and salt) and energy balances will be presented. Future directions for developing sustainable water and resource recovery systems based on anammox bioelectrochemical platform will be discussed.

O3.25

1:45 BIOGEOCHEMISTRY OF DEPLETED URANIUM AND ITS REMEDIATION

Fengxiang Han[1], Georgio Proctor[1], Steven Larson[2], John Ballard[2], Fande Meng[1], Decheng Jin[1], Jiangxia Li[1], Zikri Arslan[1], Charles Waggoner[3]
[1]Jackson State University, Jackson, MS, USA, [2]U.S. Army Engineer Research and Development Center, Vicksburg, MS, USA, [3]Mississippi State University, Mississippi State, MS, USA

Anthropogenic activities, such as ore mining and processing, nuclear power industry and weapon testing have generated depleted U (DU) contamination to soils and waters. The mobility and bioavailability of DU and redistribution were influenced by U sources, U speciation and plants species. Phytoremediation has been emerged as an environmentally friendly cost-effective green technology to remediate heavy metal polluted soils. The objectives of this study were to examine biogeochemistry of DU in soil and water and to explore the feasibility of phytoremediation in cleaning up DU polluted soils with various U sources. UO_2, UO_3 and $UO_2(NO_3)_2$ were used as U sources. Interaction of DU with soil humic and soil minerals will be investigated under various biogeochemical conditions. We found that DU was accumulated in roots and less transported into shoots. U uptake in both plants were significantly higher from the UO_3 and uranyl polluted soils than from UO_2 polluted soils since the UO_3 and $UO_2(NO_3)_2$ polluted soils had higher exchangeable, weak acid extractable and liable U than the UO_2 polluted soils. After a growing season, the exchangeable U, weak-acid soluble U and liable U in soils decreased and the redistribution of U fractions was affected by U sources/speciation. Overall U removal efficiency after one growing season reached 3.5% in the UO_3 polluted soil with Indian mustard, followed by uranyl (1.6% with both Indian Mustard and Sunflowers) and lest efficiency from the UO_2 polluted soils. The present study suggests Indian mustard/Sunflower may be potential candidate for phytoremediation of DU polluted soils.

Thursday, February 22, 2018
AFTERNOON
Room TC 218A

Moderator: Victor Ogungbe
2:05-3:05 Chemistry Entrepreneurs
(see highlights in Divisional Symposia and Workshops Section of the Journal)

AVOIDING THE *VALLEY OF DEATH* FOR EMERGING MATERIALS SCIENCE-BASED COMPANIES

Samuel H. Lahasky, PhD, R&D Specialist at Oxiteno USA

Dr. Samuel Lahasky will discuss the challenges and obstacles that await the entrepreneurial scientist as he/she ventures into the sector of research-based, start-up companies. This presentation will encompass the hurdles associated with small and large businesses, focusing on the issues that pertain to both.

SCIENTIFIC COLLABORATION FOR THERAPEUTIC DISCOVERY, DEVELOPMENT, AND DELIVERY: OPEN SCIENCE HAS NO BORDERS

Jerome Hamilton, CEO Open Therapeutics

Jerome Hamilton will discuss the launch of Therapoid™ a new crowdsourcing collaboration platform created by a group of entrepreneurs. Therapoid's mission is to foster scientific collaboration which is paramount to promoting diversity in research and reducing the cost of healthcare.

YOU, ENTREPRENEURIALISM, AND SCIENCE = YES

Monica Tisack, Ph.D., Director of The Mississippi Polymer Institute (MPI)

Dr. Monica Tisack will discuss local capabilities available to scientists and entrepreneurs and other items of consideration for budding entrepreneurs and science-based start-ups: Agenda items include the current state of MS start-ups, common terminology, funding sources, business resources, common pitfalls, and tips on getting started.

Thursday, February 22, 2018
EVENING
Ballroom
3:30 Dodgen Lecture and Awards Ceromony
General Poster Session
Immediately Following Dodgen Lecture

P3.01

ACCESSING CRYPTIC SPACE IN MYXOBACTERIA

Barbara Adaikpoh, Cole Stevens
University of Mississippi, Oxford, MS, USA

Myxobacteria serve as a rich source of underexploited chemical diversity but difficulty in culturing this δ-proteobacteria in axenic conditions results in a cryptic space. Current research shows that bacterial communication through quorum sensing molecules (QSMs) can be intercepted by myxobacteria during predation. Growth pattern changes in response to QSMs observed in the lab could be evident of significant reforms on a molecular level. Myxobacterial predation differs between aqueous and solid-surface conditions with the former reportedly dependent on point-of-contact delivery of unique antimicrobials mediated by the exopolysaccharide (EPS). The aim is to access this cryptic space through comparative analysis of axenic myxobacterial secondary metabolome (1) in the presence and absence of QSMs and (2) in aqueous conditions, either co-cultured with a prey or supplemented with isolated EPS. *Archangium sp*. Strain Cb G35 and *Archangium violaceum* cultures were exposed to acyl homoserine lactones (AHLs) produced by both Gram negative and positive bacteria. For the EPS-mediated assay, relative absorbance plotted against time for the prey (negative control) and Myxobacteria (positive control) were compared with the co-cultured predator-prey mixtures. The Global Natural Products Social Molecular Networking (GNPS) was utilized to create molecular networks with MS/MS datasets of all the ethyl acetate extracts obtained. Of the total molecular networks identified, 377 (of 788) and 643 (of 1140) chemical scaffolds were absent in the wild types of *A. sp* CbG35 and *A. violaceum* consecutively. Production of tubulysin A, known to be cryptic was also detected in the induced culture extracts.

P3.02

PREDATION BASED ACTIVATION OF CRYPTIC BIOSYNTHETIC PATHWAYS IN *Cystobacter ferrugineus* Cbfe23

Shukria Akbar, David Cole Stevens
University of Mississippi, Oxford, MS, USA

Natural products are the richest source of novel chemical scaffolds that are inimitable by any synthetic library. To discover new chemical scaffolds from natural resources, it requires the investigation of underexplored resources of natural products. Myxobacteria are underexposed soil predatory bacteria that have a high potential to produce natural products with great chemical diversity. Genome sequencing of a myxobacterium, *Cystobacter ferrugineus* Cbfe23 has predicted 38 hidden chemical scaffolds including Cystobactamid, a recently discovered antibiotic, in biosynthetic pathways (BSPs). However, most of these cryptic BSPs are inaccessible in normal laboratory conditions. Quorum sensing (QS) and contact based predation were used to access this dormant space in the genome of *C. ferrugineus*. QS is an intercellular signaling process in the bacterial communities by which bacteria modify their behavior to flourish in a definite environmental niche. QS is mediated by low molecular weight chemical signals produced by Gram-positive, Gram-negative bacteria and fungi. Myxobacteria intelligently perceive the quorum sensing molecules (QSMs) produced by prey bacteria and increase their own predatory activity, this in turn results in the activation of cryptic BSPs. LC-MS/MS-based Global Natural Product Social Molecular Networking has confirmed the presence of different molecular networks upon exposure to different QSMs. Furthermore, N-butyryl-L-Homoserine lactone, a Gram-negative QSM, has induced Cystobactamid BSP in *C. ferrugineus*. Similarly, myxobacteria have demonstrated exopolysaccharide-mediated direct contact predation in the aqueous environment. Hence, the direct contact predation of prey bacteria and eavesdropping on quorum signals from community bacteria can potentially activate BSPs with diverse chemical scaffolds in myxobacteria.

P3.03

SPECTROSCOPIC AND MOLECULAR MODELING STUDIES ON A NOVEL FLUORESCENCE SENSOR

Ja'Nautica Bee[1], Chirantan Sen Mukherjee[1], Sandipan Chakrabarty[2],

Bidisha Sengupta[1]
[1]Tougaloo College, Tougaloo, MS, USA, [2]Indian Association for the Cultivation of Science, Jadavpur, Kolkata, India

Microwave irradiation has been used to synthesize an optically active alkylated aniline namely 2,6-dimethyl-4-(1-(p-tolyl)ethyl)aniline (abbreviated DMPA). Despite that aniline, heterocyclic aromatic amines, and aryl amines are known carcinogens, aniline mustard has come into prominence recently as novel anticancer agent. Consequently, we hypothesized that DMPA would be a potential candidate for therapeutic drugs. The presence of quartet and doublet peaks in NMR and a single chromatogram in the HPLC verified that the final product DMPA, had no major impurities. By using a Lux chiral column in HPLC, two peaks were detected in the chromatogram, which corresponded to two enantiomers of chiral aniline derivative. Fluorescence spectroscopic measurements on DMPA indicated dependence of its emission behavior on the polarity (in terms of empirical polarity parameter ET(30)) of homogeneous solvents used, a property important for an optical sensor. The nature of the emission profiles, along with relevant parameter namely wavelength at emission maximum is used to infer the distribution, binding and microenvironment of the DMPA molecules in human serum albumin protein (HSA). DMPA is weakly fluorescent in aqueous buffer medium, with a dramatic enhancement in fluorescence emission in the presence of HSA, with no structural alterations of protein. Molecular modeling studies have been carried out on the two enantiomers (R and S) of DMPA with HSA which showed selectivity of one enantiomer over the other toward binding with HSA. These results attribute to two aspects of DMPA: 1. Noninvasiveness and 2. Fluorescence sensing capabilities, which would open new avenues in medicinal chemistry research.

P3.04

MALEIMIDE-COUPLED DOXORUBICINE: CONJUGATION OF ELPs FOR IMPROVED DRUG DELIVERY

Deandrea Hawkins[1], Jacob Pruett[2], Valeria Zai-Rose[2], John Correia[2], Wolfgang Kramer[1]
[1]Millsaps College, Jackson, MS, USA, [2]University of Mississippi Medical Center, Jackson, MS, USA

Doxorubicin is a common cancer chemotherapy drug. It acts as a strong DNA intercalator and targets topoisomerase II. Doxorubicin is often administered intravenously, but serious side-effects can arise. To avoid these serious side effects a more targeted delivery method is desirable. ELPs (Elastin-like Polypeptides) are synthetic biopolymers that have unique properties. ELPs are thermos-responsive and can be equipped with cell-penetrating peptides. They can also be loaded with other molecules via cysteine-maleimide crosslinking. Consequently, compounds such as effective cancer drugs like doxorubicin, can be delivered with ELPs by hyperthermia to target cancer cells. Several functional groups in doxorubicin can be used for the attachment of the maleimide. Maleimide linkers can be attached to doxorubicin via the ketone and or the amine contained in the structure. Herein we present our efforts to optimize the coupling reaction and work-up, based on a literature known procedure. Separation by preparative HPLC is improving the purity of the coupling product. The optimization allows us to vary the size of the linker and possibly incorporate more or less flexible groups to optimize drug delivery. The attachment of doxorubicin to ELPs via an amide linker increased the stability and thus side effects by pre-released doxorubicin can be minimized. This work was supported by the Mississippi INBRE, funded by an Institutional Development Award (IDeA) from the National Institute of General Medical Sciences of the National Institutes of Health under grant number P20GM103476.

P3.05

PHOTOCHEMICAL SYNTHESIS OF SMALL RINGS VIA PHOTODECARBOXYLATIVE CYCLIZATION

Saihou Ceesay[1], Axel Griesbeck[2], Wolfgang Kramer[1]
[1]Millsaps College, Jackson, MS, USA, [2]University of Cologne, Koeln, Germany

The photodecarboxylative cyclization is a convenient method for the synthesis of small to medium rings. The method uses phthalimide as the chromophore and a carboxylic acid. The photoinduced decarbozylation creates a triplet biradical which combines after Intersystem Crossing. A surprising spirocyclopropane product was isolated for certain starting materials. This project aims to investigate the scope of this reaction and explore if synthetic applications can be identified. Acknowledgment: "This work was supported by the Mississippi INBRE, funded by an Institutional Development Award (IDeA) from the National Institute of General Medical Sciences of the National Institutes of Health under grant number P20GM103476."

P3.06

SYNTHETIC APPROACHES TO PHOTOACTIVATABLE AROMATIC HETEROCYCLES FOR PHOTOINDUCED CELL DEATH

Reagan Mcguffee, Taylor Sledge, Wolfgang Kramer
Millsaps College, Jackson, MS, USA

N-Methoxy substituted aromatic heterocycles are photoactivatable compounds that produce two transient reactive species upon excitation. The reactive species, a methoxy radical and a heteroaromatic radical cation, have been shown to cleave DNA, which makes them candidates for photoinduced cell death. Applications of photoinduced cell death are found in Photodynamic Cancer Therapy. The efficiency of DNA cleavage is limited by weak ground-state association for the quinoline and isoquinoline derivatives. To increase cleaving efficiency, a DNA-binder (1,8-naphthalimide) has been synthetically attached. To further improve binding and cleaving efficiency, attempts to synthesize novel amino-heterocycles are undertaken. The goal is to shift the absorption maximum and have a flexible linker connection between heterocycle and naphthalimide. Our approach is to functionalize alkylquinolines or related heterocycles by radical bromination and then modify the products by various Grignard reactions or direct substitution with potassium phthalimide. Additionally, the use of some classical syntheses of heteroaromatic compounds such as the Bischler-Napieralski and Döbner-Miller Synthesis are potentially yielding target molecules. One focus is to use environmentally conscious synthetic routes to minimize impact. This includes avoiding halogenated solvents for the radical bromination. Several bromination methods have been suggested in the literature, including a photochemical flow-reactor. DNA-binding is determined by spectroscopic titrations and DNA-cleaving is evaluated by gel electrophoresis. This work was supported by the Mississippi INBRE, funded by an Institutional Development Award (IDeA) from the National Institute of General Medical Sciences of the National Institutes of Health under grant number P20GM103476.

P3.07

AMINOALKYL ISOQUINOLINE SYNTHESIS FOR BIFUNCTIONAL 1,8-NAPHTHALIMIDES

Shizhe Zhang, Wolfgang Kramer
Millsaps College, Jackson, MS, USA

N-Methoxy substituted aromatic heterocycles are photoactivatable compounds that produce two transient reactive species upon excitation. The reactive species, a methoxy radical and a heteroaromatic radical cation, have been shown to cleave DNA, which makes them candidates for photoinduced cell death. The efficiency of DNA cleavage is limited by weak ground-state association for the quinoline and isoquinoline derivatives. To increase cleaving efficiency, a DNA-binder (1,8-naphthalimide) has been synthetically attached. To further improve binding and cleaving efficiency, attempts to synthesize novel amino-heterocycles are undertaken. The goal is to shift the absorption maximum and have a flexible linker connection between heterocycle and naphthalimide. In this project, classical isoquinoline syntheses are employed to yield starting materials for the synthesis of bifunctional DNA cleaving reagents. So far, methylisoquinolines are targeted because they can easily be functionalized by radical bromination. This work was supported by the Mississippi INBRE, funded by an Institutional Development Award (IDeA) from the National Institute of General Medical Sciences of the National Institutes of Health under grant number P20GM103476.

P3.08

QUINOLINE SYNTHESIS FOR BIFUNCTIONAL 1,8-NAPHTHALMIDES

Leon Karekezi, Reagan McGuffee, Taylor Sledge, Wolfgang Kramer
Millsaps College, Jackson, MS, USA

Functionalized quinolines serve as building blocks for the synthesis of bifunctional DNA claving reagents. Attached to 1,8-naphthalimide, the compounds are photoactivatable and create a radical cation and a radical upon irradiation. Both of those transient species are known DNA-cleavers and are created with a quantum yield of about 0.5. Increased efficiency can be achieved by extended conjugation. This project is generating various isomers of substituted quinolines for the synthesis of bifunctional DNA cleavers. Classic quinoline syntheses are employed, synthesis and purifications are discussed. This work was supported by the Mississippi INBRE, funded by an Institutional Development Award (IDeA) from the National Institute of General Medical Sciences of the National Institutes of Health under grant number P20GM103476.

P3.09

DESIGN AND SYNTHESIS OF MULTIFUNCTIONAL TUNGSTEN SULFIDE QUANTUM DOTS FOR CELLULAR IMAGING OF TARGETED TRIPLE NEGATIVE BREAST CANCER CELLS

Kaelin Gates, Avijit Pramanik, Paresh Chandra Ray
Jackson State University, Jackson, MS, USA

Triple negative breast cancer is a subtype of cancer in which the cells' growth is unreliant on the three receptors (estrogen, progesterone, and HER2). This means that the only available way to treat this cancer is chemotherapy. Cancer cells have different characteristics that separate them from normal cells. Cellular targeting techniques use these characteristics to clearly distinguish the cells. Imaging through fluorescent nanoparticles is one of the ways to target specific cells and mark them. We have designed multifunctional fluorescent tungsten sulfide quantum dots for this purpose. For this research, we will use ferritin to detect the triple negative breast cancer cells by conjugating the protein with the quantum dots. Ferritin is a storage protein for iron that can be used to detect cancer cells. The quantum dots have been synthesized using the hydrothermal method and have fluorescent properties. Spectroscopic data was collected for the quantum dots to support this scheme. Toxicity and cell viability experiments have been considered in preparation of quantum dots.

P3.10

FINITE ELEMENT ANALYSIS SIMULATIONS OF DIFFUSION AND STRESS IN POLYMER COATINGS

Joseph Tyson, James Rawlins, Gopinath Subramanian
University of Southern Mississippi, Hattiesburg, MS, USA

The diffusion of small molecules into a polymer coating can affect performance of the coating and corrosion rate. For example, internal stress from water uptake into polymer coatings can contribute to delamination from the substrate. Finite element models were created to simulate the mechanical effects that diffusion has on these polymer coating systems as well as concentrations of small molecules at the coating/substrate interface. In these models, strain was coupled to the diffusion of small molecules through the coating. Additionally, the strain was coupled to stress through a material model appropriate for the specific coating system. Homogeneous, heterogeneous, and anisotropic material properties were considered using position dependent and directional dependent material functions. The material properties, e.g. diffusivity and moduli, used in the models were obtained experimentally. Simulations of diffusion through a region of lower diffusivity and of beam bending were performed. Simulation results were compared to experimental data.

P3.11

DEVELOPMENT OF NOVEL SERS PROBE FOR SELECTIVE SCREENING OF HEALTHY PROSTATE FROM MALIGNANT PROSTATE CANCER CELLS USING Zn(II).

Avijit Pramanik, Suhash Reddy Chavva, Bhanu Priya Viraka Nellore, Kelli May, Tejus Mathew, Stacy Jones, Aruna Vangara, Paresh Chandra Ray
Jackson State University, Jackson, MS, USA

Prostate cancer still remains the second leading cause of cancer death for men. Based on the Zn (II) content healthy and malignant prostate cancer cells, we developed Raman spectroscopy SERS probe using p-(imidazole)azo) benzenethiol attached gold nanoparticle that has capability to be used as a biomarker for determining mobile Zn(II) concentrations in biological samples. The article discusses the synthesis, characterization and evaluation as Zn(II) sensing SERS probe. Using this probe allows to selectively detect Zn(II) at 100ppt concentration. Our data indicates that Raman reporter attached gold nanoparticle forms assembly structure by binding with Zn(II). Theoretical full-wave finite-difference time-domain (FDTD) simulation has been used to understand huge enhancement of SERS signal. The reported SERS probe is highly promising for in-vivo sensing of cancer. It can be used at near IR light to avoid tissue auto-fluorescence and to enhance tissue penetration depth. Reported data show that SERS probe can

distinguish metastatic cancer cells from normal prostate cells very easily with sensitivity as low as 5 cancer cells/mL.

P3.12

SYNTHESIS OF NOVEL BIORENEWABLE POLY(ETHER AMIDES)

Guery Saenz, Colleen Scott
Mississippi State University, Mississippi State, MS, USA

Petroleum-based products have dominated the commercial market for many decades. However, there has been a push to replace petroleum-based products due to the unsustainability of petroleum source with those from renewable sources such as lignin. Herein we report the synthesis and thermal characterization of two novel and sustainable poly(ether amide)s by melt polycondensation as alternative thermoplastics. The starting material used were methyl 4-hydroxy-3-methoxybenzoate and methyl 4-hydroxybenzoate, which are lignin-derived monoaromatic compounds. The thermal properties of the new poly(ether amide)s show that the glass transition temperature (Tg), melting temperature (Tm) and the temperature for 50% mass loss range from 50-100 ºC, 180-240 ºC, and 270-320 ºC, respectively. Their structure/property relationship with respect to hydrogen bonding and its effects on the thermal and physical properties show that hydrogen bond interactions appear to play an important role to define their properties. These new and promising poly(ether amide)s could be used as replacements for commodities plastics.

P3.13

DEVELOPMENT OF A SYNTHETIC STRATEGY FOR PARA-FUNCTIONALIZED AROMATIC SUBSTITUENTS ON A TRI-SUBSTITUTED QUINOLINE AS DRUG CANDIDATES FOR HIV-1 INTEGRASE INHIBITION

Jared Hume, Nicholas Jentsch, Alison Hart, Jian Sun, Jacques Kessl, Matthew Donahue
University of Southern Mississippi, Hattiesburg, MS, USA

HIV-1 integrase is essential for replication of the virus and would be an ideal target of inhibition of its replication pathway. Quinoline-based inhibitors have shown allosteric forms of inhibition of HIV-1 integrase and have proven to be an effective antiretroviral compound by inhibiting replication. These heterocyclic compounds are synthesized in an eight-step sequence from commercially available 4-hydroxy-2-methylquinoline. A palladium-catalyzed Suzuki coupling reaction is the key step, allowing us to introduce diversity using various para-substituted boronic acids. This poster will focus on the synthetic route used to make these compounds and the challenges that occurred during scale-up and during purification of the late stage intermediates. The efficacy of the substituted quinolines to inhibit HIV-1 integrase will also be discussed.

P3.14

SULFONAMIDE-BASED RECEPTORS FOR ANION BINDING

Amber Gardner, Bobby Portis, Syed Haque, Md. Alamgir Hossain
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The anion recognition is important in many chemical, biological, and environmental systems. A variety of noncovalent interactions such as hydrogen bonding, electrostatic, Lewis acid -base, and metal–ligand interactions are commonly employed for anion binding. In particular, neutral receptors with NH binding sites have recently received considerable attention in anion binding chemistry, since they interact certain anions strongly and selectively under natural conditions. During this study, sulfonamide-based receptors with dipodal and tripodal frameworks have been synthesized and studied for anions in solution. This presentation will describe the synthesis and binding studies of these compounds for halides and oxo-anions.

P3.15

HALIDE BINDING STUDIES WITH AN M-NITROPHENYL-FUNCTIIONALIZED HEXAUREA RECEPTOR

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Because of the key roles played by anions in the chemistry and biology, molecular recognition of anions with synthetic receptors is an active area of current research in supramolecular chemistry. In particular, urea functional groups in synthetic receptors are useful binding motifs for directional hydrogen-bonding interactions with anions under neutral conditions. During this study, anion binding properties of a tripodal-based hexaurea appended with meta-nitrophenyl groups has been synthesized and studied for halide binding by NMR and UV- Vis titration studies in DMSO. The results suggest that the receptor is capable of selective binding of fluoride forming a 1:2 complex. The receptor was further investigated for its biocompatibility on HeLa cells, showing an excellent cell viability.

P3.16

ANALYSIS AND COMPARISON OF TOBACCO ALKALOIDS IN CIGARETTES, E-LIQUIDS AND E-CIGARETTES USING GC/MS

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In the last few years, the consumption of e-cigarettes and e-liquid has increased dramatically among the younger generation. From 2011 to 2015, the usage of e-cigarettes among high school students have risen from 1.5% to 16%. However, the contents of e-cigarettes and e-liquid are not currently under any regulation by the FDA. In this study, we investigate alkaloid content by looking for the tobacco alkaloids, nornicotine, mysomine, anabasine, anatabine, isonicoteine, as well as caffeine that may present in the cigarettes, E-liquids, and E-cigarettes. The continued assessment of e-cigarette products is vital to informing considerations of potential health risks and future product development. Using gas chromatography-mass spectrometry, we developed a simple and reliable sample preparation and analytical method for the quantitative determination nicotine alkaloids and caffeine in commercial disposable e-cigarettes and e-liquids.

P3.17

ANALYSIS OF CAFFEINE, THEOBROMINE, AND THEOPHYLLINE USING LC/MS: APPLICATIONS IN ARCHAEOLOGY

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Guatemalans as well as Mezzo Americans valued cacao as a delight used specifically for special occasions and traditional receptions. Ceramic tea cups were found by archeologists in New Mexico and tested for cacao, a source of caffeine. If cacao were present in the

teacups, this would indicate there was a trade between North America and the Southern region. The presence of cacao also indicates wealth in society as well as rituals. The first and second layer of the ceramic vessels were dremmeled and extracted with methanol. The samples were then analyzed by liquid chromatography – mass spectrometry for theobromine, theophylline, and caffeine, known biomarkers for cacao. Methanol blanks were run in between each sample to confirm there was no carry-over or contamination between samples. Cacao is the only Mesoamerican plant that contains theobromine as the primary methyl xanthine and its presence and ratio compared to that of caffeine was used as biomarker for our analysis. Pottery samples analyzed contained varying amounts of theobromine to caffeine ratios.

P3.18

A SIMPLE DIPODAL SCHIFF'S BASE FOR COLORIMETRIC SENSING OF COBALT ION

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Colorimetric sensing of transition metal ions by synthetic receptors is of considerable interest because of the significant roles played by metal ions in biological system. In particular, cobalt is known as a rare heavy metal that plays an essential role in ruminant nutrition. This is also a key element in vitamin B12. In our work, we synthesized a simple dipodal Schiff's base that selectively binds cobalt ions, displaying a visible color change in water. Herein is presented the synthesis, characterization and solution binding studies of this compound for transition metal ions.

P3.19

A TRIPODAL THIOUREA RECEPTOR FOR NAKED-EYE DETECTION OF SULFATE VIA FLUORIDE DISPLACEMENT ASSAY

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A tripodal thiourea receptor has been synthesized and studied for inorganic anions by NMR and UV-Vis titrations in solution. Titration studies show that the receptor selectively binds sulfate anion over fluoride. A competitive colorimetric assay in the presence of fluoride suggests that the bound fluoride is displaced by the addition of sulfate, showing a visible color change. The receptor was further tested for its biocompatibility on primary human foreskin fibroblasts (HF) and HeLa cells, exhibiting an excellent cell viability up to 100 micromole concentration.

P3.20

INTERACTION OF MODIFIED AND UNMODIFIED BIODEGRADABLE NANOPARTICLES WITH BOVINE SERUM ALBUMIN (BSA).

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Poly (D, L-lactide-co-glycolide) (PLGA) is biodegradable polymeric nanoparticle approved by Food and Drug Administration for various applications. It has shown great potential to deliver therapeutic molecules such as vaccines, drugs and genes to target cells. Upon its entry into biological systems, it encounters with various proteins. The result of this encounter depends on several factors such as type of functional groups present on their surface, size, shape and etc. Therefore understanding the effect of surface modification of PLGA on its interaction with serum proteins is important. The purpose of this project was to investigate the effect of surface modification of PLGA on their interaction with serum proteins using bovine serum albumin (BSA) as a model protein. To investigate the change in binding profile, various concentrations of bovine serum albumin (BSA) were incubated with constant concentration of either unmodified PLGA (poly (D, L-lactide-co-glycolide) (PLGA-COOH) or modified PLGAS (PLGA-PEG-NH2 and PLGA-PEG-COOH) against BSA and the size of NPs were measured using Dynamic light scattering (DLS) method. Result indicated that negatively charged surface modified PLGA (PLGA-PEG-COOH) has shown a significant increase in size upon binding to the protein while the unmodified and positively charged modified NPS (PLGA-COOH, PLGA-PEG-NH_2) show slight or no increase in size upon binding to the protein. Study using micro plate reader and Uv-Visible spectroscopy shows biding of the three PLGAs to BSA.

P3.21

FORMULATION AND UTILITY OF ENZYMATIC "SELF-CLEANING" CAULK

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Maintenance of caulked areas in moist environments like restrooms and kitchens can be difficult given the texture and often light color of the sealant. This problem is compounded by the heavy metal elements in tap water, personal care products, and oils that often encounter caulked areas leading to staining and biofilm development. Integration of bio-based molecules, such as enzymes, into coatings and polymers to provided additional functionality has the ability to reduce the impact on the surrounding environment compared to more toxic additives. One such enzyme group are lipases, a subclass of esterases that catalyze the hydrolysis of triglycerides. This hydrolysis takes place and releases glycerol and free fatty acids. The presence of these fatty acids acts like a microscopic layer of soap that interacts with the water present in the surrounding environment. The hydrolyzing function of lipases can be measured using the small molecule substrate, 4-nitrophenyl acetate. When hydrolyzed, 4-nitrophenol is released, which can be quantified using a UV/Vis spectrophotometer (μM/min rate of conversion). In the present study, 4-nitrophenyl acetate was used to determine activity of various bulk supplier lipases incorporated into a commercial tub and tile caulk. Determining the most active and economical source is imperative to maximize efficiency of the material for commercialization. Lipase activity was maintained in sealant and differences were demonstrated in a concentration dependent manner between various commercial suppliers. This data can be used to balance the cost requirements of large scale manufacturing with the activity levels required for household uses.

P3.22

ADSORPTION OF BENTAZON ON THE SURFACE OF NANOPARTICLES OF METALLIC OXIDE AND CARBON

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Nanoparticle (NP) research is becoming popular due to the number of uses in various fields. The particles have a wide variety of potential applications in biomedical, agricultural, and environmental fields. Particles ranging in sizes between 1 and 100 nanometers are classified as NPS. They have better application than bulk particles because of its unique properties given by the large surface area to mass ratio. The goal of this research is to explore the adsorption of bentazon on the surface of NPS of metallic oxides and carbon. The effort will grant knowledge that allows identification of NPS that have potential applications to be used for water purification. Bentazon is a herbicide that is known to be one of the contaminant of water system around the world due to agricultural runoff. It is a post-emergence herbicide currently used for selective control of broadleaf weeds in beans, rice, corn etc. Bentazon has acute toxicity by ingestion and dermal absorption. Human ingestion of high doses of this herbicide has caused vomiting, diarrhea, trembling, weakness, and irregular or difficult breathing. Studies also show that exposure of rodents for extended period of time lead to anemia, rapid and severe weight loss, and blood coagulation. We studied the adsorption of Bentazon on the surface of NPS of iron oxide and iron oxide at pH6 and pH8 using UV-Visible spectroscopy. Our preliminary result indicates that all particles have shown considerable amount of Bentazon adsorption, however iron oxide shown to have highest adsorption of Bentazon at pH6.

P3.23

IN VITRO CELLULAR IMAGING OF BREAST CANCER CELLS BY USING VEGETABLE AND FRUITS CARBON DOTS

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Breast cancer is the most common cause of cancer death among women (522000 deaths in 2012), and the most frequently diagnosed cancer among women in 140 of 184 countries worldwide. One in four women with cancer has breast cancer. According to U. S. Breast Cancer Statistics, about 1 in 8 U.S. women (about 12%) will develop invasive breast cancer over the course of her lifetime. Thus, there is an urgent need to develop an easy, cost effective, suitable devices that can detect breast cancer cell at their early stage. Recently, carbon-based fluorescent nanomaterials, such as carbon dots (CDs), have attracted much attention because of their unique optical, low and nontoxic features. This new class of nanomaterials is considered to be a potential alternative to semiconductor Quantum Dots (QDs). The aim of this study was to investigate the early stage of breast cancer and image them with the vegetables and fruits carbon dots such as Garlic, Mango and Prune. In this experiment we have designed the multicolor CDs, having green, blue and white fluorescence. We used several spectroscopic and imaging techniques such as UV-vis, Fluorescence, IR, TEM, SEM and EDX for characterization and study the compositions of these compounds and used for cell imaging of Breast cancer cells.

P3.24

THE DIASTEREOSELECTIVE INVESTIGATION OF VARIOUS GRINGARD REAGENTS WHEN REACTED WITH THE SCHIFF BASE N-SALCYLIDENE-4-AMINO[2.2]PARACYLOPHANE

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The diastereoselectivity of various Grignard reagents was investigated using the Schiff base N-salicylidene-4-amino[2.2]paracyclophane. The Schiff base was reacted with various Grignard reagents to determine if bulkier Grignard reagents (R-group) improved diastereometric ratios in the product. The Schiff base was prepared by nitration of [2.2] paracyclophane, reduction of the nitrate with Tin (II) chloride, and addition of salicylaldehyde to form the Schiff base. The first Grignard reagent tested was methyl Grignard which gave a yield of 88.9% and a diastereometric ratio of 1:8 was observed in the product using NMR to compare the integrations of the separate diastereomers.

P3.25

ANALYSIS OF VARIOUS WINTERGREEN RUBBING ALCOHOLS USING ELSD AND HPLC

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In this project, the percentage of wintergreen oil (methyl salicylate) in commercial rubbing alcohol was investigated using an evaporative light scattering detector (ELSD) and high pressure liquid chromatography (HPLC). Methyl salicylate is an organic ester commonly used in antiseptics, including rubbing alcohol. A procedure was developed to measure the concentration of methyl salicylate which could be utilized in an undergraduate laboratory. Nitrogen flow rate, heating, and optical parameters will all be analyzed in the ELSD in addition to performance parameters such as linearity and detection limit in order to optimize instrument response. C18 reverse-phase analytical columns will be used for the HPLC portion of this procedure. The method developed provides a good lab experiment to introduce the concepts of isocratic HPLC and application of the standard addition quantitative method to undergraduates. Future work would include additions of a similar compound to methyl salicylate, such as ethyl salicylate, to optimize the chromatography and as an internal standard. Successfully developing an accurate procedure for performing this method utilizing ELSD and HPLC is the ultimate goal as local industry has expressed interest in liquid chromatography.

P3.26

GRAPHENE OXIDE AS A NOVEL CARRIER OF PLANT FLAVONOIDS

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Steady state fluorescence along with anisotropy and induced circular dichroism (ICD) spectroscopy provide useful tools to observe and understand the behavior of the therapeutically important plant flavonoids in graphene oxide (GO) nanocavity. GO has been found to be an excellent vehicle to deliver water immiscible therapeutics. Molecular modeling studies have been carried out on a naturally occurring flavanone hesperitin, which is common in lemons and sweet oranges in GO matrix. Furthermore, this study is extended to two flavone prototypes namely 3-hydroxyflavone (3HF) and 7-Hydroxyflavone (7HF). The mode of the binding of the flavonoids with GO significantly differs from each other as is observed from docking studies. Experimental results confirm with the findings from computational studies. The interaction with GO and hesperitin proceeds mainly by H-bond between the -OH of B ring of hesperitin and the ‘O' of the cyclic ether of GO. For 7HF, the H-bond is between -OH of the carboxylic acid of GO and -OH of 7HF. We did not find any hydrogen bond interaction between GO and 3HF. This preliminary study shows that structure plays an important role in

depicting solubility of plant flavones. Further studies are underway which will corroborate with the computational studies.

P3.27

PREPARATION AND CHARACTERIZATION OF NATURAL POLYMER-ANTIBIOTIC BIOCONJUGATES: TOWARDS ANTIBACTERIAL ELECTROSPSUN FIBERS

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The field of biomaterials is currently focused on developing materials that can facilely interface with biological systems to treat or replace tissues or functions of the body. Natural polymers, like alginate and chitosan, have been investigated as suitable biomimetic materials to facilitate tissue regeneration. Electrospinning natural polymers yields nanofibers that have shown promise in several biomedical applications. Little research has been published on the controlled delivery of drugs from alginate nanofiber dressings which is due, in part, to the difficulty of electrospinning alginate and the slow degradation of alginate under physiological conditions. In this project, natural polymer-antibiotic conjugates have been developed that are hydrolytically cleavable to promote drug release from electrospun polymer scaffolds. Specifically, ciprofloxacin-modified alginate and chitosan polymers have been synthesized and characterized. The electrospinnability of these polymers and the hydrolytic release profiles of the drug-conjugated fibers are also under investigation. These products will lead to improved understanding of alginate- and chitosan-based wound healing materials, especially in the field of modern drug-laden, wound dressings, or in other applications where controlled release of small molecules is desirable.

P3.28

DISCOVERY AND OPTIMIZATION OF NOVEL BENZIMIDAZOLE DERIVATIVES AS ANTITRYPANOSOMAL AGENTS.

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Neglected tropical diseases (NTDs) impact more than one billion people living in tropical and sub-tropical regions. NTDs are a diverse group of infectious diseases that are transmitted by insect vectors. The control and elimination of these diseases remain a challenge in many countries. The drugs available to treat the diseases are mostly ineffective. One of such diseases is the human African trypanosomiasis (HAT). HAT is endemic to sub-Saharan Africa. It is caused by the kinetoplastid protozoan *Trypanosoma brucei*. In this work, 400 diverse drug-like molecules were screened against the papain-like cysteine protease, rhodesain, a drug target in *T. brucei*. Two of the compounds (MMV7703 and MMV7696) showed promising inhibitory activity against rhodesain, and moderate growth-inhibitory activity against *T. brucei*, with over 10-fold selectivity over mammalian HepG2 cells. Analogues of the benzimidazole-based compound (MMV7703) were synthesized and some of the analogues displayed superior activity against *T. brucei* than MMV7703. The physicochemical properties of the analogues have been investigated using molecular modeling. The molecular descriptors that best correlates (correlation coefficient > 0 .75) with bioactivity are being used, in part, to determine how the active compounds can be optimized as new antitrypanosomal drug leads.

P3.29

ADAMANTANE: A SYMMETRY LESSON

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Adamantane, otherwise known as tricyclo[3.3.1.1]decane, is a colorless, crystalline compound with a camphor-like odor. With the formula $C_{10}H_{16}$, it is a cycloalkane and also the simplest diamondoid. It belongs to the symmetry point group (T_d). In this work, we use symmetry and group theory to identify the equivalent hydrogen atoms and the equivalent carbon atoms in Adamantane, and each of three of its derivatives. This allowed us to predict the number of peaks in the proton and Carbon-13 NMR spectra for each molecule. Our prediction agreed with the NMR spectra calculated using SPARTAN. This demonstrated that the method accurately determined the equivalent atoms in each molecule.

P3.30

MYOGLOBIN CATALYZES THE OXIDATION OF TRYPTOPHAN

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Tryptophan (Trp) is an essential amino acid that is used in protein synthesis. It contributes to the development and the functions of the human body. Tryptophan is found in many protein-based and dietary products such as chocolate, oats, yogurt, milk, fish, eggs, and peanuts. Tryptophan oxidation is linked to the degradation for many proteins. Other than the negative effects, tryptophan oxidation also serves as a pathway to synthesize important biology molecule. For instant, in human body, tryptophan is converted by Tryptophan hydroxylase to 5-hydroxy tryptophan which is in turn converted by DOPA decarboxylase to serotonin, a monoamine neurotransmitter. In this research, we have found that myoglobin, a common heme protein catalyzed the oxidation of free tryptophan by hydrogen peroxide. The kinetic of the reaction was studied using UV-Visible absorption spectroscopy. Analysis of the kinetic data indicates that it is a sequential multi-step reaction. The data is best fit with a three component model with a k_1 of $1.33\pm0.2 \times 10^{-2}$ and a k_2 of $1.9\pm1 \times 10^{-3}$. The LC-MS study of the reaction indicate that Tryptophan is first converted to a mono hydroxyl tryptophan (the fast step) which is then quickly converted to a di-hydroxy tryptophan (the slow step).Comparing the enzyme catalyzed reaction with the non-catalyzed oxidation reaction, it is found that the first step is rate limiting and is catalyzed by myoglobin. This study may reveal a possible new pathway of biosynthesis using tryptophan. This work is supported by NSF Research Initiation Award under HBCU-UP program (Award number: 1505446).

P3.31

IDENTIFICATION OF CHEMICAL ADDITIVES IN HERBAL INCENSE PRODUCTS USING GC-MASS SPECTROMETRY

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Herbal incense has become a potentially dangerous consumer product. Manufacturers of these products typically spray unregulated chemical additives onto dried herbs and market them as incense products. The objective of this research was to analyze select brands of herbal incense products and identify their chemical additives using Gas Chromatography - Mass Spectrometry. Products subjected to two methods of solvent

extraction were evaluated. The mass spectra of the extracts were compared with a library of known chemical additives used in the production of these types of products.

P3.32

DEVELOPMENT OF CARBON NANOTUBE-EMBEDDED ALGINATE- AND CHITOSAN-BASED FIBERS

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Recent evolutions in the field of biomaterials have focused on developing materials that can be utilized in biomedical applications. Natural polymers including polysaccharides have been investigated as suitable and renewable biomimetic materials that facilitate tissue regeneration. Many natural polymers have been successfully electrospun into nanofibers for bioapplicaitons; however, due to the properties and innate charges of alginate and chitosan, they must be electrospun with co-solvents or other polymers like poly (vinyl alcohol) (PVA) to increase their electrospinnability. This research represents specific contributions to the development of a drug release profile library which will catalog the release rates of a small molecule from negatively and positively charged natural polymer-based electrospun scaffolds. In this project, multi-walled carbon nanotubes have been spun with solutions of PVA and each natural polymer - alginate and chitosan. The electrospinning conditions for these carbon nanotube-embedded natural polymer fibers have been optimized and the parameters are being utilized to prepare drug-loaded carbon nanotube-embedded alginate- and chitosan-based fibers. The effect of the carbon nanotube additives in the alginate- and chitosan-based fibers on drug release capabilities in physiological conditions will be observed in drug-release studies. It is anticipated that this data will help develop a catalog of natural polymer-based nanofiber scaffolds and the small molecule release profiles that coincide with each scaffold. It is anticipated that these scaffolds could be utilized to engineer drug-releasing constructs for use in biomedical applications.

P3.33

INVESTIGATING OXIDIZED ALGINATE-BASED FIBERS FOR BIOMEDICAL APPLICATIONS

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Current developments in the field of biomaterial synthesis focus on the creation of biocompatible products capable of treating or replacing diseased body tissues to restore function. These products are often natural fibers, many of which are capable of mimicking body tissues as well as facilitating tissue regeneration. In this project, parameters were explored for the creation of both alginate and oxidized alginate fibers through electrospinning in the presence of co-solvents and co-polymers. Oxidized alginate was selected for this project based on the reported accelerated degradation of oxidized natural polymer materials. Purchased alginate and synthesized oxidized alginate were characterized and subsequently electrospun. Utilizing these established parameters, a small drug molecule has been incorporated into the electrospinning solutions to engineer drug-loaded fibers. Drug release profiles for both alginate- and oxidized alginate-based fibers will be compiled from release studies performed under physiological conditions. It is anticipated that natural polymer-based, electrospun fiber mats will be utilized in biomedical applications related to drug release, tissue scaffolding, and wound healing.

P3.34

INVESTIGATION OF THE EFFECTS OF HYDROGEN BONDING ON THE ENANTIOMERIC EXCESS OF PIG LIVER ESTERASE HYDROLYSIS PRODUCTS

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The Masterson Research Group is currently investigating the synthesis of the precursors to unnatural amino acids and how hydrogen bonding between the compound and one of its substrates affects the enantiomeric excess of a pig liver esterase (PLE) hydrolysis. The precursor to the unnatural amino acid, a malonic diester, has its α-hydrogen replaced with a methyl group for added stability. Dimethyl malonate and 2-thiophenylcarboxaldehyde were reacted to form a diester. Further work up including a reduction and methylation at the α-carbon produced a compound prepped to undergo a PLE hydrolysis. Both a racemic and regular hydrolysis reactions were performed, and very little optical rotation was observed for the PLE hydrolysis product. The next course of action is to base these results off a chymotrypsin hydrolysis, which is known to produce products with high optical purity. Further research into this topic will involve running a PLE hydrolysis like before but with 3-thiophenylcarboxaldehyde as one of the starting materials to analyze the enantiomeric excess of the hydrolysis reaction.

P3.35

INVESTIGATION OF HEAVY METAL CONCENTRATIONS IN MISSISSIPPI DELTA SOIL USING ICP-MS AND XRF METHODS

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Mississippi Delta soil is known to be some of the most fertile and naturally diverse soil in the world, because this mass of land is between the Mississippi river and Yazoo river. The purpose of this study is to investigate distribution of heavy metal concentrations in Mississippi Delta soil using methods of Inductively Coupled Plasma- Mass Spectrometry (ICP-MS) and X-ray Fluorescence Spectroscopy (XRF). Soil samples were taken from a depth of 0cm-10cm and 10cm-20cm from each area and allowed to air dry for months. A standard acid digestion method was used to prepare the soil samples for ICP-MS and a loose powder form of the soil samples in a cell were prepared for XRF analysis. Heavy metal concentrations of Cr, Ni, Cu, Zn, As, Se, Cd, Hg, Pb and U were determined in units of ppm. We expect comparable results between the two investigative methods and to find no toxic levels of these heavy metals in the topsoil.

P3.36

MATRIX REMOVAL FOR DETERMINATION OF HEAVY METAL AND RADIONUCLIDE IMPURITIES FROM MULTIVITAMIN TABLETS BY ICP-MS

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Multivitamin (MV) supplements are complex material that contain heavy metal and radionuclide impurities beside essential elements and various proteins. The concentrations of heavy metals, such as arsenic (As), cadmium (Cd), lead (Pb) and uranium (U) are usually in sub-µg/g. Accurate quality control under such levels at such levels is a challenging task due the complexity of MV supplements by ICP-MS. Certain elements added as nutrients induce spectral and chemical interferences. Removal of MV matrix components is

important to eliminate interfering components and alleviating the adverse effects of MV matrix on ICP-MS analysis. In this study, we developed a co-precipitation approach for selectively separating As, Cd, Pb and U from MV matrix. Sequential co-precipitations using trimethylamine (TEA) and hydrofluoric acid (HF) were performed. Proteinaceous and inorganic matrices (B, Ca, Mg, Cl, Fe, K and K) were successfully removed. Sn matrix eliminated to extent. Mo levels reduced from 400 ppm to 0.02 ppm in analysis solutions alleviating the spectral interference on Cd. The method was applied to the determination of As, Cd, Pb and U in multivitamin certified reference material (SRM 3280) then applied to the analysis of various commercially available MV tablets.

P3.37

DETERMINATION OF TOTAL MERCURY AND OTHER ELEMENTS IN SOIL SAMPLES FROM OAK RIDGE, TENNESSEE

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The Y-12 National Security Facility is located near the city of Oak Ridge, Tennessee, USA, where components for various nuclear weapons systems were built in early 1950s. During enrichment processes, mercury (Hg) was used as a key element to capture enriched lithium isotopes. After the accident of 1958, large amount of Hg was released to environment causing severe contamination of soil, sediment, surface water, groundwater. Most of the contamination around Y-12 is defined in the upper 10 feet of soils and fill. Mercury is a global pollutant with a great concern due to its toxicity to living organisms. The goal of this work was to determine total mercury along with other elements in the top and bottom soils from Oak Ridge, TN as the first step toward developing improved remediation approaches. Digestive extraction was utilized to separate Hg and other metals from the complex matrix of soils HNO_3 and HF at elevated temperatures (140 ˚C). Measurements were performed with ICP-MS. Hg levels was higher in the bottom of soils, with a concentration of about 0.225 mg/Kg when compared to the top layer soil (about 0.113 mg/Kg). Other elements present in soil at significant levels were Al (about 19 mg/Kg), Mn (1.20 mg/Kg), Fe (33 mg/Kg), Cu (0.17 mg/Kg), Zn (0.25 mg/Kg), Ba (0.50 mg/Kg) and Pb (0.15 mg/Kg). No significant differences were found in the concentrations of the trace metals between top and bottom soils. Levels of V, Cr, Co, Cd, Ni, As, Se, Ag, U were below 0.1 mg/Kg.

P3.38

METHOD OPTIMIZATION FOR EXTRACTION OF SILVER NANOPARTICLES FROM OILS USED IN COSMETICS

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Silver nanoparticles (AgNPs) possess antibacterial properties and thus are being used in numerous consumer and food products, particularly in cosmetic products. Ion release and other toxicological properties are affected by the size of the AgNPs and their solubility in different media. Understanding their solubility is important to accurately predict toxicological impact of the AgNPs on human health. Here, we investigated partitioning of AgNPs between and a PBS buffer (biological liquid). Uncoated, polyvinylpyrrolidone (PVP) and oleic acid (OLA) coated AgNPs within a size range of 20-30 nm were used. AgNPs were dispersed almond, olive, hazelnut and avocado oils. The phosphate buffer (pH=7.2) was chosen as more similar to biological liquids. Measurements of the concentrations of AgNPs in the oil and buffer phases were conducted after 0, 6, 12, 24 and 48h of shaking. Samples from oils and PBB phases were analyzed by ICP-MS. Most NPs were in oli phase but determination required digestion of the oils. Various digestion/extraction methods were examined utilizing acetone, methanol, nitric acid, oxy-chloride. Highest recoveries were obtained when the oil was treated with a mixture of concentrated nitric acid and hydrogen peroxide at 140 ˚C for 30 min. The recovery obtained ranged from 80 to 100 % when compared to other tested methods (20-70%).

O3.39

COMPARATIVE STUDY ON THE CYTOTOXICITY OF SILVER, COPPER, AND ZINC NANOPARTICLES ON PATHOGENIC AND NONPATHOGENIC E. COLI

Denise Yancey-Gray, Zikri Arslan
Jackson State University, Jackson, MS, USA

Within the last decade, bacteria resistance has become an increased issue worldwide. Therefore, there is a demand on developing effective tools to combat bacteria resistance. Nanoparticles have shown to be a potential tool for antibacterial activity. Previous studies have shown the synergistic effect between silver nanoparticles (AgNPs), copper nanoparticles (CuNPs), and zinc nanoparticles (ZnNPs) combined with antibiotics against bacterial species. However, the mechanism of the synergistic effect of this combination is not fully understood. Pathogenic (BAA 1161) and nonpathogenic *E.* coli (BAA 1431) were exposed to metallic nanopowders silver (AgNPs, copper (CuNPs) and zinc (ZnNPs) various antibiotics, including neomycin, enoxacin, tetracycline, and kanamycin. The objectives of this study are to investigate concentration dependent inhibition of neomycin, enoxacin, tetracycline, and kanamycin combined with the most effective lethal concentrations of AgNP, CuNPs, and ZnNPs. Freshly prepared nanopowders of uncoated AgNPs, CuNPs, and ZnNPs were suspended in DMSO and added to bacterial cultures that were incubated 24h. Growth inhibition was confirmed via the spread plate method. Exposed bacterial cultures were analyzed by ICP-MS to determine surface adsorption on and assimilation of NPs by bacteria. Free metal ion levels measured from exposure medium to elucidate the mechanism of action on the morphological changes to pathogenic (BAA 1161) and nonpathogenic *E.* coli (BAA 1431).

P3.40

ASSESSMENT OF CYTOTOXICITY OF POWDER AND AQUEOUS FORMS OF NANOSILVER ON A-431 CELLS

Shaloam Dasari and Zikri Arslan
Jackson State University, Jackson, MS, USA

Silver nanoparticles (AgNPs) are widely used in biomedicine and various consumer products due to known antibacterial properties. Toxic effects of AgNPs vary widely with physiochemical properties (size, shape, surface coatings) and chemical methods of synthesis. Most consumer products contain powder forms of AgNPs as additives. It is however not clearly understood how physical form (powder or water-soluble form) affect toxic properties of AgNPs. In this study, we investigated cytotoxic effects of uncoated powders and aqueous solutions of AgNPs on skin carcinoma cells (A-431) by MTT assay. Suspensions of Ag nanopowders were prepared by suspending appropriate amounts in DMSO. Aqueous forms were synthesized in water by citrate reduction method. Results indicated that suspensions of powdered AgNPs were more cytotoxic to A-431 cells than aqueous

forms. A dose-dependent response was observed. Number of live cells decreases significantly with increasing AgNP concentration. Dissolved Ag ion concentration was determined from exposed culture media to elucidate the mechanism of action. Exposed cells were examined under light microscope to determine morphological changes and interaction of AgNPs with cell surface.

Friday, February 23, 2018
MORNING
Room TC 218A

8:25 Welcome

8:30 -9:30 a.m. Oral Presentations

Oral Session 7: Analytical Techniques,

Moderator: Md. Alamgir Hossain

O3.26

8:30 INVESTIGATION OF BENZYL ISOTHIOCYANATES FOR USE AS CHIRAL DERIVATIZING AGENTS FOR NMR SPECTROSCOPY

Emily Crull, Matthew G. Donahue
University of Southern Mississippi, Hattiesburg, MS, USA

A chiral, non-racemic compound's absolute configuration directly influences its chemical, physical, biological, and pharmaceutical properties. The use of nuclear magnetic resonance spectroscopy in the determination of absolute configuration is an appealing prospect due to its wide spread availability and ease of use. One means of accomplishing this is through the use of chiral derivatizing agents (CDAs) that form a covalent bond with the chiral compound. This new chiral adduct causes a change in the electronic structure inducing ^{1}H, ^{13}C and ^{19}F NMR signals for the chiral compound to shift. The direction and magnitude of the chemical shift is directly related to the stereochemistry of the chiral compound. In this talk, isothiocyanate CDAs will be discussed that are specific for primary amines to form thioureas. An empirical method has been developed that will correlate experimentally observed ^{1}H, ^{13}C and ^{19}F NMR signals of these chiral thiourea adducts to computationally calculated values. The implications will be discussed in relation to a predictive model for the assignment of absolute configuration of primary amine stereochemistry.

O3.27

8:45 SELECTIVE SEPARATION AND ERADICATION OF DRUG-RESISTANT SUPERBUGS BY USING MULTIFUNCTIONAL FLUORESCENTMAGNETIC CARBON-DOTS

Avijit Pramanik, Stacy Jones, Paresh Chandra Ray
Jackson State University, Jackson, MS, USA

The emergence of drug-resistant superbugs remains a major burden to society. As the mortality rate caused by sepsis due to superbugs is more than 40%, accurate identification of blood infections during the early stage will have a huge significance in the clinical setting. Here, we report the synthesis of red/green/blue fluorescent carbon dot-attached (CDs) magnetic nanoparticle-based multicolor, multifunctional CDs-based nanosystems, which can be used for selective separation and identification of superbugs from infected blood samples. The reported data shows that multifunctional fluorescent CDs-based magnetic nanosystems are capable of isolating Methicillin-resistant Staphylococcus aureus (MRSA), Escherichia coli (E. coli) and Salmonella DT104 superbug from whole blood samples, followed by accurate identification via multicolor fluorescence imaging. As multidrug-resistant (MDR) superbugs are resistant to antibiotics available in the market, this article also reports the design of antimicrobial peptide-conjugated multicolor fluorescent CDs-based magnetic nanosystems for effective separation, accurate identification, and complete disinfection of MDR superbugs from infected blood. The reported data demonstrates that by combining pardaxin antimicrobial peptides, magnetic nanoparticles, and multicolor fluorescent CDs into a single system, multifunctional CDs represent a novel material for efficient separation, differentiation, and eradication of superbugs. This material shows great promise for use in clinical settings.

O3.28

9:00 SYNTHESIS OF NOVEL WATER SOLUBLE SEMICONDUCTING POLYRHODAMINE

Ranganath Wahalathantrige Don, Colleen Scott
Mississippi State University, Starkville, MS, USA

The development of organic semiconducting materials (OSC) has opened a new window in the electronic industry due to their superior properties. In general, these polymers have conjugated structures and have a better solubility, low-temperature processability, and mechanical properties when compared to conventional semiconductors. These characteristics are very important in applications such as display backpanels, sensors and active/passive matrix devices. Major drawbacks of the current materials in the field, such as polyaniline (PANi) and its derivatives, are poor solubility in polar solvents and low reversibility of the redox reaction. This work describes the synthesis, chemical stability, and sensory properties of a novel electrical semiconducting water soluble polymer. The polymer was synthesized by a Buchwald cross-coupling reaction between fluorescein ditriflate and p-phenylenediamine. According to the UV-visible spectroscopic studies, the material showed very good chemical stability towards extremely acidic and basic conditions, even after several cycles back and forth. Furthermore, under acidic conditions, the wavelength of maximum absorbance (λ_{max}) of the diluted polymer solution was blue shifted from 510 nm to 488 nm when it was exposed to hydrogen peroxide (H_2O_2). On the contrary, the basified polymer became colorless in the presence of H_2O_2. When doped with polyprotic acids such as polystyrene sulfonic acid, p-toluene sulfonic acid, and sulfuric acid, the material acted as an electrical semiconductor, and the cyclic voltammetry (CV) studies showed good redox stability with reversible redox potentials. The results obtained indicate that this polymer could be a building block for a sensory or energy storing material.

03.29

9:15 DESIGN AND SYNTHESIS OF METALLOCOMPLEXES FOR COLORIMETRIC SENSING OF ANIONS

Md. Alamgir Hossain[1], Md Mhahabubur Rhaman[1], Douglas R. Powell[2]
[1]Jackson State University, Jackson, MS, USA, [2]University of Oklahoma, Norman, OK, USA

Anion sensing is an important area in supramolecular chemistry due to their significant roles in chemical, biological, and environmental science applications. In particular, there is a growing interest in designing artificial receptors that can selectively recognize anions and act as sensors. A variety of host receptors containing functionalized binding sites have been known that can are capable of binding anions in solution and solid states, exhibiting selectivity

toward certain anions. Recently, dinuclear metal complexes were shown as excellent hosts that recognize certain anions through metal-ligand interactions. In our studies, we synthesized several metallocomplexes that were investigated for a variety of anions in solutions by UV-Vis and fluorescence titrations, and in solid states by X-ray diffraction analysis. The results showed that the receptors are capable of selective binding of anions, displaying spectroscopical and visual color change.

Friday, February 23, 2018
MORNING

9:30 – 10:30 a.m. High School Poster Presentations (Co-sponsor with Health Sciences)

P3.37

DEVELOPMENT OF SYNTHESIS STRATEGIES OF QUINOLINES FOR INHIBITION OF HIV-INTEGRASE

Amy Pham[1], Matthew Donahue[2], Jacques Kessl[2], Nicholas Jentsch[2]
[1]Oak Grove High School, Hattiesburg, MS, USA, [2]University of Southern Mississippi, Hattiesburg, MS, USA

According to the World Health Organization, approximately 40 million people worldwide are infected with HIV-1. While there is no cure for HIV-1, Highly Active Antiretroviral Therapy (HAART) is one method of treatment that manages the infection giving the patient an improved quality of life and a longer lifespan. As viral resistance increases existing medications lose efficacy, therefore, there is a continual need for the development of new prescription drugs. We are currently investigating chemical synthesis strategies of novel quinolines to be tested against the HIV-integrase enzyme. Starting from commercially available substituted anthranilic acids, we have prepared a series of multi-substituted quinolines over nine steps linear synthesis. These compounds have been assayed for inhibition against HIV integrase and multimerization in Professor Jacques Kessl's laboratory. In the latter part of this talk, the structure-activity relationship between aromatic ring substitution and inhibitory concentration will be discussed.

P3.38

HOMOALLYLIC AMINES AS PRECURSORS TO CHIRAL TRISUBSTITUTED PIPERIDINES

Tamica Davis[1], Hayley Allen[2], John Hood[2], Matthew Donahue[2], Julie Pigza[2]
[1]Purvis High School, Purvis, MS, USA, [2]University of Southern Mississippi, Hattiesburg, MS, USA

This abstract describes the ACS SEED-funded summer research project to synthesize chiral, trisubstituted piperidines. Piperidine is an important building block for organic synthesis as it is found in many alkaloid natural products that exhibit significant biological activities. The goal of this research project was to complete the first two steps of the six-step sequence, which will result in the formation of the chiral, homoallylic amines precursors. In the first step, commercially available aromatic benzaldehydes were condensed with (*R*)-*tert*-butanesulfinamide to produce chiral, non-racemic *N*-sulfinyl imines. The second step is the diastereoselective, indium-catalyzed allylation of the chiral *N*-sulfinyl imines using allyl bromide. The chirality of the sulfinyl group is used to direct the allylation and the products formed are chiral, homoallylic amines. To ensure completion of the proposed research during the eight-week summer program, the first two chemical steps involved were subject to the following constraints: (i) reactions must not require a special apparatus or elaborate setup; (ii) must not utilize toxic or air/moisture sensitive reagents; (iii) reactions must be high yielding and fully consume starting materials; and (iv) crude products must be relatively pure as to avoid chromatographic purification. The authors thank the ACS Project SEED for funding of the project.

P3.39

IMAGING AND TARGETED CAPTURING OF BREAST TUMOR HETEROGENEITY USING MULTICOLOR FLUORESCENSE OF FRUIT BASED CARBON QUANTUM DOT CONJUGATED MAGNETIC NANOMATERIALS

Rimika Banerjee[1], Avijit Pramanik[2], Salma Alamgir[2], Paresh Ray[2]
[1]Madison Central High School, Madison, MS, USA, [2]Jackson State University, Jackson, MS, USA

According to World Health Organization, every year, there are over 14 million new cancer cases and over 8.8 million cancer related deaths. Breast cancer is one of the leading cancers. Histology and modern genome sequencing has shown inter- and intra- breast tumor heterogeneity which frequently causes multi drug resistance and differential outcomes among clinical patients. This makes it essential to classify breast tumor heterogeneity by accurate and sensitive methods. To address this, we report the synthesis of a new class of fruit based multicolor highly fluorescent-magnetic nanoprobes for differential imaging and identification of differences within and between tumors. The bio-conjuaged multi-functional quantum dot nanomaterials fluorescing different colors are derived from garlic, mango, persimmon, and prune. The synthesized multimodal nanoprobes exhibit excellent magnetic properties and high intensity photostable multicolor fluorescence which can be used for luminescent mapping of heterogeneous PR(+), HER2(+), and triple negative breast cancer cells. Experiments show that these conjugated nanoprobes can differentiate between targeted and non-targeted heterogeneous breast tumor cells.

P3.40

[2.2]PARACYCLOPHANE AS A CHIRAL DIRECTOR

Rachelle Speights[1], Douglas Masterson[2]
[1] Oak Grove High School, Hattiesburg, MS, USA [2] University of Southern Mississippi, Hattiesburg, MS, USA

Monosubstituted [2.2]paracyclophane molecules are chiral and we wanted to explore if the [2.2]paracyclophane unit would function as a chiral director in the addition of Grignard reagents to imines. We converted [2.2]paracyclophane into a chiral Schiff base using relatively straightforward reactions. [2.2]Paracyclophane was first subjected to nitration by treatment with nitric acid at 0 °C to provide the 4-nitro[2.2]paracyclophane in acceptable yield. The resulting 4-nitro[2.2]paracyclophane was reduced with $SnCl_2$ in water to give 4-amino[2.2]paracyclophane in good yield. The 4-amino[2.2]paracyclophane was then reacted with salicylaldehyde to provide the needed Schiff base. The Schiff base was then reacted with a variety of Grignard reagents to generate a new C-C bond and a new chiral center. This presentation will present the results from the various Grignard reagents illustrating that the [2.2]paracyclophane unit can function as an efficient chiral director.

Friday, February 23, 2018
MORNING
Room TC 218A

10:30 – 11:30 a.m.

Oral Presentations: Theoretical Calculations and Modeling

Moderator: David Magers

O3.30.

10:30 COMPUTATIONAL MODELING OF NYLON 6 NANOCOMPOSITES

Michael Roth[1], Sanjiv Jha[1], Manoj Shukla[2], Gopinath Subramanian[1]
[1]University of Southern Mississippi, Hattiesburg, MS, USA, [2]US Army Engineer Research and Development Center, Vicksburg, MS, USA

The addition of carbon nanostructures such as nanotubes, graphene, and nanofibers are possible routes for improvement of the physical properties of polymers. This research seeks to understand the effects of the addition of carbon nanostructures into nylon 6. This is accomplished using the Class2 empirical force field in LAMMPS. This research will calculate the physical properties of nylon 6 nanocomposites containing incremental amounts of carbon nanostructures. The elastic properties of the nanocomposites will be evaluated. Initial calculations indicate that Young's modulus increases as the weight % of carbon nanostructures increase in the nanocomposite.

O3.31

10:45 SPECTROSCOPIC AND MODELLING STUDIES ON A NOVEL, SYNTHETIC ANILINE DERIVATIVE

Bidisha Sengupta[1], Chirantan Sen Mukherjee[2], George Armstrong[1], William Gladney[1], Maria Muhammad[2]
[1]Tougaloo College, Tougaloo, USA, [2]Mississippi State University, Starkville, USA

Optically active alkylated aniline namely 2,6-dimethyl-4-(1-(p-tolyl)ethyl)aniline (abbreviated DMPA) has been synthesized using household microwave irradiation. The presence of quartet and doublet peaks in NMR and a single chromatogram in HPLC verified that the final product DMPA, prepared from the synthesis reactions, which showed no major impurities. By using a Lux chiral column in HPLC, two peaks has been detected in the chromatogram, which correspond to two enantiomers of the chiral aniline derivative. Fluorescence spectroscopic measurements on DMPA indicated conspicuous dependence of its emission behavior on the polarity (in terms of the empirical polarity parameter ET(30)) of the homogeneous solvents used, a property important for an optical sensor. DMPA is weakly fluorescent in aqueous buffer medium, with a dramatic enhancement in the fluorescence emission in nonpolar and aprotic solvents. The nature of the emission profiles, along with the relevant parameter namely wavelength at emission maximum (λ_{em}) is used to infer the distribution, binding and microenvironment of the DMPA molecules in human serum albumin protein (HSA). Molecular modeling studies have been carried out on the two enantiomers (R and S) of DMPA with HSA. The implications of these findings are examined in relation to the potentialities of DMPA as a novel fluorescence sensor for biological systems.

O3.32.

ADSORPTION OF INSENSITIVE MUNITIONS COMPOUNDS ON SILICA SURFACES: AN AB-INITIO APPROACH

Rajiv K. Chouhan[1], Gopinath Subramanian[1], Manoj K. Shukla[2]
[1]School of Polymers and High-Performance Materials, University of Southern Mississippi, Hattiesburg, MS, USA, [2]Environmental Laboratory, Engineer Research and Development Center, Vicksburg, MS, USA

Commonly known munitions compounds (like TNT (2,4,6-trinitromethylbenzene) and RDX (1,3,5-hexahydro-1,3,5-trinitro-1,3,5-triazine)) are very sensitive to extreme conditionals such as high temperature and pressure. This results to high risk factor for accidental detonation causing unwanted damages. To reduce the risk of spontaneous explosion, scientists are working on new type of compounds known as insensitive munitions compounds such as NTO (3-nitro-1,2,4-triazol-5-one), NQ (nitroguanidine), and DNAN (2,4-dinitroanisole) are currently under various stages of development. In this study, we investigated the adsorption of these insensitive munitions over the Silica (SiO_2) surfaces. Silica is major component of earth's crust and found in form of quartz, or sand and major component of arid soils. To understand fate of munitions compounds in the arid environment we performed the adsorption using the first principle density functional approach.

O3.33

11:15 THE RING STRAIN OF CYCLOPROPANE REVISITED

David Magers
Mississippi College, Clinton, MS, USA

The strain energy in small cyclic compounds have interested chemists ever since Adolf von Baeyer studied the deviation of normal tetrahedral bond angles in cyclic alkanes in the 1880's. Most studies of ring strain have centered round the strain energy in cyclopropane and cyclobutane. Of course, these systems are the prototypical three- and four-membered rings, but they generate additional interest because of the remarkable similarity of their strain energies, which are almost always reported to lie between 1 and 2 kcal/mol of each other. This result is surprising because cyclopropane must have greater Baeyer or angle strain. The usual explanation is that cyclopropane is stabilized by sigma aromaticity. But cyclopropane is not the only three-membered ring with a relatively small strain energy. The strain of oxirane is quite similar to that of cyclopropane, while the strain of thiirane is much smaller. Yet, the strain energy of silirane is much larger. In the current study, the conventional strain energies of each of these systems is computed with the use of homodesmotic and hyperhomodesmotic model reactions and correlated with bond distances and bond angles. Furthermore, the electronic energies of these cyclic systems are broken down into the nuclear-electron attraction part and the two repulsive components, the nuclear-nuclear repulsion and the electron-electron repulsion, to examine their relative contributions. Finally, the reaction energies of the model reactions used to compute the conventional strain energies are calculated with each of these parts of the electronic energy to assess the contribution of each to the strain.

11:30 a.m. Divisional Business Meeting

11:35 a.m. Thank You to Our Sponsors and Student Awards Ceremony
Sponsors

- University of Southern Mississippi College of Science & Technology
- Jackson State University Department of Chemistry
- University of Southern Mississippi Department of

Chemistry and Biochemistry
- Chemglass Life Sciences
- Fisher Scientific
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Friday, February 23, 2018
AFTERNOON

12:00-1:00Plenary Speaker
1:00-3:00 Mississippi INBRE/ Millsaps HHMI Symposia

ECOLOGY AND EVOLUTIONARY BIOLOGY

Chair: AHM Ali Reza

Delta State University

Vice-Chair: Nina Baghai Riding

DeltaState University

Thursday, February 22, 2018
MORNING
Room TC 226
9:00-12:00

SYMPOSIA ON ECOLOGICAL DIVERSITY AND THE ENVIRONEMNT
***Organizers*: Dr. AHM Ali Reza and Dr. Nina Baghai-Riding**
Delta State University

Title: 'Project *Magnolia grandiFLORA*, Mississippi's Digital Herbarium and Plant Atlas'

Mac H. Alford, Ph.D., Professor

Department of Biological Sciences,
University of Southern Mississippi, Hattiesburg, MS 39406

Title: 'Pursuing a Dream - Protecting Mississippi's Natural Resources'

Dr. Cathy Shropshire and Libby Hartfield

Natural Science Museum

Title: 'Vectors from space. How nutrient stoichiometry can help us understand the ecology and evolution of mosquitoes'.

Donald A. Yee, Ph.D., Associate Professor

Department of Biological Sciences,
University of Southern Mississippi, Hattiesburg, MS 39406

Title: **'Evolution and Diversification of Malaria Parasites'**

Dr. Diana Outlaw, Associate Professor

Department of Biological Sciences,
Mississippi State University, Mississippi State, MS 39762

Thursday, February 22, 2018
AFTERNOON
Room TC 226

O4.01

1:00 USE OF A SCANNING ELECTRON MICROSCOPE IN WILDLIFE RESEARCH AND MANAGEMENT

Aaron Sassenrath-Cole, AHM Ali Reza

Delta State University, Cleveland, MS, USA

We used scanning electron microscope (SEM) images to identify food remains in coyote (*Canis latrans*) scats. Determining primary food items of coyote is of great interest to the researchers and wildlife managers. Concerned decisions can be made more accurately based on their known food habit which would help to set up better management plan for a carnivore species like coyote. Tracking food preferences of carnivorous animals is not simple as many of them are nocturnal, solitary and secretive. Carnivore scat analysis is a standard procedure for the researchers to know the food contents. Using SEM in food remains analysis is not very common. We dissected previously collected scat samples from Dahomey National Wildlife Refuge and the food contents were photographed using SEM. The common food remains are: plant matter, berries, seeds, bones, body remains, and a lot of hairs. Among all others, hairs were the most difficult food contents to identify in scats and we used SEM photos to differentiate and specifically identify which species are being eaten by coyotes of Dahomey. Our SEM photographs result showed that two prey animals are most common in coyote diet: Grey Squirrel (*Sciurus carolinensis*) and an unidentified mouse species (26.67% of scats contained them). The other food remains are: wild hog (*Sus scrofa*) - 20% scats, mink (*Mustela vison*) - 13.33% scats, and white-tailed deer (*Odocoileus virginianus*) - 13.33% scats.

O4.02

1:15 A PRELIMINARY EVALUATION OF USING TRAIL CAMERAS FOR SURVEYING MAMMAL SPECIES

Mitchell Coleman[1], Christian Frew[1], Peyton Hamblin[2], Joshua Glover[1], Matthew Gallowy[1], Eric Blackwell[1]

[1]Delta State University, Cleveland, MS, USA, [2]Mississippi Department of Environmental Quality, Oxford, MS, USA

Surveys are an important part of maintaining healthy and stable mammalian populations because they can provide relatively quick and inexpensive surveys and the efficiency of management practices. This project was conducted in order to evaluate the efficiency of trail camera photography for mammal surveys. The survey was conducted in the Loess Hills west of Holcomb, Mississippi. This area was chosen for the camera trap survey because it is located on the boundary zone between the Mississippi Delta and the "Hill" area of Mississippi. Cameras were deployed over a period of 76 days and checked approximately every 14 days. We utilized ten Bushnell Trail cameras set up in ten random locations. Each camera was set to capture three images upon the triggering of a motion sensor. During this survey, we captured 1,194 mammal images and recorded the presence of 12 different species. We determined that the most prevalent species photographed by the camera traps was *Procyon lotor*. The use of trail cameras for conducting mammal surveys may be useful for larger mammals but traditional trapping would be required for small mammals such as mice and shrews. Future surveys will use line transects with more cameras placed every 100m to standardize our procedure.

O4.03

1:30 POPULATION AND BEHAVIORAL STUDY OF FERAL CAT (*FELIS CATUS*) ON DELTA STATE UNIVERSITY CAMPUS, CLEVELAND, MS

Hope Edge, Bethany Walker, AHM Ali Reza

Delta State University, Cleveland, MS, USA

Feral cats (*Felis catus*) have become increasingly problematic on Delta State University (DSU) campus in the city of Cleveland, MS. There are signs proclaiming, 'do not feed the cats' as well as surveillance cameras in place to discourage students and faculty members from doing so. There have been no scientific studies in existence for DSU campus to determine the population status and other ecological aspects of these cats. Feral cats are a growing problem not only for DSU campus but all across the United States; only 2% of the 30-40 million cats have been spayed or neutered in the recent years. Under favorable conditions, this can lead to overpopulation considering females can begin getting pregnant at only 5 months of age. We initiated a study with a hypothesis that the feral cat population is increasing on DSU campus. In addition, we also studied several other ecological aspects of these cats as well as their impact on other native wildlife species. We used visual encounter survey (VES) technique to study the feral cats on campus. We also photographed the cats to individually identify them. Our initial results indicate that DSU campus has a healthy feral cat population and that they mostly live by eating food provided by humans or leftover food from dumpsters located around shops and the student cafeteria.

O4.04

1:45 PRELIMINARY ANALYSIS OF POPULATION DYNAMICS OF *AMPHIUMA TRIDACTYLUM* AND *SIREN INTERMEDIA* IN THE MISSISSIPPI DELTA

Karoline Lambert, Hannah Taylor, Sara Barrett, Shelby Babb, Eric Blackwell

Delta State University, Cleveland, MS, USA

A mark and recapture study was performed at Delta State University's Center for Science and Environmental Education. The target species were *Amphiuma triadactylum* and *Siren intermedia*. Modified minnow traps were baited at four of the five ponds on the property with either fish, chicken, or cured bacon during spring and fall of 2017 and spring of 2018. In order to document the species, Passive Integrated Transponder (PIT tags) were inserted between the muscular part of the tail and abdomen area before releasing the individuals back into the ponds. Length (cm) was also documented. This procedure is important in recognizing recapture periods of individuals previously tagged. Since little is known about the population dynamics of these salamander species this information is useful for wetland restoration and wildlife management in the Mississippi Delta. By performing mark and recapture studies, these animals can be used to study movement patterns, the structure and density of their populations, survival, and recruitment rates. Future studies are planned to also assess population growth rates as well as individuals.

O4.05

2:00 MORPHOLOGICAL, GENETIC, AND ENVIRONMENTAL CHARACTERIZATION OF AN UNUSUAL POPULATION OF ISOETES (ISOETACEAE, LYCOPODIOPHYTA)

Shannon Walker, Mac Alford

The University of Southern Mississippi, Hattiesburg, MS, USA

A large and unusual population of *Isoetes* (Isoetaceae, Lycopodiophyta) in the DeSoto National Forest, Wayne County, Mississippi, was studied to determine if the individuals there represent a new species or if they represent part of the variation of the one primary species of the longleaf pine belt of Mississippi, *Isoetes louisianensis*, which it most closely resembles. The unusual population and specimens of known *Isoetes louisianensis* were examined comparatively based on morphology, megaspore ornamentation, examination of habitat characteristics, and phylogenetic analysis of DNA sequence data from the nuclear internal transcribed spacer 1 and 2 (ITS) and the 5.8S ribosomal gene. No differences were discovered between the populations in DNA sequence data, small differences were discovered in megaspore ornamentation and habitat, and more significant differences were discovered in morphology, although all of the differences were based on small sample size. Thus, the results of this study are inconclusive as to the species status of the unusual *Isoetes* population. However, the detailed environmental data collected in the drainage do show that senescence (loss of leaves) closely follows water levels, not temperatures or seasons, as some have hypothesized. This study augments scientific understanding of *Isoetes louisianensis*, considering that much about this species is still unknown due to many new, recent discoveries of populations, similarities in appearance with other species of *Isoetes*, natural occurrences in *Isoetes* of cross-fertilization with the production of sterile hybrids, variations in ploidy level, and the need for scanning electron microscopy to carefully observe megaspore ornamentation.

O4.06

2:15 DIVERSITY OF THE MOSQUITO (DIPTERA: CULICIDAE) COMMUNITY ALONG AN ELEVATIONAL GRADIENT IN PUERTO RICO

Nicole Scavo, Joseph Nelsen, Donald Yee

University of Southern Mississippi, Hattiesburg, MS, USA

Elevational studies provide the opportunity to understand how communities change over temperature and climatic gradients. This understanding can be applied in the context of the changing climate to make predictions about future species distributions and community compositions. Such knowledge about mosquitoes is particularly important given their role as vectors of disease. We surveyed mosquitoes at five elevations (200, 400, 600, 800, 1000 m) in El Yunque National Forest in Puerto Rico. Six containers and six plastic cups lined with oviposition paper were set out at each elevation for two weeks, collected, and the eggs and larvae were reared to adults in a laboratory setting. Specimens will be identified to species level and analyzed for abundance and richness across elevations. Results will offer the first baseline set of data understanding the mosquito communities at different elevations in the Luquillo Experimental Forest. This information can be extended to make predictions about mosquito community composition in similar systems as the climate changes and can also serve as a comparison point for large disturbance events such as hurricanes.

2:30 Divisional Business Meeting

Thursday, February 22, 2018

EVENING

Ballroom

3:30 Dodgen Lecture and Awards Ceromony

General Poster Session

Immediately Following Dodgen Lecture

P4.01

UNCOVERING SELECTION IN HEMOGLOBIN DEGRADATION GENES OF HAEMOSPORIDIAN PARASITES

Haley Bodden[1], Diana Outlaw[1], Susan Perkins[2], Olof Hellgren[2], Staffan Bensch[2]

[1]Mississippi State University, Starkville, MS, USA, [2]Lund University, Lund, Scania, Sweden, [3]American Museum of Natural History, Manhattan, NY, USA

Haemosporidians are blood parasites that can infect many different hosts including amphibians, reptiles, birds, and mammals. There are many genera in the order Haemosporida, which transmit different malaria parasites to specific hosts. Hemoglobin degradation is an extremely important metabolic process that occurs in the acidic food vacuole of haemosporidian parasites. This process is responsible for the intraerthrocytic development that must occur during the haemosporidian lifecycle before the parasites mature and rupture from the red blood cells to continue the infection. The enzymes involved in this process degrade the hosts' amino acids so they can be used by the haemosporidian. The corresponding genes to the enzymes that are involved in hemoglobin degradation will be analyzed for patterns of selection. The genes from avian, mammalian, and reptilian transcriptomes will be aligned and patterns of selection will be evaluated using codon substitution models across gene alignments. We will use the program paml to determine the best estimate of selection within each tree (i.e., branch model), and determine, on each branch of tree, which amino acid residues are under selection (i.e., branch-site model). To our knowledge, this will be the first taxonomically broad study that will span across mammalian and non-mammalian host species, analyzing genes involved in the hemoglobin degradation metabolic pathway of malaria parasites. Analyzing malaria parasites will allow the community to be more informed about the scope of vertebrates affected and will help to develop techniques to better understand their evolution.

P4.02

VERNAL POOLS AT DAHOMEY NATIONAL WILDLIFE REFUGE IN MISSISSIPPI

Tyler Kitchings, Cade Francis, Maverick Harrison, Brady Chambley, Nina Baghai-Riding

Delta State University, Cleveland, MS, USA

Vernal pools exist at Dahomey National Wildlife Refuge (DNWR) during the late fall and winter months. These pools occur on the bottomland, hardwood forest floor and are the result of heavy winter rains. Most are less than an acre in size. Vernal pools are an important source of water for game species as well as a breeding habitat for aquatic macroinvertebrates, frogs, and salamanders. From 2006 - 2017, Dr. Baghai-Riding's Material and Methods in Environmental Science class has conducted water quality tests on vernal pools at DNWR. Passive leaf trap samplers are used to capture aquatic macroinvertebrates and are left in the deepest parts of the vernal pools for four weeks. Additionally, pH, soluble salts, turbidity, nitrates, phosphates, and water depth are measured during the placement and retrieval of the leaf traps. This past March, 83 specimens were collected from five leaf traps, representing 10 different species: sow bugs, snails, scuds, clams, crawfish, beetle larvae, catfish, and a skink. In comparison, the 2016 passive leaf trap data possessed 14 species and 156 specimens. Twenty-nine different taxa have been documented over the 12-year period, and the water quality has ranged from fair to good. Water quality assessment is determined by the presence of indicator macroinvertebrate species established by the Mississippi Department of Environmental Quality and Mississippi Wildlife Federation. The fair water quality assessments for 2017 may be from lower than average rainfall. Normal parameters, however, were reflected by other tests; pH values were 7.4 and soluble salts were 0.1 ppm.

P4.03

SUITABILITY OF TIME-LAPSE PHOTOGRAPHY TO QUANTIFY VERTEBRATE ACTIVITY PATTERNS

Kelsey E. Houghton, Hannah L. McGuire, D. Michael Reeves, Frank R. Hensley

Mississippi College, Clinton, MS, USA

Understanding patterns of animal activity, such as the range of ambient temperatures, time of day, and seasonality of habitat use is important for conservation practices such as estimating population size or managing habitat. Biologists use variety of methods and technologies to track animal activity, such as direct observation, mark-recapture, and radiotelemetry. The purpose of our study is to determine the practicality of time-lapse visual and infrared photography for measuring vertebrate activity patterns. We deployed five game cameras along a small woodland stream, programmed to take photographs every 30 or 60 seconds continuously for several days at a time, from November 2016 through December 2017. We reviewed more than 270,000 photographs, detecting vertebrate animals in approximately 0.5% of photographs examined. We found that the ranges of temperatures, times of day, and seasonal patterns were generally consistent with published values for both mammals and reptiles that we frequently observed. For uncommon species, however, even such a large number of photographs yielded too few observations to draw conclusions about activity patterns or make comparisons with published values. We conclude that time-lapse photography is inexpensive and yields large data sets, but processing large numbers of photographs is labor intensive and may not always be practical for assessing habitat use and activity patterns, particularly for uncommon species.

P4.04

ISOLATION AND IDENTIFICATION OF ANTIBIOTIC PRODUCING MICROBES FROM *MALLDON DASYSTOMOUS* (COLEOPTERA: CERAMBYCIDAE)

William Neal[1], Arnold Spiers[1], Tanya K. McKinney[1], Ellen S. Green[1], Nathan M. Schiff[2]

[1]Delta State University, Cleveland, MS, USA, [2]USDA Forest Service, Center for Bottomland Hardwoods Research, Stoneville, MS, USA

Insects comprise the most heterogeneous group of animals on Earth. Herbivorous species consume plant material covered with diverse microbial populations. Yet, many of these insects are resistant to most microbial infections. Recent studies indicate that

the gastrointestinal microflora of the insect may protect its host via the production of antimicrobial compounds. For example, microbes from the gastrointestinal tract of *Spodoptera littoralis*, the cotton leafworm, have been shown to produce compounds that inhibit or kill other bacterial species. The current study assesses the antibiotic producing capacity of the intestinal microflora of the hardwood boring beetle *Malladon dasystomous* (the hardwood stump borer). Larval digestive tracts were dissected into phosphate buffered saline, macerated, and serially diluted. Samples were plated on 1/10X tryptic soy agar. Antibiotic producers were identified using the "crowded plate" method. To date, 15 beetle larvae samples have been subjected to analysis.

P4.05

ANALYZING THE CHANGE IN MISSISSIPPI FOREST STRUCTURE – A CENTURY OF CHANGE IN THE RELATIVE ABUNDANCE OF TREE SPECIES

Donaven McLaurin, Mac Alford

The University of Southern Mississippi, Hattiesburg, MS, USA

Public Land Survey System (PLSS) records provide some of the earliest quantitative and qualitative data on the composition of pre-settlement forests. These records are used often to geo-spatially reconstruct forests and model past vegetation. PLSS records from the 1912 survey of Forrest County, MS, within one township (Township 1S, Range 13W), were transcribed for an analysis of relative dominance of species recorded by the surveyors. Additionally, records were obtained from the Mississippi Forest Inventory (MFI) as a proxy to assess the relative abundance of tree species in post-settlement forests. We hypothesized that the early landscape of Mississippi would be dominated by *Pinus palustris* and that the relative abundance of this species and others would differ in present forests. Within PLSS records, we found 10 species were recorded, and 96.1% of the species were recorded as *Pinus*; however, due to the use of common names rather than scientific names, there is no certainty that the pines recorded are *Pinus palustris*, partially supporting our hypothesis. When analyzing the MFI records, 58 different species were recorded from the 7,309 individuals that were sampled. From this analysis, *Pinus* comprised 49.4% of the species recorded, a 46.7% decrease relative to findings derived from PLSS records. Findings from these preliminary analyses reveal a change in the composition of the landscape of Mississippi over the last century. PLSS and MFI records both, however, pose limitations in this assessment but are the best tools in assessing this degree of vegetative change over such a broad spatial scale.

P4.06

CEREBELLAR MORPHOLOGY AND DISPLAY COMPLEXITY IN MANAKINS (PIPRIDAE)

Mary Harvey, Lainy Day

University of Mississippi, Oxford, Mississippi, USA

While much is known about the neural connections and pathways involved in vocal control for songbirds, very little is known about the neural pathways involved in complex motor movement of birds. Manakins are a suboscine passerine bird found in the American tropics. Their reproductive success is dependent on male performance and female processing of an intricate courtship display. Across manakin species, the complexity of the courtship display varies greatly. Some manakins only perform a limited amount of coordinated movement, while others have elaborate displays that consist of acrobatic movements and mechanical sound production. The complexity of these displays has been found to be positively related to the cerebellar size, due to the importance of cerebellar processing in coordinated movement. We found that the complexity of these displays is positively related to the cerebellar volume, presumably due to the importance of cerebellar processing in coordinated movement. My current research involves counting and measuring the size of Purkinje cells, and taking volume measurements of the Purkinje layer in the cerebellum. Preliminary data show a positive relationship between Purkinje cell number and both the display complexity and layer volume. The Purkinje cells provide the sole output pathway of the cerebellum, thus; relationships between the neuroanatomy of this layer and display complexity, strongly suggest correlated evolution of motoric demands for courtship displays and cerebellar control of movement.

P4.07

DOES HOW MUCH YOU WEIGH AFFECT YOUR DANCE MOVES?

Alicia Hobbs, Lainy Day

University of Mississippi, Oxford, MS, USA

Manakin males (Aves: Pipridae) perform physically elaborate courtship displays that vary in complexity across genera. Within genera, displays are thought to be highly similar. However, initial observations of high-speed video from two *Ceratopipra* species, suggested differences in bird posture and foot movements during the production of the "moon-walk". Additionally, we previously demonstrated that display complexity is related to brain size and body size across manakin species. However, *C. cornuta* falls above the mass X complexity regression line, weighing more than expected for his complexity level. We hypothesized that *Ceratopipra* kinematics differ because the heavier bird, displaying high in the canopy, "moonwalks" more slowly and on thinner branches than its lighter congener, *C. mentalis*. Such kinematics would reduce branch vibration for *C. cornuta*. We confirmed that *C. cornuta* (n=2, 60 displays) shuffles in a predominantly horizontal and upright posture while *C. mentalis* (n=2, 18 displays) hops in a predominantly crouched posture. We then measured branch diameter for each observation and obtained speed, velocity, and distance for several display elements using Phantom Camera Control Software, Wayne, New Jersey. *C. cornuta* displays on smaller branches than C. *mentalis*. *C. cornuta* performs moonwalks faster than C. *mentalis*, but this may be an artifact of measuring across moonwalks rather than measuring hops/shuffles within moonwalks. We are unaware of other studies showing that larger animals may have to alter display kinematics if the environmental substrate does not compensate for size differences.

P4.09

DISTRIBUTION OF AROMATASE IN THE BRAIN OF THE GOLDEN-COLLARED MANAKIN (MANACUS VITELLINUS)

Blake McClure, Kaitlyn Duda, Steven Wilkening, Patrick Ayers, Lainy Day

The University of Mississippi, Oxford, MS, USA

Estrogen receptors (ER), androgen receptors (AR), and estrogen synthase, aromatase (AROM), are known to modulate courtship song in oscine songbirds but there has been little telencephalic steroid control found in sub-oscines studied. However, the sub-oscine golden-collared manakin (GCM), which performs complex acrobatic courtship displays, appears to have greater steroid control of the telencephalon than the other sub-oscines and may also have

steroid control of motor regions specific to manakins. Thus, we wanted to perfect an antibody assay for the GCM, for which initial reports appeared, and then determine the relationship between AROM distribution and display complexity in manakins, which varies across species. We have been optimizing an antibody assay for AROM in GCM. Our work suggests common areas with a songbird that we have run parallel with our GCM assays. The cerebellum, hippocampus, hypothalamus, nidopallium, and the pre-optic area have been confirmed to have AROM distributions that correspond with zebra finch staining. We have observed odd staining within the Purkinje cell, molecular, and granular layers. We will use the optimized assay to determine if the distributions of AROM have evolved independently of the avian song circuit and determine if AROM has a unique relationship to courtship complexity in manakins.

P4.10

THE CONTROVERSIAL NATURE OF HYDRAULIC FRACTURING

[1]Chirantan Sen, [2]Bidisha Sengupta, [3]M. S. Zaman

[1]Department of Electrical Engineering, Bagley College of Engineering, Mississippi State University, Starkville, MS USA, [2]Department of Chemistry, Tougaloo College, Tougaloo, MS, USA, [3]Department of Biological Sciences, Alcorn State University, Lorman, MS,USA

Energy production has been a vital economy booster for the United States. Shale and natural gas production from hydraulic fracturing (HF) has created over 9.8 million jobs and led to the development of many large chemical companies and businesses. Despite the benefits of HF to the economic growth of the U.S., the negative consequences of HF to the environment and public health are tremendous. Studies indicate that a significant amount of chemicals used in fracking fluids are toxic to our ecosystems. There are many reports of drinking water resources being contaminated by the toxic chemicals from fracking fluids, which have negatively impacted human health. The disposal of fracking fluids on land and soil can also be detrimental to the environment. Polluted soil from fracking fluids can contain harmful chemicals such as radium, selenium, and lead which can endanger farming lands, livestock, poultry, and humans. Furthermore, methane emissions from HF can drastically increase the rate of global warming, resulting in major climate changes. However, new studies are being conducted to develop fracking fluids that are recyclable and friendly to our environment.

Friday, February 23, 2018
MORNING
Room Union C

9:00-11:00 WORKSHOPS

THE USE OF COTTON MUTANTS AND NEAR ISOGENIC LINES TO ENHANCE NUTRITION AND PRODUCTION OF COTTONSEED AND LINT

This workshop will be led by Dr. Rick Turley, USDA-ARS, Stoneville, MS

APPLICATION OF SENSORS IN IRRIGATION MANAGEMENT, WATER CONSERVATION, AND CROP PRODUCTION

This workshop will be led by Dr. Daniel (Ken) Fisher, USDA-ARS, Stoneville, MS

Friday, February 23, 2018
MORNING
OFFSITE

11:00-1:00 Field Trip

Field Trip to Lake Thoreau Environmental Center — The trip to Lake Thoreau Environmental Center will involve a walk through longleaf pine savannah, a mixed hardwood seepage area, and a small lake as well as a tour of the museum facility that houses the USM herbarium and the fish collection.

Friday, February 23, 2018
AFTERNOON

12:00-1:00 Plenary Speaker

1:00-3:00 Mississippi INBRE/ Millsaps HHMI Symposia

GEOLOGY AND GEOGRAPHY

Chair: R. Tyler Berry
Mississippi Department of Environmental Quality-Office of Geology
Vice-Chair: Andrew O'Reilly
University of Mississippi

Thursday, February 22, 2018

MORNING
Room Union H

8:15 WELCOME/INTRODUCTION

O5.01

8:30 ANALYSIS OF COTTON VALLEY PRODUCTION IN THE NORTHEASTERN MISSISSIPPI INTERIOR SALT BASIN

Theresa Woehnker

The University of Southern Mississippi, Hattiesburg, MS, USA

The Mississippi Interior Salt Basin (MISB) is a major negative structural feature in the interior onshore northeastern Gulf of Mexico. The Cotton Valley Group is an Upper Jurassic – Lower Cretaceous subsurface siliciclastic unit that has been studied extensively in the MISB for the last several decades because of its high potential as a reservoir rock. Collection of sample logs, core descriptions, and approximately 350 electric wireline logs have been used in the preparation of cross sections to correlate various sand intervals within the Upper Cotton Valley Group. This study provides an understanding and comparison of well production from each sand interval within the Upper Cotton Valley Group. In literature, these units are poorly defined and are typically inconsistent with stratigraphic relationships. By following an outlined methodology to define these units, the various sands can be classified and correlated across the study area. Although most of the traps in the MISB are salt-related structures, this study attempts to identify and locate potential targets for stratigraphic traps. Since hydrocarbon entrapment is directly related to the percentage of sand to shale,

identifying significant changes in percent sand within the Upper Cotton Valley reservoir may indicate locations of such traps. The purpose of this research is to ultimately determine the production potential and locations of possible hydrocarbon accumulations from the Upper Cotton Valley Group within the northeastern MISB.

O5.02

8:50 DISTRIBUTION OF ELEMENTS AND POLYCYCLIC AROMATIC HYDROCARBONS IN A COMMERCIAL RETENTION POND SEDIMENT: COLONY CROSSING, MADISON, MISSISSIPPI

Austin Harris, Stan Galicki

Millsaps College, Jackson, MS, USA

Retention ponds constructed adjacent to large parking lots are one of the best practices for managing stormwater runoff. Polycyclic aromatic hydrocarbons (PAHs) are one class of the numerous physical, organic and inorganic contaminants contained in stormwater. Seven sediment samples obtained from the retention pond at Colony Crossing in Madison, Mississippi were analyzed for grainsize, organic carbon, PAHs using EPA 8270C, and 49 elements using INAA-ICP. The 1 ha pond catches runoff from the 18 ha Colony Crossing retail development. EPA 8270C analyses indicate heterogeneous distributions of the 16 EPA priority PAH compounds.

O5.03

9:10 EXPLORING THE OXBOW LAKE FACIES MODEL AT MAYES LAKE STATE PARK

Maya Willis, Zachary Musselman

Millsaps College, Jackson, MS, USA

The classic facies model representing oxbow lake formation and evolution suggests a meandering river erodes its cutbacks and the neck of the meander at those two meanders pinches to provide the river a shorter course of flow. As the new foreshortened river course develops, the abandoned channel neck fills with a mud plug and subsequently disconnects the main channel from the newly established oxbow lake. In this traditional model, the sediment filling the oxbow lake are muds, representing the lower energy environment of the stagnant lake. Our study explores this traditional facies model by sampling the sediment near an oxbow lake within the Pearl River floodplain. Sediment from two hand augured holes near Mayes Lake were sampled to analyze the texture, organic carbon, and soil color.

O5.04

9:30 NEAR-SURFACE GEOPHYSICAL IMAGING OF DEFORMATION ASSOCIATED WITH THE DAYTONA BEACH SAND BLOW DEPOSITS, LEE COUNTY, ARKANSAS

Michael Rohrer[1], James Harris[1], Mark Teague[2], Cooper Cearley[1]

[1]Millsaps College, Jackson, MS, USA, [2]Teaco Geophysical, Clinton, MS, USA

A recent compressional-wave (P-wave) seismic reflection survey acquired by the U. S. Geological Survey (USGS) along Highway 243 in Lee County, Arkansas, across the Daytona Beach sand blow cluster, identified a previously unknown fault zone that is likely associated with Holocene earthquake activity. However, the USGS data were not able to image the shallow section (<60 m deep) and show a direct connection between the deeper faulting and the sand blows. In order to investigate the near-surface structure of the fault zone, we acquired an integrated geophysical data set consisting of 430-m-long shear-wave (S-wave) seismic reflection and ground penetrating radar (GPR) profiles above the deformation imaged on the USGS profile. The S-wave reflection data were collected using a 24-channel, towable landstreamer and the seismic energy was generated by a sledgehammer/I-beam source. The GPR data were collected with a cart-mounted 250-MHz system, using a 0.5-m antenna spacing and a 0.10-m step size. The processed seismic profile exhibits coherent reflection energy throughout the Quaternary section. Changes in reflection amplitude and coherency, offset reflections, and abundant diffractions suggest the presence of a complex zone of high-angle faults in the shallow subsurface coincident with the mapped lineament. Folded shallow reflections show that the deformation extends upward to within 10 m of the surface. Furthermore, the GPR profile images a distinct zone of deformation in the very near surface (<1.5 m deep) that is coincident with the upward projection of the deformation imaged on the S-wave seismic reflection profile.

O5.05

9:50 SHALLOW SEISMIC REFLECTION ANALYSIS OF THE BLISS CREEK LINEAMENT IN THE BIG BLACK RIVER VALLEY NEAR EDWARDS, MISSISSIPPI

Andrez Aguilar, James Harris, Michael Rohrer, Cooper Cearley

Millsaps College, Jackson, MS, USA

In evaluating neotectonic deformation in the Mississippi Embayment (ME), anomalous surface features (topographic scarps, lineaments, and drainage pattern irregularities) have often been targeted for investigation. Previous remote sensing and geomorphic analysis has identified the Bliss Creek Lineament (BCL) and associated it with an anomalous straight reach of the Big Black River (BBR) in west-central Mississippi. The study further proposed a tectonic influence on the river anomaly and identified a suspected fault coincident with the BCL. Subsequent work investigated the tectonic geomorphology of the BBR system in the vicinity of the anomalous reach by analyzing drainage-basin asymmetry. Our work is focused on evaluating the use of shallow seismic reflection methods, emphasizing the high-resolution potential of shear wave (S-wave) propagation in unconsolidated sediments, to image the shallow subsurface of the BBR valley in the vicinity of the BCL near Edwards, Mississippi. Preliminary tests using both 12-channel and 24-channel S-wave landstreamers and a sledgehammer/I-beam energy source have identified a strong target reflection (~15-20 m deep) in the near surface. Correlation with a local well log indicates that the reflection is likely from the Glendon Limestone member of the Vicksburg Group (Oligocene). Interpretation of an initial S-wave reflection profile suggests possible structural deformation coincident with the location of the BCL. Further work, including additional seismic reflection profiling and drilling, is ongoing.

O5.06

GROUNDWATER AND SURFACE-WATER INTERACTION CHARACTERIZATION OF THE MISSISSIPPI DELTA USING HYDROGRAPH-SEPARATION TECHNIQUES AND TREND ANALYSES

Courtney Killian[2], Jeannie Barlow[1], Paul Barlow[3], Wade Kress[1], Darrel Schmitz[2]

[1]U.S. Geological Survey, Jackson, MS, USA, [2]Mississippi State University, Mississippi State, MS, USA, [3]U.S. Geological Survey, Reston, VA, USA

Understanding the relationship between groundwater withdrawals and aquifer response can allow for the estimation of changes in

groundwater availability over time and help determine best water-resource-management practices to sustain groundwater and surface water resources for agricultural irrigation, ecological flow, and other uses. An increase in groundwater withdrawals from the Mississippi River valley alluvial (MRVA) aquifer for agricultural irrigation has resulted in stream and groundwater level declines in the Mississippi Delta region, in northwest Mississippi. In 2016, the U.S. Geological Survey (USGS) began a study to better understand the effects of pumping on groundwater availability in the alluvial aquifer. Two USGS continuous continuous-gaging stations and co-located piezometers provided hydrologic data to characterized groundwater/surface-water interaction at two sites in the Delta. The sites are located at the Sunflower River at Sunflower, Mississippi and the Tallahatchie River at Money, Mississippi. Baseflow, the amount of groundwater that contributes to streamflow, was estimated at each site using hydrograph-separation and trend-analysis techniques provided in the USGS Groundwater Toolbox open-source software. Recently collected streambed resistivity data provided insight into the variability of hydraulic connectivity along streambeds and values were compared with the hydrograph separation and trend analysis results. This combination of techniques allowed for better characterization of the hydrogeologic conditions and the groundwater/surface-water interactions at the selected site. Characterizing hydrologic relations such as this will help refine a regional groundwater model of the Delta that will aid water-resource managers in future decisions pertaining to groundwater availability of the alluvial aquifer.

O5.07

10:30 INVESTIGATING THE NEED OF PUBLIC EDUCATION FOR NOURISHING BEACHES USING CULLET

Claire Babineaux, Brenda Kirkland, Darrel Schmitz

Mississippi State University, Mississippi State, MS, USA

Nourishing beaches is a common practice in the mitigation of coastal erosion. The proposed use of cullet in beach environments as an alternative to dredged sands is an idea that has been met with resistance as it has not been formally used in Mississippi in beach nourishment projects. Cullet is a geologically compatible aggregate made of crushed, recycled glass that can be manufactured to a size comparable to the natural beach sediment distribution. The goal for this project was to determine a need for an educational program informing the general public of issues associated with coastal erosion, as well as, current and potential mitigation techniques. Public opinion surveys were conducted both in-person and with online platforms to measure the level of acceptance of cullet use in nourishment practices and to determine whether there is a need to experience the material before its use can be accepted. Initial resistance to the concept of purposefully putting broken glass onto a beach was anticipated, and the need for a tangible and haptic experience is shown in the data from the in-person pre-to post-surveys and online surveys. The data shows there is a need for an educational program geared towards informing the public of coastal erosion effects and processes, as well as, the materials used.

O5.08

10:50 GROUNDWATER DEPLETION AND DROUGHT FREQUENCIES: A GLOBAL ANALYSIS

Aynaz Lotfata, Shrinidhi Ambinakudige

Mississippi State University, Starkville, MS, USA

Groundwater accounts for about 33 percent of total water withdrawals worldwide (Silbert et al. 2010). In many parts of the world, public water supply and irrigation are the major source of groundwater exploitation (Famiglietti, 2014). Groundwater acts as the key strategic reserve in times of drought. However, faster depletion of groundwater in drought regions can significantly deteriorate the living conditions and affect the global water security. The frequency and severity of droughts are expected to increase and groundwater depletion can exacerbate the impacts of droughts (Konikov and Kendy, 2005). In this study, we investigated the relation between groundwater anomalies and the frequency of droughts in various regions and aquifers of the world. We used GRACE satellite data (Gravity Recovery and Climate Experiment), Land data assimilation system (GLDAS) and the Multivariate Standardized Drought Index (MSDI). The preliminary results have shown that the groundwater depletion is extensive in regions such as the California Central Valley, the Northwestern India and the Northern Middle East (Iran, Iraq, Syria and Turkey). Similarly, frequency of droughts also increased in many parts of the world. In the southwestern United States, frequent drought conditions have resulted in crop loss (Long et al., 2013). Some of the worst draughts were in South Africa, North Korea, Brazil, Spain, Australia etc. Our study results also indicated significance spatial and temporal variations in groundwater anomalies and drought frequencies.

O5.09

11:10 USING ADSORPTION ISOTHERMS TO DESCRIBE THE FATE AND TRANSPORT OF ANATOXIN-A IN TEXTURALLY DIFFERENT SOILS IN GRENADA COUNTY, MISSISSIPPI

Justin Hobart, Andrew O'Reilly

University of Mississippi, University, MS, USA

Anatoxin-a is a potent algal toxin that can be fatal to birds, cattle, and other animals when consumed at high enough concentrations. Although anatoxin-a has been extensively studied in surface water systems, significantly less is known about the fate and transport of the toxin in soils. The aim of this study is to quantify different soils' abilities to adsorb and degrade anatoxin-a via individual soil horizons. The soils chosen were from Grenada County Mississippi and consist of a vertisol, ultisol, alfisol, inceptisol, and gully soil. These soils will be subjected to batch experiments in which subsamples from each horizon will be mixed with anatoxin-a at concentrations of 0.3, 1, 3, 7, and 15 µg/L. Once adsorption equilibrium between each subsample and anatoxin-a is achieved, the concentration of anatoxin-a in the supernatant fluid will be measured using enzyme-linked immunosorbent assay (ELISA) equipment and procedures and the concentration of the toxin adsorbed on the soil will be determined. Adsorption isotherms will be created by comparing the anatoxin-a concentrations in the soil to the five initial concentrations used in each batch test. The resulting isotherms may be useful in identifying types of soils that are prone to transporting or removing anatoxin-a in the environment. It is predicted that clayey soils (such as vertisols) are more likely to adsorb anatoxin-a compared to other soil types due to the toxin's small ionic size and net positive charge and clays' large surface area and net negative charge.

O5.10

11:30 A COMPARATIVE CASE STUDY OF REFLECTION SEISMIC IMAGING METHOD

Moones Alamooti, Adnan Aydin

University of Mississippi, University, MS, USA

Seismic imaging is the most common means of gathering information about subsurface structural features. The accuracy of seismic images may be highly variable depending on the complexity of the subsurface and on how seismic data is processed. One of the crucial steps in this process, especially in layered sequences with complicated structure, is the time and/or depth migration of seismic data. The primary purpose of the migration is to increase the spatial resolution of seismic images by repositioning the recorded seismic signal back to its original point of reflection in time/space, which enhances information about the complex structure. In this study, our objective is to process a seismic dataset (courtesy of the University of South Carolina) to generate an image on which the Magruder fault near Allendale SC can be clearly distinguished and its attitude can be accurately depicted. The data was gathered by common mid-point method with 60 geophones equally spaced along an about 550 m long traverse over a nearly flat ground. In the future, we will apply different migration algorithms (including finite-difference and Kirchhoff) and the results will be compared in time and depth domains to investigate the efficiency of each algorithm in reducing the processing time and improving the accuracy of seismic images in reflecting the correct position of the Magruder fault.

12:00 General Sessions

Thursday, February 22, 2018
AFTERNOON
Room Union H

1:00 Guest Speaker Guest Speaker:

Dr. Ezat Heydari

"What is Curiosity Rover doing in Gale Crater, Mars?"

Thursday, February 22, 2018
AFTERNOON
Room TC

O5.11

1:30 CHLORIDE TRANSPORT IN HETEROGENEOUS FORMATION-A CASE STUDY IN WEST TEXAS

Arindam Mukherjee, Robert M. Holt

University of Mississippi, University, MS, USA

Groundwater recharge estimates in arid and semiarid regions are critical for managing and protecting groundwater resources. The chloride mass balance (CMB) method is the most widely used tracer technique to estimate groundwater recharge in arid and semiarid areas. CMB method looks at the variations of chloride concentration with depth in relationship to precipitation and chloride input. The vertical distribution of chloride is attributed mainly to the assumption of one dimensional piston flow or vertical flow. In many places, however, the vertical distribution of chloride will be influenced by subsurface heterogeneity, leading to horizontal movement of infiltrating waters. During focused recharge, horizontal movement of chloride-bearing waters, coupled with upward movement driven by evapotranspiration, may lead to chloride bulges that could be misinterpreted if the CMB method is used to estimate recharge. The purpose of this study is to 1) simulate groundwater flow and chloride transport through the unsaturated zone of Ogallala, Antlers, and Gatuna (OAG) Formations in Andrews County, Texas and 2) determine the applicability of conventional one-dimensional CMB approach in this site. A two dimensional finite element numerical model will show the movement of chloride through the heterogeneous unsaturated zone of OAG formations. We expect to see chloride bulges not only close to the surface but also at depths characterized by horizontal or upward movement. A comparative study of focused recharge estimates in this study with available recharge data will be presented. This improved understanding will allow more robust recharge estimate for efficient resource management and better predictive modeling.

O5.12

1:50 GENERALIZED RADIAL TRANSPORT MODEL FOR INTERPRETING CONVERGENT FLOW TRACER TESTS IN FRACTURED ROCK

Md Lal Mamud, Robert M Holt

University of Mississippi, University, MS, USA

The generalized radial Flow (GRF) model is suitable in heterogeneous and extensively fractured-rock aquifers because determination of hydraulic properties from traditional analysis of a pumping test produce non-plausible results. The double-porosity Generalized Radial Transport (GRT) model is an extension of the GRF approach. In both approaches, a flow dimension characterizes the change in flow area such as heterogeneity, boundaries, and leakage versus radial distance from the borehole. The GRT model collapses to a 1D, radial, and spherical advection dispersion equation (ADE) for integer flow dimensions of 1, 2, and 3, respectively. Non-integer flow dimensions, especially sub-radial, are commonly reported from pumping tests in fractured rock systems and can be linked with aquifer geometry and heterogeneity. We consider the impact of sub-radial flow dimensions on convergent flow tracer tests in fractured rock. Then, we compare the results of double porosity, radial transport and GRT interpretations of convergent flow tests conducted in a fractured dolomite in southeastern New Mexico. In comparison to radial transport, sub-radial transport leads to higher velocities, much earlier arrival times, and higher peak concentrations in breakthrough curves. Faster advective transport leads to less diffusion into fracture-bounded matrix blocks and steeper slopes of late time concentrations. Larger blocks, corresponding to slower diffusion rates, are undersampled. Transport and diffusion parameters estimated from sub-radial tracer tests using a radial ADE will lead to underestimates of dispersivity and diffusive capacity and overestimates of diffusion rates.

O.513

2:10 ESTIMATING GROUNDWATER RECHARGE FROM AN OXBOW LAKE-WETLAND SYSTEM TO AN AQUIFER BASED ON HYDROLOGIC MONITORING AND TEMPERATURE TRACING

Michael Gratzer[1], Gregg Davidson[1], Andrew O'Reilly[1], James Robert Rigby[2]

[1]University of Mississippi, University, MS, USA, [2]USDA Agricultural Research Service, Oxford, MS, USA

The amount of water in the Mississippi River Valley alluvial aquifer (MRVAA) is decreasing; sustaining this resource requires understanding its recharge sources. We are investigating the recharge contribution from Sky Lake, an oxbow lake-wetland in northern Humphreys County. We monitored groundwater level in 11 wells, two in the wetland and nine spread over about 37 km^2 in Sky Lake's vicinity, as well as wetland surface-water level. Early summer hydrographs for wetland surface-water level, two wetland

wells, and two wells outside the wetland indicate that the well that generally shows the most connection to the surface water level lies outside the wetland by ~0.45 km and outside the lake by ~0.57 km. Potentiometric surface maps for January, March, April, and June indicate a steeper hydraulic gradient between two wells separated by the wetland than two wells without wetland between them, consistent with recharge from the wetland and flow toward the well in question. We monitored wetland soil temperatures at 30- and 60-cm belowground at ten locations. Temperatures at 60 cm belowground for three locations from February-July indicate that one of the locations correlates to the surface, in terms of temperature, stronger than the others, suggesting greater downward flow along preferential flow pathways near this location. The head and soil temperature data are helping us determine if significant vertical recharge occurs from the Sky Lake oxbow-wetland to the MRVAA. If so, the numerous oxbow lakes in the area overlying the MRVAA may have the potential to provide considerable recharge to the aquifer.

2:30 Division Student Awards

Awards are sponsored by the Department of Geology, University of Mississippi, and the Mississippi Department of Environmental Quality-Office of Geology

Thursday, February 22, 2018

EVENING

Ballroom

3:30 Dodgen Lecture and Awards Ceromony

General Poster Session

Immediately Following Dodgen Lecture

P5.01

STRUCTURAL SYNTHESIS AND SPATIAL DISTRIBUTION OF A 335 MA IGNEOUS SUITE FROM THE EASTERN BLUE RIDGE, ALABAMA, SOUTHERN APPALACHIANS

Avery Rosenbalm, Jeremy Deans

University of Southern Mississippi, Hattiesburg, MS, USA

The Appalachian range was formed by three orogenies, the most recent being the Alleghenian beginning ~330 Ma. A small pluton outcropping along highway 280 near Alexander City, AL, called the 280-granodiorite, intrudes the Devonian Elkahatchee Quartz Diorite and is dated at ~335 Ma. While little work has been done on the intrusion, it is significant for its age: all deformation of the intrusion should be related to the Alleghenian orogeny. The pluton was mapped showing the intrusion is relatively small, roughly ~0.75 km^2. Fractures, faults, and foliations were measured, with normal faults striking NW-SE and dipping NE, fractures with a W-NW strike and steep SW and NW dips, and foliations with a N-NE strike and moderate SE dip. Oriented samples were taken for petrographic and microstructural analysis. Petrographic assessment suggests the pluton is granodiorite. Microstructural analysis reveal quartz deformed by grain boundary migration recrystallization, indicating amphibolite grade deformation. Shear sense indicators such as sigma and delta clasts of feldspar suggest predominantly sinistral, reverse shear, with a few normal sense of shear fabrics. Field observations of brittle deformation indicate dextral extension. Whereas the nearby Wedowee Group, metamorphic rocks in fault contact with EQD and 280-granodiorite, has amphibolite grade dextral extensional features, the 280-granodiorite has both reverse and normal amphibolite grade kinematic indicators suggesting a record of high temperature contraction during the Alleghanian orogeny, then amphibolite grade (fabrics) and below greenschist grade (faults) extension during orogenic collapse.

P5.02

TRACE METAL DISTRIBUTION AND POTENTIAL ISOTOPE SYSTEMATICS (E.G. MG, SR) IN TUFA; TURNER FALLS, OKLAHOMA

Parsa Rafatian, Inoka Widanagamage

University of Mississippi, MS, USA

Tufa deposits form via both inorganic and organic carbonate precipitation processes (Chafetz and Folk, 1984). Carbonates minerals (E.g. calcite, CaCO3) are dominant in Tufa deposits. Calcite formation could be abiotic or biologically mediated. Stromatolites were found in several places along the Honey Creek in Turner Falls, where the samples for this project were collected. The primary source of water for Honey Creek comes from three large springs. Tufa precipitation occurs downstream from the springs, forming small dams. The small accumulations of tufa eventually lead to major tufa waterfall deposits. The spring water is saturated with CaCO3 and supersaturated with CO2 with respect to the overlying atmosphere. As the water is discharged, CO2 is released into the atmosphere and CaCO3 is precipitated onto streambeds (Osborn, Christenson, and Halihan et al, 2006). Turbulence has been attributed as one of the principal factors for precipitation of tufa at Turner Falls. This is due to aeration from the turbulence providing a supportive environment for algae and moss. The spongy algae and mosses provide a permeable, absorbent surface for tufa to amass (Love et al 1985). Carbonate minerals could incorporate strontium (Sr) and/or magnesium (Mg) in the crystal structure due to the chemical similarities between the cations (Averyt et al, 2003). Also, these elemental signatures preserve for long periods of time and may provide important information on the paleo-environmental conditions. We believe that the mechanism of elemental distribution with tufa may be better explained with most recent vs. old tufa analysis.

P5.03

LOCALLY GROWN FRUIT RETAINS ITS SOIL SIGNATURE: An ELEMENTAL STUDY OF REGIONAL VARIATION IN NONCOMMERCIAL JAMS AND JELLIES

Callie Masterson, Raven Allison, Dana Rico, William Whittington, Breana Randle, Gregory Peacock, Nina Baghai-Riding, Charles Smithhart

Delta State University, Cleveland, MS, USA

The nutritional value of food is correlated with human health. Limiting elements in diets include calcium, magnesium, potassium and more. Students in Dr. Baghai-Riding's 2017 Material and Method Class wanted to determine whether jams/jellies from different areas of the United States could be correlated with the soils in which they were grown. In this study, seven, noncommercial jams/jellies were acquired from six areas. Samples included blackberry jam and muscadine jelly from Cleveland, Mississippi, strawberry preserves from Fredericksburg, Texas, grape jelly from Mills, Massachusetts, peach jam from Laurel, Virginia and Nampa, Idaho, and elderberry from Lincoln Co., Nevada. Each jam/jelly sample was cooked on a hot plate to consolidate minerals and remove volatiles. Cooked samples then were placed in a Muffle Furnace for 24 hours at 1,000°C to generate an ash. Ash samples

were analyzed with an energy dispersive x-ray unit associated with the scanning electron microscope to determine elemental composition. The National Conservation Resource Service soil website was used to establish local soil types that were associated with each sample. Twenty-one elements were noted from the seven ash samples including iron, aluminum, oxygen, silicon, chromium and phosphorous. Each jam or jelly had unique properties. For example, nickel occurred in the Nampa, Idaho sample that may be from mineral tailings when this area was a gold mining town. The blackberry jam yielded vanadium, zirconium, and molybdenum, which may be attributed from periodic flooding of the Mississippi River. Future classes will expand this analysis to other areas of the USA.

P5.04

SEDIMENTOLOGY, PETROGRAPHY, AND MINERALOGY OF THE TALLAHATTA FORMATION NEAR THE TOWN OF MERIDIAN, MISSISSIPPI

Kiana McFadden, Ezat Heydari

Jackson State University, Jackson, MS, USA

The Tallahatta Formation is rock unit that was deposited in Mississippi during the Eocene time. It is currently exposed along an arcuate outcrop belt extending from east-central to north-central part of the state. We investigated sedimentology, petrography, and mineralogy of an exposure of this rock unit in a road cut along Interstate 20 highway west of the town of Meridian, Mississippi. Here, the Tallahatta Formation displays a rhythmic sedimentation pattern consisting of alternation of two lithofacies. The first is the bioturbated and nodular mudstone consisting of centimeter-thick beds of irregular siltstone that alternate with thin layers of highly argillaceous soft mudstone. The second lithofacies is the white, massive mudstone. Petrographic studies of thin sections prepared from thirteen samples from this outcrop indicate that bioturbated and nodular mudstone consists of a mixture of quartz silt and other very fine-grained particles. In contrast, the white massive mudstone lithofacies consists of very fine-grained amorphous grains, most likely volcanic glass. These properties suggest that beds of white, massive mudstone lithofaices are volcanic ash layers. The absence of shallow water indicators such as cross beds, the dominance of fine grain lithology, and the abundance of bioturbation indicate that Tallahatta Formation was deposited in low energy waters below wave base in the study area. The abundance of amorphous grains points to presence of volcanic ash as a major sediment source.

P5.05

PUBLICATION OF A SURFACE GEOLOGIC MAP OF JACKSON COUNTY, MISSISSIPPI

James Starnes[1], Lindsey Stewart[2]

[1]MDEQ, Mississippi Office of Geology, Jackson, Mississippi, USA, [2]MDEQ, Mississippi Office of Land and Water Resources, Jackson, MS, USA

Mississippi's coastal geology has been a problem area for geological interpretation for quite some time. Geologic mapping supported by USGS STATEMAP grants has resulted in significant adjustments to the understanding of coastal geology in Mississippi. Early works by the state survey's Glen Francis Brown attempted to map, characterize, and explain the complexity of inadequate stratigraphic boundaries of the Graham Ferry Formation, Pascagoula Formation, and a complex of overlying coastal and river terraces in south Mississippi. The broad use of Matson's (1916) "Citronelle Formation" in this area equates unrelated fluvial and marine units with stream and coastal terrace units throughout the gulf coastal plain in the northern Gulf of Mexico. The understanding of the geology of this region has been greatly revised by stratigraphic test hole drilling, new detailed LiDAR coverages of this region, and key new additions to the paleontological record along with detailed stratigraphic work. A composite geologic map of Jackson County was published this year as Open File Report 285, which includes portions of Harrison, Stone, and George counties. This work was performed in conjunction with the Mississippi Office of Land and Water Resources, the Mississippi Office of Geology's STATEMAP grant program over the last three years. This composite map along with accompanying reports and cross-sections will serve as a stratigraphic framework for the late Miocene, Pliocene, and Pleistocene geology in coastal Mississippi.

Friday, February 23, 2018
Room Union H
MORNING

8:00- Welcome and Divisional Business Meeting

O5.14

9:00 EXCAVATION OF AN ARCHAEOCETE WHALE, *ZYGORHIZA KOCHII*, FROM THE LATE EOCENE YAZOO FORMATION NEAR SHERMAN HILL IN SCOTT COUNTY, MISSISSIPPI

James Starnes[1], Paul Parrish[1], Andrew Newcomb[1], George Phillips[2]

[1]MDEQ, Mississippi Office of Geology, Jackson, Mississippi, USA, [2]MDWFP, Mississippi Museum of Natural Science, Jackson, Mississippi, USA

In the fall of 2016, an Archaeocete whale, *Zygorhiza kochii*, from the Late Eocene age Yazoo Formation, was reported by collectors Matthew Giammalvo and Sid Champion near Sherman Hill in Scott County, Mississippi. An excavation was conducted on the specimen in May of 2017 by the writers and Mississippi Department of Environmental Quality staff: Mary McKay, Kristian Macias, Madison Kymes, Lindsey Henley, Johnathan McKinnon, Austin Brister, Andrew Cummings, Kristen Sorrell, and Rachel Harris. The team uncovered a significant portion of what seems to have been a relatively complete, albeit very fragmented skeleton. Represented among the remains were the vertebral column, thorax (ribs sternum), shoulder girdle, forelimbs, hyoid, and skull, along with a wealth of associated vertebrate remains of shark and other fish. The bones lay scattered about the excavation, lying on what once was the deep ocean floor. As the carcass decayed it became a feeding ground for fish, sharks, crabs, and other seafloor scavengers until it and portions of the associated scavengers were buried by sediment. This phenomenon, known as a "whale fall", occurs today. Whale fall, an ecosystem that thrives dependently on dead whale carcasses, is an oasis of biological activity on an otherwise largely barren, deep ocean floor. The Sherman Hill specimen is curated at the Mississippi Museum of Natural Science for preservation, documentation, and study. Select elements recovered from the excavation are being preserved and reconstructed for an educational display on the specimen at the library in City of Forest in Scott County, MS.

O5.15

9:20 HISTORY OF THE PALEONTOLOGY PROGRAM AT THE MISSISSIPPI MUSEUM OF NATURAL SCIENCE

George Phillips

Mississippi Museum of Natural Science, Jackson, MS, USA

In 2018, the Mississippi Department of Wildlife, Fisheries, and Parks' Museum of Natural Science (MMNS) Paleontology program will celebrate 40 years of research, collecting, and community outreach. Staff, field associates, and donors have contributed to the current inventory of 68,000 catalogued specimens. Collecting and research conducted by the program has led to publications about a wide variety of early plant and animal residents of Mississippi and the Southeast, including ancient crustaceans, echinoids, fishes, turtles, whales, rhinos, and dinosaurs. A network of fossil collectors and AFMS member clubs from Texas to North Carolina has been crucial to building the collection and assisting in a better understanding of the fascinating marine and terrestrial plant and animal communities that once inhabited the Gulf Coastal Plain. This network grows, in part, from museum-based and remote events that draw attention to our state's wondrous geological and paleontological heritage. The existence of MMNS Paleontology is in large part due to early efforts of the Mississippi Gem and Mineral Society (MGMS) to find a venue for showcasing 'prehistoric' aspects of Mississippi's natural history. In 1971, a rare, relatively complete skeleton of the small, toothed whale *Zygorhiza* was recovered from Yazoo County by the MGMS membership. The serendipitous discovery and concomitant need for professional reconstruction of this important specimen played a pivotal role in motivating the MMNS staff to create the museum's first fossil displays. A new exhibit category was thus born devoted to featuring a diversity of fossils that tell a fascinating story about Mississippi's ancient past.

O5.16

9:40 JUVENILE MICROPOGONIAS UNDULATUS OTOLITHS FROM A RANGIA JOHNSONI BED IN THE UPPER PASCAGOULA FORMATION (LATE MIOCENE), STONE COUNTY, MISSISSIPPI.

Gary Stringer[1], James Starnes[2]

[1]University of Louisiana at Monroe, Monroe, LA, USA, [2]MDEQ, Mississippi Office of Geology, Jackson, MS, USA

A Rangi johnsoni bed in the Late Miocene Pascagoula Formation was encountered in three of the five test holes during the 2016- 2017 USGS STATE MAP geologic mapping project field work in Stone and George counties in southeastern Mississippi. Fish otoliths (ear stones) were recovered from drill samples in a R. johnsoni dominated shell bed in a dark, carbonaceous clay at a depth of 340-350 feet below land surface in Stone County Test D-0058 (30.834919N, 088.992706W). The otoliths were well preserved, and morphological features pointed the family Sciaenidae (drums and croakers). All otoliths were less than 5.51 mm in length. It was possible to determine the length of the fossil fish by applying the formula developed by fisheries biologists for this species (OL=1.91 + 0.04 TL), where OL isotolith length and TL is fish total length. Results showed that all otoliths represented fish less than 90 mm. Since moder one year old M. undulatus are generally greater than 201 mm length, the otoliths represented very young or juvenile fish. Modern juvenile M undulates reside for several months in oligohaline primary nursery areas, which consist of shallow upstream, organic-rich, soft-bottom estuarine creeks and bays. Adult Atlantic croakers are most abundant in mesohaline polyhalinesalinities and are rare below 10 0/00. This analysis of the fossil otoliths from this drill sample is a rare window into the possible depositional environment of the R. johnsoni beds of the Pascagoula Formation in southeastern Mississippi.

O5.17

10:00 THE INAUGURAL USM-MSU FIELD GEOLOGY COURSE OF SUMMER 2017

Franklin Heitmuller[1], Darrel Schmitz[2], Evan Bagley[1], Claire Babineaux[2]

[1]The University of Southern Mississippi, Hattiesburg, MS, USA, [2]Mississippi State University, Starkville, MS, USA

The University of Southern Mississippi's Department of Geography and Geology and Mississippi State University's Department of Geosciences launched the first joint Field Geology course during the Summer of 2017 in Central and West Texas, New Mexico, and Colorado. This effort coupled instructional expertise and technical resources of both institutions to fulfill an integral and mandatory part of the curriculum for both undergraduate and graduate students in geology. The course included two warm-up exercises followed by eight group projects that focused on geologic mapping of complex structural regions with variable lithology, hydrologic and geomorphic assessments of mountain streams, and aspects of engineering geology. Benefits incurred through institutional cooperation include assurance that our students are accepted, assurance that enough students enroll to avoid course cancellation, retention of tuition, equitable distribution of instructional support, broader availability of specialized field supplies and equipment, and camaraderie developed among students and faculty that serve to support professional networks in the state.

O5.18

10:20 ORTHOQUARTZITE IN THE UPPER CLAIBORNE COCKFIELD FORMATION, ARCHAEOLOGY, AND THE PUBLICATION OF THE TCHULA, MISSISSIPPI 7.5MIN. GEOLOGIC MAP

James Starnes[1], R. Tyler Berry[1], David Abbott[2]

[1]MDEQ, Mississippi Office of Geology, Jackson, MS, USA, [2]Mississippi Department of Archives and History, Jackson, MS, USA

The area covered by the Tchula 7.5-minute quadrangle in Holmes County, Mississippi occupies a portion of Mississippi River alluvial plain (MRVAP) and the adjacent uplands of its eastern valley wall, which consists of a subcrop of the Claiborne age (Late Eocene) Cockfield Formation. The Cockfield Formation consists of organic-rich silts, sands and clays of deltaic origin. Thick orthoquartzite beds resembling those of the Kosciusko Fm. occur in the lower Cockfield Formation in Sections 2, 11, and 14, Township 15 North, Range 1 East. Coarse sands and gravels of the ancestral Mississippi River's Pre-loess Terrace Deposits (Pleistocene) cap the uplands above approximately 280 feet above mean sea level and are largely obscured by a thick mantle of Peorian loess. Deeply dissected uplands drained by westward-flowing streams form large alluvial fans at the edge of the MRVAP. Streams bordered by first order terraces are described as "Prairie Terraces" by R. Saucier and other mappers. The location, terrain, fresh water supply, and availability of high-quality lithic material from the Pre-loess Terrace Deposits and the Cockfield Formation have sustained human occupation of the area since the end of the Pleistocene resulting in an unusually high-density of recorded archaeological sites. These sites include large-scale, long-term occupation sites and lithic quarry sites. Deep testing of the alluvial fans may prove promising for the discovery of new archaeological sites with intact stratigraphy.

O5.19

10:40 STRUCTURAL SYNTHESIS AND SPATIAL DISTRIBUTION OF A 335 MA IGNEOUS SUITE FROM THE EASTERN BLUE RIDGE, ALABAMA, SOUTHERN APPALACHIANS

Avery Rosenbalm, Jeremy Deans

University of Southern Mississippi, Hattiesburg, MS, USA

The Appalachian range was formed by three orogenies, the most recent being the Alleghenian beginning ~330 Ma. A small pluton outcropping along highway 280 near Alexander City, AL, called the 280-granodiorite, intrudes the Devonian Elkahatchee Quartz Diorite and is dated at ~335 Ma. While little work has been done on the intrusion, it is significant for its age: all deformation of the intrusion should be related to the Alleghenian orogeny. The pluton was mapped showing the intrusion is relatively small, roughly ~0.75 km^2. Fractures, faults, and foliations were measured, with normal faults striking NW-SE and dipping NE, fractures with a W-NW strike and steep SW and NW dips, and foliations with a N-NE strike and moderate SE dip. Oriented samples were taken for petrographic and microstructural analysis. Petrographic assessment suggests the pluton is granodiorite. Microstructural analysis reveal quartz deformed by grain boundary migration recrystallization, indicating amphibolite grade deformation. Shear sense indicators such as sigma and delta clasts of feldspar suggest predominantly sinistral, reverse shear, with a few normal sense of shear fabrics. Field observations of brittle deformation indicate dextral extension. Whereas the nearby Wedowee Group, metamorphic rocks in fault contact with EQD and 280-granodiorite, has amphibolite grade dextral extensional features, the 280-granodiorite has both reverse and normal amphibolite grade kinematic indicators suggesting a record of high temperature contraction during the Alleghanian orogeny, then amphibolite grade (fabrics) and below greenschist grade (faults) extension during orogenic collapse.

O5.20

11:00 COMPLETING A MENTOR'S GEOLOGICAL MAPS

Darrel Schmitz

Mississippi State University, Mississippi State, MS, USA

The author has been finalizing the compilation and completing geologic maps that had been initiated by his mentor and colleague Dr. E. E. Russell. The quadrangles include several in the Cretaceous outrcrop area in northeast Mississippi. The author had been asked by Dr. Russell to participate in the development of several of those, including the Tupelo, Mississippi 7.5 minute quadrangle. This included field excursions by the author with Dr. Russell in surrounding areas within the Cretaceous outcrop area that included the Bissell, Guntown, Kirkville, Marietta, Ratliff, and Sherman Mississippi 7.5 minute quadrangles, which are the maps the author has been working to complete. After Dr. Russell's death his family provided the author field maps, field books, field stratigraphic sections, and photographs from Dr. Russell's mapping efforts (many of which the author had participated in developing).

Surficial geologic maps including shallow subsurface geology have been compiled for the Guntown, Kirkville, Marietta, Ratliff, and Tupelo quadrangles. The Bissell and Sherman quadrangles are still in progress. In addition to Dr. Russell and my field data, USDA Natural Resources Conservation Service (NRCS) Soil Survey data and Mississippi Department of Environmental Quality, Office of Geology (MDEQ) geophysical logs were utilized to complete the quadrangles. LIDAR data were also utilized in completing most of these quadrangles. Existing small scale geologic maps were also utilized but were of limited use due to their scale and age. The completed geologic maps are in the process of being digitized.

O5.21

11:20 ENVIRONMENTAL GEOLOGY DIVISION'S WEB PAGE: STATEWIDE SHALLOW GEOPHYSICAL INFORMATION

Paul Parrish, Andrew Newcomb

Mississippi Office of Geology, Jackson, MS, USA, Mississippi Office of Geology – Environmental Geology Division, Jackson, MS USA

The Mississippi Office of Geology and its Environmental Geology Division house a shallow geophysical log collection that begins in 1919. The current geophysical logging program is continually adding to the collection. The collection is comprised of 10,155 logs of which 10,092 have been uploaded to the division's new web page. The web page (www.geology.deq.ms.gov/environmental) is the result of several years of work. All of the historic collection was scanned into digital format. A database was developed to include as many borehole attributes as were available. Accurate location information was developed for the database from the borehole header data. The resulting geodatabase allowed for a GIS based tool that would allow agency staff, industry, and private stakeholders to have updated geophysical information at their fingertips. The web page was well received by the public. It went live in July of 2017 and accrued over 7000 page views in the next two and a half months. Feedback was very positive due to the user-friendly format. Several suggestions were taken into account, and added to the capabilities of the tool. Suggestions and feedback mainly came from water well contractors, private sector environmental/geotechnical professionals, and academia. This web page is a living page unlike many static government pages. The page will be updated continually to keep up with incoming data from the Environmental Geology Division's logging program.**0246**

O5.22

11:40 PROVINCIALISM AND EVOLUTION OF LATE CRETACEOUS OSTRACODES OF THE U.S. GULF COASTAL PLAIN

Terry Puckett

University of Southern Mississippi, Hattiesburg, MS, USA

Fossil provincialism is both a blessing and a curse. Cosmopolitan taxa, such as planktonic microfossils, are often excellent tools for global correlation, whereas benthic organisms, due to difficulties in dispersal, are often excellent tools for biogeography and plate tectonics. Generally, ostracodes are in the latter category. Ostracodes can be subdivided into two types: primitive (long-ranging), blind and smooth taxa that occur globally, and highly ornamented, often sighted ostracodes that are provincial. In the Late Cretaceous deposits of the U.S. Gulf Coastal Plain, ornamented ostracodes show a wide range of provincialities. Examples include an indigenous fauna in the Santonian oyster *Flemingostrea cretacea* biostromes of a small area in eastern Alabama; species of *Acuminobrachycythere* that occur only in Mississippi and Alabama; and several undescribed species of the highly diverse genus *Anticythereis*, which only occur in the Atlantic Gulf Coastal Plain and the eastern flank of the Mississippi Embayment. Within the latter genus, species are often restricted to specific localities. This provincialism is an important clue to evolution and taxonomy. Specialists on both sides of the Atlantic have assigned ornamented

species to genera that occur on opposite sides of the ocean, often with spurious results. Recognition of ornamented genera that occur in widely separate areas of the world may indicate errors in generic assignments, particularly in synchronous deposits. Provinciality should be assumed unless paleobiogeographic linkages can be demonstrated.

Friday, February 23, 2018
AFTERNOON

O5.23

1:00 PAIRED WELLS TELEMETRY PROJECT FOR THE MISSISSIPPI DELTA

Madison Kymes

Mississippi Department of Environmental Quality, Jackson, MS, USA

The Mississippi Delta is a unique region filled with complex geology, prolific agriculture, and finite water. Abundant use of irrigation has created a dramatic drawdown, of water, from the Mississippi River Valley Alluvium (MRVA) and even into the Tertiary aquifers. Before implementing any strategies for finite groundwater conservation, geology, groundwater resources, and groundwater uses (particularly for agriculture) must be observed. By strategically drilling observation wells in the MRVA and Tertiary aquifers, a better understanding of the interaction between all three can be gained.

O5.24

1:20 MISSISSIPPI RIVER BASIN GEOLOGY

David T. Dockery III

Mississippi Department of Environmental Quality, Jackson, MS, USA

Most of Mississippi is drained by five river basins, the Yazoo, Big Black, Pearl, Pascagoula, and Tombigbee river basins. Three of these basins enter the Gulf through structural troughs. The Yazoo and Big Black join the Mississippi River and follow the axis of the Mississippi Embayment. The Tombigbee joins the Mobile River and passes through the Mobile Bay Graben. Between these passes are the Wiggins Uplift and other basement highs. Across central Mississippi, floodplain elevations of the Yazoo and Tombigbee step up to those of Big Black and Pascagoula and then to that of the Pearl. South of Jackson, the Pearl River is entrenched in the high plateaus of the Citronelle Formation with remnant surfaces at Brookhaven of 500 feet and Magee at 550 feet above sea level. Bluffs along the Pearl River near Columbia are known as Mississippi's Grand Canyon. The Wilcox cuesta/escarpment follows the eastern flank of the Mississippi Embayment and forms the divide between the Tombigbee and, from south the north, the Pascagoula, Pearl, Big Black, and Yazoo river basins. Yazoo and Tombigbee Basin lowlands meet in northern Mississippi above the limit of the other higher basins. Here the Yazoo-Tombigbee River Basin divide crosses geological boundaries to join the Pontotoc Ridge and the Cretaceous Ripley/McNairy Sand cuesta. Tributaries of the Yazoo River flow east to west as did the course on ancient rivers seeking base level when the embayment was a seaway.

O5.25

1:40 DEPOSITIONAL SYSTEMS ANALYSIS OF THE KOSCIUSKO FORMATION (MIDDLE CLAIBORNE GROUP) IN SOUTHERN MISSISSIPPI

R. Tyler Berry

Mississippi Department of Environmental Quality, Jackson, MS, USA

The middle Claiborne Kosciusko Formation is one of the primary water supplies for much of central and northwestern Mississippi. The formation consists of fluvial and deltaic sand, clay, and lignite, all of which comprises of a complex depositional system. In west-central Mississippi, the Kosciusko Formation contains upper and lower aquifer sands. These sand bodies rank fourth among the eleven most valuable water-bearing units in the state. The formation varies in thickness from approximately 1,000 feet (305 meters) near the Mississippi River in western Claiborne County to approximately 250 feet (76 meters) in Clarke County before grading to shale southward. This depositional systems analysis maps the net sands within the Kosciusko Formation using high-quality geophysical logs where possible. Sand body geometries, based on the net sand maps within this analysis, are compared with those of modern depositional systems to find a modern analogue that best characterizes the Kosciusko Formation's depositional framework.

HEALTH SCIENCES

Chair: Ray Grill
University of Mississippi Medical Center
Chair: Jennifer Harpole
University of Mississippi Medical Center
Vice-Chair Frank Spradley
University of Mississippi Medical Center
Vice-Chair: Gouri Mahajan
University of Mississippi Medical Center
Program Commitee: Olga McDaniel
University of Mississippi Medical Center
Program Commitee: Jana Bagwell
University of Mississippi Medical Center
Program Commitee: George Moll
University of Mississippi Medical Center
Population Health Consultant: Joshua Mann
University of Mississippi Medical Center

Thursday, February 22, 2018
MORNING
Room TC Ballroom II/III

9:30 – Noon **Population Health Symposium I**
Invited Keynote Speakers
Moderators: D. Olga McDaniel, PhD
George Moll MD, PhD.
University of Mississippi Medical Center

9:30 **WELCOME**

9:45 **MISSISSIPPI HEALTH CARE, PRESENT AND FUTURE**
James Keeton, MD
University of Mississippi Medical Center

10:15 **ADDICTIONS AND VIOLENT BEHAVIOR**
Julie A. Schumacher-Coffey, PhD.
University of Mississippi Medical Center

10:45 **BEYOND PRESCRIPTION OPIOIDS: NOVEL PAIN THERAPEUTICS WITH REDUCED ABUSE LIABILITY**
Kevin Freeman, Ph.D.
University of Mississippi Medical Center

11:15 **APPROACHES TO TREATING GENETIC NEUROMUSCULAR DISORDERS**
S.H. Subramony, MD
University of Florida

11:45 **PANEL DISCUSSION**

Thursday, February 22, 2018
AFTERNOON
Room: Ballroom
Room TC Ballroom II/III

1:00-2:55 **Population Health Symposium II**
Precision/Personalized Medicine

1:05 **MATHEMATICAL MODEL OR HumMod. AN INTEGRATIVE PHYSIOLOGY**
Robert Hester
University of Mississippi Medical Center

1:35 **APPLICATION OF HumMod, DIAGNOSTIC VALIDATION**
Drew Pruett
University of Mississippi Medical Center

2:05 **VACCINES, POPULATION DIVERSITY AND COMPLIANCE**
Paul Beyers, MD
Mississippi State Epidemiologist, Director

2:35 **PANEL DISCUSSION**

Thursday, February 22, 2018
EVENING
Ballroom II/III

3:30 **Dodgen Lecture and Awards Ceromony**
General Poster Session
Immediately Following Dodgen Lecture

P6.01

HISTOPATHOLOGICAL ASSESSMENT OF SUSTAINED DELIVERY OF EGCG ON AN SK-OV-3 OVARIAN CANCER LIKE CELL LINE

Jennifer Price[1,2], Michelle Tucci[1], Hamed Benghuzzi[1]
[1]University of MS Medical Center, USA, [2]Copiah-Lincoln Community College, USA

Ovarian cancer ranks fifth among the causes of cancer-related deaths in women. Ovarian cancer is problematic to diagnose due to its symptoms being vague and easily confused with other diseases. Sustained delivery has succeeded in distributing potential treatments into the body in a predetermined manner. The objective of this study was to investigate the morphological effects of sustained delivery of Epigallocatechin-3-gallate (EGCG) on SK-OV-3 ovarian cancer cells. A total of 72 wells were plated with (105 per well) SK-OV-3 cells and subdivided into 2 groups according to standard lab protocols. Group 1 served as control and group 2 was treated with EGCG (3 µg/ml). The results of the study revealed the comparison of cancer cells to the treated cancer cells: the cancer cells were medium-sized with a single, oval shaped nucleus with healthy cytoplasm; however, the treated cells were medium-sized with a single, oval-shaped nucleus with severe vacuolization in the cytoplasm with course chromatin. Overall conclusion: the administration of EGCG to the ovarian cancer cells showed potential in damaging the cytoplasm and disrupting its life cycle to prevent the growth of ovarian cancer.

P6.02

FRACTAL ANALYSIS OF CLINICALLY FAILED ZIRCONIA DENTAL IMPLANTS IS INDEPENDENT OF MEASURING LOCATION

Kartikeya Jodha[1], Susana Salazar Marocho[1], Susanne Scherrer[2], Yuanyuan Duan[1], Jason Griggs[1]
[1]University of Mississippi Medical Center, USA, [2]University of Geneva, Switzerland

Purpose: Previous studies have shown that fracture toughness values (KIC) of ceramics can be determined from fractal dimensions (D) of their leveled fracture surfaces. This study was to test the hypothesis that D values are independent of the location on the fracture surface. Methods and materials: Twelve clinically fractured zirconia dental implants from four different brands: Axis Biodental (n=7), Z-Systems (n=3), Straumann (n=1), and SDS (n=1) were retrieved. Epoxy replicas were made of three locations along the crack path (near origin (O), hackle (H), and near compression curl (CC)) using polyvinylsiloxane impressions (Extrude, Kerr). Surfaces were scanned using the atomic force microscope (Bioscope Catalyst, Veeco) and then leveled using 1st order flattening operations. The height data were imported into custom MathCAD script, and FRACTALS software (Russ) was used to determine D value by Minkowski cover algorithm. Results: The data were not normally distributed (S-W $p \leq 0.05$). Two-way repeated measures ANOVA showed no significant difference among D values for different implant brands ($p=0.66$) and fracture surface locations ($p=0.83$). After eliminating implant brand as a factor, data passed normality and equal variance tests (S-W $p=0.88$, BF $p=0.15$). The mean D values and standard deviations from the three locations (O, H, CC) were 2.183±0.031, 2.179±0.024, and 2.175±0.018, respectively. One-way repeated measures ANOVA showed no significant effect of location ($p=0.74$). Conclusion: D was the same at the three locations on the fracture surfaces. This means that H and CC regions can be used to determine KIC when the failure origin has been lost.

P6.03

ANTI-INFLAMMATORY ACTIVITY OF *PSEUDOGNAPHALIUM OBTUSIFOLIUM* EXTRACTS VIA INHIBITION OF PROTEIN DENATURATION

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The plant *Pseudognaphalium obtusifolium*, an integral part of Native American traditional medicine, has been shown to contain many polyphenolic compounds and secondary metabolites that exhibit health-promoting effects due to their specific chemical properties. These small molecules exhibit radical scavenging and antioxidant properties, as well as potential anti-inflammatory activities. Protein denaturation, caused by various environmental conditions (including pH, temperature, and oxidative stress), plays a role in inflammatory processes. These unfolded proteins form aggregates that initiate complex physiological responses. As protein denaturation occurs, polypeptide unfolding leads to interaction among exposed hydrophobic patches. Aggregation occurs and is evidenced by an increase in optical density (OD). Through biochemical interactions, *P. obtusifolium* phenolic constituents may participate in anti-inflammatory activity via inhibition of protein denaturation. The anti-inflammatory activities of whole leaf and separated extracts (ethanol-, hexane-, and dichloromethane-derived) were evaluated. Fetal bovine serum (FBS) was heated to denature proteins and percent inhibition of protein denaturation for serial dilutions of each extract were determined by spectrophotometrically measuring turbidity of the samples in triplicate. The OD of the test samples and control were used to calculate percent inhibition. The highest percent inhibition was seen in whole leaf extract, exhibiting a concentration-dependent decrease in OD. Ethanol-derived extract also produced similar inhibition percentages that were concentration-dependent. FBS samples exposed to hexane-derived extract notably displayed an inverse concentration-dependent relationship. Dichloromethane-derived extract significantly inhibited denaturation. The results of this study emphasize the potential anti-inflammatory activity of *P. obtusifolium* extracts. Future studies will include performing proteinase inhibitory assays for each of the extracts.

P6.04

CELECOXIB ATTENUATES NEONATAL SYSTEMIC LIPOPOLYSACCHARIDE-ENHANCED ADULT VULNERABILITY OF NIGROSTRIATAL DOPAMINERGIC SYSTEM TO ROTENONE NEUROTOXICITY

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Chronic brain neuronal inflammation has been proposed to play an important role in the development of neurodegenerative disorders in adult life. Our previous study showed that perinatal lipopolysaccharide (LPS) exposure induced a chronic neuronal inflammation, as indicated by increases in pro-inflammatory molecules-induced cyclooxygenase-2 (COX-2)+ cells, and enhanced adult susceptibility to develop neurodegenerative disorders triggered by rotenone, a commonly used pesticide. The objective of the current study was to examine whether celecoxib, a selective COX-2 inhibitor, has long-lasting protective effects and attenuates LPS-induced motor behavioral dysfunction and LPS-enhanced susceptibility to rotenone toxicity in later life. Intraperitoneal (i.p.) injection of LPS (2 mg/kg) or saline was performed on postnatal day 5 (P5) Sprague-Dawley male rat pups, and celecoxib (20 mg/kg) or vehicle was administered (i.p.) 5 min after LPS injection. On P70, rats were challenged with rotenone through subcutaneous mini-pump infusion at a dose of 1.25 mg/kg per day for 14 days. Motor behavioral tests were carried out from P70 to P98 and brain injury was examined on P98. Our results showed that neonatal administration of celecoxib provided protection against LPS-enhanced rotenone-induced neurobehavioral impairments, brain injury, and an increase in the number of activated microglia in the substantia nigra of P98 rats. Results from the current study suggest that treatment with celecoxib has long-lasting protective effects against perinatal brain inflammation-enhanced adult susceptibility to environmental toxin-induced neurodegenerative disorders. Our results are useful for studying mechanisms involved in the pathogenesis of dopaminergic neuronal injury induced by infection/inflammation and the development of potential therapeutics.

P6.05

STRESS-ENHANCED MOTIVATION FOR HIGH FAT FOOD REWARD IN SATIATED RATS: INDEPENDENCE OF THE HPA AXIS ACTIVITY

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Overeating contributes to obesity. The neurobehavioral mechanisms underlying the motivation to consume excessive foods, especially with high calories, are not fully understood. Exposure to stressful life events is proposed to be an environmental and psychological factor that may promote overeating behavior.

Objectives: The present study examined whether stress enhances the motivation to procure high-fat food reward in satiated rats and determined whether the stress-enhanced motivation involves the hypothalamic-pituitary-adrenal (HPA) axis activity.

Methods: Male Sprague-Dawley rats with rodent chow available ad libitum in their home cages were trained to press a lever under a progressive-ratio schedule for deliveries of high-fat (35%) food pellets (45 mg). Prior to the test sessions, rats received pharmacological stress challenge (intraperitoneal administration of yohimbine) following treatment with glucocorticoid synthase inhibitor metyrapone or receptor antagonist RU486.

Results: The rats emitted high levels of lever responses to earn the high-fat food pellets. Yohimbine (1 mg/kg, IP) challenge substantially enhanced lever responses for the reward. The effect of yohimbine was not changed by pretreatment with either RU486 (60 mg/kg, IP) or metyrapone (100 mg/kg, IP).

Conclusions: Pharmacological stress challenges significantly enhanced the motivation for obtaining high-fat food reward beyond rat energy homeostasis need. This facilitating effect of stress on motivation for reward did not require activation of the HPA axis. In light of our previous findings (citation removed for review process) showing that a CRF_1 receptor antagonist NBI blocked the stress effect, it is suggested that the stress-enhanced motivation for high-fat food reward may involve the extra-hypothalamic CRF neurotransmission.

P6.06

MAXIMUM TEMPERATURE THROUGH Y-TZP CERAMIC AFTER Er,Cr:YSGG LASER IRRADIATION

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Removing Y-TZP restorations with diamond burs is time-consuming, yet destructive. Using a laser could be a safer method. However, the heat produced might damage the tooth pulp (>42°C). Our purpose was to determine the maximum temperature (T) reached during the use of different settings of the Er,Cr:YSGG laser through a Y-TZP ceramic. Y-TZP slices were prepared into 7 experimental groups. For the control group, a diamond bur was operated onto the Y-TZP slices. For the 6 experimental groups, the laser was operated at a constant combination of 33% water and 66% air during 30 s with two different power settings (W) at three frequencies (PPS), as follows (W/PPS): 2.5/20, 2.5/30, 2.5/45, 4.5/20, 4.5/30, and 4.5/45. The T through Y-TZP was recorded in degrees Celsius by using a digital thermometer with a K thermocouple. The median T of the control group was 26.5 °C. The use of 4.5 W resulted in the median T (°C) of 44.2 at 20 PPS, 53.3 at 30 PPS, and 58.9 at 45 PPS, while 2.5 W showed 34.6, 31.6, and 25.0 at 20, 30, and 45 PPS, respectively. Kruskal-Wallis one-way ANOVA showed that within each power setting, the T was similar. The high power and lowest frequency (4.5/20) showed no significant difference from the 2.5 W settings and the control group. The lower power setting (2.5 W) is a potential method for the use of the Er,Cr:YSGG laser with Y-TZP structures. The higher power (4.5 W) with high frequencies (30 and 45 PPS) is unsuitable.

P6.07

MODELING CUE-EXPOSURE THERAPY FOR ALCOHOL USE DISORDER

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Although treatment options exist for alcohol use disorders, relapse rates remain unacceptably high. Relapse can be precipitated by alcohol-paired environmental cues that elicit craving and promote alcohol consumption. Cue-exposure therapy (CET) is designed to weaken the association between alcohol-paired cues and alcohol consumption and, ultimately, decrease craving and relapse. We developed a nonhuman primate model of CET and investigated the potential of putative cognitive-enhancing drugs to augment its efficacy. Subjects were male rhesus monkeys with extensive histories of oral ethanol (2% w/v) self-administration under conditions in which each opportunity to drink was paired with red cue lights (i.e., alcohol-paired cue). After achieving stable self-administration, extinction sessions occurred during which the contingency between alcohol-paired cues and alcohol consumption was reduced by omitting the ethanol yet keeping response-contingent presentations of the cue lights. During extinction, monkeys were treated with the α5GABA-A inverse agonist RY-23 (0.03 or 0.3 mg/kg), the glycine partial agonist d-cycloserine (DCS; 3 mg/kg) or placebo (saline). A cue-reactivity test occurred four days after extinction (i.e., re-exposure to response-contingent presentations of the cue light in the absence of ethanol) after which baseline self-administration resumed. RY-23, but not DCS, accelerated extinction compared to placebo. DCS and RY-23 also significantly reduced responding during cue reactivity tests indicating a potential decline in cue-induced craving. Unfortunately, no drug treatment increased time to reacquisition of self-administration. Our findings suggest that CET, with adjunct pharmacotherapy, has efficacy at reducing cue-induced craving. However, other strategies are needed to prevent reacquisition of alcohol drinking. Supported by: AA16179

P6.08

GASTRIN-RELEASING PEPTIDE SIGNALING IS ALTERED IN A RODENT MODEL OF VERTICAL SLEEVE GASTRECTOMY

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Background: Though bariatric surgery is an effective treatment of Metabolic Syndrome, the mechanisms for improvements remain unknown. Here, we hypothesize that molecular changes in the hypothalamus after vertical sleeve gastrectomy (VSG) drive the beneficial effects.

Methods: Three cohorts were used for these studies: 1) For microarray, male rats were made obese and then received sham surgery (sham), vertical sleeve gastrectomy (VSG) and were euthanized after 8 months on high fat diet (HFD). 2) For target validation studies by qPCR, a second cohort of diet-induced obese female sham and VSG rats were euthanized after 7 weeks. Hypothalamic and gastric tissue samples were processed for

mRNA. 3) For circulating hormone determination, sham and VSG male rats were sampled 6 weeks post-surgery.
Results: Among the various gene changes, the microarray data showed gastrin-releasing peptide receptor (GRPR) was down-regulated in the hypothalamus of VSG animals by 1.55 fold ($p = 0.002$) when compared to sham. qPCR assays validated this in the second cohort of rats and further showed a reduction in GRP in the hypothalamus. The stomach showed reduced GRPR and its ligand ($p<0.05$). Neuromedin B receptor (NMBR) and bombesin receptor subtype 3 (BRS3) were down-regulated in the hypothalamus ($p<0.05$). Finally, there were no changes in ad libitum fed plasma GRP; however, 6-hour fasted levels of GRP were increased in VSG rats.
Conclusion: These data show the bombesin-related peptides and their receptors are significantly affected by VSG. Further research will determine the importance of GRP signaling to the beneficial effects of bariatric surgery.

P6.09

ALTERED BLOOD-BARRIER FUNCTION IN A RAT MODEL OF THORACIC LEVEL SPINAL CONTUSION

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SCI leads to long term motor, sensory and autonomic peripheral nervous system (PNS) dysregulation which may also affect the central nervous system (CNS). The trauma of spinal injury produces local and systemic inflammation that may have durable and long-term effects. Here we test whether spinal contusion alters blood-neural barriers 4 and 14 weeks post injury when maintained on a chow or low-fat/high-fat diet respectively. Two cohorts of male, Long Evans rats received either thoracic level contusion of the spinal cord (tSCI) or sham laminectomy (Sham) or were naïve (Naïve). One group was tested 4 weeks after injury and the second group after an additional 10 weeks on low/high fat diet. Terminal experiments included deep anesthesia coupled with 1h intravenous delivery of a cocktail containing 1mg/kg Cy5-labelled dextran of 500,000 Da size, 1mg/kg neutral Texas Red-labelled dextran of 3000 Da size and 0.5 mg/kg sodium fluorescein of 300 Da size. Tissue fluorescence was determined by *ex vivo* organ fluorescence imaging using an IVIS Spectrum. In animals 4 weeks post-injury, increased relative fluorescence was measured in the ventral brain of the tSCI rats in the 3,000 da and 500,000 da size in comparison to Sham. Furthermore, increased fluorescence was measured in the tSCI spinal cord in all 3 sizes in comparison to Sham. In animals placed on either LF or HF diet for an additional 10 weeks, no difference in fluorescence was measured in the ventral or dorsal brain or spinal cord. Further work is required to understand under what conditions the permeability is normalized following spinal cord injury.

P6.10

VIABILITY OF SELECT BACTERIA ON VARIOUS SURFACES FOUND IN HEALTHCARE FACILITIES

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Healthcare-associated infections (HAIs) cause complications in large numbers of patients. According to the CDC, infections with carbapenem-resistant Enterobacteriaceae (CRE) are particularly dangerous because of their high levels of resistance to treatments. *Klebsiella pneumoniae* and *Escherichia coli* are the most common CRE causes of HAIs. Up to 50% of patients who contract these infections die due to the difficulty of treatment. Because these infections are difficult to treat, it is important to focus on preventing transmission. The goal of my research was to test the viability of common HAIs causative agents on different types of materials found in healthcare settings. Different materials were inoculated with a standard concentration of the bacteria. At set times after inoculation, the amount of bacterial growth was measured with contact plates. The number of colonies from different areas on the surfaces was counted. A progressive decrease in the number of organisms was observed. Each experiment continued for 24 hours. The experiment was repeated on different materials. Preliminary data gathered shows a tendency of these organisms to lose viability when exposed to copper. No viable colonies of *K. pneumoniae* or *E. coli* were detected after 6-8 hours of incubation on copper or copper alloys (bronze and brass). However, the test organisms grown on other materials remained viable for longer than 24 hours. Current results suggest a strong relationship between type of material on which the organism grow and the length of time of exposure on the various materials.

P6.11

TOTAL FLAVONOID CONTENTS OF TRADITIONAL MEDICINE PLANT EXTRACTS REVEAL POTENTIAL FOR PRODUCING PHYTOCHEMICALS IMPORTANT FOR TREATMENT OF CERTAIN CANCERS

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Pseudognaphalium obtusifolium, a member of the Asteraceae family, is an important plant in Native American traditional medicine. Scientific studies have identified many of its biologically active plant compounds including the large phytochemical family, the flavonoids. The flavonoids interfere with many regulatory pathways, and many studies suggest that certain flavonoids are capable of inhibiting the path of oncogenesis that leads to cancer in certain tissue types. The known flavonoids of *P. obtusifolium* can be divided into distinct structural subclasses including the flavones, flavonols, and flavanones. Total flavonoid contents of *P. obtusifolium* extracts (previously prepared using a solvent mixture of dichloromethane, hexane, and ethanol) were assessed by the aluminum colorimetric method. Serial dilutions of quercetin, a high-activity flavonol, were used to prepare a standard for comparison with each extract. A reaction mixture containing aluminum chloride, potassium acetate, methanol, and dH_2O was mixed with quercetin dilutions, incubated at RT 30min, and absorbance read at 415nm. The same reaction used for quercetin was performed for each extract. Scatter plots were used to compare extract data to a quercetin scatter plot trend line. For flavonoid activity assays, the hexane and dichloromethane extracts had 22% of the flavonoid activity of quercetin, twice that of ethanol extracts. Numerous *in vitro* and *in vivo* studies have demonstrated that flavonoids are promising natural anticancer products capable of inhibiting cancer cell growth. Since *P. obtusifolium* has significant flavonoid content, perhaps this plant holds promise for producing chemicals that may be useful in treating a variety of disorders, including certain cancers.

P6.12

BONE DENSITY OF PATIENTS IN THE JACKSON HEART STUDY

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Osteoporosis is a condition that is characterized by the bones of the patient having much less density than it should. This can cause the patient to be much more susceptible to a break or fracture as the bone is much weaker than it should be. The objective of the project was to find causes of osteoporosis in a wide group of people in order to further help prevent and treat the condition. For this IRB-approved HIPAA-compliant retrospective study, quantitative CT bone density measurements were taken of a sample of over 2800 different African Americans of both genders and all ages in the Jackson Heart Study. The measurement was the density of the lumbar of the patient (specifically the average of L3 and L4). Although the results have not been able to be fully analyzed yet, initial analysis showed that 176 patients (6.13%) had osteoporosis, 574 patients (19.99%) had osteopenia (weak bone density but not osteoporotic), and 2122 patients (73.89%) had good bone density. There are two reasons why the percentage of osteoporotic patients was fairly low. First, there were a large number of young adults with great bone density measured. The study was also on African Americans which contributed to the low percentage of osteoporotic patients. In conclusion, a majority of the patients measured did have good bone density, but these results also need to be further analyzed to find out why some patients had very low density. This can help in both preventing and treating the condition of osteoporosis.

P6.13

THE EFFECT OF SEXUAL EDUCATION ON CONDOM USAGE IN TEENAGERS, AGES 12-19 IN HINDS COUNTY

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According to the Centers for Disease Control and Prevention (CDC), student condom usage peaked and stalled at 60% a decade ago. In Mississippi, Hinds County ranks 48th in teenage pregnancy and 14th in STDs which reflects lack of condom usage among Mississippi youth. The lack of condom usage among teenagers age 12-19 is attributed the lack of sexual health education. The purpose of this research is to determine if targeted sexual education effects condom usages among African American teenagers in Hinds County. Theoretically, sexual health education increases self-reported condom usage. This research utilized secondary data analysis using findings from My Brother's Keeper, Inc's. Community Reach project that aims to reduce teenage pregnancy rates via comprehensive reproductive health training. Results from self-reported surveys completed by 162 teenagers were extrapolated from training pre- and post-test that gauged sexual health knowledge change. Results indicated that there was a 30% overall score increase in the knowledge. More importantly, there was a 41.8% increase in participants who felt that using condoms would be good for them in the next three months. Further, there was a 44.6% increase in participants who reported they would try to get their sexual partner to use condoms. In conclusion, sexual health education has a positive impact on attitudes on condom usage on teenagers in Hinds County. This study suggests that there should be greater access to sexual trainings opportunities for this priority population.

P6.14

THE ASSOCIATION BETWEEN CONDOM PERCEPTION AND CONDOM USAGE AMONG MSM

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According to Centers for Disease Control and Prevention (CDC), men who have sex with men (MSM), report the highest rates of HIV transmission. Condoms have been a staple method of HIV/STI transmission for decades. However, "condomless sex" has become a standard phenomenon. The purpose of this research is to determine how MSM perceive condom usage and if that perception reduces the probability of condom usage. Theoretically, there is a linkage between the perception of condom usage and the actual use of condoms. A secondary data analysis was conducted using results from the Minority AIDS Research Initiative (MARI) study conducted by My Brother's Keeper (MBK) Center for Research, Evaluation and Environmental and Policy Change. During the MARI study, a series of questions were posed with select MSMs (208) regarding condom usage with casual partners. The results reflected a notable number of the study participants used condoms with casual partners. Of participants reporting no condom usage, 67% of them reported dislike of condoms. Moreover, of those reporting no use due to their dislike, 100% of their partners reported dislike and non-use as well. Thus, this research supports the concept of perception affecting condom usage. It is suggested that MSM communities be offered access to alternative HIV prevention options – like PrEP – in conjunction with more education and support regarding condom usage.

P6.15

NOT REALLY THE WAY YOU PICTURED YOUR FIRST CRIB?

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The aim of this study is to determine whether informative teen pregnancy interventions are effective in promoting contraceptive use among teens aged 13-18. Survey results showed there was a significant increase in the number of individuals who found sexual classes beneficial (p=0.017) and those who decided to use a condom within the next three months (p=0.036). At the conclusion of this study, it was determined that the data supports the hypothesis of increased awareness on teen pregnancy and contraceptive use amongst teens as effective means in preventing teen childbirth. A limitation of the study would include the small sample size which is not an attributable representation of the entire population of teens in Mississippi. However, this study suggests that increased awareness of STDs and contraceptive use can decrease childbirth rates amongst teens. Promoting healthy sexual behaviors and providing additional resources for teen pregnancy prevention as well as beneficial alternatives to those who may have become pregnant can increase positive outcomes within these individuals.

P6.16

CERVICAL CANCER RISK FACTORS FOR WOMEN WITH HIV: RECOMMENDATIONS TO DECREASE MORTALITY

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The number of deaths from cervical cancer has decreased over the last 40 years; however, women with HIV have a six-fold greater chance of being diagnosed with invasive cervical cancer. Lower CD4 counts create a greater risk; hence, the chance of cancers is increased in individuals who have HIV. In the clinical latency stage, the body is still at a greater risk of developing cervical cancer than a woman living without HIV. According to the Center for AIDS Information and Advocacy, rates of Cervical Intraepithelial Neoplasia (precancerous abnormality, CIN) in women with HIV versus without HIV were 14.3% versus 4.3% for CIN1, 11.3% versus 3.6% for CIN2, and 6.8% versus 2.5% for CIN3 or worse demonstrating a disparity in HIV positive women. For HIV positive women, a bi-annual pap smear test along with regular STD testing is recommended to detect abnormal changes in the cervix and distinguish precancerous growths. Antiretroviral drugs, HPV vaccines, and protection can decrease risks. However, radiotherapy and chemotherapy are not available in many resource-limited settings for reasons of cost and limited health infrastructure thus higher rates among rural women (40%), women living in poverty (43%), and women aged 50 to 64 (47%). Therefore, easier access to healthcare would significantly decrease the risks of HIV positive women being diagnosed with cervical cancer. Thus, it is crucial to have easy access to health care. Lower cost for STD testing, bi-annual pap smears, HPV vaccines and antiretroviral therapy will decrease rates by increasing the overall health of the individual.

P6.17

REDUCING ADOLESCENT OBESITY THROUGH A HIGH SCHOOL INTERVENTION PROGRAM IN MISSISSIPPI

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While the American Medical Association classified obesity as a disease in 2013, it is still a condition that is considered preventable. Being physically active and nutritionally aware are lifestyle components that aid in preventing the disease; however, these components must be carried out habitually. It can be difficult for adults to form healthy habits, but adolescents are still forming habits daily. If high school students are exposed to such lifestyles through their schools, obesity rates could decrease and also prevent the development of obesity in adulthood. According to stateofobesity.org, Mississippi has the highest rate of obesity among high school students at 18.9% and another 17.1% of students classified as overweight. With the Mississippi Department of Education accounting for over 130,000 enrolled in high schools, these students need to incorporate healthy habits into their lifestyle. With the program, each student would have the option of eating from a fresh fruit and vegetable bar coupled with daily walks with their classes. The intervention would be school wide and incorporated into the everyday lives of teachers and students. Every student in the school would be weighed twice a year while the number of students choosing to eat from the fresh bar would be documented by lunch registers. With the CDC publishing guidelines that identify school policies and practices most likely to be effective in promoting lifelong physical activity and healthy eating, this in-school intervention could form healthy habits and thus reduce adolescent and then adult obesity rates.

P6.18

ASSESSING THE PRIORITIES OF URBAN AND RURAL COMMUNITIES RELATED TO FARMERS MARKETS

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The purpose of my project is to show the priorities of urban and rural communities related to farmers markets. The secondary data analysis including findings collected from farmers market participants in Hinds County and Natchez/Wilkinson County. The hypothesis of this analysis is that because of the differences in location and demographics, the priorities related to farmers market would be different. In both Jackson and the Southwest Delta region, most of the people that visited these markets were women, and the main reason for visiting the market, amongst men and women, was to support local farmers (Jackson: 53%, Natchez: 80%). In Hinds county, 88% of people that visited the market were African American, and 82% of people that visited the market in Natchez/Wilkinson counties were Caucasian. With these different demographics, find-ings still show that these counties had many similarities. These include shopping at grocery stores outside of the farmers market and agreeing that the produce in the grocery stores are about the same price as those at the markets. In the counties the farmers market visited, the citizens had intentions of consuming more fruits and vegetables in the future.

P6.19

THE IMPORTANCE OF THE LANGUAGE ACCESS PLAN

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This project examines the effects of budget cuts on the termination of HIV prevention and testing funding in Mississippi in comparison to California (excluding Los Angeles and San Francisco). To lessen the severity of effects of these cuts remaining federal funds were redirected. This analysis projects the impact of budget cuts and distribution of resources on HIV transference and HIV treatment expenses. We estimated the effect of budget cuts and reallocation for California health departments on the number of individuals living with or at-risk for HIV who received HIV prevention services. We used a Bernoulli model to estimate the number of new infections that would occur annually as a result of the changes, and assigned lifetime treatment costs to new infections. We explored the effect of redirecting funds to more cost-effective programs and the potential effect of allocating funds by transmission category. We estimated that cutting HIV prevention resulted in 55 new infections associated with $20 million in lifetime treatment costs. Redirecting funds to more cost-effective programs averted 15 HIV infections. If HIV prevention funding were allocated proportionately to transmission categories, we estimated that HIV infections could be reduced below the number that occurred annually before state budget cuts.

Reducing funding for HIV prevention may result in short-term savings at the expense of additional HIV infections and increased HIV treatment costs. Existing HIV prevention funds would likely have a greater impact on the epidemic if allocated to more cost-effective programs and populations most likely to acquire and transmit the infection.

P6.20

ARE PEOPLE LIVING WITH HIV MORE DEPRESSED THAN PEOPLE LIVING WITHOUT HIV

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In Society, People believe that people that are living with HIV are

more depressed than people that are not living with HIV. Depression is a mental health disorder characterized by a persistently depressed mood or loss of interest in activities, causing significant impairment in daily life. Human immunodeficiency virus (HIV) is a virus that is sexually transmitted that stop your body the ability to fight off organism that causes disease. There are over 200,000 people around the world that are mentally, physically and emotionally depressed. It can cause the affected person to suffer greatly and function poorly at work, at school and in the family. The purpose of this project is to show that being HIV positive is not the cause of depression around the world. The Hypothesis was tested using My brother's keeper Shield intervention 2016 questioner survey that was giving to people living with HIV and people that are not living with HIV. The result shows, 26.1% of people living with HIV stated that they are rarely or never felt depressed; while, 35.9% felt depressed. The result of people living without HIV, 73.9% rarely or never felt depressed; while, 64.1% felt depressed. As a collective, the stigma that people living with HIV are more depressed than those living without should cease.

P6.21

INVESTIGATING THE ENVIRONMENTAL FACTORS OF BIRTH DEFECTS AMONG CHILDREN NATIONALLY VS. STATE LEVEL

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The Center for Disease Control and Prevention reported that 3 percent of all children born in the US have major malformation at birth, translating to 130,000 US children per year. Although 70 percent of major birth defects are unknown, 10 percent of birth defects are due to environmental agents, drug, biological, and nutritional factors and 20 percent are genetic or associated with chromosomal changes. Comparatively, the Mississippi Department of Health reported 347,821 live births in 2000-2007 for Mississippi. Out of those live births 7,520 birth defects were reported. Because some children had more than one birth defect, the total number of children with birth defects is 6,086 with this being from age's birth to seven years old. Eighty-three percent were reported to have one major birth defect, 13 percent were reported to have 2 major birth defects, and 4 percent were reported to have three or more types of birth defects. In Mississippi, major birth defects were statistically higher in males (2.38%) than among females (1.93%). When it comes to fetal exposure, the CDC says any exposure that occurs by way of the mother is typically considered environmental. Lack of folic acid, poverty, and tobacco use are the most common environmental factors of birth defects. Because of these factors, there are several risk factors which include spinal bifida, anencephaly, cleft lip/ palate, and malnourishment. At the conclusion of this study, it was determined, that the leading cause of birth defects nationally is tobacco use whereas in Mississippi it is poverty.

P6.22

ASSESSING THE EFFECTIVENESS OF MANY MEN, MANY VOICES (3MV) INTERVENTION IN THE MISSISSIPPI GULF COAST REGION

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The Mississippi Gulf Coast region is the second highest district in Mississippi in regards to number of new cases of HIV each year. Among those infected with HIV, the prevalence of HIV is disproportionately high for African-American men who have sex with men (MSM). The purpose of this study is to determine the effectiveness of an HIV Prevention intervention with Black MSM in this region. We hypothesize that an HIV prevention intervention would be effective in motivating participants to reduce risky sexual behaviors and increase their use of condoms. Many Men, Many Voices (3MV) is an evidence-based intervention program that targets African-American MSM to prevent STDs and HIV through 7 interactive group sessions. The 3MV program was implemented in the Mississippi Gulf Coast in 10 waves with a total of 95 participants from February 2016 to May 2017. The analysis included pre- and post- 3MV intervention survey responses. Results show increased community connectedness to the Black gay community, higher confidence levels in getting a sexual partner to use a condom, improved attitudes of using a condom for dominant and receptive partners, and increased confidence in their skill to use a condom efficiently. It is concluded that 3MV was not only effective in encouraging participants to reduce risky sexual behaviors and increase their use of condoms but as well as reducing social and cultural tensions with increased community connectedness. The proven effectiveness of this study supports the use of 3MV as an HIV prevention intervention for Black MSM.

P6.23

THE ASSOCIATION BETWEEN PATIENT-REPORTED EXPOSURE AND RECTAL GONORRHEA AND CHLAMYDIA IN YOUNG BLACK MSM

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Sexually transmitted diseases are beginning to rise in the country once again. Among African Americans, young males who have sex with men (MSM) are an extremely high risk population for transmission of sexually transmitted diseases.[1] The rectum is a sensitive part of the body that is more susceptible to the pathogens that cause these diseases.[2] Often the sexually transmitted diseases gonorrhea and chlamydia are presented as co-infections in those who acquire them. The data from this study analyzes the incidence of the co-infection of gonorrhea and chlamydia from Open Arms Healthcare Clinic. The objective of this study is to detect the association of the sexually transmitted diseases gonorrhea and chlamydia in young black men who have sex with men.

P6.24

HISTOPATHOLOGICAL ANALYSIS OF THE F344 RAT LUNG UPON EXPOSURE TO RETENOIC ACID, OVALBUMIN, MOLD SPORES AND CITRAL

Ibrahim Farah[1], Carlene Holt-Gray[1], Joseph Cameron[1], Michelle Tucci[2], Hamed Benghuzzi[2]
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The objective of this study was to evaluate the histopathological implications of such exposure in vivo. This IACUC approved in vivo study used Fischer 344 rats (n = 80 ; 229 to 273g), which were randomly assigned to controls as well as ovalbumin and mold-sensitized treatment groups (0.80 mg/kg and $1X10^9$ mold spores combined from 4 strains/100 µl intra-tracheal; all others were dosed by intra-peritoneal injection at days 1 and 7 with 80 mg/kg each of ATRA as well as 20 and 50 mg/kg each of Citrals 1 or 2 individually or in combination to represent all four chemicals and

mold spores treatments.. Positive and negative controls for each treatment were also included in the study. Animals were housed in rat cages at the JSU Research Animal Core Facilities and were placed on a 12:12 light–dark cycle. A standard rodent diet and water access were provided adlibidum. All animals were sacrificed on day 21 and lung tissues were processed for histopathology. Slides were prepared and were digitized for comparison of tissues pathology. Results showed that exposure of the F344 rats to ovalbumin and ATRA showed various levels of lung tissue damage that was ameliorated by Citral 2 in combination. Mold and ATRA exposure caused various levels of lung tissue damage that was reversed by C1 in combination. Taken together, the study showed that there are variable pathologic inflammatory responses from the interaction of ovalbumin, Citrals, mold spores and retinoic acid, and that Citrals in combination were reversing lung tissue pathologies.

P6.25

METABOLIC DISEASE IN A RODENT MODEL OF THORACIC LEVEL SPINAL CONTUSION

Brittany Duncan, Kwamie Harris, Alexandra Himel, Raymond Grill, Bernadette Grayson
University of Mississippi Medical Center, USA

Metabolic Syndrome (MetS) is a significant long-term problem for chronic spinal cord injury (SCI) patients. MetS is a compilation of diseases which includes obesity, type-2 diabetes, dyslipidemia and cardiovascular disease and is globally on the rise. MetS may be exacerbated in the SCI population for a variety of reasons which may include altered physical activity, caloric consumption and body composition that may accelerate the trajectory towards MetS in SCI persons. Here we determine the effect of diet on metabolic parameters in a clinically-relevant rat model of spinal contusion.

Adult, male, Long Evans rats (200-225 g) received either thoracic SCI (tSCI) or sham laminectomy (Sham). Rats were allowed to recover on normal chow for 4 weeks and then placed on either a low-fat (LFD) or high-fat diet (HFD) for an additional 12 weeks. Four weeks after injury, tSCI rats had reduced body mass ($p< 0.05$) and lean mass ($p< 0.05$) with no impact on fat mass. After placement on special diets, tSCI rats still showed lower body weight as an effect of injury, $p(injury) < 0.05$. Lean mass continued to be lower in tSCI animals, $p(injury) < 0.01$, but fat mass was significantly increased in all HFD-fed rats, $p(diet) < 0.05$. Despite differing body weights, there were no differences in the plasma triglycerides taken in fed and fasted states between the sham and tSCI rats suggestive that their smaller mass does not confer any metabolic health benefit. Further work is needed understand the metabolic health ramifications on the injured cord.

P6.26

REVERSAL OF ALCOHOL-INDUCED COGNITIVE DEFICITS BY AN INVERSE AGONIST SELECTIVE FOR α5 GABAA RECEPTORS

John Overton, Cassie Chandler, Daniela Rüedi-Bettschen, Jaren Reeves-Darby, Ian Taylor, Donna Platt
University of Mississippi Medical Center, USA

Cognitive deficits are a hallmark of prolonged heavy alcohol consumption, and may increase the vulnerability for relapse in alcoholics. Compounds demonstrating cognitive-enhancing properties are gaining traction as adjunct therapies to behavioral treatments for alcohol use disorders (AUDs). The hippocampus and surrounding parahippocampal regions are brain areas particularly susceptible to alcohol-induced damage. We evaluated the ability of L-655,708, an inverse agonist selective for $\alpha5GABA_A$ receptors (which are predominately expressed in the hippocampus) with demonstrated cognitive-enhancing properties, to reverse alcohol-induced deficits in novel object (NOR) and novel place (NPR) recognition tasks, which are dependent upon the hippocampus and parahippocampal regions. Adult male Sprague Dawley rats were allowed two months access to water and 5, 10, and 20% alcohol solutions. NOR/NPR testing occurred over two days following this free access period. Each test consisted of three 5 minute trials spaced an hour apart (habituation, object exposure, object test). During the object test, a familiar object was replaced with a novel one for NOR; and for NPR, a familiar object was moved to a novel location. Half of the rats received L-655,708 prior to the object exposure. L-655,708 significantly reversed deficits in novelty detection for the NOR task. No differences were seen between groups for the NPR task; however, there was a trend towards the treatment group spending more time in the familiar object's previous location. To the extent these tasks tap into deficits relevant for relapse, the findings support the use of $\alpha5GABA_A$ receptor inverse agonists as adjunct therapies for AUDs. Support: AA16179

P6.27

DOES HYPOXIA AND/OR ENDOTHELIN AFFECT CYR61 PROTEIN EXPRESSION IN SMOOTH MUSCLE CELLS DERIVED FROM UTERINE FIBROIDS?

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University of Mississippi Medical Center, USA

PURPOSE: Studies have identified imbalances in angiogenic factors such as cysteine -rich protein 61 (Cyr61) in women with uterine fibroids. Hypoxia has been shown as a possible mechanism to increase endothelin-1 and lead to aberrant expression of Cyr61. We hypothesize that hypoxia decreases CYR61 expression via activation of the ET_A receptor. METHODS: Fibroid and myometrium tissues were collected from women undergoing hysterectomies. Tissue was washed in phosphate-buffered-saline and digested in collagenase-solution for 6hrs. Smooth muscle cells were grown until confluent at 37°C prior to trypsinization and seeding at 50,000 cells/well. Cells were cultured under normoxia/hypoxia for 24hrs with/without 1µM of ET_A antagonist. Supernatant was collected for ELISA and SMCs harvested for western blot. Results were analyzed with ANOVA and paired t test. RESULTS: There was not a significant difference in CYR61 secretion between mSMCs and fSMCs exposed to hypoxia ($p=0.823$). CYR61 secretion was decreased in fSMCs exposed to hypoxia compared to normoxic fSMCs ($p=0.03$), similar results were seen with mSMCs ($p=0.03$). Blockade of the ET_A receptor prevented a hypoxia-induced decrease of CYR61 secretion in fSMCs ($p=0.521$) and in mSMCs ($p=0.339$). Western blot analysis showed a trend for increased CYR61 due to hypoxia. CONCLUSION: These results suggest that hypoxia decreases CYR61 secretion from SMCs and also that blockade of the ET_A receptor prevents these decreases. Acknowledgement: This work was funded by an IDeA from the NIGMS-(P20GM103476), ASRM-NIG; NIH-LRP and ABT-627-(#REN-11-0065).

P6.28

THE "HAVES" AND "HAVE NOTS": AN ANALYSIS OF THE IMPACT SOCIOECONOMIC STATUS HAS ON TEEN PREGNANCY RATES IN CENTRAL MS

TreOnna Readus[1], Rushunna Harris[2], T'Juan Rucker[3]
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Mississippi has one of the highest rates of Teen Pregnancy in the United States. According to recent statistics, Mississippi ranks 3rd in teen birth rates among girls ages 15-19 (34.8 per 1,000 girls). This research will examine the impact socio-economic factors has on the rates of teen pregnancy in Madison, Rankin, and Hinds counties. To analyze socioeconomic factors and teen pregnancy in these counties, statistics from the Mississippi State Department of Health and County Health Ranking documents were utilized. Hinds county ranked the highest in teen pregnancy among the Tri-County Area followed by Rankin county in the year of 2016. As of 2016, Hinds county teen pregnancy rate was 52 per 1,000 females ages 15-19 compared to Rankin and Madison counties whose teen pregnancy rates were 41 and 33 per 1,000 females ages 15-19. Hinds county median household income is $37,324, whereas Rankin county median income is $58,801 and Madison county median income is $64,376. Hinds county had a graduation rate of 70% compared to Madison and Rankin counties graduation rates were 83% and 85% as of 2016. Research data reveals the counties with low socio-economic status have higher teen pregnancy rates and counties with higher socio-economic status have lower rates of teen pregnancy, which clearly suggests that socio-economic status has a direct impact on teen pregnancy rates.

P6.29

DOES THE MENTAL AND EMOTIONAL IMPACT OF STRESS CAUSE PSYCHOLOGICAL CONSEQUENCES?

Kayla Rice[1], Kheri Strong[2], Tameka Curtis[3]
[1]Jackson State University, USA, [2]Alcorn State University, USA, [3]My Brother's Keeper, Inc., USA

The aim of this study is to determine how many individuals are affected by psychological consequences of mental health. Mental Health includes the emotional, psychological, and social well-being. There are many different mental illnesses, including depression, schizophrenia, attention deficit hyperactivity disorder (ADHD), autism, and obsessive-compulsive disorder. Each illness alters a person's thoughts, feelings, and/or behaviors in distinct ways. Even though there are many different illnesses there are treatments to help. Data was collected from Web D- Intellectual Disability Information and The National Center for Biotechnology Information- Morbidity of Psychiatric Disorder. Additionally, graph results were done based on various mental health questions. Data was also collected from Open Arms Healthcare Center. Questionnaires were issued to the participants during patient registration. Data was randomly selected from 50 men and 50 women ranging from ages 18 through 55. There were several questions issued to the Becoming a healthier you participants based on their mental well-being. Mental health is more than just being incapable of managing individual's daily lives. In conclusion, we have studied that mental health affects the everyday life of individuals. It affects the emotional impact of the stress of the overall well-being and it also causes psychological consequences. Based on the data the no percentages on depression were higher than yes percentages. The data also shows that more individuals have attempted suicide before. It also shows that attempted suicide in the African American race was higher than the Caucasian race.

P6.30

***BODY II BODY*: A REPRODUCTIVE HEALTH AWARENESS CAMPAIGN FOR ADOLESCENT STUDENTS AGES 13-18**

Ambresha Johnson[1], Tybrea Vivians[2], Terra Cousin[3]
[1]Jackson State University, USA, [2]Alcorn State University, USA, [3]My Brother's Keeper, Inc., USA

According to the CDC, in 2014 nearly half of the 20 million people diagnosed with HIV/STDs were ages 15-24. In 2014, Mississippi ranked fourth in HIV, fourth in Chlamydia, and third in Gonorrhea. These infections were highest among individuals ages 15-29. Many young people engage in sexual risk behaviors resulting in unintended health outcomes such as HIV/STDs infection. Because of various factors, many young people, especially adolescents, lack knowledge about HIV/STDs infection. The *Body II Body* campaign aims to educate adolescents ages 13-18 about the contraction and prevention of HIV/STDs through a community outreach approach (i.e. educational sessions) in urban and rural areas. At two educational sessions (one urban – Jackson, MS, one rural – Port Gibson), adolescents received information about HIV/AIDS and STDs. Each adolescent was given a pre- and post-test to assess their level of knowledge before and after the session, and completed a course satisfaction survey with the added benefit of a resource guide. In the rural area, results showed a 1.83 difference in pre- and post-test assessments yielding a 12.2% change in knowledge. In the urban area, results showed a 2.80 difference yielding an 18.7% change. Even though the urban area had a larger increase in knowledge, adolescents in rural areas scored higher on their pre-tests, which signifies that adolescents in rural areas had more prior knowledge than those in urbanized areas. Jackson is an area with more services and outreach teams. Therefore, public health workers conduct more outreach and educational sessions in rural areas.

P6.31

IS YOUR FRIENDZONE BENEFICIAL? *THE INFLUENCE OF SOCIAL SUPPORT ON BODY IMAGE, OPTIMISM, AND SEXUAL PRACTICES*

Kambria Badgett[1], Xavier Short[2], Obie McNair[2]
[1]Alcorn State University, USA, [2]Rust College, USA

African-American men who have sex with men (AAMSM) have been the targeted group associated with HIV since the 1990s. AAMSM are more at risk to contract the virus, which increases for those between the age of 13-24. Social networks and their input on practicing safe sex may/may not shape the decisions made by the individuals during the time of having condom-less anal intercourse. For this project, we analyzed the effects of optimism, body image, and social support to see if they play a role in the lack of condom usage within AAMSM.

For this cross-sectional analysis, we included data from 333 AAMSM participants that enrolled in The MARI Study. The analysis consisted of descriptive statistics and Pearson's and Spearman correlations to determine associations. The variables included in our analysis focused on areas of sexual behavior, optimism, social support, and body image. The results showed a heavy influence an inner social support system has regarding sexual engagement, body image, and optimism. We discovered a positive correlation between opinions regarding condom use and casual sex partners. There was also a positive correlation between negative perceptions of body image and social support. We found a positive correlation between optimism and inner social support networks. The effects of social support, optimism, and

body image, are all intertwined and extremely dependent on one another. We recognized that decisions made by the individual's social circles influenced the choices made to not practice safe sex. Future research should examine the variable relationships with social support more deeply.

P6.32

HISTOMORPHOMETRIC ANALYSIS OF THE KIDNEY GLOMERULI OF OVARIECTOMIZED RATS FOLLOWING SUSTAINED DELIEVER Y OF ESTROGEN REPLACEMENT THERAPY

Alexis Crockett[1], Michelle Tucci[2], Joseph Cameron[1], Hamed Benghuzzi[2], Zelma Cason[2]

[1]Jackson State, USA, [2]University of Mississippi Medical Center, USA

Recent research has shown that older women who are taking hormone replacement therapy containing estrogen (E-HRT) had increased blood pressure and formation of kidney stones. Because kidney stones and blood pressure are influenced by a variety of lifestyle and other related health factors, the true impact of E-HRT on kidney ultrastructural changes has not been fully determined. The goal of our study was to evaluate the kidney of ovariectomized (OVX) rats and determine the role of E-HRT at 2, 4 and 8 weeks post-implantation of a tricalcium phosphate (TCP) delivery device containing estrogen. Twenty female Sprague Dawley rats were divided into four equal groups (intact control, OVX control, SHAM (non-drug loaded TCP capsule), and TCP+E (implants containing 5 mg of estrogen benzoate)). Body weights, organ weights, and kidney tissues (glomeruli length, width and area) were measured, evaluated, and the results were compared for statistical differences. There was a statistically significant increase in glomerular area, length, and width. Sustained delivery of estrogen reversed weight gain and the kidney changes seen in the OVX control and SHAM treated animals. Removal of the ovaries results in loss of estrogen and increases in body weight, kidney wet weight, and overall kidney size, with substantial changes in the glomeruli which were reversed by HRT.

P6.33

AIF-1 IN ASSOCIATION WITH TLR-2 INDUCES PROINFLAMMATORY RESPONSE IN MONOCYTES AFTER ISCHEMIA REPERFUSION (IR)

Olga McDaniel, Allen Simeone, Larry McDaniel

University of Mississippi Medical Cnter, USA

Inflammatory responses fundamentally influence the short and the long term performance of cardiac allograft after transplantation. Genes associated with innate immunity are prime activators of early inflammatory responses to an allograft and that may lead to host-induced inflammation and organ rejection. We have shown in a rat model of the left anterior descending (LAD) artery occlusion, the AIF-1 and TLR-2 gene transcripts were significantly elevated in tissue monocytes of left ventricle after ischemia-reperfusion (IR). We hypothesized that endogenous substances or damage-associated molecular patterns (DAMPs), released during organ procurement IR such as AIF-1 by interacting with cardiac-resident TLR-2 could promote activation of innate immune responses in cardiac monocytes. Functional activity of AIF-1 was confirmed in an *in vitro* model using human coronary vascular smooth muscle cells and monocytes, treated with IFN-g, and HEK293 cells transfected with h-TLR-2 or TLR-4 in which was determined by production levels of IL-18 cytokine. AIF-1 treated cells demonstrated 1.25 to 4.5 fold, increase of IL-18 secretion in HEK-293 transfected cells with TLR-2. The monoclonal antibody (mAb) to TLR-2 blocked the activation of human HEK-293 by AIF-1. The IL-18 production was significantly reduced with mAb to TLR-2, an indication of an interference of the interaction. AIF-1 peptides generated from N-terminus and C-terminus of AIF-1 were less effective. In conclusion, characterization of AIF-1 as an endogenous ligand for TLR-2 in the process of myocardial IR and induction of inflammatory response may have potential for the development of therapeutic inhibitors for clinical applications and further to improve transplantation outcomes.

P6.34

MCF-7 BREAST AND CACO-2 COLORECTAL ADENOCARCINOMA CELL APOPTOTIC PROTEIN SIGNALING PATHWAYS BASED ON ANTIBODY ARRAY ANALYSIS FOLLOWING DICHLOROMETHANE-DERIVED PHYTOCHEMICAL TREATMENT

Carson Huynh, Leah Bowlin, Brandon Marcella, Angela Whittom Reiken

Mississippi College, Clinton, MS, USA

Since anti-carcinogenic phytochemicals have been identified in Pseudognaphalium obtusifolium extracts, we used high-quality dichloromethane-derived extract prepared by rotary evaporation to treat MCF-7 human breast ductal epithelial adenocarcinoma and Caco-2 colorectal adenocarcinoma cells. Membrane-based antibody arrays were used to determine changes in expression of 43 apoptotic pathway proteins. MCF-7 cell proliferation was drastically reduced and there were extreme changes in cell morphology. Caco-2 proliferation was only slightly reduced with no observable morphological changes. Using antibody array data and SABiosciences Pathways signaling database information, we constructed proposed signaling pathways to depict possible roles of each protein and compare the data. The most notable change in MCF-7 was extreme downregulation of survivin, the protein most upregulated in Caco-2. Upregulated proteins in both Caco-2 and MCF-7 included p53, caspases 3 and 8, and SMAC. HSP60 and HTRA were significantly decreased for MCF-7, but significantly increased for Caco-2. Based on apoptotic signaling data, MCF-7 exhibited protein expression consistent with apoptosis following extract treatment whereas Caco-2 did not. MCF-7 breast cancer cells are estrogen-dependent, and aromatase (cytochrome p450) converts androstenedione to estrone, then estrone to estrogen. Since apoptosis was not initiated in Caco-2 cells, we suspect the extract causes MCF-7 apoptosis through the aromatase signaling pathway. XenoSite was used to predict xenobiotic sites on known extract molecules that can be modified by aromatase. Predicted target results included cytochrome P450 enzymes, estrogen receptor, and estradiol 17-beta-dehydrogenase-1. We are currently working to measure changes in aromatase activity in dichloromethane-derived extract-treated MCF-7 cells.

Friday, February 23, 2018

MORNING

RoomTC Ballroom II

7:30-7:45 a.m. HSD Business Meeting

Oral Presentation I: Molecular/Cell Biology

Moderators: Larry McDaniel, PhD. and Gouri Mahajan, PhD. University of Mississippi Medical Center

O6.01

8:00 VIRULENCE OF ENCAPSULATED STREPTOCOCCUS PNEUMONIAE IS INCREASED UPON EXPRESSION OF PNEUMOCOCCAL SURFACE PROTEIN K.

Haley Pipkins, Jessica Bradshaw, Lance Keller, Larry McDaniel

University of Mississippi Medical Center, Jackson, MS, USA

Streptococcus pneumoniae is a serious human pathogen associated with numerous diseases. Current S. pneumoniae vaccines specifically target the capsular polysaccharide of a limited number of pneumococcal serotypes. This selective pressure forces vaccine-targeted strains to mutate and has led to an increased distribution of nonencapsulated S. pneumoniae (NESp). Cocolonization by encapsulated pneumococci and NESp within the nasopharynx increases the opportunity of intra-species genetic exchange. Acquisition of NESp genes by encapsulated pneumococci could alter virulence and help vaccine-targeted serotypes persist in the host. The purpose of this study was to investigate the risks associated with encapsulated pneumococci obtaining the NESp virulence protein PspK. Adhesion and invasion assay were performed using human epithelial cells. In vivo models assessing murine nasopharyngeal colonization, murine pneumonia, and chinchilla otitis media (OM) were also used. PspK expression increased encapsulated pneumococcal adhesion and invasion of lung epithelia and enhanced virulence during pneumonia and OM. Additionally, PspK increased nasopharyngeal colonization, persistence in the lungs, and persistence in the middle ear when expressed in a capsule deletion mutant. Competition experiments demonstrated encapsulated pneumococci expressing PspK also had a selective advantage in both the lungs and nasopharynx. We conclude PspK increases encapsulated pneumococcal virulence during pneumonia and OM. PspK also partially compensates for loss of virulence in the absence of capsule and provides a selective advantage in a competitive environment. Therefore, acquisition of PspK increases encapsulated virulence in a condition-dependent manner. Together, these studies demonstrate risks associated with pneumococcal intra-species genetic exchange and emphasize the need to re-evaluate pneumococcal preventatives.

O6.02

8:15 ALTERED NEURO-INFLAMMATORY GENE EXPRESSION IN HIPPOCAMPUS IN MAJOR DEPRESSIVE DISORDER.

Gouri Mahajan[1], Eric Vallender[1], Michael Garrett[1], Lavanya Challagundla[1], JC Overholser[2], G Jurjus[3], Lesa Dieter[2], Maryam Syed[1], Damian Romero[1], Hamed Benghuzzi[1], Craig Stockmeier[1]

[1]University of Mississippi Medical center, USA, [2]Case Western Reserve University, USA, [3]7Louis Stokes Cleveland VA Medical Center, USA

Major Depressive Disorder (MDD) is a common psychiatric disease for which available medications are often not effective. Decreases in hippocampal volume with increasing duration of MDD suggest altered gene expression. The high prevalence of MDD and modest response to existing therapies compel efforts for better molecular understanding and treatment of MDD. Tissue punches from the dentate gyrus were collected from 23 pairs of MDD and psychiatrically-normal control subjects. Total RNA was isolated and whole transcriptome paired-end RNA-sequencing was performed using an Illumina NextSeq 500. For each sample, raw RNA-seq reads were aligned to the Ensembl GRCh38 human reference genome. Analysis revealed 30 genes differentially expressed in MDD compared to controls (FDR<0.05). Downregulated genes included several with inflammatory function (ISG15, IFI44L, NR4A1) and GABBR1, while up-regulated genes included several with cytokine function (IL-32, CCL2), angiogenesis inhibitors (ADM, ADAMTS9), and the KANSL1 gene, a histone acetyltransferase. Similar exploratory analyses of specific subsets of MDD subjects (suicide/non-suicide, single/multiple episodes, and male/female) yielded analogous, although not identical results. Enrichment analyses identified an over-representation of inflammatory signaling pathways (interferon/IL-6) significantly altered in the hippocampal dentate gyrus in MDD. Together, these data associate neuro-inflammation, potentially mediated by microglia with pathological effects on astrocytes, as playing a crucial role in MDD. These findings support continued efforts to identify adjunctive approaches towards the treatment of MDD using drugs with anti-inflammatory and neuroprotective properties. P30GM103328; P20GM104357; P20GM103476.

O6.03

8:30 EVALUATION OF RYANODINE RECEPTORS IN LYMPHATIC MUSCLE CELLS.

Michelle Everett[2], Brittney Garner[1], Terry Fletcher[1], Amanda Stolarz[1], Nancy Rusch[1]

[1]University of Arkansas for Medical Sciences, USA, [2]Mississippi College, USA

Lymphedema is the accumulation of protein-rich fluid in interstitial tissue that results from inadequate lymphatic drainage. Lymphedema either can be caused by genetic factors or develop secondarily to cancer treatments including surgery, radiation, and chemotherapy. Importantly, lymphedema may become irreversible and no pharmacological therapies are available to treat it. The lymphatic system normally maintains fluid homeostasis by spontaneous rhythmic contractions of lymph vessels, which return lymph fluid from the tissues to the central venous circulation. These spontaneous contractions critically rely on the cyclic elevation of calcium in lymphatic muscle cells (LMCs). Thus, activation or inactivation of calcium channels in LMCs can have profound effects on lymphatic contractions. Most studies have focused on the contribution of voltage-gated calcium channels in the plasma membrane to lymphatic contractile function, and largely ignored the role of intracellular ryanodine receptors (RyRs), which are calcium-release channels located in the sarcoplasmic reticulum (SR). In this study, we evaluate the expression of RyRs in LMCs. The relative abundance of the three RyR isoforms (RyR1, RyR2, RyR3) is tissue- specific; however, based on previous reports suggesting LMCs are an unique hybrid of striated and smooth muscle, we hypothesized that all three RyR isoforms are expressed by LMCs. To test this hypothesis we will use immunocytochemistry, Real-Time Polymerase Chain Reaction (RT-PCR), and Western blot to establish which RyRs isoforms are present in the LMCs of rat mesenteric lymph vessels.

O6.04

8:45 OLIGOPEPTIDE BINDING PROTEINS ALIC AND ALID ALTER PROTEIN EXPRESSION AND MEDIATE VIRULENCE OF NON-ENCAPSULATED STREPTOCOCCUS PNEUMONIAE.

Jessica Bradshaw, Haley Pipkins, Larry McDaniel

University of Mississippi Medical Center, Jackson, MS 39216, USA

Nonencapsulated Streptococcus pneumoniae (NESp) is an emerging human pathogen that colonizes the nasopharynx and is associated with noninvasive diseases such as otitis media, conjunctivitis, and nonbacteremic pneumonia. Recently, surveillance studies have linked NESp expressing oligopeptide binding proteins AliC and AliD with severe, invasive disease. Therefore, we hypothesize AliC and AliD enhance the pathogenic potential of NESp. In this study, we compared proteomes of wild type NESp MNZ41 and an isogenic mutant containing a deletion of both aliC and aliD (JLB01) to investigate the effect of AliC and AliD on NESp physiology. Comparative proteome analysis revealed pneumococcal surface protein CbpAC was significantly downregulated in JLB01 relative to MNZ41. Thus, we created an isogenic deletion of cbpAC in MNZ41 (JLB10) and examined the impact of CbpAC on NESp virulence. Pneumococcal adherence to human Detroit 562 pharyngeal cells was assessed. To examine nasopharyngeal colonization, C57BL/6 mice were intransally challenged with pneumococci. We also utilized flow cytometry to investigate binding of host immune effectors on the surface of viable NESp. Our study demonstrates deletion of cbpAC results in significantly decreased adherence to pharyngeal epithelial cells and attenuates murine nasopharyngeal colonization. Additionally, flow cytometry indicated NESp expressing CbpAC had less human C3b deposited on the bacterial surface and were able to sequester nonspecific IgA. Altogether, this study highlights the role of AliC and AliD in NESp pathogenesis. Furthermore, CbpAC expression enhanced NESp virulence by aiding in both adherence to epithelial cells and host colonization, as well as facilitating evasion of host immune effectors.

O6.05

9:00 INTERACTIONS BETWEEN GENETICS AND LIGANDS IN MU-OPIOID RECEPTORS BIAS THE DOWNSTREAM SIGNALING PATHWAYS.

Xiao Zhang[1], Shaurita Hutchins[2], Robert Gilmore[2], Eric Vallender[2]

[1]Program in Neuroscience, University of Mississippi Medical Center, USA, [2]Department of Psychiatry and Human Behavior, University of Mississippi Medical Center, USA

Mu-opioid receptors, which used as key targets for analgesics, are G protein-coupled receptors (GPCRs). Understanding the GPCR downstream signaling pathways in mu receptors are proposed to benefit the development of high efficient analgesics with minimized side effects. Mu receptors have several genetic mutation forms in human, some of which have been shown to affect their pharmaceutical responses, but the molecular mechanism is unclear. So here, we examined whether these mu polymorphisms have effects on their GPCR signaling pathways. Three human origin polymorphisms (A118:C17, G118:C17 and A118:T17) and two functional paralleled monkey origin polymorphisms (C77 and G77) were examined. Frist, we transduced responsible luciferase reporters from four pathways (NFkB, cAMP, MAPK/ERK & JNK) into three cell lines (SK-N-MC, CHO and HEK 293) by lentivirus, then we transfected a specific variation of the mu receptor plasmids and generated concentration response curves with DAMGO, beta-endorphin and morphine. Our previous work has demonstrated the effects of both human and rhesus polymorphisms on the cAMP signaling pathway for studied ligands. For the NFkB signaling pathway, in both humans and rhesus macaques, significant differences in potency of morphine, betaendorphin have been observed, but not DAMGO. Both human C17:G118 and T17:A118 have higher potencies for these ligands. A similar pattern is seen in the derived G77 allele in rhesus macaques. Preliminary data suggests that mu polymorphisms may exert their effects through differential downstream signaling and ligand potencies. This has implications for understanding how genetic differences affect novel biased ligands, which ultimately help to create personalized Mu analgesics.

O6.06

9:15 PREVALENCE AND ASSOCIATED VIRULENCE OF NON-ENCAPSULATED STREPTOCOCCUS PNEUMONIAE.

Caleb Martin, Jessica Bradshaw, Haley Pipkins, Larry McDaniel

University of Mississippi Medical Center, Jackson MS, USA

Streptococcus pneumoniae (pneumococcus) is a bacterium that colonizes the human nasopharynx and also causes diseases such as meningitis, otitis media, and pneumonia. Current pneumococcal vaccines protect against disease associated with encapsulated strains but elicit no protection against nonencapsulated S. pneumoniae (NESp). Increased isolation of NESp during disease has occurred following vaccine implementation. The purpose of this study was to define NESp prevalence among Mississippians presenting with disease and determine virulence mechanisms associated with isolated NESp. Pneumococcal clinical isolates were obtained from the UMMC surveillance laboratory from October 2015 to July 2016. Polymerase chain reaction (PCR) was used to classify 35 isolates based on the presence of four genes: cpsA, pspK, aliC, and aliD. Antibiotic susceptibility was also examined. Bacterial adherence and invasion was investigated using A549 pulmonary and Detroit 562 pharyngeal epithelial cells. Pneumococcal biofilm production was also assessed. PCR analysis revealed that 3 out of the 35 isolates were NESp. Of the 3 NESp isolates, two encoded aliD and one encoded pspK. All NESp isolates were resistant to commonly prescribed pneumococcal antibiotics. NESp strains adhered greater to pharyngeal cells in comparison to pulmonary cells, but these strains did not efficiently invade epithelial cells. Additionally, NESp strains were capable of forming dense biofilms. Altogether, NESp isolated in Mississippi during clinical presentation of disease were found to be resistant to multiple classes of antibiotics and expressed phenotypes that would enhance persistence in a host. Further surveillance will need to be conducted to evaluate the ongoing health threat posed by NESp.

O6.07

9:30 DYNAMIN IS CRITICAL FOR MOUSE CYTOMEGALOVIRUS MATURATION AND ENVELOPMENT.

Mohammad Hasan, Rinkuben Parmar, Leslie Davis, Ritesh Tandon

Department of Microbiology and Immunology

University of Mississippi Medical Center, Jackson, MS, USA

Cytomegalovirus secondary envelopment occurs in a virus-induced cytoplasmic assembly compartment (vAC) generated via a drastic reorganization of the membranes of the secretory and endocytic

systems. Dynamin is a euokaryotic GTPase that is implicated in membrane remodeling and endocytic membrane fission events. Dynamin is also important in the entry of several viruses in cell types where the primary method of virus entry is clathrin-mediated endocytosis. The role of dynamin in cellular trafficking of viruses beyond virus entry is only partially understood. Mouse embryonic fibroblasts engineered to excise all three isoforms of dynamin by a tamoxifen inducible knockout strategy were infected with mouse cytomegalovirus (MCMV-K181) at a high multiplicity of infection. Equivalent levels of immediate early (IE1; m123) viral protein were detected in triple dynamin knockout (TKO) and parental uninduced (UI) cells indicating intact virus entry; however, virus growth was reduced several folds in TKO cells compared to UI cells. Analysis of later time points in infection revealed similar distribution of viral early (m04) and late (m55; gB) proteins in TKO and UI cells. Ultrastructural analysis revealed intact stages of nuclear virus maturation in both cases with equivalent numbers of nucleocapsids containing packaged viral DNA (Ccapsids) indicating successful viral DNA replication, capsid assembly and genome packaging in TKO cells. Most importantly, severe defects in virus envelopment and egress were visualized in TKO cells but not in parental UI cells. In summary, dynamin-mediated endocytic pathways are dispensable for early stages of MCMV infection in fibroblasts but are critical for cytoplasmic maturation.

Friday, February 23, 2018

MORNING

RoomTC 227

Oral Presentation II: Applied and Social Sciences

Moderators: Jana Bagwell, PhD. and Olga McDaniel, PhD

University of Mississippi Medical Center

O6.08

8:00 POLICIES ADDRESSING DISTRACTED DRIVING DUE TO MOBILE DEVICE USE-POTENTIAL NEXT STEPS FOR MISSISSIPPI.

Amy Radican-Wald

Center for Mississippi Health Policy, Jackson, MS, USA

Background: In 2015, Mississippi enacted legislation banning texting and accessing social networking sites while driving for all drivers to curtail distraction-related crashes. This law will be revisited in 2018. Objective: Examine effectiveness of enacted policies by states prohibiting mobile device use when driving. Methods: Analyze traffic, death, and survey data from 2010-2016. Results: Mississippi's motor vehicle crash death rate rose significantly (22.7 to 25.6 per 100,000; p<.01) from 2010 to 2015. In 2016, ~1,500 Mississippi traffic crashes involved drivers using a mobile device. Mississippi also ranked second highest nationwide for the ratio of average daily trip time by average amount of phone use time as measured from applications capturing actual driver use. Enacted policies vary among states and include mobile device use bans for novice drivers (n=38) as well as text messaging (n=47) and hand-held (n=14) device bans for all drivers. While safety campaigns coupled with aggressive enforcement are effective in reducing these behaviors, officials often cite enforcement difficulties. Only three texting while driving citations were issued in Mississippi during 2016. Research reveals more frequent traffic citations for drivers of all types when using hand-held devices than for drivers violating other mobile device use bans. Post-ban enactment, researchers also observed significantly fewer drivers using hand-held devices in states with hand-held phone bans for all drivers than in those states that enacted the other types of bans. Conclusions: Effective enforcement of policies addressing distractions from mobile device use by drivers is a key factor to consider in reducing crash-related deaths.

O6.09

8:15 STRESS BEHAVIOR AND HYPOTHALAMIC-PITUITARY-ADRENAL AXIS ALTERATIONS IN A FEMALE RAT MODEL OF VERTICAL SLEEVE GASTRECTOMY

Alexandra R. Himel, Sharon A. Cabral, James P. Shaffery, Bernadette E. Grayson

University of Mississippi Medical Center, Jackson, Mississippi, USA

Surgical weight loss results in a host of metabolic changes that culminate in positive health benefit to the patients. However, the psychological impact of these surgeries has not been fully understood. On one hand, surgical weight loss has reported improvements to standard quality of life and resolution of symptoms of depression. On the other hand, reports of self-harm and increased ER visits for self-harm have alarming potential ramifications for these gastric surgery patients.

In the present study, we used our models of diet-induced obesity and vertical sleeve gastrectomy (VSG) to ask whether anxiety behavior and hypothalamic-pituitary-adrenal (HPA) axis gene changes were affected by surgical weight loss under two diet regimens: i.e. low-fat diet (LFD) and high-fat diet (HFD). We show reduced exploratory behavior in the open field test ($p(surgery) < 0.05$) but increased time in the open arms of the elevated plus maze ($p(surgery) < 0.05$). Furthermore, we show increased plasma levels of corticosterone ($p(surgery) < 0.05$) in female VSG recipients in the estrus phase and increased levels of hypothalamic arginine-vasopressin (avp) mRNA ($p(surgery) < 0.05$) among other dietdriven changes in stress-relevant gene targets in the hypothalamus (oxt, pomc, crhr1), pituitary (crh1) and adrenal (nr3c1, nr3c2, mc2r). Taken together, these data suggest a significant impact of surgical weight loss and diet on the HPA axis and further impact on behavior. Additional assessment is necessary to determine whether molecular and hormonal changes of surgical weight loss are the source of these findings.

O6.10

8:30 IS BREASTFEEDING ASSOCIATED WITH SCHOOL PERFORMANCE AMONG 4TH GRADERS IN THE USA?

Norma Ojeda[1], Mina Qobadi[2], Lei Zhang[2], Nancy West[1], Fazlay Faruque[1]

[1]University of Mississippi Medical Center, USA, [2]Mississippi State Department of Health, USA

Breastfeeding may be associated with better academic achievement later in childhood. This study investigated the association between breastfeeding rates and school performance in the USA. We hypothesized that breastfeeding rates would be positively associated with school performance among 4th graders. We used a retrospective ecological study to test our hypothesis. Breastfeeding rates by states from year 2005 were obtained from the Centers for Disease Control and Prevention. School performance scores by states at 4th grade from year 2015, were obtained from the US Department of Education. Data were analyzed using the Spearman coefficient of correlation between the breastfeeding rates and six

domains for school performance. Exclusive breastfeeding during the first 3 months postnatally showed significant positive association with percentage of students at or above reading proficient level (r=0.28; P=0.0497), mathematics scores (r=0.29; P=0.0414), percentage of students at or above mathematics proficient level (r=0.34; P=0.0156), science scores (r=0.35; P=0.0168), and percentage of students at or above science proficient level (r=0.37; P=0.0125). Exclusive breastfeeding during the first 6 months postnatally showed significant positive association with percentage of students at or above mathematics proficient level (r=0.29; P=0.0390), science scores (r=0.30; P=0.0430), and percentage of students at or above science proficient level (r=0.33; P=0.0266). Despite a restricted dataset that limited our ability to consider potential confounding variables, these results suggest that exclusive breastfeeding during 3 and 6 months postnatally is positively associated with higher school performance.

O6.11

8:45 PERCEPTIONS OF CONCUSSION RISK AT THE UNIVERSITY OF MISSISSIPPI.

Madison Frerker, Nicole Ashpole.

University of Mississippi, University, MS, USA

Concussions are a form of mild traumatic brain injury (mTBI) that can occur from any force to the head or body that causes the brain to move within the skull. Concussions are common in the sport of football, and injured athletes can experience a wide array of symptoms. Like other players participating with powerhouse football programs, those at the University of Mississippi are at risk of concussion throughout their collegiate careers. Whether players and fans perceive the risks of concussion equally has not been previously studied. The purpose of this project was to survey football players, students, faculty, and staff at the University of Mississippi regarding their views of the effects and associated risks of concussion on Ole Miss Players. In addition to variations in perception between athletes and nonathletes, we set out to determine which position was believed to be at the highest risk. We were also interested in how the public viewed concussions in the media as well as current concussion diagnosis procedures. We sought to analyze responses based on age, gender, current or previous participation in football or other sports, education level, and interest in football. The results of this study serve to open a dialogue regarding the safety of Ole Miss Football players in years to come.

O6.12

9:00 HYPERCALCEMIA WITH HYPERACTIVITY: MUTATION DIRECTED THERAPY

Rachel Palmer, George Moll.

University of Mississippi Medical Center, Jackson, MS, USA

Background: Hypercalcemia as an incidental finding leads to extensive work-up for hyperparathyroidism, neoplasm, renal failure, medication errors and rare endocrine disorders. A male presented with asymptomatic hypercalcemia during Attention Deficit Hyperactive Disorder (ADHD) assessment. A rare genetic mutation associated with Familial Hypocalciuric Hypercalcemia (FHH) was identified. Case Report: Our 7 y/o male patient presented with hypercalcemia 13.6+/-0.2 mg/dl. Aside from difficult school progress now through 9th grade, he has grown about average height and weight for age. His mother noted his good appetite but lack of focus and listlessness without abdominal pain, jaundice or abnormal urination. Athena Diagnostics confirmed a known FHH calcium receptor (CaSR) inactivating dominant mutation. Cinacalcet Therapy: FHH beyond neonatal age is considered benign. But pancreatitis, gallstones, chondrocalcinosis increasing with age, fatigue and headaches are frequently reported in FHH patients. An off label due to age clinical trial was entered for use of recently available CaSR activating cinacalcet therapy with a grant for about 1 year. Our patient noted improvements with cinacalcet: calcium 11.6-12.5 mg/dl, phosphorous 3.4-4.2 mg/dl and parathyroid 51.7-90.9 pg/ml. Cinacalcet normalized his parathyroid over an 8 hour interval, and no serious cinacalcet side effects were noted. At last clinic visit off cinacalcet his abnormal lab results returned: calcium 12.9 and phosphorous 2.5 mg/dl with parathyroid over 100 pg/ml.

Conclusion: Although considered benign, our patient noted improvements in bone related mineral and hormone levels and reports of improved school effort with cinacalcet. This is one of few reports of beneficial cinacalcet use in pediatric patients.

O6.13

9:15 MISSISSIPPI'S GASTROSCHISIS BURDEN: NECROTIZING ENTEROCOLITIS AND INTESTINAL ATRESIA IN NEONATES WITH GASTROSCHISIS

India Byrd, Emily Turbeville, Brent Ferguson, Minal Patel, Jaimin Patel, Mobolaji Famuyide

University of Mississippi Medical Center, Jackson, MS, USA

Gastroschisis is a congenital anomaly of the anterior abdominal wall with an increasing incidence nationwide. Our group examined the incidence, risk factors, and variables linked with necrotizing enterocolitis (NEC) and intestinal atresia in patients with gastroschisis admitted to the Neonatal Intensive Care Unit(NICU) at the University of Mississippi Medical Center(UMMC). A retrospective cohort study was conducted. Using data from our academic 102 bed, level IV NICU database (NeoData®), we identified patients with gastroschisis admitted to the NICU from January 1, 2000 to June 30, 2012. 158 neonates born with gastroschisis were admitted to UMMC's level IV NICU and included in the analysis. 31 of these were identified with complex gastroschisis with NEC/atresia. The incidence of complex gastroschisis in this cohort is higher than previously reported in the literature (17% vs. 20%). There was a significant difference in the incidence of sepsis between the complex gastroschisis/NEC/atresia cohort vs. the simple gastroschisis cohort (48.39% to 16.54%, p-value= 0.0002). The number of days to first feeds and the time to full feeds was significantly longer in the NEC/atresia cohort (p-values $\leq$ 0.0001). Our findings are in keeping with previously reported literature suggesting a higher incidence of sepsis and longer time to full feeds in neonates with complex gastroschisis. Our cohort is novel in that we focused on not just all cases of complex gastroschisis, but specifically those with NEC/Atresia. The high incidence in our resource limited, rural state also begets further epidemiological evaluation to determine the etiology/associated factor.

O6.14

9.30 ASSESSING VITAMIN D CONSUMPTION IN NON-INSTITUTIONALIZED AGING ADULTS IN THE US POPULATION: NHANES 2011-2012

Shamonica King and Hamed Benghuzzi

University of Mississippi Medical Center, Jackson, MS, USA

Overall nutrient intake is thought to decline as a person ages. Adequate 25-hydroxyvitamin D levels are known to have an

association with better health outcomes. However, vitamin D is less commonly found, naturally, in foods. As health-related illnesses increase as one ages, Vitamin D supplementation in older adults could potentially prevent skeletal disorders and other diseases when nutrient consumption is not adequate. To properly assess the needs for vitamin D supplementation, vitamin D consumption should be measured across age groups. The objective of this study was to analyze mean consumption of vitamin D through nutrient intakes and supplement consumption in all age groups, in non-institutionalized United States citizens from 2011-2012. The dietary intake of vitamin D (mcg) in 8,389 individuals of all age groups, who participated in the National Health and Nutrition Examination Survey (NHANES) in the 2011-2012 survey cycle, was analyzed using the respondent's dietary survey responses. The data was analyzed using IBM SPSS, Incorporated version 24.0. The findings of this study demonstrated older adults consumed less nutrient vitamin D than other age groups. The analysis of supplement consumption provided evidence that middle-age and older adults consumed more vitamin D through supplements when compared with other age groups. Since, vitamin D consumption is critical to maintaining good health, especially in older adults, vitamin D levels should be monitored and vitamin D supplementation should be considered.

06.15

9:45 ROCKY MOUNTAIN SPOTTED-FEVER (RMSF) ACUTE METABOLIC ENCEPHALOPATHY, MENINGITIS AND STROKE: A CASE REPORT

Kori McDaniel, Nikhil Chinmaya, Richard Kazibwe

Danville Medical Center, SOVA Health Danville, Danville, VA, USA

Background: RMSF is a tick-borne disease caused by Rickettsia rickettsii, an obligate intracellular bacterium. Although deadly, early diagnosis and treatment makes the disease curable. The infection causes vascular injury affecting blood vessels though out the organs. The most common symptoms are fever, rash and headache. The hallmark is blanching erythematous rash with macules seen on palms and soles with central distribution. This is a case report associated with acute encephalopathy, meningitis and acute cerebral-vascular accident (CVA) commonly known as stroke. Patient: A 53 year old WF was admitted to the emergency department (ED) by EMS because of AMS (atypical measles syndrome), somnolence and noticeable right sided weakness. The SNF report indicated, she was awake-alert-oriented the night before, but had headache and fever, treated with Tylenol. Vital signs were elevated and Chest X-ray showed bilateral PNA; CT: showed new small acute/subacute infarct. She was started on Levaquin and Vancomycin and admitted to the step down unit. Her medical history includes HTN; T2DM; bipolar; RA; COPD; Seizure; Schizoaffective; HLD; GERD and OSA. Laboratory tests: CBC, Chem-7, Cardiac enzymes, glucose, Coagulation all normal. Toxicology screening was negative. Urine analysis was normal. CSF study revealed differential white cells. Segmented neutrophils: 64; Lymph: 31 and monocytes 4. Serology testing showed Rickettsia IgM antibody 1.07. She was put on doxycycline. Conclusion: Atypical presentations and lack of adequate symptoms can make the diagnosis challenging. Rickettsial infection as meningitis the definitive diagnosis relies mainly on serological findings. Early treatment improves prognosis, diminishes mortality and sequelae associated with rickettsioses.

Friday, February 23, 2018

MORNING

RoomTC 228

Oral Presentation III: Clinical and Material Sciences

Moderators: Jennifer Price, PhD. Copiah-Lincoln Community College and Frank Spradley, PhD. University of Mississippi Medical Center

O6.16

8:15 DIABETES MELLITUS CONTROL HEMOGLOBIN A1C CLINICAL DISPARITY.

George Moll

University of Mississippi Medical Center, Jackson, MS, USA

Background: Diabetes mellitus type 1 (T1DM) requires individualized treatment for long-term survival. The patient clinic visit is prime-time for T1DM care recommendations. Hemoglobin A1c (HgbA1c) reflects abnormal blood glucose (BG) binding to body tissues and mean BG over 2 to 3 month intervals to monitor and improve T1DM control. A patient's point of care (POCT) HgbA1c may vary from that patient's clinical chemistry (CENT) HgbA1c that returns after clinic. Objective: This study compared same clinic visit POCT vs CENT HgbA1c for variance due to patient diversity and National Glycohemoglobin Standardization Program (NGSP) certifiable instrumentation. Design/Methods: This Quality Improvement (QI) study compared 2 POCT and CENT HgbA1c obtained at 2 patient clinic visits to clarify T1DM control conflicting with patient reported control. Data analyses were performed for total group, African-American female (AF) and male (AM) and Caucasian female (WF) and male (WM) subgroups. Results: HgbA1c levels ranged 6% to 14% (excellent T1DM control HgbA1c 7.5% or less).

Group	(n)	Correlation POCT vs. CENT	HgbA1c POCT Mean±SD	CENT Mean±SD
AF	8	0.94	11.2% ±2.1%	10.4% ±1.8%
AM	7	0.95	9.5% ± 1.7%	9.0% ± 1.2%
WF	7	0.97	9.2% ± 2.1%	8.9% ± 1.7%
WM	8	0.96	9.0% ± 1.9%	8.4% ±1.5%
*Total	60	0.96	9.7% ± 2.2%	9.2% ± 1.8%

*Total 30 x 2 each

Conclusions: There were no significant mean POCT vs mean CENT HgbA1c differences. However, some visit good to fair POCT HgbA1c levels later returned Cent HgbA1c levels reflecting better T1DM patient control.

O6.17

8:30 PHYTOCHEMICALS OF DICHLOROMETHANE-DERIVED PSEUDOGNAPHALIUM OBTUSIFOLIUM EXTRACT POSSIBLY COMBAT OXIDATIVE STRESS-DRIVEN PROLIFERATION OF HUMAN COLORECTAL ADENOCARCINOMA CELLS.

Brandon Marcella, Niang Cing, Carson Huynh, Whittom Reiken

Mississippi College, Clinton, Mississippi, USA

Scientific studies have shown that human colorectal adenocarcinoma cells exhibit more oxidative stress compared to non-tumorous adenoma cells, and this additional oxidative stress may actually stimulate proliferation and aggressive behavior.

Flavonoids are plant metabolites that exhibit therapeutic properties including anti-carcinogenic and antioxidant behavior. We utilized a dichloromethane-derived extract from the traditional medicine plant Pseudognaphalium obtusifolium to explore this assumption in human colon carcinoma (Caco-2) cells. In addition to containing flavonoids, the extract has been shown to have high H2O2 radical scavenging activity. We treated Caco-2 cells with media-only, dichloromethane extract, or dimethyl sulfoxide (DMSO), the extract solvent. Half the samples for each condition were treated with (+)H_2O_2 or without (-)H_2O_2 and harvested after 48 hours. Cells were counted by hemocytometer. No significant difference was found between any of the (-)H_2O_2 samples. The (+)H_2O_2 media-only cells had significantly decreased proliferation. Significantly increased proliferation was observed for both (+)H_2O_2 DMSO and extract-treated cells, with 2X greater proliferation for DMSO relative to extract-treated cells. Notably, proliferation was significantly decreased for (+)H_2O_2 relative to the (-)H_2O_2 extract-treated cells. Studies have shown that DMSO can react with H2O2 radicals, producing further radicals and increasing oxidative stress. DMSO is also capable of binding drugs, enhancing their delivery to cancer cells. Based on our data and the literature, it is possible that extract phytochemicals are capable of counteracting the proliferative effects of DMSO-H2O2 interactions due to their anti-carcinogenic and antioxidant properties coupled with their improved delivery into Caco-2 cells. We plan to explore this in future experiments.

O6.18

8:45 Er,Cr:YSGG LASER TREATMENT FOR DEBONDING OF Y-TZP STRUCTURES TO A RESIN CEMENT

David Remley, Steve Magee, Darrell Hutto, Jason Griggs, Susana Salazar Marocho

University of Mississippi Medical Center, Jackson, USA

Objective: To determine the effect of different powers of the Er,Cr:YSGG laser on the debonding strength between a Y-TZP ceramic and a resin cement. Materials and method: Slices (1 mm-thick) of a Y-TZP ceramic were submitted to tribochemical silica-coating and bonded to a resin composite cylinder (Ø=~3.8 mm) with a dual-cured resin cement (Variolink, Ivoclar). The sets were randomized and divided into three groups according to the power of the Er,Cr:YSGG laser (Waterlase MD, Biolase) application: i) control group (C): no laser application; ii) 2.5 W; and iii) 4.5 W. The laser irradiation was performed with a sapphire tip (Ø=1 mm, MG6; Biolase). The tip was brushed across the simulated occlusal surface over the bonding area and was kept perpendicular to the Y-TZP surface. Then, the sets were submitted to the shear bond strength test using a wire loop at a loading rate of 1 mm/min until failure. Results: The data passed the normality test (S-W, p=0.199). The mean bond strength values (MPa) and standard deviations from the three groups (C, 2.5 W, 4.5 W) were 9.5±2.7, 10.8±2.7, and 7.5±1.9, respectively. The Tukey's test (α=0.05) showed that the C group had a similar bond strength value to the 2.5 W and 4.5 W groups. The 2.5 W group was significantly different from the 4.5 W group that exhibited the lowest bond strength ($p \leq 0.05$). Conclusions: The high power setting (4.5 W) decreased the strength necessary to debond the Y-TZP ceramic from the resin cement by ~21% when applied for 30 s.

O6.19

9:00 DECIPHERING THE ROLE OF FATTY ACIDS IN BILE INDUCED MEMBRANE DAMAGE IN LISTERIA MONOCYTOGENES.

Oindrila Paul[1], Dominique Clark[2], Jessica Wilson[3], Janet Donaldson[1]

[1]The University of Southern Mississippi, USA, [2]Tougaloo College, USA, [3]Mississippi State University, USA

Listeria monocytogenes is a Gram positive, facultative intracellular organism responsible for the foodborne disease listeriosis. L. monocytogenes must survive a variety of stressors encountered within the gastrointestinal tract, including variations in pH, oxygen availability, and bile. It is known that changes in the fatty acid profile helps L. monocytogenes to survive under extreme cold. To determine what effect bile has on the fatty acids in L. monocytogenes and if this shift has a direct link to bile resistance, fatty acid profiles from three different strains of L. monocytogenes were analyzed under aerobic and anaerobic conditions, with and without exposure to 0.3% bile. Results suggested an increase in saturated fatty acids palmitic acid and stearic acid and detection of unsaturated fatty acids oleic acid and linoleic acid in all three strains. To determine if these fatty acids had a "protective" role, cultures were pre-treated with a lipid mix containing varying concentrations of lipid mix (palmitic acid, oleic acid, stearic acid, linoleic acid and others) and subsequently exposed to 0% or 5% bile under aerobic and anaerobic conditions. Results indicated that under aerobic conditions, but not under anaerobic conditions, the lipid mix protected HCC23 against bile. To further assess the role of fatty acids in membrane fluidity, changes in membrane fluidity was measured using the fluorescent dye 1,6-diphenyl hexa-1,3,5 triene (DPH) under aerobic and anaerobic conditions. From this study it can be concluded that alterations to the cell membrane through incorporation of exogenous lipids improves bile survival under aerobic and anaerobic conditions.

O6.20

9:15 ANTICONVULSANT BIOACTIVE SECONDARY METABOLITES FROM TAPINANTHUS GLOBIFERUS A. RICH

Vimal Sharma[1], James Fajemiroye[2], Cammi Thornton[1], Christianah Elusiyan[3], Nicole Ashpole[1], Kristine Willett[1], Ikhlas Khan[1], Jordan Zjawiony[1]

[1]The University of Mississippi, USA, [2]Federal University of Goiás, Brazil, [3]Obafemi Awolowo University, Nigeria

Epilepsy is a brain disorder characterized by the occurrence of spontaneous, recurrent and unpredictable seizures as a result of abnormal discharge of electrical signals. Globally, 65 million people suffer from epilepsy. Currently available antiepileptic drugs only offer moderate relief and pose serious side effects. Herbal products used in the traditional system of medicine offer vast structural diversity which makes them the rich source of new drugs leads. Tapinanthus globiferus A. Rich. (Family: Loranthaceae) is a Nigerian Mistletoe which has been used for different diseased states including hypertension, ulcers, tumor, etc. This mistletoe is also a well-known remedy to treat convulsions. To carry out the phytochemical work methanolic extract (50 grams) of the leaves of T. globiferus was fractionated using hexanes, chloroform and n-butanol. The n-butanol (12 grams) fraction was further column chromatographed which provided different sub-fractions and also resulted in the isolation of secondary metabolites. The sub-fractions and compounds were bioassayed using zebrafish anti-epileptic and excitotoxic

neuroprotective assays. 3-α-L-arabinopyranosyloxy-kaempferol (K-3-OA) and AT.1.10.TG.17 (sub-fraction) significantly reduced the Pentylenetetrazol (PTZ) induced large activity in zebrafish in a dose-dependent manner, i.e. 1 and 5 mg/L. K-3-O-A at the concentrations of 10 μM and 20 μM was also found to be neuroprotective under standard exitotoxic condition. Detailed phytochemical and pharmacological findings will be presented.

O6.21

9:30 DICHLOROMETHANE-DERIVED EXTRACT FROM PSEUDOGNAPHALIUM OBTUSIFOLIUM CONTAINS PHYTOCHEMICALS THAT EXHIBIT EXTREME HYDROGEN PEROXIDE RADICAL SCAVENGING ACTIVITIES.

Navjot Kaur, Leah Bowlin, Claudia Cruz Rivera, Victoria Hodges, Carson Huynh, Navpreet Kaur, Angela Whittom Reiken

Mississippi College, Clinton, MS, USA

L-ascorbic acid, also known as vitamin C, is considered to be one of the strongest antioxidants. Due to its radical scavenging capabilities, it is commonly used as a primary defense against free radicals which damage cells and can cause numerous pathologies including cancer. Ascorbic acid is obtained through many fruits and vegetables in the diet and is often taken as a dietary supplement. Plants produce a variety of phtyochemicals that exhibit antioxidant capabilities. Among these small molecules are the flavonoids, plant metabolites that exhibit many therapeutic properties including antioxidant behavior. We prepared extracts of Pseudognaphalium obtusifolium, a traditional medicine plant containing flavonoids, using a solvent mixture of dichloromethane, hexane, and ethanol followed by rotary evaporation and suspension in dimethyl sulfoxide. Whole leaf extract was also prepared. To determine extract hydrogen peroxide (H2O2) radical scavenging activities, serial dilutions of ascorbic acid were prepared as a standard. H2O2 solution prepared in phosphate buffer was added and mixtures were incubated in the dark for 10min at RT followed by absorbance readings at 230nm. The same reaction used for the standard was used to test each extract. When equivalent concentrations of extracts and ascorbic acid were compared, dichloromethane extract exhibited the greatest H2O2 radical scavenging activity, almost 50X that of ascorbic acid. Whole leaf, ethanol, and hexane extracts were 25X, 6.6X, and 1.9X more, respectively. This data shows that P. obtusifolium phytochemicals have better antioxidant activities than ascorbic acid, and extraction and use of these antioxidants as dietary supplements should be considered.

9:30 – 10:30 a.m. High School Poster Session II

9:30 Poster Session II

Poster Coordinator: Olga McDaniel, PhD

P6.35

CYCLOPHOSPHAMIDE PROTECTS AGAINST RENAL INJURY BUT NOT HYPERTENSION IN AN EXPERIMENTAL MOUSE MODEL OF SYSTEMIC LUPUS ERYTHEMATOSUS

Breanna McNair, Victoria Wolf, Michael Ryan

University of Mississippi Medical Center, USA

Systemic lupus erythematosus (SLE) is an autoimmune disorder that is associated with an increased risk of developing kidney disease and hypertension. Cyclophosphamide, a drug clinically used in chemotherapy, has commonly been used to treat patients with lupus. The goal of our research was to test whether this drug protects against kidney disease and hypertension. Our hypothesis was that the impact of cyclophosphamide treatment on blood pressure during SLE would be limited by its toxic effect on ovarian function. To test this hypothesis, cyclophosphamide was administered weekly for 4 weeks, beginning at 30 weeks of age in female NZW (control) and NZBWF1 (SLE) mice. At the end of the study, blood pressure was measured by carotid artery catheters in conscious freely moving animals. Kidney damage was monitored weekly by measuring urinary albumin both by colorimetric (dipstick) assay, and then by an albumin ELISA. Cyclophosphamide did not attenuate the development of hypertension in SLE compared to vehicle treatment [128±6 (n=10) vs 136±4 mmHg (n=8), p=0.6]. However, SLE mice treated with cyclophosphamide had a lower urinary albumin excretion rate compared to vehicle-treated SLE mice [5.70±4.02 (n=15) vs 0.11±0.04 (n=13) mg/day]. Estrus cycling, assessed by vaginal cytology, was altered by cyclophosphamide treatment with an increase in the time treated mice spent in the estrus phase of the cycle. These data support the hypothesis that ovarian toxicity may limit the efficacy of cyclophosphamide to control blood pressure.

P6.36

VIRUS LIKE PARTICLES WITH SELECTED PEPTIDES FOR TARGETING CANCER CELLS

Sophia Bowley[1], Stephen Stray[2]

[1]*Base Pair, USA,* [2]*University of Mississippi Medical Center, USA*

Two widely-used cancer treatments, chemotherapy and radiation therapy, have toxic side effects that destroy healthy cells. This is because cancer develops from genetically-mutated normal cells, consequently making normal host cells and cancer cells practically indistinguishable to drugs and human antibodies. We wish to develop an alternate potential treatment, the use of virus-like particles (VLP), to deliver toxic cargo to cancer cells while sparing neighboring normal cells. VLPs have the potential to deliver toxic cargo to kill cells, without being able to infect neighboring cells. We wish to target these VLPs to cancer cells using peptides selected through a phage display library, which analyzes how well specific proteins attach to cancer cells. Once the phage binding tightly to a test line of cells are separated from those not binding tightly, the DNA in tightly-bound phages can be sequenced, and the peptides inserted into VLPs. Then, how that VLP binds to a cancerous cell versus a normal cell or another form of a cancerous cell can be analyzed in further experiments. In addition, toxic metals, like platinum, can be evaluated for binding to capsids of VLPs, to prove that phage could successfully carry and insert a substance able to kill cancerous cells. Hopefully, through these methods, cancer treatments that harm

cancerous cells and not healthy cells can be developed.

P6.37

THE ROLE OF INHIBITING AT1-AA TO IMPROVE THE PATHOPHYSIOLOGY OBSERVED IN A RAT MODEL OF PREECLAMPSIA

Shyanne McDuffy[2], Mark Cunningham[1], Lorena Amaral[1], Denise Cornelius[1], Tarek Ibrahim[1], Nathan Campbell[1], Ventaka Ramana Vaka[1], Babbette B. LaMarca[1]
[1]University of Mississippi Medical Center, USA, [2]Murrah High School, Base Pair Program, USA

Preeclampsia (PE) is a disease in pregnant women characterized by high blood pressure and can cause damage to the kidneys and brain. The origins of preeclampsia is unknown, but we believe that it originates from placental ischemia. Women with PE have an increase in angiotensin II type 1 receptor agonistic antibodies (AT1-AA), natural killer(NK) cells, oxidative stress, and decrease in nitric oxide(NO) bioavailability. There is no cure for PE. To study PE, we use the reduced uterine perfusion pressure (RUPP) model in rats to mimic placental ischemia. The objective of this study is to determine if AT1-AA inhibition during pregnancy will improve outcomes in rats. METHODS: Rats were separated into 3 groups: normal pregnant (NP), RUPP, and RUPP+AT1-AA inhibitory peptide. Day 14 of gestation, RUPP surgery was performed and they received AT1-AA inhibitory peptide via osmotic pump. Day 18, catheters are inserted into the carotid artery and jugular vein to measure blood pressure and renal function. Day 19, blood, kidney, and brain tissue is collected. RESULTS: Blood pressure, brain size, mitochondrial oxidative stress, plasma creatinine, plasma isoprostanes, and brain NADPH increased with RUPP rats and returned to NP levels with AT1-AA inhibition. GFR usually decreased, but improved with AT1-AA inhibition. Placental cytolytic NK cells increased in RUPP rats and was blunted with AT1-AA inhibition. CONCLUSION: This data shows that AT1-AA inhibition improves blood pressure, renal function, inflammation, cerebral pathology/function, oxidative stress, and NO bioavailability in RUPP rats. The clinical significance is that AT1-AA inhibition could be used as a therapy for PE.

P6.38

GEOGRAPHIC HEALTH DISPARITIES IN MISSISSIPPI: PILOT WITH ACUTE CARE HOSPITALS

Christian Johnson, Fazlay Faruque
University of Mississippi Medical Center, USA

Mississippi is perhaps the least healthy state in the nation, consistently ranking at or near the bottom of state rankings for health. The health of a particular location is often determined by the availability of healthcare resources in that location. Mississippi's health status, however, is not uniform, which may be caused by disparities in the availability of healthcare resources throughout the state. Our objective is to examine the distribution of healthcare resources in Mississippi in order to assess any existing disparities. To conduct this research, available geographical data for healthcare resources from the Mississippi Automated Resource Information System (MARIS) was used. Additionally, we downloaded county data containing information such as a county's total population. This data was then imported to GIS software, where it was used to map healthcare resources within Mississippi. Using a method known as spatial overlay, we were able to calculate the number of hospitals and health clinics in each county. We then examined the number of hospitals and clinics per total population for each county, finding that the number of beds varied from county to county, from zero in counties such as Amite and Tunica, to as much as 1760 for Hinds. Finally, circles were created around the hospitals, each proportional to the total number beds within the hospital. This showed areas with a possible shortage of access to hospital services. It is a reasonable assumption that areas outside the circles demand attention for hospital service availability.

P6.39

ISCHEMIA/REPERFUSION-INDUCED LIVER INJURY IN OBESE FEMALE RATS

Ryan Nichols[2], Frank Spradley[3], Barbara Wilson[3], Christopher Anderson[3]
[1]Murrah High school, USA, [2]Base Pair Program, USA, [3]Department of Surgery UMMC, USA

Nonalcoholic fatty liver disease is dangerous and highly prevalent. Morbidity and mortality from NAFLD-mediated chronic liver disease is rising as a result of the obesity pandemic. In males, the incidence of NAFLD is higher where more studies have examined obesity-induced liver injury. Less is known about the injury response in steatotic livers from female rats. We tested the hypothesis that steatosis exaggerates the injury response to ischemia/reperfusion in obese melanocortin-4 receptor homozygous-deficient compared to $MC4R^{+/+}$ female rats. At ~20 weeks old, rats were subjected to 45" of 70% warm liver ischemia with plasma and liver tissue harvested at 24 hours of reperfusion. Sham surgeries were controls. While body weights were not altered by I/R or Sham, respectively, in $MC4R^{-/-}$ or $MC4R^{+/+}$, they were greater in the $MC4R^{-/-}$ strain overall. Similarly, EchoMRI revealed that % total body fat was not altered by I/R or Sham, respectively, in $MC4R^{-/-}$ and $MC4R^{+/+}$ along with % total liver fat in obese $MC4R^{-/-}$ and lean $MC4R^{+/+}$, but these were both greater in the $MC4R^{-/-}$ strain. Plasma liver enzymes were measured to assess liver injury. Liver I/R increased ALT levels, which were exaggerated in obese $MC4R^{-/-}$ compared to lean $MC4R^{+/+}$ along with exaggerated I/R-induced AST levels in $MC4R^{-/-}$ over $MC4R^{+/+}$ .Tumor necrosis factor-alpha, is a pro-inflammatory that mediates liver I/R injury. Liver I/R increased plasma TNF-alpha levels, which were exaggerated in obese $MC4R^{-/-}$ compared to lean $MC4R^{+/+}$. In conclusion, the data implicate inflammation in mediating exaggerated I/R-induced liver injury in obese female rats.

P6.40

INTERLEUKIN-1 RECEPTOR ANTAGONIST ATTENUATES LIPOPOLYSACCHARIDE-INDUCED BRAIN HIPPOCAMPAL INJURY AND IMPROVES COGNITIVE IMPAIRMENT IN JUVENILE RATS

Oluwatosin Akinyemi[1], Donisha Lard[1], Tembra Jones[3], Emily Turbeville[4], Camilla Wright[2], Iman Washington[5], Brenkeevia Langston[5], Jonathan Lee[2], Silu Lu[2], Norma Ojeda[2], Yi Pang[2], Abhay Bhatt[2], Renate Savich[2], Lir-Wan Fan[2]
[1]Base Pair Program, University of Mississippi Medical Center/Murrah High School, USA, [2]Department of Pediatrics, Division of Newborn Medicine, University of Mississippi Medical Center, USA, [3]School of Nursing, University of Mississippi Medical Center, USA, [4]School of Dentistry, University of Mississippi Medical Center, USA, [5]Mississippi INBRE Research Scholars Program, USA

Inflammation in neonatal human and animal models has been shown to be associated with cognitive dysfunction later in life. Our previous studies have shown that administration of interleukin-1 receptor antagonist (IL-1ra) can protect against lipopolysaccharide (LPS)-induced sensorimotor dysfunction and brain inflammation in neonatal rats. The objective of this current study is to further

determine whether IL-1ra protects against LPS-induced chronic brain inflammation, hippocampal injury, and cognitive dysfunction in juvenile rats. Intraperitoneal (i.p.) injections of LPS (2 mg/kg) or saline was performed in postnatal day 5 (P5) Sprague-Dawley rat pups, and IL-1ra (100 mg/kg) or vehicle was administered (i.p.) at 5 min, 24, 48, and 72 hours after LPS injection. Neurobehavioral tests were carried out from P14 to P22, and brain injury was examined at P22. Our results showed that neonatal systemic LPS exposure resulted in cognitive deficits and chronic inflammation in juvenile rats which were associated with hippocampal neuronal injury, as indicated by loss of NeuN (neurons) immunoreactivity in the hippocampus of the P22 rat brain. IL-1ra treatment significantly attenuated LPS-induced cognitive deficits and hippocampal injury. IL-1ra administration also significantly attenuated LPS-induced increases in the numbers of Iba1+ cells (microglia) and increases in IL-1β concentration in the hippocampus of the P22 rat brain. These results suggest that IL-1ra provides protection against neonatal LPS exposure-induced chronic inflammation, hippocampal injury, and cognitive deficits in juvenile rats, which may be associated with the blockade of LPS-induced pro-inflammatory cytokine IL-1β.

P6.41

FINITE ELEMENT MODELING OF AN ALL-CERAMIC THREE-UNIT FIXED DENTAL PROSTHESIS

Alton Chambers, Matthew Araujo, Yuanyuan Duan, Jason Griggs
University of Mississippi Medical Center, USA

To create a three-dimensional numerical model of a multilayered three-unit all-ceramic fixed dental prosthesis (FDP) using finite element analysis (FEA). Micro-computed tomography (Skyscan1172, Microphotonics) was used to reconstruct 3D scans of specimens, and the data were uploaded into the 3D modeling software (ScanIP, Simpleware). During data reconstruction, the framework mask was constructed by thresholding based on radiolucency. The fusion glass layer, premolar and molar abutments, and cementation layer were constructed by segmentation, 3D editing, cavity-fill, and Boolean operations to extract the necessary masks. Models were then exported into FEA software (ABAQUS) for stress analysis. Veneering porcelain, framework and fusing glass-ceramic layer were defined as IPS e.max CAD, IPS e.max ZirCAD and IPS e.max CAD Crystall./Connect using elastic constants found in the literature to simulate the e.max CAD-on technique. An axial load of 100 N was applied on the central fossa of the pontic tooth to simulate the physiological occlusal load. First principal stress was calculated and plotted. A three-unit FDP model composed of seven components was successfully created. It was found that the highest stress resided in the veneering porcelain layer located on the occlusal surface surrounding the loading area. For the bridge framework layer, the highest stress was located at the gingival embrasure of bridge connector. Accurate three-dimensional FEA models of FDPs can be generated by combining micro-CT technique and Simpleware software. This all-ceramic system was resistant to fracture at the given physiological occlusal loading level.

P6.42

MITO-TEMPOL HAS NO EFFECT ON BLOOD PRESSURE IN MALE SHR

Jaylen Sandifer, Jane Reckelhoff, Carolina Dalmasso
University of Mississippi Medical Center, USA

Oxidative stress contributes to the development and maintenance of hypertension in male rodents. Dr. Reckelhoff's laboratory has shown that TEMPOL, a superoxide dismutase mimetic, decreases blood pressure (BP) in young male spontaneously hypertensive rats (SHR). MitoTEMPOL (Mito-T) is a derivative of TEMPOL that targets reactive oxygen species (ROS) in the mitochondria decreasing oxidative stress. Mito-T has been used in vivo and in vitro to study the role of mitochondria-derived superoxide signaling and to prevent mitochondrial oxidative damage in vivo. The role that mitochondrial ROS play in mediating the elevated BP in male SHR is not clear. The aim of the present study was to test the hypothesis that Mito-T decreases BP in young male SHR. Male SHR (n=6, 5 months of age) were implanted with radiotelemeters, and mean arterial pressure (MAP) was measured for 5 days. After MAP baseline, rats were injected with Mito-T (0.7 mg/kg/d; s.c.) for 9 days. Mito-T treatment did not decrease MAP when compared with baseline (Baseline: 142±3; Mito-T: 145±5 mm Hg, p=NS). In order to make certain that ROS played a role in mediating the elevated BP in SHR males, rats received TEMPOL (30 mg/kg/d) in drinking water for 5 additional days. As expected, TEMPOL treatment decreased MAP compared with baseline and Mito-T (Baseline: 142±3; Mito-T: 145±5; TEMPOL 129±5 mm Hg, $p<0.05$), suggesting that cytosolic ROS are more important for mediating hypertension in male SHR.

Friday, February 23, 2018
MORNING
TC Ballroom II

10:00 -11:30 Population Health Interactive Workshop,
Workshop Coordinators and Associates:

D. Olga McDaniel, PhD, George Moll, MD., PhD, Jana Bagwell, PhD, Gouri Mahajan, PhD, Jennifer Price, PhD, Frank Spradley, PhD

I. **Speaker: Josie Bidwell, DNP, RN, FNP- C**. University of Mississippi Medical Center
Title: "Mobile Clinic"

II. **Speakers George Moll, MD., Keisha Luckey RN, CDE**,
Mary K Armstrong FNP University of Mississippi Medical Center
Title: "Controlling Diabetes Mellitus - Telemedicine Monitoring and Compliance Enhancement"

Friday, February 23, 2018
AFTERNOON
12:00-1:00- Plenary Speaker
1:00-3:00 Mississippi INBRE/ Millsaps HHMI Symposia

HISTORY AND PHILOSOPHY OF SCIENCE

Chair: Nick Gilbert
University of Mississippi Medical Center
Chair: Katie Alford
University of Mississippi Medical Center
Vice-Chair: Mary Ball Markow
University of Mississippi Medical Center
Vice-Chair: Rachel Sharp
University of Mississippi Medical Center

Thursday, February 22, 2018
MORNING

Two options:
Option 1
Room TC Ballroom II/III
Co-Sponsor with Health Sciences

9:30 – Noon **Population Health Symposium I**
Invited Keynote Speakers

Moderators: D. Olga McDaniel, PhD
George Moll MD, PhD.
University of Mississippi Medical Center

9:30 **WELCOME**

9:45 **MISSISSIPPI HEALTH CARE, PRESENT AND FUTURE**
James Keeton, MD
University of Mississippi Medical Center

10:15 **ADDICTIONS AND VIOLENT BEHAVIOR**
Julie A. Schumacher-Coffey, PhD.
University of Mississippi Medical Center

10:45 **BEYOND PRESCRIPTION OPIOIDS: NOVEL PAIN THERAPEUTICS WITH REDUCED ABUSE LIABILITY**
Kevin Freeman, Ph.D.
University of Mississippi Medical Center

11:15 **APPROACHES TO TREATING GENETIC NEUROMUSCULAR DISORDERS**
S.H. Subramony, MD
University of Florida

11:45 **PANEL DISCUSSION**

12:00 General Symposium

Thursday, February 22, 2018
AFTERNOON
Room: Ballroom
Room TC Ballroom II/III

1:00-2:55 **Population Health Symposium II**
Precision/Personalized Medicine

1:05 **MATHEMATICAL MODEL OR HumMod. AN INTEGRATIVE PHYSIOLOGY**
Robert Hester
University of Mississippi Medical Center

1:35 **APPLICATION OF HumMod, DIAGNOSTIC VALIDATION**
Drew Pruett
University of Mississippi Medical Center

2:05 **VACCINES, POPULATION DIVERSITY AND COMPLIANCE**
Paul Beyers, MD
Mississippi State Epidemiologist, Director

2:35 **PANEL DISCUSSION**

Option 2

Thursday, February 22, 2018
MORNING
Room TC 226
9:00-11:00

SYMPOSIA ON ECOLOGICAL DIVERSITY AND THE ENVIRONEMNT
***Organizers*: Dr. AHM Ali Reza and Dr. Nina Baghai-Riding**
Delta State University

Title: **'Project *Magnolia grandiFLORA*, Mississippi's Digital Herbarium and Plant Atlas'**

Mac H. Alford, Ph.D., Professor

Department of Biological Sciences,
University of Southern Mississippi, Hattiesburg, MS 39406

Title: **'Pursuing a Dream - Protecting Mississippi's Natural Resources'**

Dr. Cathy Shropshire, Retired

Wildlife Biologist from Mississippi

Title: **'Vectors from space. How nutrient stoichiometry can help us understand the ecology and evolution of mosquitoes'.**

Donald A. Yee, Ph.D., Associate Professor

Department of Biological Sciences,
University of Southern Mississippi, Hattiesburg, MS 39406

Title: **'Evolution and Diversification of Malaria Parasites'**

Dr. Diana Outlaw, Associate Professor

Department of Biological Sciences,
Mississippi State University, Mississippi State, MS 39762

Thursday, February 22, 2018

EVENING

Ballroom

3:30 Dodgen Lecture and Awards Ceromony

General Poster Session

Immediately Following Dodgen Lecture

Friday, February 23, 2018
MORNING
TC 226

O7.01

8:30 METRICS OF SOCIAL JUSTICE IN HEALTH CARE

Laura C. Kebert, Ralph H. Didlake

University of Mississippi Medical Center, Jackson, MS, USA

Variance in health status and health care outcomes within and among populations has drawn increasing attention from physicians, policy makers, payers, and health care delivery systems. Investigation of these variances has led to the development of numerous metrics of individual or group health that are commonly under claims of measuring health or health care disparity, inequality, or justice. The philosophical concept of justice requires that the distribution of goods in a society have a reasonable element of fairness. Both the sufficiency and the mechanism of that distribution remain debated by philosophers, policy analysts, political scientists, and economists. Mapping traditional conceptions of justice to the operation of health delivery systems and the health status of populations is further complicated both by unequal starting positions of individuals, fixed physiologic variables that limit capacity or potential for health, and social determinants such as access to care, literacy, and transportation. In an effort to understand the ethical features of health care equity metrics, qualitative analytic techniques were used to categorize published equations on which such metrics are based. Using a four-box method, 28 equations were examined and found to be predominantly measures of health outcome rather than more robust measures of distribution equity of health or health resources within a population. This work allows observations on the complexity of mapping constructs of justice to health and the need for multi-component models that include social determinants of disease.

O7.02

8:50 A HISTORY OF HOMEOSTASIS: FROM PHYSIOLOGICAL REGULATION TO BIOLOGICAL SPECIES

Kenneth J Curry[1], Paula J. Smithka[2]

[1]Independent Scholar, Hattiesburg, MS, USA, [2]University of Southern Mississippi, Hattiesburg, MS, USA

Claude Bernard, working in the nineteenth century, expanded the then current notion of physiological regulation to include both the internal and external environments and described specific internal regulations that would respond to changing internal and external conditions. Bernard's recognition of this significant regulatory phenomenon was extended in the early twentieth century with more empirical detail and with Walter Cannon's (1929) neologism 'homeostasis' that marked the importance of the phenomenon as an object for future research. By mid-twentieth century, the concept of homeostasis had been extended into the fields of genetics and ecology. Genetic homeostasis described the stability of gene frequencies in populations while ecosystem homeostasis expanded the concept to describe stable relations among multiple species and their abiotic environments. Waddington's (1957) related neologism 'homeorhesis' designated a stable trajectory for animal development. Of course that term could also be used to describe an evolutionary trajectory. Thus homeostasis, as it has been used historically, describes a synchronic phenomenon of stability, and homeorhesis describes a diachronic phenomenon of stability. Eldredge and Gould (1972) apparently were the first to apply the concept of homeostasis to biological species. The first reference to biological species as a homeostatic unit in philosophical literature was made by Richard Boyd (1989). Stuart Kauffman (1993, 1995) equated homeostasis with attractors (systems theory) and as an integral part of self-organizing systems (complexity theory). We argue that homeostasis has matured into a theory with demonstrable mechanisms that account for both stability and the ability for change within a system.

O7.03

9:10 GROUNDING HOMEOSTATIC PROPERTY CLUSTERS FOR BIOLOGICAL SPECIES IN SYSTEMS AND COMPLEXITY THEORIES

Paula J. Smithka[1], Kenneth J. Curry[2]

[1]University of Southern Mississippi, Hattiesburg, MS, USA, [2]Independent Scholar, Hattiesburg, MS, USA

The explanatory power of considering biological species as homeostatic property clusters has been debated in the philosophy of biology since the late 1980s (Ereshefsky, 1992). Homeostasis has been accepted uncritically as a set of nebulous mechanisms that explain species cohesion while the property cluster has been used uncritically as way to account for variability among the members of a species (Boyd, 1989, 1991). The concept of homeostasis has been expanded from its nineteenth century role of stability in physiological regulation to a concept applicable at all levels of biological organization including biological species (Eldredge & Gould, 1972; Boyd, 1989). Homeostasis is synonymous with the concept of attractors from systems theory (Kauffman, 1995). We argue that property clusters form attractors as self-assembling systems which operate mechanistically with positive and negative feedback loops and on/off switches as described in cybernetic systems. Thus, property clusters form nomologically necessary homeostatic assemblies. Slight internal or external perturbations can nudge those assemblies to adjacent attractors (Kauffman, 1993, 1995) thereby explaining dynamic changes in species populations while maintaining overall stability. Larger perturbations would drive speciation events. We conclude that homeostasis, with its applicability to various levels of spatial and temporal organization, together with the characterization of species as property clusters, i.e., clusters of self-assembling properties, is fecund because of the broad theoretical support both notions enjoy from systems theory and complexity theory.

O7.04

9:30 CONFIRMATION AND PSYCHOLOGICAL EXPLANATION

Gregory Johnson

Mississippi State University, Meridian, MS, USA

Piccinini and Craver (2011) assert that the only way to verify that a psychological explanation is correct is to check it against the relevant neurobiological process. Shapiro (2016) rejects this claim and argues that confirming psychological explanations indirectly-

that is, by using the hypothetico-deductive method or Bayes' rule-is just as warranted as verifying them by examining the underlying neurobiological processes.

Although I agree that there are practical constraints that force us to use indirect methods to confirm psychological explanations, I disagree with Shapiro's basic stance. The outline of my argument is as follows. There are two options. One is to hold that directly inspecting how a process operates will provide a greater degree of certainty about the description of the process than an indirect method of confirmation can provide. That gives us a reason to seek to verify psychological explanations by inspecting the relevant neurobiology. The second option is to maintain that no evidence is better or worse than any other when it comes to confirming psychological explanations. In this case, we are holding that either (a) the processes described by cognitive psychology are not carried out by neurobiological entities and activities or (b) indirect methods of confirmation provide as much confirmation for an explanation as directly inspecting the process that the theory describes. Since (a) and (b) are both false, we should accept the first option and, as a general principle, seek to verify psychological explanations by inspecting the relevant neurobiological processes.

O7.05

9:50 ETHELDRED BENETT: A WOMAN'S CONTRIBUTIONS TO GEOLOGY BEFORE ANNING'S "SEASHELLS ON THE SEASHORE"

Renee Clary

Mississippi State University, Mississippi State, MS, USA

Although many have heard of Mary Anning (1799-1847), Etheldred Benett (1776-1845) preceded Anning as a woman geologist. Like Anning, Benett received little recognition for her contributions since her gender prevented her formal participation in professional societies. Benett's fossil interests began early and her independent wealth made it possible for her to pursue her collections. She was more than a fossil collector, however. She labeled and illustrated specimens, identified new species, and compiled research monographs. By 1809, people were visiting her collections and by 1810 she was corresponding with prominent contemporary geologists. Sowerby used Benett specimens in his Mineral Conchology, while Buckland included a Benett specimen in the Bridgewater Treatises. Since Benett was generous with her specimens, many ended up in museums in the UK and beyond. Benett also thoroughly described Wiltshire through its fossils and determined the stratigraphy of the Upper Chicksgrove Quarry, which Sowerby directly transcribed for Mineral Conchology without crediting her. Furthermore, Benett is a candidate for the first woman to name fossil taxa. She should be recognized as one of the first female geologists, since she not only amassed one of the earliest, best documented fossil collections, but she also demonstrated stratigraphical skills in her analyses.

Friday, February 23, 2018

AFTERNOON

Union C

12:00-2:00 **Asylum Hill Research Consortium**

Invited Workshop: **Sponsored by: Center for Bioethics and Medical Humanities, Univeristy of Mississippi Meidcal Center**

Friday, February 23, 2018

AFTERNOON

1:00-3:00 Mississippi INBRE/ Millsaps HHMI Symposia

Friday, February 23, 2018

AFTERNOON

1:00- 2:00 WORKSHOP

MS COLLEGE AND CAREER READINESS WORKSHOP

Organizer: Dr. Jackie Sampsell, Mississippi Department of Education

During this workshop, an overview of the 2018 Mississippi College and Career Frameworks for Science Education will be discussed.

MARINE AND ATMOSPHERIC

Chair: Dr. Remata Reddy,
Jackson State University

Vice-Chair: Francis Tuluri,
Jackson State University

Thursday, February 22, 2018

MORNING
Room 227

O8.01

9:00 NUMERICAL SIMULATION OF A STORM SURGE IN THE GULF OF MEXICO

Duanjun Lu, P.C. Yuan, Hui-Ru Shih

Jackson State University, Jackson, MS, USA

Storm surges are flood like phenomena caused by storms the can cause a threat to coastal areas such as northern Gulf Coastal regions. Different methods for surge prediction are used until now. Nevertheless, these methods are not always capable to provide insight in observed surge patterns in Gulf coasts. In this study, we will focus on assessing and explaining spatial and temporal patterns of a storm surge occurring in Gulf of Mexico by applying numerical simulation study of Advanced Circulation (ADCIRC) model. The storm surge was produced by the landfall of Hurricane Isaac in southeast Louisiana on 29 August 2012. We also tried to investigate the coupling between an atmosphere model (WRF) & ocean (ADCIRC) modeling analysis for water level data.

O8.02

9:30 RELATIVE FREQUENCIES OF TWO SPECIES OF COWNOSE RAYS (ELASMOBRANCHII: RHINOPTERIDAE) IN THE GULF OF MEXICO

Helen Weber[1], Christian Jones[2], Jill Hendon[3], Gregg Poulakis[4], David Wells[5], Nicole Phillips[1]

[1]The University of Southern Mississippi, Hattiesburg, MS, USA, [2]National Marine Fisheries Service, Pascagoula, MS, USA, [3]Gulf Coast Research Laboratory, Ocean Springs, MS, USA, [4]Florida Fish and Wildlife Conservation Commission, Port Charlotte, FL, USA, [5]Texas A&M University, Galveston, TX, USA

Recent research reveals the presence of two morphologically conserved cownose rays, the Atlantic (Rhinoptera bonasus) and the Brazilian (Rhinoptera brasiliensis), within the Gulf of Mexico. However, the relative frequencies of the two species within the Gulf of Mexico remains unknown. The Atlantic cownose ray is considered highly migratory with a documented range from Maryland, USA to southern Brazil, and is listed as Vulnerable by the IUCN. The Brazilian cownose ray was thought to be non-migratory and confined to the coastal waters of Brazil, leading to its listing as Endangered by the IUCN. The presence of both species within the Gulf of Mexico suggests the abundance of the Atlantic cownose rays has likely been inflated, resulting in a need for a reassessment of the conservation status for both species. By collecting samples which encompass both migratory and historically resident populations, we are able to better evaluate the occurrence and relative frequencies of both cownose ray species. To facilitate this, tissue samples were collected from 409 cownose rays throughout their documented ranges from Virginia, USA to Brazil. Species identifications were performed using a 450-base pair region in the mitochondrial genome. The species-specific identification of cownose rays generated in this study will facilitate a better understanding of the relative abundance and extent of occurrence of both species in the Gulf of Mexico. This is a crucial first step in understanding the population biology of cownose rays in the western Atlantic, and will facilitate the reassessments of the IUCN conservation statuses for both species.

O8.03

9:45 HURRICANE-SPAWNED TORNADOES UNDER ANTHROPOGENIC CLIMATE CHANGE

Dereka Carroll[1], Jeff Trapp[2]

[1]Jackson State University, Jackson, MS, USA, [2]University of Illinois at Urbana-Champaign, Urbana, IL, USA

The purpose of this study is to investigate the impacts of anthropogenic climate change on the frequency of tornadoes spawned by tropical cyclones making landfall in the U.S. Atlantic Basin. Hurricane Ivan (2004), a prolific tropical cyclone tornado (TCT)-producing storm, is the particular case under consideration. Using the Weather Research and Forecasting model, Hurricane Ivan is simulated under its current-climate forcings. Such a control simulation is compared to simulations conducted using a "pseudo-global" warming (PGW) approach, which allows for an assessment of both near-future and long-term impacts of changes in greenhouse gas concentrations and associated radiative forcing. The PGW simulations involve future climate conditions over a late (2080-2090) century time period. Changes in tropical cyclone intensity and TCT production for the PGW-perturbed Ivan are documented and analyzed. Ultimately, these simulations will be paired with demographic and socioeconomic data to assess the resultant disaster risk under future climates.

10:00 BREAK

10:15 LOOKING BACK FOR THE FUTURE: USING HISTORIC ROSTRA TO FURTHER SAWFISH CONSERVATION

Annmarie Fearing[1], Kelcee Smith[2], Tonya Wiley[3], Jeff Whitty[4], Kevin Feldheim[5], Peter Kyne[6], Nicole Phillips[1]

[1]University of Southern Mississippi, Hattiesburg, MS, USA, [2]Louisiana State University, Baton Rouge, LA, USA, [3]Havenworth Coastal Conservation, Palmetto, FL, USA, [4]Florida Fish and Wildlife Conservation Commission, Pensacola, FL, USA, [5]Field Museum of Natural History, Chicago, IL, USA, [6]Research Institute for the Environment and Livelihoods, Charles Darwin University, Darwin, NT, Australia

Sawfishes are considered the most threatened family of all sharks and rays, having suffered globally from declines in range and abundance. The Critically Endangered largetooth sawfish, *Pristis pristis*, was historically distributed in the Pacific, Atlantic and Indian Oceans. Today, however, 'viable' populations are largely limited to northern Australia. Populations that have suffered from drastic declines in abundance are typically at risk of having reduced, or low, levels of genetic diversity. Previous research found that *P. pristis* populations in Australia have experienced genetic bottlenecks, but it is unclear when this event occurred. It is unknown whether levels of genetic diversity in this species have been maintained over the last ~100 years or if they are severely reduced from historic levels. A direct way of quantifying changes in genetic diversity is to compare genetic diversity in contemporary populations to those from the past. DNA analysis of 145 tissue samples from old sawfish rostra (saws) housed in public and private collections provides access to historic populations that can be compared to contemporary samples from previous research. DNA sequences were generated, via qPCR, for a ~1,100 base pair portion of the mitochondrial control region and will be used to assess and quantify any loss of genetic diversity in *P. pristis* over the past ~100 years. If the levels of genetic diversity in contemporary populations are severely reduced from those of past populations, protecting any and all remaining genetic diversity should be a high priority in management plans.

O8.05

10:30 UTILIZING BAYESIAN BELIEF NETWORKS TO MODEL THE OCEAN-ATMOSPHERE INTERFACE

Warith Abdullah, Remata Reddy, Cary Butler

Jackson State University, Jackson, MS, USA

The ocean-atmosphere interface (OAI) is a dynamic boundary of complex energy and chemical exchange. Research is on-going to improve how the OAI is represented within tropical cyclone (TC) prediction models and ensembles. Motivation for improvement stems from a rapidly changing thermodynamic environment caused by climate change. Such changes are not widely understood, as no scientist has observed or measured these changes on long time scales. We assert the possibility of climate change, its underlying uncertainties and modified atmospheric variability can potentially lead to rapid intensification events as observed with TC Matthew in October, 2016. Despite 20 knot wind shear, TC Matthew strengthened in the wake of an unusually moist atmosphere and an abundance of ocean heat content (OHC) where studies show a deepening thermocline. We argue simplification of OAI to capture model ensemble data uncertainty through probabilistic modeling via Bayesian Neural Network (BNN). We retrieved area-averaged satellite data from NOAA and NASA, tabularizing several parameters—atmospheric air temperature (Air Temp), atmospheric temperature anomaly (ATA), atmospheric carbon dioxide (CO2), sea surface temperature (SST), tropical cyclone heat potential (TCHP), mid-layer wind shear (Wind Shear), convective available heat potential (CAPE), vertical motions (Vertical Motion), perceptible water content (PWC) and our derived OAI parameter as inputs into a BNN via R programming language. We used the BNN to model the OAI and inferenced potential favorability of OAI given conditional probabilities. The BNN network rejected ATA and

Wind Shear. Results showed probabilities acceptable within expert interpretations of parameter interactions to predict favorable OAI conditions.

O8.06

10:45 STUDIES OF LARGE-SCALE SURFACE FLUXES, VERTICAL MOTIONS, INTENSITY CHANGE AND TRACK PREDICTION ASSOCIATED WITH LAND FALLING HURRICANE KATRINA

Remata Reddy, Duanjun Lu, Francis Tuluri, Meheri Fadavi

Jackson State University, Jackson, MS, USA

Our study investigated the possible correlation between large-scale heat fluxes, vertical motions and intensity change associated with landfall of Hurricane Katrina. After reaching the category 5 intensity on 29 August 2005 over the central Gulf of Mexico, Katrina weakened to category 3 before making landfall on 29 August 2005, Louisiana coast with maximum sustained winds over 110 knots. We examined the vertical motions associated with this intensity change of the hurricane. The data for Convective Available Potential Energy (CAPEV), sea level pressure and wind speed were obtained from Atmospheric Soundings, University of Wyoming and NOAA National Hurricane Center (NHC) for the period 24 August 24 to 3 September 2005. We developed an empirical model and a program using C++ to calculate surface potential temperatures and heat fluxes using the data sources mentioned. Vertical motions using CAPEV values were calculated and results show maximum large-scale heat fluxes of 7960 W/m2 during landfall with a central pressure of 905 mb on 29 August 2005. CAPEV and the vertical motions peaked 3 to 5 days before landfall. We also used the NCAR Numerical model (WRF/ARW) with data assimilation to ascertain our model's performance with respect to hurricane tracking and intensities associated with hurricane Katrina. Results from our model's are in good agreement with the actual observations. Our model also reproduced the precipitation, intensity change and track associated with hurricane Katrina. The model presented could form an early warning system to predict land falling hurricanes associated with severe weather over the Gulf of Mexico.

O8.07

11:00 AIR QUALITY, AND METEOROLOGY ASSOCIATION FOR ASTHMA PREVALENCE IN MISSISSIPPI GULF COASTAL REGION

Francis Tuluri[1], Amit Gorai[2], Travis Johnson[1], Reddy Remata[1]

[1]Jackson State University, Jackson, MS, USA, [2]National Institute of Technology, Rourkela, Odisha, India

Study of interplay between asthma and environmental conditions are essential to predicting controlling asthma prevalence. The present study is an investigation on the influence of air quality, and meteorological parameters on the prevalence of asthma in selective regions of Mississippi Gulf Coast, USA. Daily data of asthma admissions, particulate matter (PM2.5), Ozone (O3), Nitrogen dioxide (NO2), temperature, and humidity is collected for selective locations of Mississippi coastal region of Gulf of Mexico for the period 2003 to 2011 based on the availability of data. Poisson regression model showed positive and negative correlations for asthma with the dependent variables. Positive correlation is observed for the association of asthma with Ozone, PM, and temperature and the correlation was found to be statistically significant ($p < 0.05$) in certain regions, though the correlation of other variables was not consistent uniformly except in few cases.

O8.08

11:15 OBSERVATIONS WITH THE JSU MOBILE METEOROLOGY UNIT DURING 2017: FROM THE MOUNTAINS TO THE SEA AND A TOTAL SOLAR ECLIPSE

Loren White, Anthony Thornton

Jackson State University, Jackson, MS, USA

A wide variety of data have been collected since October 2016 using the "JSU Mobile Meteorology Unit". This compact set of equipment includes capabilities for vehicular transects, pedestrian measurements, and radiosonde measurements. Phenomena targeted have included: atmospheric response to the total solar eclipse; the North American monsoon system; midlatitude fronts; drylines; marine layer incursions; and microclimatic characterization of archaeological sites and sinkholes. The vehicular platform measures temperature and humidity with Rotronics Hygroclips at 2-s intervals, both within a U-tube and a Gill shield, as well as solar radiation, pressure, and GPS position. The pedestrian system uses an Apogee TS-100 aspirated shield for the Hygroclip, a pyranometer, a barometer, an infrared temperature sensor, and GPS. Data are analyzed as time series, spatial series, and geographic map views. Calculated quantities include potential temperature, dewpoint, mixing ratio, and heat index. The lower tropospheric Windsond radiosonde system enables vertical sampling of temperature, humidity, wind, and pressure up to about 6 km MSL. Soundings have been done for the eclipse and at varying positions relative to fronts and drylines. Aside from targeting of specific weather conditions, the variety of geographic and meteorological settings encountered while operating the vehicular system in more than 20 states, temperatures ranging from -12 to 43 C, and elevations from -70 to 3040 m MSL has provided a rich dataset to examine spatial variability scales and response characteristics of the instrumentation. In particular, there is interest in comparison of the different sensor shields in rain, non-precipitation, fog, and snowfall cases.

11:30-12:00 Divisional Business Meeting

12:00 pm – 1:00 pm: General Symposia

Thursday, February 22, 2018

EVENING

Ballroom

3:30 Dodgen Lecture and Awards Ceromony

General Poster Session

Immediately Following Dodgen Lecture

P8.01

AN OVERVIEW OF NCEP: PRODUCTS, SERVICES, AND IMPACTS

Mariama Feaster[1], Genene Fisher[2]

[1]Jackson State University, Jackson, MS, USA, [2]NCEP, College Park, MD, USA

The NOAA Centers for Environmental Prediction (NCEP) delivers national and global weather, water, climate and space weather guidance, forecasts, warnings and analyses to a broad range of users and partners. NCEP products and services from its nine centers respond to user needs to protect life and property, enhance the

nation's economy, and support the nation's growing need for environmental information. This presentation will explain the mission of these NCEP centers and their efforts to build a Weather-Ready Nation. It will also include discussion of the socio-economic impacts of weather and climate events and the value of NCEP products and services.

P8.02

MEASURING SOLAR CORONAL MAGNETISM DURING THE TOTAL SOLAR ECLIPSE OF 2017

Keon Gibson[1], Scott Sewell[2], Steve Tomczyk[2], Andrea Smith[2]

[1]Jackson State University, Jackson, MS, USA, [2]NCAR/UCAR, Boulder, CO, USA

The total solar eclipse on August 21, 2017 provided a notable opportunity to measure the solar corona at specific emission wavelengths to gain information about coronal magnetic fields. Solar magnetic fields are intimately related to the generation of space weather and its effects on the earth, and the infrared imaging and polarization information collected on coronal emission lines here will enhance the scientific value of several other ongoing experiments, as well as benefit the astrophysics and upper atmosphere communities. Coronal measurements were collected during the 2 minute and 24 second totality period from Casper Mountain, WY. Computer-controlled telescopes automatically inserted four different narrow band pass filters to capture images in the visible range on a 4D PolCam, and in the infrared range on the FLIR 8501c camera. Each band pass filter selects a specific wavelength range that corresponds to a known coronal emission line possessing magnetic sensitivity. The 4D PolCam incorporated a novel grid of linear polarizers precisely aligned with the micron scale pixels. This allowed for direct measurement of the degree of linear polarization in a very small instrument with no external moving parts as is typically required. The FLIR offers short exposure times to freeze motion and output accurate thermal measurements. This allowed a new observation of the sun's corona using thermo infrared technology.

P8.03

SAWFISH CSI: OPTIMIZING ENVIRONMENTAL DNA PROTOCOLS TO SEARCH FOR THE CRITICALLY ENDANGERED SMALLTOOTH SAWFISH IN NORTHERN GULF OF MEXICO WATERS

Ryan Lehman[1], Jill Hendon[2], Gregg Poulakis[3], Nicole Phillips[1]

[1]The University of Southern Mississippi, Department of Biological Sciences, Hattiesburg, MS, USA, [2]The University of Southern Mississippi, Center for Fisheries, Research, and Development, Ocean Springs, MS, USA, [3]Fish and Wildlife Conservation Commission, Fish and Wildlife Research Institute, Charlotte Harbor Field Laboratory, Port Charlotte, FL, USA

Studying the occurrence of the critically endangered Smalltooth Sawfish, *Pristis pectinata*, with traditional survey methods such as trawls and gill nets is challenging due to factors such as low abundance, permitting constraints, and cost. Environmental DNA (eDNA) presents a cheaper, alternative option to locating and studying this species in the northern Gulf of Mexico in areas where reports of encounters have recently emerged, but their status remains uncertain. Environmental DNA can be isolated from water or sediment samples and has been used in both freshwater and marine habitats for a number of different target species and applications. However, methods of eDNA capture vary widely across studies, particularly within marine environments. To date, most eDNA studies have collected surface water due to ease of collection; however, some research suggests that the majority of eDNA sinks to the bottom. Therefore, surface collection may not be the most appropriate approach to quantify smalltooth sawfish occurrence, especially since they are benthic rays. To determine the optimal protocol for eDNA collection and filtration in our region, we collected water samples from the top 30 cm of the ocean surface, and from 30 cm above the substrate. We tested different filter pore sizes on these water samples to quantify the speed of filtration, and compared the average DNA yield per sample. Finally, we compared these results to eDNA concentrations in corresponding ocean sediment samples to determine the best method for eDNA collection for application in smalltooth sawfish surveys in the northern Gulf of Mexico.

P8.04

AGE AND GROWTH OF RED DRUM IN THE NORTH-CENTRAL GULF OF MEXICO

Beckah Campbell, Corbin Bennetts, Robert Leaf

University of Southern Mississippi, Long Beach, MS, USA

Individual growth parameter estimates, derived from length-at-age models, are essential to the assessment and management of fish stocks and decision support for sustainable use policies. Red Drum are fished by both commercial and recreational users, and have a long history of stock exploitation. The most recent Red Drum assessment (2000) indicated that the Gul of Mexico stock was both "overfished" and "data limited". The objective of this project was to describe the sex-specific age and growth characteristics of Red Drum in the north-central Gulf of Mexico. Age, standard length, and sex data were measured from a total of 310 Red Drum collected from Mississippi coastal waters from nn Month-nn Month YYYY. Such data are critical to developing a more accurate description of the length-at-age relationship of Red Drum, particularly by modeling the sex-specific relationship and thereby reducing the unexplained variance in the current length-at-age relationships of Red Drum. This information has been ultimately used to refine the sex-specific length-at-age relationship for Red Drum in the northern Gulf of Mexico using a three-parameter con Bertalanffy growth function. Ultimately, it is hoped that these improvements to the length-at-age models of Red Drum in coastal Mississippi waters shall be used to better inform management decisions of this recreationally and commercially important species.

P8.05

DEVELOPMENT OF ENVIRONMENTAL DNA METHODS TO ASSESS HABITAT USAGE IN BULL SHARKS (*CARCHARHINUS LEUCAS*)

Katherine Schweiss[1], J. Marcus Drymon[2], Toby Daly-Engel[3], Nicole Phillips[1]

[1]The University of Southern Mississippi, Hattiesburg, MS, USA, [2]Mississippi State University, Biloxi, MS, USA, [3]Florida Institute of Technology, Melbourne, FL, USA

Identifying the distribution and habitat preference of elasmobranchs (sharks and rays) traditionally requires setting nets and handling the target species to collect tissue samples and attach tags. Such methods are costly, time consuming, and inflict stress to both target and non-target species. Environmental DNA (eDNA) sampling provides a non-invasive approach to studying elasmobranchs, eliminating the need to capture or even observe the target organism. In the Gulf of Mexico, Bull Sharks (*Carcharhinus leucas*) are known to use the interface between freshwater and marine systems;

however, the extent to which they use the rivers feeding these systems is unknown. To investigate riverine habitat use, we established a standard protocol for collecting and filtering highly turbid coastal water samples, preserving the filters, extracting the DNA, and amplifying a target sequence specific to *C. leucas* via polymerase chain reaction (PCR). Water samples were filtered with various filter pore sizes to test for efficiency and multiple DNA extraction protocols were compared to determine which produced the highest quality and quantity DNA. Droplet digital PCR (ddPCR) was used to detect *C. leucas* DNA in each water sample, if present. DdPCR can identify minute amounts of target DNA with unparalleled precision by partitioning the sample into individual droplets, conducting PCR reactions, and quantifying resultant products from each droplet. Having a reliable and consistent approach to filtering, isolating, and amplifying *C. leucas* eDNA will expand our knowledge of this species' distribution and preferential habitat.

P8.06

COMPARISONS OF MID-ALTITUDE RADIAL CONVERGENCE SIGNATURES IN SEVERE STORMS FROM KDGX AND KULM

Janae Elkins, Eric Carpenter, Duanjun Lu, Todd A. Murphy, Anne Hanks

Jackson State University, Jackson, MS, USA

The primary radar used for warning services in the NWS Jackson, MS county warning area is KDGX, located in Brandon, MS. Up until recently, KDGX provided the best data coverage in much of the Delta region, including extreme southeast Arkansas and northeast Louisiana, and northwest Mississippi. But as of 2017, a new S-band polarimetric radar, KULM, is being operated by the University of Louisiana at Monroe in northeast Louisiana, and this radar has already brought operational benefits, especially in terms of tornado detection and improved tornado warnings. While the focus has been on documenting improvements as they relate to tornado warning issuances, the hope here is to document additional improvements related to severe weather, including radar signatures associated with straight-line winds in severe thunderstorms. The purpose of this presentation was finding and comparing MARC (Mid Altitude Radial Convergence) signatures between KULM and KDGX, and to emphasize cases when better sampling at KULM helped to improve warning services for NWS Jackson, MS. This was done by searching numerous severe weather events from the first half of 2017 for severe storms and damaging straight-line wind reports occurring in the Delta region, and then comparing velocity and reflectivity data from the two radars. Data from the following events was used in this presentation: 25 March, 29 March, 2 April, 30 April, 28 May, and 1 July.

P8.07

EXPLORING THE CAPABILITIES OF THE CHM 15K CEILOMETER TO DETECT ICING CONDITIONS WITHIN CLOUDS

Jaylond Harvey[1], Scott Landolt[2], Jamie Wolff[2]

[1]Jackson State University, Jackson, MS, USA, [2]National Center for Atmospheric Research, Boulder, CO, USA

Aircraft icing is a known hazard in the aviation field that results from supercooled liquid water (SLW) in clouds impacting aircraft surfaces. Detecting icing conditions is an important step in keeping aircraft out of harm's way. However, detecting icing conditions aloft can be difficult. In this study, data from a Lufft CHM 15K ceilometer were analyzed to determine if the sensor could detect icing conditions aloft. A CNR1 solar radiation sensor was used to determine cloudy days and a GEONOR 600mm precipitation gauge was used to identify precipitation events on the cloudy days. Each case identified from these sensors was categorized into the days considered for the precipitating and non-precipitating events for this study. PIREPs (pilot reports) are used to provide Air Traffic Control (ATC) and other pilots with a variety of information including encountered weather type, icing severity, altitude, and date/time of occurrence. Icing information from PIREPs was compared against the ceilometer data to investigate whether the ceilometer shows any abilities in detecting icing conditions aloft. The ceilometer data were plotted as a function of time and the raw signal return data were analyzed against the PIREPs to determine if there was any information in the signal that might indicate icing conditions in the atmosphere. Results of this study will be shown and several case studies will be highlighted to show the ceilometers performance during known icing conditions.

P8.08

GEOSTATIONARY LIGHTNING MAPPER COMPARISON TO CLOUD OPTICAL DEPTH IN VARIOUS STORM ENVIRONMENTS

Robert Garrett[1], Remata Reddy[1], Jamese Sims[2], Curtiss Burnett[3]

[1]Jackson State University, Jackson, MS, USA, [2]NASA, Greenbelt, MD, USA, [3]ARSC, Greenbelt, MD, USA

This study aims to find patterns in lightning frequency per area in different storm modes and how they relate to cloud thickness. Some of these storm modes are: Single Cell Thunderstorms, Multi-Cell Thunderstorms, Supercells, Squall Lines, and Meso-convective Systems. To complete this study, new products on Geostationary Operational Environmental Satellite-16 (GOES-16) were used. These products include the new Level 2+ Lightning Cluster-Filter Algorithm (LCFA) from the Global Lightning Mapper (GLM) instrument, and the Level 2+ Cloud Optical Depth (COD) product generated from the Advanced Baseline Imager (ABI). To develop the code associated with this project, storms from late May and Mid-June were used, but for the most accurate data, only storms occurring from July 5th, 2017 through July 6th, 2017 will be used. The GOES-16 products that are being used are in the beta maturity phase, which means that there are still some significant bugs in the data that is being distributed. To account for these potential bugs, the team decided to wait for the DO.00.05 upgrade in the DE, which fixed some data issues in the COD product. GLM data was able to be used after mid-June with the DO.04.04 upgrade. The purpose of this project is to test the overall capabilities of GLM in high sun glare environments, and to study lightning patterns associated with cloud thickness in different systems, considering: water content, cloud particle size, and liquid/ice water path, which can help in generating a value for Cloud Optical Depth.

P8.09

ANALYZING THE IMPACT OF SYNOPTIC WEATHER ON THE SURFACE ENERGY BUDGET OF A LARGE INLAND WATER BODY

Justin Bonds[1], Raleigh Grysko[2], Zhongming Gao[2], Heping Liu[2], Remata Reddy[1]

[1]Jackson State University, Jackson, MS, USA, [2]Washington State University, Pullman, WA, USA

A large inland water body's energy budget is a delicate system and can be subject to a variety of changing conditions. A large water body's surface energy budget consists of net radiation, latent heat, sensible heat, and terrestrial radiation. Therefore it is important to understand how the surface energy budget is impacted by varying factors. Data were collected from an eddy covariance system located within the Ross Barnett Reservoir in Ridgeland, MS. These data are being used to analyze diurnal and monthly changes in latent heat, sensible heat, and net radiation, all of which are key components of the surface energy budget. We chose data from the spring months of March and April of 2008. The reservoir is subject to many synoptic weather systems, which can impact the water's surface energy budget. Therefore, dates when frontal systems would pass through the area are of significance to this study. We expect that weather systems will negatively impact the reservoir's surface energy budget, leading to less heat and energy output than on a normal day. The primary objective of this study is to examine any direct impacts weather has on the reservoir's surface energy budget, and what other variables, such as humidity and temperature, are affected.

P8.10

CLIMATE CHANGE AND GLOBAL WARMING: ANATOMY OF WEATHER PATTERNS, GLOBAL AND HEALTH EFFECTS

Abhay Cheruku[1], Nathan Massey[1], Aditya Remata[1], Remata Reddy[2]

[1]Clinton High School, Clinton, MS 39056, USA, [2]jackson State University, Jackson, MS, USA

Climate change is a largely occurring phenomenon, and poses significant risks for a broad range of human and natural systems. Human activities largely determine the evolution of the Earth's climate, which not only impact the next few decades, but the coming centuries and millennia. Global warming is the natural heating of the Earth's surface caused by the increasing amount of greenhouse gases in the atmosphere. Climate change is expected to alter production opportunities facing agricultural producers. Global studies of climate change impact on agriculture and suggest positive benefits worldwide. Changes in land values are used to impute expected changes to agricultural GDP (Gross Domestic Products). The climate and weather data from NOAA and NASA were analyzed for understanding the global and health effects due to global warming. The results showed that some areas around the world benefit from climate change and that previous estimates may be overly pessimistic. Human activities still have a growing effect on climate change. As a result of climate change, global warming has altered the effects of many natural occurrences including temperature increase, anatomy of weather patterns, sea level rise and human health effects. These changes impact the lives of humans in a number of ways. More carbon dioxide is rising into the atmosphere due to human activity and there is less oxygen to balance it. Countries will spend large quantities of money on fighting respiratory diseases. Severe precipitation is causing the sea level to rise, which is disastrous for coastal towns and cities.

P8.11

EXAMINING DIURNAL VARIABILITY ACROSS THE EQUATORIAL PACIFIC BASIN ASSOCIATED WITH ENSO

Tony Hurt[1], Tony Hurt[2], Naoko Sakaeda[3], Juliana Dias[4], George Kiladis[3]

[1]Jackson State University, Jackson, MS, USA, [2]Significant Opportunities in Atmospheric Research and Science, Boulder, CO, USA, [3]NOAA Earth System Research Laboratory, Boulder, CO, USA, [4]Cooperative Institute for Research in Environmental Sciences, Boulder, CO, USA

Many questions remain regarding driving mechanisms behind the diurnal cycle across ocean basins and factors that influence it. Advancements in weather and climate predictability are closely related to improved accuracy of diurnal cycle depiction in numerical models, and the proliferation of atmospheric observation tools such as satellites and buoys during recent decades has enabled increasingly detailed research. The Global Tropical Moored Buoy Array (GTMBA) is one such tool that presents a unique advantage in analysis of the relationship between diurnal cycle variability and large-scale climate variations such as El Niño - Southern Oscillation (ENSO), largely due to the temporal resolution of its collected data. This study examines diurnal variability of selected atmospheric variables, notably rainfall, across the equatorial Pacific basin during the December through February (DJF) seasonal period from 1998 through 2012. Daily mean, diurnal amplitude and phase were calculated for each variable using GTMBA data, along with probability distributions of amplitude and phase. Air and sea-surface temperature, relative humidity and surface winds were also examined to evaluate potential contributions to the diurnal variability of rainfall. Analysis indicated increased frequency of heavier rainfall during ENSO warm phase (El Niño) events as suggested by larger diurnal amplitude and greater variability in observed rainfall rates across the central Pacific basin, while diurnal phase exhibited a large degree of variability across the basin regardless of ENSO phase. Comparison of buoy rainfall measurements against microwave satellite rainfall measurements was also conducted, with similarities in characteristics of diurnal amplitude and phase observed in both.

P8.12

AN INVESTIGATION OF THE LARGE-SCALE HEAT FLUXES AND AIR-SEA INTERACTIONS OF HURRICANE HARVEY BY USING SATELLITE DATA

Arvind Loganathan[1], Xavier Brown[2], Remata Reddy[2]

[1]Northwest Rankin High School, Flowood, MS, USA, [2]Jackson State University, Jackson, MS, USA

We investigated to calculate the large-scale heat fluxes and determined the air-sea interactions associated with Hurricane Harvey using satellite data. Hurricane Harvey was a category 4 storm that made landfall in Texas near the Gulf of Mexico on August 25, 2017, with a low pressure 938 millibars and with wind highest speed 58.1 m/s. It effected 180 billion dollars' worth of property damage and caused a total of 82 fatalities. An empirical model is designed to calculate the large-scale heat fluxes of Hurricane Harvey. We developed the model by differentiating the ideal gas law and by using the large-scale heat fluxes equation. Large-scale heat fluxes are the measurement of energy flow per unit of area per unit of time. We used satellite data to collect wind speed, air pressure, air temperature, and ocean temperature. We collected our data from NOAA, NDBC, and NASA. Hurricane Harvey was at its strongest point on 26 August 2017 at 4:00 GMT. Our results show that there is an inverse relationship between pressure and large-heat fluxes, when pressure is low and the large-scale heat fluxes are high. The difference between and air and sea temperature was highest at 4.9 degrees Celsius, Our results further show that Harvey's maximum large-scale heat fluxes were around 4600 J/m2. Our model functions well since it can accurately replicate actual observations made from the hurricane. In the future, we could use

satellite data and our empirical model to determine the severity and track of any Atlantic hurricane.

P8.13

INFERRING OCEAN VELOCITY FROM SEQUENCES OF OCEAN IMAGES

[1]Courage Klutse, [1]Dmitri Nechaev, [2]Hans Ngdock, [2]Innocent Souopgui

University of Southern Mississippi, Stennis Space Center, MS, USA and Naval Research Laboratory, Stennis Space Center, MS, USA

Assimilation of observed ocean velocity information have been shown to have significant impacts on the quality of forecasts for ocean surface circulation. Furthermore, previous studies have suggested that ocean velocity information can be estimated from sequences of images containing geophysical features. Consequently, this work examines a unique opportunity of hypothetically estimating reliable ocean velocity information for regions where ocean images are available. The assimilation of the image sequences, using a four-dimensional variational data assimilation (4DVAR) analysis system is tested in a controlled environment. Synthetic images of the surface trace concentration are obtained from the solution of the advection-diffusion equation with prescribed velocity field. The velocity field is then reconstructed from synthetic images. The ability to invert images of the passive tracer concentration into surface velocity by assimilating tracer concentrations is a validation for the approach in these initial experiments. Subsequent experiments focus on assessing the differences between the extracted velocities and independent velocity observations, and assessing the impact of assimilated reconstructed velocities on model forecast.

Friday, February 23, 2018
MORNING

10:15-11:30	Simulation Based Education in Mississippi: A Statewide Organizational Meeting
10:00-1:00	Mississippi-INBRE Graduate Scholars Symposium)

AFTERNOON

12:00-1:00	Plenary Speaker
1:00-3:00	Mississippi INBRE/ Millsaps HHMI Symposia

MATHEMATICS, COMPUTER SCIENCE AND STATISTICS

Chair: Jamil Ibrahim
University of Mississippi Medical Center
Vice-Chair: Ping Zhang
Alcorn State University

MORNING
ROOM TC Board Room 229

O9.01

8:30 COMPARE BIG DATA SECURITY ANALYTIC TOOL PERFORMANCE

Yong Wang

Alcorn State University, Lorman, MS, USA

This talk will review big data characteristics in the cloud. Big data security and privacy challenges will be presented. Followed by a review of the current security analytic tools in big data. Finally, a comparison of the different security analytic tool performancefor big data will be presented.

O9.02

8:50 SURVEY OF ARTIFICIAL INTELLIGENCE APPLICATIONS

Devontrae Williams, Ping Zhang

Alcorn State University, Lorman, MS, USA

In this abstract, Artificial Intelligence's (AI) basic concepts and algorithms are discussed. Artificial neural networks (ANNs) and genetic algorithms (GAs) are two ways that programmers collect information for data training and test. Artificial Intelligence systems employ devices such as agents and sensors to collect data to aid in future decision-making. Some applications are given. In addition, the adversarial search of AI is introduced, such as the minimax algorithm and alpha beta pruning. These search algorithms demonstrate the efficiency and abilities of artificial intelligence

O9.03

9:10 HUMAN ACTIVITY RECOGNITION USING WEARABLE DEVICES

Sarbagya Ratna Shakya, Zhaoxian Zhou

University of Southern Mississippi, Hattiesburg, MS, USA

Human Activity recognition (HAR) has been one of the important fields of research in recent times. HAR has a wide range of applications in the field of health, safety, video surveillance, entertainment, robotics, human computer interactions and tactical scenarios. Despite the installation of accelerometer and gyroscope in all the mobile devices which provides the opportunity for the continuous collection of data, HAR using these accelerometers is still not accurate due to the poor recognition accuracy of existing recognition methods. The performance of such methods depends largely on the feature extraction and classification techniques. In this study we investigate the state of art in HAR based on the data collected through the accelerometer and gyroscope of the wearable devices. In this approach, we employ the machine learning classifiers, algorithms, and deep learning (DL) approaches across

many human activity benchmark datasets. This datasets include information collected from different users using smartphones for recognizing different daily activities. The experimental result from this study compared the performance between the different machine learning activity recognition algorithms and the deep learning algorithms based on convolutional neural network(CNN) and recurrent neural network(RNN) for activity recognition. The results show that DL algorithms have slightly outperformed the machine learning and have achieved better accuracy.

O9.04

9:30 IMPLEMENTATION OF ALGORITHMS FOR ANALYTICAL APPROACHES TO MASSIVE DATA EXPERIMENTAL VALIDATION OF CONTEXT

Ramakalavathi Marapareddy, Sowmya Wilson Saripalli

University of Southern Mississippi, Hattiesburg, MS, USA

To use the data measured by experimental results for various scientific analyses and engineering applications, it is essential that the accuracy and precision of such data be validated in advance. Usually, validation experiments and validation analyses are conducted to confirm the data precision, by comparing the data measured by one experiment source with data measured by other independent instruments with verified precision. The reference data should have comparable or better accuracy than the target data to be verified. Another important consideration is that both data to be compared should be measured as close as possible in time. The aim of this work is to design and test algorithms for analyzing very large-scale data. This work is in its importance on demanding analytical evaluation of algorithms' and statistical measures of output ambiguity, in difference to the principally experiential approaches presently used in data mining and machine learning. The preliminary results reveal that experimental validation is accomplished in a superior mode.

O9.05

9:50 COLLEGE ALGEBRA - ONLINE VS TRADITIONAL CLASSES

Lixin YU

Alcorn State University, Lorman, MS 39180, USA

Many studies have been done to investigate the effectiveness of the online learning of Algebra. While some studies show that computer-assisted learning improves the student-learning outcome of the College Algebra classes, other studies have data to prove that traditional lecture is associated with better final grades and lower failure rates. Alcorn State University employs computer-assisted learning across all the sections of College Algebra, but it offers both traditional face-to-face sections and synchronized online sections via Blackboard Collaborate. This research analyzes of data of online class vs traditional face-to-face class in terms of the class attendance, homework completion, midterm and final exam performance, chapter test performance, and validity of the proctored and un-proctored tests. The results will be discussed to study the pros and cons of the synchronized online classes as a delivery method of College Algebra education.

O9.05

10:10 THE IMPACT OF MOBILE TECHNOLOGY ON STUDENT ENGAGEMENT IN LEARNING ACTIVITIES

Jamil Ibrahim, Saja Ibrahim, Ibrahim J. Ibrahim Ibrahim

University of Mississippi Medical Center, Jackson MS USA

Mobile device usage is widespread among students today. There is no doubt that advances in technology continue to have a great impact on the way faculty, and other campus community stakeholders interact with learners. Opportunities and challenges are emerging for all of these groups and institutions from the increasing availability of low-cost mobile devices and associated infrastructures. The aim of this research was to measure how students perceive mobile usage in the classroom, the types of mobile devices they own or use, and other educational activities. Also this study investigated whether students' perceptions are related to factors such as age, gender, race, and school affiliation. During the 2016-2017 academic year, a survey was administered online students from a southern university using Qualtrics as a data collection tool. A total of 2573 questionnaires were sent to students. Of these, 1225 responses were received for an approximately 47 percent response rate. This paper reports the findings of this study and concludes with the pros and cons of using mobile technologies to support learning. It also offers recommendations on the best practices of incorporating mobile devices in learning environments.

10:30 BREAK

O9.06

10:45--11:45 Invited Lecture

DEMOSTRATION OF HOW TO PERFORM META-ANALYSIS USING COMPREHENSIVE META-ANALYSIS SOFTARE

Elgenaid Hamadain

University of Mississippi Medical Center, Jackson, MS, USA

Meta-analysis is a statistical analysis that combines results of multiple studies. The basic idea is that there is a common truth behind all similar studies, but which has been measured with an error within individual studies. The aim is to use statistical approach to derive a pooled estimate closest to the unknown common truth. Meta-analysis contrasts results from different studies and identify patterns among study results and sources of disagreement. When effect size is consistent, meta-analysis is used to identify this common effect. When the effect varies, meta-analysis is used to identify the reason for the variation. A key benefit is the aggregation of information leading to a higher statistical power and more robust point estimate than is possible from the measure derived from any individual study. Comprehensive Meta-analysis software (CMA) will be used to illustrate this concept. CMA is a powerful computer program with a wide array of computational options and sophisticated graphics. The process begins with a systematic review, which is a lengthy process that includes formulating a research problem, searching the literature using MEDLINE, EMBASE, and other search engines, deciding which studies to include in the synthesis based on objective criteria, and then performing meta-analysis. Once an appropriate group of studies has been identified, the relevant data will be abstracted. This presentation provides a brief overview of important features of meta-analysis with emphasis on concepts and practical applications. Several topics such as fixed and random effects model, potential for bias, and conducting subgroup analyses will be discussed.

11:45 Divisional Business Meeting

Thursday, February 22, 2018
AFTERNOON
Room: Ballroom

1:00-2:55 **Population Health Symposium II**
Precision/Personalized Medicine
Co-sponsor with Health Sciences

1:05 **MATHEMATICAL MODEL OR HumMod. AN INTEGRATIVE PHYSIOLOGY**
Robert Hester
University of Mississippi Medical Center

1:35 **APPLICATION OF HumMod, DIAGNOSTIC VALIDATION**
Drew Pruett
University of Mississippi Medical Center

2:05 **VACCINES, POPULATION DIVERSITY AND COMPLIANCE**
Paul Beyers, MD
Mississippi State Epidemiologist, Director

2:35 **PANEL DISCUSSION**

Thursday, February 22, 2018
EVENING
Ballroom

3:30 **Dodgen Lecture and Awards Ceromony**
General Poster Session
Immediately Following Dodgen Lecture

P9.01

FINITE ELEMENT ANALYSIS OF ZYGOMATIC IMPLANT-SUPPORTED MAXILLARY PROSTHESES

Denise Cherry, Evan Theilman, Ravi Chandran, Yuanyuan Duan

University of Mississippi Medical Center, Jackson, MS, USA

Objectives: To construct 3D composite numerical models of zygomatic implant-supported full-mouth maxillary prostheses with a variety of additional alveolar bone defects that simulate various clinical scenarios and to investigate the effects of these defects on the stress distribution in surrounding bone structures. **Methods**: A commercial zygomatic implant system, a dental implant system and a standardized saw-bone human skull model were digitized using a micro-CT scanner and a cone-beam CT scanner respectively. A 3D model of maxillary prosthesis supported by two dental implants and two zygomatic implants were created in Mimics. A variety of additional bone defects were created around zygomatic implants to simulate the following scenarios: (1) without additional defects; (2) one additional alveolar defect on one zygomatic implant; (3) additional defects on both zygomatic implants. All models were exported into finite element analysis (FEA) software (ABAQUS) for stress analysis. **Results**: The highest stress in surrounding bone structure was found in Model 3 and the lowest stress was found in Model 1. Stress concentration in the surrounding bone were located at the crestal contact area between zygomatic implant and bone. The highest stress in the prosthesis was found in Model 3 and the lowest stress was found in Model 1. Stress concentrations in the prosthesis were located at the abutment connection area of zygomatic implant and screw thread area between zygomatic implant and bone. **Conclusions:** Additional alveolar bone defects have a negative effect on the stress distribution in the surrounding bone structure of zygomatic implant-supported maxillary prosthesis.

P9.02

FINITE ELEMENT ANALYSIS OF TWO REDUCED-DIAMETER ZIRCONIA DENTAL IMPLANTS

Justina Boles[1], Jason Griggs[1], Yuanyuan Duan[1], Susanne Scherrer[2]

[1]University of Mississippi Medical Center, Jackson, MS, USA, [2]University of Geneva, Geneva, Switzerland **Objectives**: To investigate the biomechanical behavior of two one-piece reduced-diameter zirconia dental implants using finite element method and provide information for design optimization of ceramic dental implants. **Methods**: Two reduced-diameter zirconia implants, Straumann PURE Ceramic (SP, Ø=3.3mm) and Z-Systems Z5m (ZZ, Ø=3.6mm) were scanned using a micro-CT scanner (Skyscan1172). Matching crowns for a mandibular central incisor were designed and fabricated using a dental CAD/CAM unit (InLab MC XL) and scanned. 3D models of implants, crowns, cementation layer and surrounding bone were created in ScanIP. Stress analysis was performed using ABAQUS. A 100-N load was applied to the incisal edge at a 30-degree angle to the long axis of the tooth to simulate occlusal loading according to ISO 14801. Convergence tests were performed to select the appropriate level of mesh refinement **Results:** Maximum 1st principal stress in the implant body was located on the buccal surface of implant between the 2nd and 3rd screw threads for both models. The ZZ implant model had a higher peak stress value than the SP model. Maximum von Mises stresses in the surrounding bone were located in the crestal bone on the lingual side for both models. The ZZ model had a higher peak von Mises stress value in the surrounding bone than the SP model. **Conclusion**: The predicted peak stresses in the surrounding bone were below the bone resorption thresholding value for both models. Both implants are predicted to be resistant to fracture when restoring mandibular central incisors under the given loading amplitude.

Friday, February 23, 2018
MORNING

Room TC 229

O9.07

8:30 A NEW UP-WINDING WEIGHTED COMPACT SCHEME FOR SHOCK CAPTURING

Caixia Chen[1], Yonghua Yan[2], Fan Yang[3]

[1]Tougaloo College, Tougaloo, MS, USA, [2]Jackson State University, Jackson, MS, USA, [3]University of Shanghai for Science and Technology, Shanghai, China, China

Numerical simulations of fluid flow, especially the supersonic flows involving turbulent inflow and flow separation, are very sensitive to both numerical dissipation and dispersion. A good numerical scheme should have the ability to capture small length scales and it should also be robust to capture and accurately reproduce the discontinuities in the computational domain (such as shock waves). In the present work, a new high-order and high-resolution up-winding weighted compact scheme (UWCS) is proposed for accurate approximation of the derivatives in the governing Euler equations. To develop a stable weighted compact scheme (WCS), three stencils with five points and 2 free parameters respectively are used to construct the compact schemes. The resolutions of each

compact scheme is investigated and free parameters are used to optimize the overall performance of the schemes to deal with the derivatives. A WENO scheme is also added to one of the compact scheme so that it has appropriate dispersion. The computation cost is dramatically reduced compared to the Modified weighted compact scheme (MWCS). Numerical tests on several cases are performed and the numerical results are compared with the well-established WENO scheme.

O9.08

8:50 COMPUTATIONAL MECHANICS ANALYSIS OF BIO-INSPIRED STRUCTURAL SYSTEMS

Reena Patel[1], Guillermo Riveros[1], David Thompson[2], Felipe Acosta[3], Carlos Colon[3], Edward Perkins[1]

[1]U.S. Army Engineer Research and Development Center, Vicksburg, MS, USA, [2]Mississippi State University, Starkville, MS, USA, [3]University of Puerto Rico-Mayaguez, Mayaguez, PR, Puerto Rico

Living organisms have evolved from a single cell to complex biomolecules through the process of evolution driven by functional needs. A distinguishing feature that is prevalent in biostructures is their unique hierarchical architecture, which imparts superior characteristics such as strong, tough, lightweight, etc. Conceptual prototypes of energy-dissipative mechanical system models inspired by the rostrum of the paddlefish have been developed using several lattice patterns. This work focuses on analyzing the mechanical response of the conceptual models under extreme loading conditions using 3D computational mechanics experiments. This research seeks to identify the optimized lattice architecture from the series of configurations used in the conceptual models.

O9.09

9:10 FRUIT BRUISE DETECTION USING IMAGE PROCESSING TECHNIQUES AND MATLAB

Hemantha Ramamurthy, Ping Zhang, Babu Patlola

Alcorn State University, Lorman, MS, USA

Bruise detection today is mostly done manually; manual checking is time consuming, inefficient, and can sometimes even cause bruising. Automation through machine vision can help increase speed, efficiency, and avoid further damage to the fruit. Machine vision included image processing where we use algorithms that reduces the digital object as thin as possible (skeletonization). Edge detection is another technique where the image processor detects where there is a sharp change in brightness and to separate the image into its different layers. The main objective of this research is to employ different image processing tools available in Matlab and find the best possible way to detect bruises in fruits such as apples, tomatoes, etc. and make it affordable.

O9.10

9:30 BRUISED APPLE RECOGNITION USING DEEP LEARNING ALGORITHM

Ping Zhang[1], Zilong Hu[2], Jinshan Tang[2], Babu Patlolla[1]

[1]Alcorn State University, Lorman, USA, [2]Michigan Technological University, Houghton, USA

We propose an algorithm for recognizing bruised apples based *only on surface shape* information obtained by a 3D near infrared (NIR) imaging system. The proposed algorithm is composed of two parts: construction of feature map, and classification of apples into bruised or unbruised categories. We propose a new algorithm to code *3D* shape information into a *2D* feature map. For classification, we propose to build a convolutional neural network to extract deep hierarchical features from the *2D* feature maps that are optimal for the identification of bruised apples. Experimental results show that the proposed algorithm is better than the algorithm developed previously, which indicates the potential of the proposed algorithm for the identification of bruised apples.

O9.11

9:50 SOME RESULTS OF 2-BACKBONE COLORING OF K-TREES

Co Quach, Emlee Nicholson

Millsaps College, Jackson, MS, USA

Let H be a spanning tree subgraph of a graph G. A 2-backbone coloring is defined as a coloring f, such that, for very edge $uv \in E(H)$, $|f(u)- f(v)| \geq 2$. In this project, we will discover the 2-backbone coloring number of graph G when G is a tree-like-2-tree and tree-like-3-tree, with an implication to determine the 2-backbone coloring of k-tree, for every k in $\mathbb{N}$. We are also able to show that for every tree-like-k-tree, for every $k \geq 2$, exists a spanning tree T such that the 2-backbone coloring number of (G,T) is less than or equal to $k+3$

O9.12

10:10 FINITE ELEMENT MODELING OF AN ALL-CERAMIC THREE-UNIT FIXED DENTAL PROSTHESIS

Alton Chambers, Matthew Araujo, Yuanyuan Duan, Jason Griggs

University Medical Center, Jackson, MS, USA

To create a three-dimensional numerical model of a multilayered three-unit all-ceramic fixed dental prosthesis (FDP) using finite element analysis (FEA). Micro-computed tomography (Skyscan1172, Microphotonics) was used to reconstruct 3D scans of specimens, and the data were uploaded into the 3D modeling software (ScanIP, Simpleware). During data reconstruction, the framework mask was constructed by thresholding based on radiolucency. The fusion glass layer, premolar and molar abutments, and cementation layer were constructed by segmentation, 3D editing, cavity-fill, and Boolean operations to extract the necessary masks. Models were then exported into FEA software (ABAQUS) for stress analysis. Veneering porcelain, framework and fusing glass-ceramic layer were defined as IPS e.max CAD, IPS e.max ZirCAD and IPS e.max CAD Crystall./Connect using elastic constants found in the literature to simulate the e.max CAD-on technique. An axial load of 100 N was applied on the central fossa of the pontic tooth to simulate the physiological occlusal load. First principal stress was calculated and plotted. A three-unit FDP model composed of seven components was successfully created. It was found that the highest stress resided in the veneering porcelain layer located on the occlusal surface surrounding the loading area. For the bridge framework layer, the highest stress was located at the gingival embrasure of bridge connector. Accurate three-dimensional FEA models of FDPs can be generated by combining micro-CT technique and Simpleware software. This all-ceramic system was resistant to fracture at the given physiological occlusal loading level.

10:40 Divisional Business Meeting

Friday, February 23, 2018

AFTERNOON

12:00-1:00 Plenary Speaker

1:00-3:00 Mississippi INBRE/ Millsaps HHMI Symposia

PHYSICS AND ENGINEERING

Chair: Cecille Labuda
University of Mississippi
Vice-Chairs: Shanti Bhushan
Mississippi State University

Thursday, February 22, 2018

MORNING

Room Union A

8:30 HIGH-PERFORMANCE COMPUTATIONAL MODELING AND SIMULATION IN AN INTERACTIVE PYTHON ENVIRONMENT WITH THE OPEN SOURCE PROTEUS TOOLKIT

Chris Kees, PhD

Coastal and Hydraulics Laboratory

US Army Engineer Research & Development Center

Coastal and hydraulic engineering is dominated by multiphase, multiscale flow processes, due to the importance of capturing water's interaction with soil and air phases. Unfortunately, many different mathematical model formulations are required to model particular processes at particular scales of interest, and each formulation often requires specialized numerical methods. The Proteus toolkit is an open source software package for modeling and simulation designed to meet these challenges. The toolkit was developed both to enable research on new models of coastal and hydraulic processes and on new numerical methods for these models. It was developed specifically to target 3D multiscale, multiphase processes and parallel, adaptive numerics on complex geometric domains. The models considered to date include multiphase flow, shallow water flow, turbulent free surface flow, and various flow-driven processes. The numerical methods include continuous, discontinuous, and non-conforming finite elements on a variety of reference cell geometries in Eulerian and Arbitrary Lagrangian-Eulerian frames. In this presentation I will give an overview of the current release of Proteus as well as on-going research and development with the toolkit.

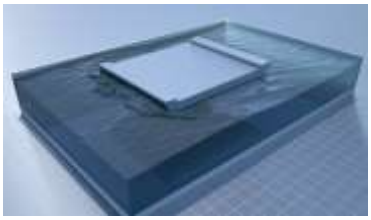

Figure 1: Computational simulation of air/water flow around a bay of the Army's Improved Ribbon Bridge obtained using Proteus toolkit.

O10.01

9:00 DNS OF THE NONLINEAR GROWTH OF ASYMMETRIC PERTURBATIONS IN A BOUNDARY LAYER

Yonghua Yan[1], Caixia Chen[2], Fan Yang[3]

[1]Jackson State University, Jackson, MS, USA, [2]Tougaloo College, Tougaloo, MS, USA, [3]Shanghai Key Laboratory of Multiphase Flow and Heat Transfer in Power Engineering, Shanghai, Shanghai, China

A DNS (direct numerical simulation) without additional asymmetric perturbations(such as suction and blowing at wall boundary) is conducted to investigate nonlinear growth of the tiny asymmetric perturbations from numerical errors in a transitional boundary layer. The mechanisms of the development of asymmetric perturbations in the boundary layer are studied in detail. The influence of these asymmetric disturbances on the important vortical structures like Lambda vortices and ring-like vortices are demonstrated. It is found that the growth of asymmetric perturbations in the boundary layer will influence the formation and development on shear layers besides the ring-like vortices and thus further produce the asymmetric vortex structures in the flow. The development of asymmetric vortex structures is also studied.

O10.02

9:20 THE BEHAVIOR OF HIGH INTENSITY FOCUSED ULTRASOUND (HIFU) - INDUCED SHEAR WAVES IN A VISCOELASTIC MICELLAR FLUID

E.G. Sunethra Dayavansha, Cecille Labuda, Joel Mobley

National Center for Physical Acoustics and Department of Physics and Astronomy, University, USA

Wormlike micellar (WM) fluids, which flow when subjected to long term stresses, are mechanically viscoelastic over shorter durations. These fluids are birefringent under shear, allowing the study of shear wave propagation using both optical and acoustic modalities. In this work, the thermal and spectral behavior of ultrasonically generated shear waves in a WM fluid are studied. A fluid consisting of hexadecyltrimethylammonium bromide (CTAB) and sodium salicylate (NaSAL) combined in a 5:3 ratio is used in a 200 mM concentration. A high intensity focused ultrasound (HIFU) beam generates radiation pressure in the fluid and can induce shear waves of sufficient amplitude to be visualized optically when the beam is modulated. By pulsing the HIFU beam, a train of shear waves are generated which propagate laterally from the focal region. The temperature and frequency dependent behavior of the HIFU generated shear waves are correlated with the rheological and microstructural properties of the fluid.

O10.03

9:40 NUMERICAL PREDICTIONS OF HYDROKINETIC TURBINE WAKE AND FREE-SURFACE SIGNATURES

Oumnia El Fajri, Shanti Bhushan

Mississippi State University, Starkville, MS, United States

Renewable energy sources such as wind and solar power are unpredictable due to their inherent intermittency. Besides, water represents a non-intermittent source of energy and has historically been used to extract hydroelectric power from dams that impound rivers. Hydrokinetic energy is an alternate untapped form of hydropower which can be harnessed from the flowing currents in tidal rivers and/or oceans using hydrokinetic turbines (HKT). HKT farm involves design issues similar to wind turbines, in particular interaction among the turbines in an array via their wakes, and its effect on the power generation. However, HKT farms involve additional complexity due to their interaction with the air-water interface, which can affect both wake recovery and result in signatures on the surface. Computational Fluid Dynamics has proven to be a well-established method for wake evaluation in terms of cost and time compared to experiments. Previous numerical studies have focused on the wake recovery of an isolated HKT in single phase flow using ANSYS/Fluent. Herein, we will extend the study and focus on the free surface effect on the HKT wake and

reciprocally the effect of the wake on the free surface. The goal of this research is to accurately design HKT arrays to maximize power generation. High fidelity simulations will be performed using OpenFOAM for a three-blade HKT using a resolved rotating turbine model, and URANS and DES turbulence models. The results and details of the wake recovery will then be validated using experimental data from literature and previous single-phase ANSYS Fluent simulations.

O10.04

10:00 EVALUATING THE INFLUENCE OF PARTICULATE MATTER ON SPECTROSCOPIC MEASUREMENTS OF A COMBUSTING FLOW

Jonathan Herlan, Nathan Murray

University of Mississippi -- NCPA, Oxford, MS, USA

An adiabatic table-top burner has been used to develop a method for estimating the temperature and concentration of OH in a measurement volume of a non-premixed, hydrogen-air flame. The estimation method uses a nonlinear curve-fitting routine to compare experimental absorption spectra with a model derived, using statistical mechanics, from the Beer-Lambert law. With the aim of applying this method to the analysis of rocket exhaust plumes, this study evaluates whether or not it provides faithful estimates of temperature and OH concentration when the combusting flow contains particulate matter---such as soot or tracers used for particle image velocimetry (PIV) measurements. The hydrogen line of the table-top burner will be seeded with alumina, Al2O3, particles and their influence on spectroscopic measurements elucidated. It is found that the presence of particles not only reduces the transmitted intensity of light, but also seem to enhance some of the absorption modes of OH.

10:20 BREAK

Session II: Chair: Dr. C. Labuda

O10.05

10:40 OPTIMIZING MRI SEQUENCES FOR MRI-BASED STEREOTACTIC RADIOSURGERY TREATMENT PLANNING

Somayeh Taghizadeh[1], Ali Fatemi[2], Cecille Labuda[1]

[1]University of Mississippi, University, USA, [2]University of Mississippi Medical Center, Jackson, USA

MRI is becoming a more common method for stereotactic Radiosurgery (SRS) treatment planning, especially for patients with brain lesions or normal anatomical targets that are poorly distinguished by CT. This methodology seeks to optimize MRI sequences to generate distortion-free and clinically relevant MR images for MRI-only SRS treatment planning. We used commercially available SRS MRI-guided radiotherapy phantoms and eight patients to optimize sequences for patient imaging. Workflow involved choice of correct MRI sequence(s), optimization of the sequence parameters, evaluation of image quality (artifact free and clinically relevant), measurement of geometrical distortion, and evaluation of the accuracy of our offline correction algorithm. The CT images showed the maximum (1.3 mm) and minimum of (0.4 mm) division from true fiducial position for SRS coordinate definition. Interestingly, non-corrected MR images showed maximum (1.2 mm) and minimum of (0.4 mm) division, comparable to CT images used for SRS coordinate definition. After geometrical correction, we observed maximum (1.1 mm) and minimum (0.3 mm) deviation. Our optimized MRI pulse sequences and corrected images show promising results; MR images produced under these conditions are appropriate for direct use in SRS treatment planning.

O10.06

11:00 STRAIN RATE DEFORMATION OF BEAD-SPRING ELASTOMERS

Gopinath Subramanian

University of Southern Mississippi, Hattiesburg, MS, USA

We present results from the driven parallel replica method used to study the low strain-rate behavior of bead-spring elastomers. The statistics of single chain breakage show that these natural locations for superbasin boundaries result in an exponential distribution of escape times, allowing us to exploit the notion of the quasi-stationary distribution. We apply the driven parallel replica method to study low strain-rate behavior, a regime that has historically been inaccessible to simulations.

O10.07

11:20 ANALYTICAL INVESTIGATION OF CORROSION-TOLERANT PRE-STRESSED CFRP FATIGUE MITIGATION FOR IMPROVED WATERWAY LOCK RELIABILITY

Christine Lozano

University of Arkansas, Fayetteville, USA

Lock gates are an important part of the transportation infrastructure within the United States (US), having many economic, safety, and environmental benefits over rail and highway transportation systems. Unfortunately, many existing lock gates throughout the US have reached or exceeded their initial design life and require frequent repairs to remain in service. Unscheduled repairs often increase as gates age, having a local economic impact on freight transport and which can create economic ripples throughout the nation. Fatigue and corrosion are key causes of unscheduled service interruptions, degrading lock gate components over time. Additionally, because lock gates are submerged during operation, crack detection prior to component failure can be difficult, and repair costs can be high. An analytical investigation was conducted into fatigue damage within common lock gate geometries, and development of fatigue mitigation strategies capable of extending gate service-life. The goal of the investigation was to identify the critical fatigue region and locally extend the component fatigue life. Detailed finite element analyses were combined with fatigue and fracture mechanics theories to predict critical fatigue regions within common gate details and develop retrofit strategies for mitigating fatigue cracking. Carbon fiber reinforced polymer (CFRP) plates having optimized pre-stress levels based on the analytical analysis were investigated as a potential retrofit strategy.

O10.08

11:40 FATIGUE TESTING VALIDATION OF CRACK PROPAGATION IN STEEL STRUCTURES USING THE PARIS LAW

Daniel Martinez, Guillermo A. Riveros

US Army Engineer Research & Development Center, Vicksburg, MS, USA

Steel structures are often submitted to dynamic cyclic loadings, which throughout time, cause fatigue and crack propagation. It is important to study material damage and crack propagation since many structures exceed their design life and are kept under

operation with continuous maintenance and repairs. It is of great importance to understand the behavior of fatigue cracks in manner to develop efficient repair methods to assure structure safety and reduce continuous repair interventions. Abaqus Extended Finite Element Modeling (XFEM) and the Paris Law model have been proven capable of reproducing experimental scenarios to investigate appropriate mathematical models and numerical methods to accurately assess crack formation and propagation. Innovative computational techniques are evaluated such as the Abaqus direct cyclic analysis which allows to combine Fourier series and time integration of the nonlinear material behavior to obtain the stabilized response of the structure directly. The latter models progressive damage in bulk materials, at material interfaces, and predicts degradation and evolution of material properties based on the principles of linear elastic fracture mechanics. Experiments containing cracked plates under tensile fatigue loads with and without repairs are under successful validation procedures. Validation parameters consist of crack growth vs load cycles, which yield experimental and XFEM simulation data curves. Calibration and iterative process to determine and assign appropriate material and environment parameters is required to reproduce accurate crack propagation. Similarly, numerical simulations of Carbon Fiber Reinforced Polymer (CFRP) repairs to the same cracked steel plates are under development for validation.

12:00 – 1:00 Divisional Business Meeting

Thursday, February 22, 2018
AFTERNOON
Room Union A

Session III: 1:00 – 3:00 (Chair: Dr. S. Bhushan)

O10.09

1:00 REFLECTION AND TRANSMISSION OF RADIATION BY AN ENZ INTERFACE

Zhangjin Xu, Henk F. Arnoldus

Mississippi State University, Starkville, MS, USA

We have studied the reflection and transmission of an electromagnetic plane wave which is incident from vacuum on an interface with an epsilon-near-zero (ENZ) medium. We have considered the Fresnel reflection and transmission coefficients for s and p polarized light as a function of the angle of incidence in the ENZ limit. For p polarization we find that the reflection coefficient is Rp = -1 and the transmission coefficient is zero for all angles of incidence. This seems to imply that no radiation penetrates the material. More careful analysis shows that the electric field does penetrate the material. The transmitted electric field is evanescent and circularly polarized for all angles of incidence. The transmitted magnetic field is identically zero. For s polarization, the transmitted electric field is s polarized and the transmitted magnetic field is circularly polarized.

O10.10

1:20 PARTICLE DETECTORS ON CAUSAL SETS EMBEDDED IN MINKOWSKI SPACE

Benjamin Pilgrim, Emad Aghili, Luca Bombelli

University of Mississippi, Oxford, Mississippi, USA

Causal set theory is a scheme to discretize time and space typically done on an Alexhandrov set replacing the continuum with a discrete set of points and a partial order. One may then consider the propagation of scalar fields on the background of the causal set similar to what one does in quantum field theory. Much work has been done in this regime; however, no one has calculated what the response to an Unruh-DeWitt particle detector would be due to the discreteness. In this work, first the continuum response function is calculated for a massless scalar field in 1+1 dimensional Minkowski space on an Alexhandrov set for a variety of inertial and non-inertial trajectories which is then compared to the same quantities calculated on the causal set. Oddly but excitingly, these quantities differ which may ultimately lead to a way for an observer to use a particle detector to determine if he or she exists on a causal set; however, more work needs to be done to determine if this is an artifact.

O10.11

1:40 GRAVITATIONAL WAVES FROM ULTRALIGHT SCALAR FIELD

Richard Brito[2], Shrobana Ghosh[1], Enrico Barausse[3], Emanuele Berti[1], Vitor Cardoso[4], Irina Dvorkin[3], Antoine Klein[3], Paolo Pani[5]

[1]University of Mississippi, Oxford, MS, USA, [2]Max Planck Institute of Gravitational Physics, Potsdam,Golm, Germany, [3]Institut d'Astrophysique,Sorbonne Universités, Paris, France, [4]CENTRA, Departmento de Fisica, Instituto Superior Tecnico, Lisbon, Portugal, [5]Dipartimento di Fisica, University of Rome, Rome, Italy

One of the possible components of cold dark matter is the Axion. It was first postulated to solve the strong CP problem in quantum chromodynamics. However, it is still elusive. Therefore, evidence of existence of axion within a specific mass range is of great interest. Incidentally, rotating black holes can serve as particle detectors by producing a superradiant instability of a massive field. A non-axisymmetric cloud of a massive scalar field leads to emission of gravitational radiation that can be detected by ground based detectors like LIGO-VIRGO or future space based detectors like LISA, depending on the mass of the field. Additionally, the stochastic background created by a large number of such events may also be detected, helping to constrain the mass of axion. In fact, based on this work, the stochastic background from LIGO O1 may already exclude a range of mass in the Advanced LIGO band.

O10.12

2:00 USING MOST PROBABLE PATH TO FIND THE DIMENSION OF A CAUSAL SET

Mir Emad Aghili, Luca Bombelli, Benjamin Pilgrim

University of Mississippi, University, MS, USA

Causal set theory is a minimalistic approach to quantize the geometry of spacetime. One of the challenges of this theory is to find the dimension of a manifold-like causal set. Along these lines a few different methods based on different properties of causal sets are proposed. In this presentation, we try to propose an alternative method for finding the dimension. This work is done on the flat two-dimensional spacetime. Further study can be done on extending this method to *d*-dimensions and hopefully use it to find other properties such as curvature.

O10.13

2:20 VIBROMETRIC CHARACTERIZATION OF A FULL-SCALE AND A SCALED MODEL TN-32 DRY STORAGE CASK FOR SPENT NUCLEAR FUEL

Kevin Y. Lin[1,2], W. Prather[2], Z. Lu[2], G. Priyadarshan[2], J. Mobley[1,2], J. Gladden[1,2]

Department of Physics and Astronomy, University of Mississippi, Oxford, MS, USA, [2]National Center for Physical Acoustics, Oxford, MS, USA

The assessment of the internal structural integrity of dry storage casks for used high burnup nuclear fuel assemblies is of critical importance before these are transported to permanent repositories. The size of the casks (5.2 m in height and 2.4 m in diameter), structural complexity and the inability to access the interior make this a challenging task. This project addresses these difficulties through a multi-modal approach involving nuclear, charged particle and acoustic methods. In this talk, we report on linear and nonlinear vibrational spectra of intact full-scale and scaled model TN-32 casks. These studies use both impulsive and swept continuous-wave excitations with a variety of sensor placement configurations. From the resulting spectra, resonant frequencies, quality factors and harmonic responses of various vibrational modes were determined. A detailed finite element model of the TN-32 was constructed and the experimental results are compared to the modal structure determined numerically. [This work is supported by DOE NEUP Award: DENE0008400]

O10.14

2:40 SENSITIVITY ANALYSIS OF ERROR IN BILAYERED THREE-POINT FLEXURE TEST

Jason Griggs

University of Mississippi Medical Center, Jackson, MS, USA

OBJECTIVES: Estimate the relative contributions to error introduced by imprecise measurements when testing strength of bilayered ceramic beams and to determine the optimal specimen and fixture dimensions to minimize these errors. METHODS: The failure stress formula for bilayered specimens loaded in three-point flexure was derived using MathCAD software (Parametric Technology Corporation). Coefficient relations were determined by the finding partial differentials of the failure stress with respect to each measurement (failure load (FL), support span (SS), specimen width (SW), core thickness (CT), veneer thickness (VT), core material Young's modulus (CYM), and veneer material Young's modulus (VYM)). The maximum error contribution of each measurement to the calculated stress value was taken to be the absolute value of its coefficient relation multiplied by its precision. When varying test parameters, failure load was adjusted to keep failure stress constant. RESULTS: Total error was insensitive to specimen strength, SS, CT/VT ratio, and SW and was inversely related to total thickness, overall beam stiffness, and CYM/VYM ratio. Total error was minimized at 2.8% for the case of 1-mm thick porcelain (VYM=67GPa) layered on 1-mm thick zirconia (CYM=209GPa) with the zirconia side of the specimen placed in tension. Relative contributions to the total error were: FL (35.9%), CT (20.0%), VT (15.8%), VYM (13.8%), CYM (8.8%), SW (4.5%), and SS (1.2%). CONCLUSIONS: Imprecision in measuring failure load and thicknesses of bilayers are the primary contributions to measurement-associated error. It would be prudent to use the lightest possible load cell and to measure actual layer thicknesses in strength specimens.

Thursday, February 22, 2018

EVENING

Ballroom

3:30 Dodgen Lecture and Awards Ceromony

General Poster Session

Immediately Following Dodgen Lecture

P10.01

HYDRODYNAMICS OF TURTLE SHELLS

Gaurav Nag[1], Bryan Robinson[2]

[1]Center for Advanced Vehicular Systems, Starkville, MS, USA, [2]Delta Airlines, Atlanta,GA, USA

The project focuses on the hydrodynamic analysis of three common turtle species, namely: pond slider, river cooters and spiny softshell, to understand the relationships between turtles' optimum foraging and habitual selection. To achieve the objectives, Computation Fluid Dynamics (CFD) simulations are performed using Ansys/Fluent for small, medium and large turtles of each species, including assessment of the grid resolution and turbulence modeling, and flow unsteadiness. The geometric shape of the turtles were obtained from the database of the turtles images obtained from Museum of Natural Science in Jackson, MS. The grids were generated using Pointwise for the two dimensional models of the turtle geometry, and the flow properties were specified using the generic values available in the literature. The analysis of the results focus on the analysis of the mean and unsteady drag and lift coefficients, to identify the outliers among the specifies, and correlation of the hydrodynamics characteristics of the shell on their foraging habits.

P10.02

TORQUE PROPERTIES OF PORCINE PATELLAR TENDON

Jasmine Ferrell, Cameron Boswell, Lakeisha Williams

Mississippi State University, Starkville, MS, USA

As a result of athletic injuries, the anterior cruciate ligament (ACL) is commonly replaced by the central third of the patella tendon (PT). The ACL failure mechanism is complex; however, research has shown that failure is commonly associated with a torsional stress state. Studies suggest that the PT, when compared to the hamstring replacement of ACL and allografts, is a more effective ACL replacement. Our goal is to quantify the PT's response to torque and determine if its properties are close to that of the ACL. For this study, porcine PTs were subjected to a torque stress state with a customized device developed in-house. The PT was attached to the patella bone at its proximal end and tibia and fibula at the distal end. Both the patellar bone and tibia/fibula were cemented into separate blocks and then loaded onto the torque device. One end of the device was connected to the gear, which turned the potted bone while the other potted bone remained stationary. When the program commenced, the tendon was twisted. Data showed an increasing linear trend as is also shown in the typical stress-strain response of tendon in tension. The current results suggest that the novel test setup works properly, the recorded data was from the tendon only, and confirmed that the tendon can withstand torque. Future testing, including testing to failure, will allow for comparisons to the ACL torque failure rates that have already been observed through prior research studies.

P10.03

STUDY OF ELASTIC PROPERTIES OF THERMOELECTRIC SnSe

Ashoka Karunarathne[1], Josh Gladden[1], Gautam Priyadarshan[2], Pai-Chun Wei[3], Yang-Yuan Chen[3], Sriparna Bhattacharya[4], Apparao Rao[4]

[1]Department of Physics and Astronomy, University of Mississippi, University, MS, USA, [2]National Center for Physical Acoustics, University of Mississippi, University, MS, USA, [3]Institute of Physics, Academia Sinica, Taipei, Taiwan, [4]Department of Physics and Astronomy, Clemson Nanomaterials Institute, Clemson University, Clemson, SC, USA

Resonant Ultrasound Spectroscopy (RUS) is a precise experimental approach for investigating the elastic properties of solid materials at different temperatures and hydrostatic pressures. In RUS, the elastic stiffness tensor of crystalline solids with different crystal structures are determined from their vibrational resonance spectra. A study of the mechanical properties of thermoelectric materials can provide insights to their high efficiency and low thermal conductivity. SnSe is a thermoelectric material which exhibits a high efficiency and low thermal conductivity due to its anharmonicity and low symmetric crystal structure. SnSe exhibits a structural phase transition from *Pnma* to *Cmcm* at ~800 K, and the single layered orthorhombic crystal structure of SnSe results in nine independent elastic constants. In this study, RUS was used to determine the temperature dependent elastic properties of polycrystalline SnSe through its phase transition temperature. Use of RUS technique to better understand the temperature dependent elastic properties of low symmetry crystals will be discussed. The elastic constants of single crystal SnSe calculated by RUS at room temperature are in agreement of within ~ 35% of theoretical reported values.

P10.04

CYBER SECURITY AWARDNESS AND COMMUNITY

Pao-Chiang Yuan[1], Kawandrea Spann[2], Niwan Fan[3]

[1]Jackson State University, Jackson/Mississippi, USA, [2]Jackson State University, Jackson/Mississippi, USA, [3]Jackson State University, Jackson/Mississippi, USA

Information technology advanced so rapidly moving into the 21st century. Nowadays, most of us possess handheld cellular phones. We almost cannot go anywhere cannot without it. It controls our TVs, coffee pots, cars, computers and even heating, ventilation and air condition systems. It connects with computers and computer networks in cyberspace. Technology has become embedded in our daily lives. The cybercrimes or attacks are also happening and increasing. The general communities easily receive cyber threats, which can be grouped into three categories: a. unstructured; b. structured; c. highly structured. These kinds of attacks can come from anywhere and can be implemented by anyone who knows about computers. The impacts can be destruction, corruption and theft of data/information or money. Furthermore it can disrupt of critical services, denial of service and cause physical, economic or reputable damage. According to Federal Emergency Management Agency (FEMA)'s Essential of Community Cyber Security manual, engaging the whole community is critical to successfully achieving a secure and resilient nation; and individual and community preparedness is a key component. An effective partnership relies on engaging all elements of the whole community and, when appropriate, international partners. Engaged partnership and coalition building includes clear, consistent, effective, and culturally appropriate communication and shared situational awareness. This paper describe different threats and how to partnership with community.

P10.05

OBJECT IDENTIFICATION AND TRACKING FOR AUTONOMOUS VEHICLES USING COMPUTER VISION AND MULTI-SENSOR DECISION FUSION

Jon Steele[1], Balakrishna Gokaraju[1], Kyle McLellan[1], Anish Turlapaty[3], Raymond Tesiero[1], Rajeev Agrawal[2]

[1]Department of CIST, University of West Alabama, Livingston, Alabama, USA, [2]Information Technology Laboratory, ERDC, Vicksburg, MS, USA, [3]Department of Electrical and Communications Engineering, International Indian Institute of Technology, Chittor, INDIA, Madras, Chennai, India

Computer vision is the process of automatically gathering information from images and then analyzing it for better decision capability. This information can be used in object detection, movement analysis and 3D reconstruction. Computer vision has a wide variety of applications: everyday phone cameras focusing on faces, Xbox Kinect picking up dance moves as an input to a dance video game, and 3D models reconstruction from Magnetic Resonance Images (MRI). The objective of computer vision is to give computers the ability to identify and respond to its environment. This can be in an industrial setting where computer vision is used to inspect and identify defective bolts going through an assembly line, or in the application of self-driving cars to identify pedestrians, traffic signals, road signs and other vehicles.

Computer Vision would complement the autonomous robotics goals of accuracy and precision by adding "eyes" to the performance of the robot. We will be researching on computer vision techniques and experimenting their benefits with autonomous robotics. We investigated both Arduino MegaTM Controller Board and Raspberry Pi for analyzing the flexibility of chipset for computer vision using the 4-wire dual data bus Pixi Camera (CMU's 5th version). Both C/C++ and Python libraries were implemented to test the vision camera using I2C and USB communication. Pixi camera scans at a rate of 50 frames per second. We investigated the object recognition, object classification and object tracking capabilities using various algorithms.

P10.06

GREEN SYNTHESIS OF GOLD NANOPARTICLE FOR BIOLOGICAL SENSING

Aysha Evans, Israel Thompson, Yolanda Jones, Sandra Barnes, Anant Singh

Alcorn State University, Lorman, Mississippi 39096, USA

A method for gold nanoparticle (AuNP) synthesis from buffered starch solution has been developed and the particles investigated by UV-Vis spectroscopy, transmission electron microscopy (TEM) and atomic force microscopy (AFM). For the synthesis of AuNPs, we used rice (*Sella*) starch as the unique reducing and stabilizing agent, chloroauric acid ($HAuCl_4 \cdot 3H_2O$, A) as the metal precursor, and deionized (DI) water (ρ > 18.2 MΩ cm) as dispersing medium. Among several inorganic and biological Good's buffers, phosphate and MES buffers give the best results with quite uniform AuNPs. Typical AuNP diameters from MES and phosphate buffers (PB) are 4 ± 1 nm and 13 ± 2 nm with plasmon band peaks at 521 nm and 523 nm, respectively. The role

of the phosphate buffer is mainly to control the pH, while MES is also a synergist with more composite function. TEM confirms the crystalline structure of the AuNPs, meaning that the AuNP surfaces are low-index single-crystal facets such as (100), (110) and (111). Surface of obtained AuNP was conjugated with S6 and HER2 antibody for breast cancer cell (SKBR3) binding and screening. Primary result revels the sensitivity of the system up to ~60 cell/mL, and found to efficiently enhance sensitivity and selectivity only for SKBR3 cell avoiding any other biological cells available in the mixture. "This work was supported by the Mississippi INBRE, funded by an Institutional Development Award (IDeA) from the National Institute of General Medical Sciences of the National Institutes of Health under grant number P20GM103476."

P10.07

CONJUGATED GOLD NANO-STRUCTURES FOR SELECTIVE SENSING OF HEAVY

April Whitehead, Kiera Bridges, Angela Hairston, Yolanda Jones, Sandra Barnes, Anant Singh

Alcorn State University, 1000 ASU Dr. 780, Lorman MS, USA

In this study, we developed a rapid, simple and inexpensive fluorescence and forced aggregation method for mercury ions sensing, adopting rhodamine 6G (R6G) and 3-mercaptopropionic acid (MPA) co-modified nanoparticle as the plasmonic substrate. At the next step, we used 'Hg^{2+} inhibited aggregation mechanism, in which the pyridine induced aggregation of unmodified gold nanoparticles (AuNPs) could be inhibited upon addition of Hg^{2+}. Compared with the previous Hg^{2+} induced aggregation mechanism, the new design demonstrates a cheap and facile chemical reagent, pyridine, as an inducer of aggregation of AuNPs and elimination of the modifying or labeling step. The R6G-MPA fluorescence sensor has a sensitivity of 0.6 pM for both Hg^{2+} ions detection, which is about 4 orders of magnitude lower than the maximum level of drinking water defined by the United States Environmental Protection Agency (EPA). We also investigated the effects of pyridine concentration and the behavior of AuNPs in the aqueous solution. Result shows that the extinction ratio value at 525 and 700 nm increased linearly over the Hg^{2+} concentration range of 0.20–3.50 µM with a detection limit of 55 nM. "This work was supported by the Mississippi INBRE, funded by an Institutional Development Award (IDeA) from the National Institute of General Medical Sciences of the National Institutes of Health under grant number P20GM103476."

P10.08

INTRAARTICULAR DRUG THERAPY WITH GENIPIN AND PUNICALAGIN TO SLOW THE PROGRESSION OF OSTEOARTHRITIS

Anna Hinton, Steve Elder

Mississippi State University, Starkville, Mississippi, USA

Intraarticular drug therapy will study the effects of genipin and punicalagin as a precursor to developing an injection that will modify osteoarthritis by strengthening and protecting the cartilage from degradation. Genipin and punicalagin will be used for crosslinking and anti-inflammatory, protective properties respectively. The combination of these drugs should result in additive benefits to the articular cartilage extracellular matrix. Genipin and punicalagin will be tested individually and in combination to study how the two drugs behave and interact. Mechanical testing will determine how these concentrations will effect the articular cartilage surface through friction and compression testing. Additional testing will show how treated cartilage reacts to the enzymatic breakdown of osteoarthritis and determine amounts of free amino groups released from each sample. The enzyme collagenase will be used to mimic osteoarthritic breakdown of the articular cartilage extracellular matrix. Once treated, samples will be introduced to collagenase to determine how effective the treatments are at reducing breakdown. The final test determines amounts of free amino groups released by each sample. Sufficient crosslinking of each sample should release fewer amino groups. In combination, the drugs have shown significant results during collagenase testing. Treated cartilage withstands the effects of the enzyme dramatically more than the untreated. Genipin has shown progressively positive results with each increased concentration, and punicalagin is expected to have similar results. Further testing will be able to use this information to develop an injection to drastically impact osteoarthritis during the drug to cartilage interaction time.

P10.09

SYNTHESIS AND CHARACTERIZATION OF HYBRID ORGANIC INORGANIC PEROVSKITES

Kayla Cole[1], Hamidreza Khassaf[0]

[1]Brown University, Providence, RI, USA, [2]Tougaloo College, Tougaloo, MS, USA

Solution-processed hybrid organic–inorganic perovskites have attracted great deal of interest for their photovoltaic properties. Interestingly for these applications, single crystals have shown improved physical properties as compared to its polycrystalline counterpart. Here we synthesize large single crystals as well as polycrystalline HOIP's and study their charge-transport properties. We implement a recently proposed temperature—dependent pulsed voltage-current measurements under dark conditions to study electronic transport and the nature of migrating species (cation/anion) with grain sizes. Further, we investigate the growth of large grain HOIP's within confined containers. Such configurations could be extremely helpful in order to improve performance of detectors, and energy storage devices.

P10.10

ELUCIDATING LIGAND SELECTIVE RESPONSES OF ANDROGEN RECEPTOR THROUGH PROTEIN-LIGAND HYDROGEN-BONDING CONTACTS

Pradip Biswas, Raquema Williams

Tougaloo College, Tougaloo, MS, USA

Background and Objective: De-novo and acquired resistances from hormone therapy are of major concerns in combating prostate cancer. Dietary supplements containing flavonoids, in particular, resveratrol and its analogues are being suggested to inhibit the progression of prostate cancers. Our objective is to study ligand selective hydrogen-bonding contact responses of Androgen Receptor (AR) and establish a Structure-Activity-Relationship (SAR) to identify potential agonists and antagonists for drug designing. **Methods:** Using in-silico techniques, we study the hydrogen bonding contacts of six different ligands to understand their ability to act as an agonist or antagonist. In particular, employing the crystal structures of Androgen Receptor, molecular modeling (VMD, Swiss PDB-Viewer), and molecular dynamics simulation (GROMACS) we analyze the hydrogen bonding pattern of the ligands. **Results:** From the hydrogen bonding pattern of DHT (a known AR agonist) and Flutamide (a known AR antagonist), we first identify the non-overlapping contacts and then analyze the

properties of resveratrol analogues based on their contacts. In addition to the hydrogen-bonding contacts, ligand binding energies to the protein also provides us a clue of which ligand can be a potent antagonist. **Conclusion:** Based on the results, we conclude that the ligand binding energy and ligand hydrogen bonding contacts to the protein, can be used to identify potential agonists and antagonists and can supplement the existing the drug designing effort

Friday, February 23, 2018
MORNING
Room Union A

Session IV Chair: Dr. Pradip Biswas

O10.15

8:20 AMATEUR RADIO FOR EMERGENCY COMMUNICATIONS

HuiRu Shih, Mia Griffin, Taneshia Davenport, Kawandrea Spann

Jackson State University, Jackson, MS 39217, USA

Communication failures have been a defining part of natural and man-made disasters. During and after disasters, amateur radio operators can provide a critical communications link. Amateur radio provides a means of communication "when all else fails". The amateur radio service was created to allow for public use of one of our key natural resources, the electromagnetic spectrum. The demand for radio spectrum continues to increase with the explosive growth of wireless devices. However, authorities still reserve slices of the spectrum for licensed Amateur Radio operators, recognizing their value to the public, particularly with respect to providing emergency communications. Emergency Management Technology (EMT) program at Jackson State University has established a new amateur radio *station.* The goal of this project is to build a sustainable amateur radio community on campus and provide a venue for hands-on experience in radio communications. Besides being appropriate to emergency management technology courses, other areas such as electronics, communications, antenna, networking, digital signal processing, and telemetry can benefit from developing interest in amateur radio. D-STAR (Digital Smart Technologies for Amateur Radio) is a digital voice and data protocol specification for amateur radio. D-STAR brings the booming digital industry to the world of amateur radio. This study investigated the possibilities of including amateur radio with D-STAR capability in the emergency communications plan, when traditional communication channels, like landlines, cell phones, Wi-Fi calling and Internet access are inaccessible.

O10.16

8:40 RUNWAY DETECTION BY UNSUPERVISED CLASSIFICATION TECHNIQUES USING UAVSAR DATA

Ramakalavathi Marapareddy, Sowmya Wilson Saripalli

University of Southern Mississippi, Hattiesburg, MS, USA

Remote sensing data gives the essential and critical information for detecting or identifying an object, a place, image fusion, change detection, and land cover classification of the selected area of interest. The runway detection is an important topic because of its applications in military and civil aviation fields. This paper presents an approach for airport detection using remote sensing images by implementing unsupervised classification techniques based on polarimetric decomposed features. The obtained results reveal that classification based on decomposed polarimetric features provides better results for the detection of the target. In this work, the effectiveness of algorithm was demonstrated using quad polarimetric L-band Polarimetric Synthetic Aperture Radar(polSAR) imagery from NASA Jet Propulsion Laboratory's (JPL's) Uninhabited Aerial Vehicle Synthetic Aperture Radar (UAVSAR). The study area is Louis Armstrong New Orleans International Airport, LA, USA.

O10.17

9:00 ACHIEVING THE PRECISION AND ACCURACY OF AUTONOMOUS VEHICLES THROUGH PID AND STATICS CONTROL VARIABLES

Jonathan B. Steele[1], Balakrishna Gokaraju[1], Kyle Mclellan[1], Adrian D. Doss[1], Samit Bhattacharya[2]

[1]Department of CIST, University of West Alabama, Livingston,AL, USA, [2]Department of Computer Science, Fayetteville State University, Fayetteville,AL, USA

Accuracy and Precision are two major goals that needs to be attained while working with autonomous vehicles or robots. Accuracy goals can be achieved in two ways i.e. using mechanical and or programming techniques. For e.g. (i) the mechanical techniques would be based on the strength of materials being used and the static variable estimations (ii) the programming techniques would be by manipulating the electrical switching of the controls and as well the power controls of the output speeds using proportional, Integral and Derivative PID controls. In the present study, we will be discussing our recent findings by using the above two techniques in achieving up to an accuracy of 90% cross validation accuracy for autonomous movements. We built an autonomous robot by considering the above target goals of precision and accuracy and used it in the 2017 IEEE hardware competitions for performing the desired tasks. The sensors being used for reading the input data are optical shaft encoders that work by converting angular position of the motor into a digital output value. By feeding these values from the encoder input through the estimated PI control formula, the precision is greatly increased. In addition, the accuracy will also be maximized with Gyro sensor. The Gyro sensor will help the robot in completing tasks such as following the line and exact turns.

O10.18

9:20 SCALING OF A NON-LINEAR SCHRODINGER EQUATION AND ITS APPLICATION TO MULTICELLULAR TUMOR GROWTH

Pradip Biswas

Tougaloo College, Tougaloo, MS, USA

We show that by appropriate scaling of the order parameter of a non-linear Schrodinger equation, we can employ the growth and collapse of a condensate represented by the equation to the oscillatory growth pattern of a multicellular tumor. Simulation results are compared with the experimental results on the growth pattern of a multicellular tumor in the absence of any angiogenesis. The scheme can readily be applied to study other form of congregations with appropriate scaling. Author acknowledges financial support from MS-INBRE funded by NCRR/NIH-5P20RR016476-11 and NIGMS/NIH-8P20GM103476-11.

O10.19

9:40 BUILDING A SATELLITE ENGINEERING PROGRAM FROM THE GROUND-UP

Lokesh Shivakumariah

Mississippi State University, MGCC Campus, Gautier, MS, USA

Starting a satellite branch of an Engineering program throws a daunting challenge to satisfy the program objectives such as innovative problem solvers with a strong work ethic, peer recognition as the sound application of mathematics, science, computing, and engineering, demonstrate engineering leadership, life-long learning, and effective oral and written communication skills. This work presents how engineering educators are incorporating understanding program outcomes, student difference, program coordination, classroom engagement, lab experience, active and cooperative education, undergraduate research experience, industry-university synergy, service learning, community outreach, meeting contemporary challenges, ABET student outcomes to continuously monitor, maintain and improve the shortcomings of the satellite program to reflect standards as that of the long established program. The analysis hopes to develop an Engineering Education model that can help future Engineering Educators and Administrators in replicating efforts and good practices to build satellite campuses.

10:00 BREAK

Session V: Chair: Dr. Parthapratim Biswas

O10.20

10:40 RELATION BETWEEN HYPER-UNIFORMITY AND THE STATIC STRUCTURE FACTOR OF AMORPHOUS SILICON

Devilal Dahal[1], Raymond Atta-Fynn[2], Parthapratim Biswas[1]

[1]The University of Southern Mississippi, Hattiesburg, Mississippi, USA, [2]University of Texas at Arlington, Arlington, Texas, USA

Using the atomic pair-correlation function (PCF), generated via classical molecular-dynamics simulations, we have studied the structure factor of large models of amorphous silicon containing 262400 atoms to address the nature of hyper-uniformity or the behavior of the structure factor in the small wave-vector limit. The structure factors, S(K), at K = 0 has been computed using the Filon and Gaussian-quadrature methods by incorporating real-space information from the atomic pair-correlation function of up to 40 $^{\circ}$A. Our study suggests that the value of the computed static structure factor at K = 0 is about $S(0) \approx 0.026 \pm 0.013$. This value is comparable with the earlier simulation results and that of from experimental small-angle X-ray diffraction studies. The non-zero value of the structure factor at K = 0 can be attributed to the density fluctuations in the system, which is a characteristic structural property of the system that depends on position distribution of the atoms.

O10.21

11:00 SURFACE ENHANCED RAMAN SPECTROSCOPY OF Rh6G AT Au-NANO SURFACE AND APPLICATION FOR BIOSENSING

Aysha Evans, Anant Singh

Alcorn State University, Department of Chemistry & Physics, Lorman, MS, USA

Point-of-care device development is a growing field that aims to develop low-cost, rapid, sensitive diagnostic testing platforms that are portable, and can be used anywhere from modern clinics to remote and low resource areas. In this work, we report the state of art surface-enhanced Raman scattering (SERS) based optical detection techniques with an application focus on cancer diagnostics involving the development of a novel sustained and cost-effective substrate composed of Gold nanoparticles protected by Rh6G as a Raman reporter and its systematic evaluation for biological sensing. Optical-ruler-based distance measurements are essential for tracking biomolecular processes in a wide range of analytical biochemical applications. The normally used Förster resonance energy transfer (FRET) ruler is not useful for investigating distance-dependent properties when distances are more than 10 nm. In this work, we used gold nanoparticles and Rh6G dye-modified rigid, variable-length double-strand DNAs to alter the proximity of analyte from nano-surface in order to control the SERS signal intensity. Our experimental results show that one can tune the length of the SERS ruler between 8 and ~18 nm by choosing the size of the gold nanoparticles. A possible mechanism for our observed distance-dependent SERS phenomenon will be discussed using the Gersten and Nitzan model. We believe long-range SERS molecular rulers can be an important step toward understanding distance-dependent biological processes. "This work was supported by the Mississippi INBRE, funded by an Institutional Development Award (IDeA) from the National Institute of General Medical Sciences of the National Institutes of Health under grant number P20GM103476."

O10.22

11:20 SIMULATION OF SMALL-ANGLE X-RAY SCATTERING IN AMORPHOUS SILICON

Pramod Acharya, Durga Paudel, Parthapratim Biswas

The University of Southern Mississippi, Hattiesburg, MS, USA

In this work, we have presented an efficient approach to simulate the intensity of small-angle X-ray scattering (SAXS) for amorphous materials. Starting with the pair-correlation function (PCF) of large amorphous silicon (a:Si) networks, the intensity in SAXS of a-Si was computed by Fourier transform of the atomic pair-correlation function. Since the intensity in the small-angle limit de- pends on the behavior of the PCF at large distances in the presence of considerable noise in the PCF spectrum, we have employed a number of noise-reduction techniques to improve the signal to noise ratio for an accurate determination of the scattering intensity for small values of wave vectors. In particular, we have studied the effect of exponential- and Gaussian-damping factors on scattering intensities and the usefulness of employing filters based on the moving-average and Savitzky-Golay methods. Our results indicate that the Savitzky-Golay filter is the most effective one as far the scattering intensities in the small-wave vector region (< 0.2 Ang^{-1}) are concerned.

O10.23

11:40 TIGHT-BINDING CALCULATIONS OF ELECTRONIC DENSITY OF STATES: APPLICATIONS TO CRYSTALLINE AND AMORPHOUS SOLIDS

Sujan Subedi, Parthapratim Biswas

The University of Southern Mississippi, Hattiesburg, USA

We have studied the electronic density of states of single-chain (1D), square (2D), cubic (3D) crystals, and amorphous solids using

the tight-binding approximation of the electronic Hamiltonian. By constructing the Hamiltonian matrix in the nearest-neighbor approximation, we have computed the total energy, electronic eigenvalues, and the electronic eigenfunctions of the system for sizes up to 30x30x30 sites. The localized or delocalized nature of the electronic eigenfunctions in these systems have been studied using the inverse participation number of the electronic wave functions. Furthermore, the electronic conductivity of the systems has been addressed using the Kubo-Greenwood formula in real-space formalism and the method is illustrated by applying it to a realistic model of amorphous silicon.

Friday, February 23, 2018

AFTERNOON

12:00-1:00 Plenary Speaker

1:00-3:00 Mississippi INBRE/ Millsaps HHMI Symposia

PSYCHOLOGY AND SOCIAL SCIENCES

Chair: Gary Chong
Tougaloo Collge
Vice-Chair: Mehrun Laiju
Tougaloo Collge
Vice-Chair: Frederick Hunter
Tougaloo Collge

Thursday, February 22, 2018

MORNING
Room Union D

10:30 Panel Discussion:
INTERDISCIPLINARY RESEARCH AND TEACHING
Gary Chong, Mehrun Laiju, and Frederick Hunter,
Tougaloo College

General Symposia

Thursday, February 22, 2018
AFTERNOON
Room TC227

O11.01

1:00 A BODY IN MOTION: NEUROCOGNITIVE PROFILES AND RURAL HEALTH

Rodney Wilson

Mississippi State University - Meridian, Meridian, MS, USA

O11.02

1:15 GATEWAYS TO PRO-ANOREXIA AND FACTORS INFLUENCING CONTINUED ENGAGEMENT: A PILOT STUDY

Rachel Bravenec, Louwanda Evans, A. Kurt Thaw

Millsaps College, Jackson, MS, USA

Pro-anorexia (or "pro-ana") is an internet sub-community in which users engage in behavior that romanticizes, glorifies, promotes, and embraces Anorexia Nervosa. While the existence of pro-ana communities has been characterized and harmful consequences of interaction with pro-ana content have been confirmed, the current study is the first to investigate how pro-ana content is initially discovered and accessed by users as well as life factors potentially influencing engagement with pro-ana. A 24 item self-report questionnaire was developed using previously established self-report and evaluative questionnaires as a basis and point of reference to collect data on reported gateways into pro-ana content, factors influencing initial and continued engagement with pro-ana content, and demographic information. The survey was made available to pro-ana communities over multiple internet-based platforms. Of 306 participants, nearly a third reported the initial gateway into pro-ana as being a random exposure on social media, and an additional third reported the initial gateway as being exposure after searching the internet for diet-related terms. Comprehensive data on factors influencing engagement was collected with a 28-category survey item. Prominent factors included anxiety, depression, prior eating disorder, body image disturbance, isolation, and stress. Demographically, the majority of participants were adolescent non-Hispanic white females who have yet to complete high school from no particular socioeconomic background. Individuals who identified as transgender were overrepresented in the study by a factor of 14.2 as compared to national averages, indicating that transgender individuals may be a particularly vulnerable group to pro-ana exposure and engagement.

O11.03

1:30 COMPARATIVE STUDY OF DIETARY INTAKE, PERCEPTION OF WEIGHT STATUS AND MEASURED WEIGHT STATUS OF PRESCHOOL CHILDREN AND PARENTS

Martha Ravola[1], Priscilla Houston[2]

[1]Alcorn State University, Lorman, MS, USA, [2]Alcorn State University, Lorman, MS, USA

Childhood obesity, a complex health issue warrants early incorporation of healthful behaviors for later healthy outcomes. Healthful behaviors infused through parent education and awareness programs have proven beneficial for life long dietary practices. The current presentation is an outcome of the findings from a study conducted through the Parents and Children Engaged (PACE) to Prevent Childhood Obesity project funded by USDA NIFA Evans-Allen Grant. The study sample comprised 95 parent-child cohorts drawn from three Head start centers in four counties under the aegis of AJFC Community Action Agency, Inc. in Southwest Mississippi. The project efforts were geared towards providing parents the needed educational inputs to prevent childhood obesity through a structured 8 week intervention program engaging parent-child cohorts. Each cohort comprised 8-10 participants. Variables of the study included awareness of body weight, dietary intake, sleep and physical activity. The proposed presentation will describe the various stages of project including the methodologies involved in developing the 8 week intervention program, baseline data extraction, parental demographic information, anthropometric measurements and self-assessment survey. The comparative analysis of the primary data on weight with classifications on age, gender and employment status in comparison with the national standards, parental perception of weight status of self and their child and actual anthropometric measures would also be presented. The obtained weight status and comparisons with parent's self-reported weight

status will be discussed as avenues for parent education. The outcomes of the project are beneficial to administrators, researchers and policy makers engaged in child care, welfare and education.

O**11.04**

1:45 USE OF HEART RATE VARIABILITY RESILIENCY TRAINING TECHNIQUES FOR THE MANAGEMENT OF STRESS

Juliette Schweitzer, Taunjah Bell Neasman

Jackson State University, Jackson, MS, USA

While stress is a necessary part of our lives and can have both beneficial and detrimental effects, stressors in the modern world have shifted to work, school and family stress. The combination of grades, financial challenges and relationship issues experienced by young adults can lead to elevated blood pressure (BP), burnout and poor decision making. Training on managing stress and increasing resilience can provide benefits for relational, emotional, mental, and physical wellbeing. To this end, utilization of a heart rate variability (HRV)/resiliency training program to attenuate some of the physiological and psychological stressors experienced by university students can prove to be an effective technique with the potential to improve optimal performance. Heart rate variability is a measure of balance within the body, and it reflects variation in the intervals between heart beats, which is a biomarker that shows promise as a broad indicator of overall health, fitness, stress management, and cardiac function. In an HRV training program, participants undergo approximately four 60-minute sessions that involve practice of coherence techniques enhanced by HRV feedback obtained using emWave technology developed by the HeartMath Institute. Heart rate variability feedback assists participants in learning and sustaining self-management of coherence. Paper-based assessments can be used to measure psychological stress and results can possibly support HRV feedback data. The expectation is that HRV resiliency training will attenuate physiological stress measured by emWave technology and alleviate psychological stress with the overarching goal of reducing individuals' reactions to acute and chronic stressors as well as stress related consequences.

O11.05

2:00 SELF-ATTITUDES AMONG HETEROSEXUAL AND SEXUAL MINORITY MEMBERS

Tacangeria Morgan, Gary Chong

Tougaloo College, Tougaloo, MS, USA

This study focused on Self-Attitudes among Heterosexual and Sexual Minority Members. Individuals of different sexualities may hold a variety of attitudes about their own and others' sexuality. Several studies have suggested that gay, lesbian, and bisexual individuals are at increased risk for mental health and social problems ("Lesbian, Gay, Bisexual, and Transgender Health" Centers for Disease Control and Prevention, 2014). A recent 2017 survey indicated that about 3.8% of people self-identify as LGBT ("In U.S., More Adults Identifying as LGBT." *Gallup.com*). This study sought to add to the understanding of self-attitudes of heterosexual and sexual minority members. It was hypothesized that since sexual minority members of society endure more negative daily life issues than heterosexual members, sexual minority members' self-attitudes would be more negative and they would report experiencing more emotional pain. The independent variable of this study is the sexuality identification of participants (i.e., heterosexual, lesbian, gay, bisexual, or transgendered). The dependent variables were emotional pain, as indicated by the Daily Heterosexist Experiences Questionnaires (DHEQ) and self-attitudes measured by the Self-Rating Scale (SRS). Research participants included 80 African American College Students from an HBCU in the Jackson, Mississippi metro area. Statistical analysis of the data was conducted using the Analysis of Variance (ANOVA) and post hoc t-tests.

O11.07

2:15 DIFFERENT TYPES OF MUSIC AND ITS EFFECTS ON MEMORY RETENTION

Jasmine Younger, Gary Chong

Tougaloo College, Tougaloo, MS, USA

This study focused on how different types of music affect a person's ability to retain information in memory. Previous research has indicated a relationship between higher students' grades and listening to instrumental classical music while studying (Rastogi & Silver, 2014). The purpose of this study was to observe the cognitive abilities of African-American college students as they performed verbal and nonverbal tasks while listening to either instrumental or lyrical music. It was predicted that, with lyrical music being played while engaged in a learning task, participants would score lower than participants exposed to instrumental music during a learning task. The independent variable was the type of music (lyrical or instrumental). The dependent variable was a participant's score on a set of verbal and non-verbal tasks in a memory evaluation protocol. The research participants for this study were 60 African American college students who attend a Historically Black College or University (HBCU) in the Jackson, MS metro area. The participants were obtained by convenience sampling. There were 30 males and 30 females who were randomly assigned to task condition groups (instrumental, lyrical music, and a no music control group). Statistical analysis of the data was conducted using t-tests.

2:30 Business Meeting

Thursday, February 22, 2018

EVENING

Ballroom II/III

3:30 Dodgen Lecture and Awards Ceromony
General Poster Session
Immediately Following Dodgen Lectuer

P11.01

CYBER SECURITY AND HOMELAND SECURITY: AN EVALUATION OF THE CYBER SECURITY RELATED PRACTICES OF A MID-SIZED PUBLIC EDUCATIONAL INSTITUTION

Alaba Oludare, Christopher Lanclos, Bianca Watkins, Mubarak Ibrahim

Mississippi Valley State University, Itta -Bena, MS, USA

Cyber security has been and will continue to be a huge challenge for our nation as we continue in this technological age when more and more devices are connecting to the Internet. Governments are concerned with maintaining the security of the cyber space to protect the integrity of critical infrastructure. The purpose of this faculty led research is to educate the public on the significance of cyber security in homeland security. It is imperative to understand the vulnerability of all types of institutions including business, educational and governmental organizations as well as non profits

whether small or large. This is an exploratory research on the importance of cyber security for homeland security. This research evaluates extant literature on organizational protection, as it relates to Homeland Security. The study further examines the cyber security related policies and practices of a mid-sized public university to demonstrate the significance of cyber security to homeland security. The research concludes with policy implications and recommendations for all stakeholders to ensure cyber security in the effort to protect the homeland.

P11.02

AT-RISK YOUTH SUMMER CAMP PROGRAMMING: THE EFFECTS OF EQUINE ASSISTED LEARNING IN RELATION TO EMOTIONAL SAFETY

Mattie Dunlap, Katherine Cagle, Julie Parker

Mississippi State University, Starkville, MS, USA

The purpose of the summer programming for at-risk youth was to teach life skills and enhance emotional safety through interactive equine assisted learning activities. A mixed method approach was used to indicate the impact of participation. A pre-post quantitative measure assessed growth in equine science understanding and daily qualitative semi-structured interviews were conducted to evaluate emotional awareness and development over a four week period. A paired-samples t-test was conducted to compare pre test scores with post test scores from the equine assisted learning sessions. There was a significant difference in the scores for the pre-test (M=15.08, SD=5.01) and the post-test (M=19.62, SD=6.31) conditions; t(12)=-2.958, p = .012. The data demonstrated a link between the quantitative and qualitative measures regarding how equine knowledge directly impacted relational understanding of and to the horse. Through this improved relational understanding, emotional safety was established. This pilot study demonstrates the value of equine assisted learning as an alternative intervention for underserved minority and rural youth.

P11.03

SEX DEPENDENT EFFECTS OF NOVEL KAPPA AGONIST, NALFURAFINE, ON THE ANALGESIC QUALITY AND ABUSE LIABILITY OF OXYCODONE

Shelley Rae Edwards[1], Hina Qureshi[1], C. Austin Zamarripa[2], John Yi[2], Kevin Freeman[2]

[1]Millsaps College, Jackson, MS, USA, [2]University Of Mississippi Medical Center, Jackson, MS, USA

The consistent rise of prescription opioid related mortality in the United States has led to the search for new formulation of clinical analgesics that would deter abuse. One approach to abuse deterrent formulations is to combine traditional opioid analgesics with other compounds to attenuate the euphoric effects. One such compound is a kappa agonist. We hypothesized that nalfurafine, a novel kappa agonist, would be able to lower the abuse liability of oxycodone without reducing the therapeutic effects of the drug. A progressive reinforcement ratio was used to allow male subjects to intravenously self-administer oxycodone alone, nalfurafine alone, and varied mixtures of the two in order to determine the effect of nalfurafine on the reinforcing effects of oxycodone. Next, the same subject group received the drug conditioned through a cumulative dosing procedure during hot plate analgesia testing to determine clinical antinociceptive utility in comparison to oxycodone. Male and female subjects were administered the cumulative dosing procedure subcutaneously to determine the effect of sex as a biological variable on the analgesic effects of all drug conditions. It was determined that when provided oxycodone for self-administration, rats dose dependently reduce self-administration in response to nalfurafine addition. It was also observed that the addition of nalfurafine increases thermal antinociception when combined with oxycodone with no apparent sex dependent effects. These findings confirm the possible utility of a mu/kappa agonist combination in the clinical treatment of pain without the unintended consequence of addiction traditionally associated with opioid analgesics.

P11.04

EXAMINATION OF THE IMPACT OF CLASSIFICATION, AGE, GENDER, AND COLLEGIATE SPORT ON ANXIETY, DEPRESSION, AND STRESS IN STUDENT-ATHLETES

Ronella Gollman, Taunjah Bell Neasman, Myron Gilmore

Jackson State University, Jackson, MS, USA

Possible explanations for scant literature on effects of collegiate sports and other factors on HBU student-athletes' mental health may include inaccessibility to this population or limited awareness of any effects on HBU players. Petitpas and Buntrock (1995) noted that student-athletes face many challenges including identity conflicts, burnout, social isolation, substance use and abuse. Although students face challenges, the combined impact of collegiate sports and other factors might make handling these issues more challenging (Parham, 1993). Our aim was to examine the effect of classification, age, gender, and sport played (independent variables) on anxiety, depression, and stress (dependent variables) using the Beck Anxiety Inventory (BAI), Beck Depression Inventory-II (BDI-2), and Stress Inventory (SI). HBU student-athletes (N=152) < age 21 and > age 21 participated in this study. Data were analyzed using SPSS software (version 24). A MANOVA was calculated to examine the effect of sport type on BAI, BDI-2, and SI scores. Findings revealed a significant main effect of sport type (Roy's Largest Root (2.381,6), p= .034) on all dependent variables. Follow-up ANOVAs indicated that BAI scores of athletes > age 21 were higher than younger athletes (F(5.887,1), p=.017). BDI-2 scores were significantly higher for these athletes as well (F(5.058,1) p=.027). LSD post hoc comparisons revealed significant differences between football and baseball players' SI scores. LSD results showed significant differences between football and softball (p=.016); basketball and softball (p=.003); track and softball (p=.019); baseball and softball (p=.005) players' BDI-2 scores. Our findings imply that collegiate sports policies should address mental health.

P11.05

CORRELATION BETWEEN LISTENING TO CERTAIN TYPES OF RAP MUSIC AND ENDORSING SPECIFIC PSYCHOLOGICAL VARIABLES

Jesse Anderson, Briana Frizell, Anthony Jones, Garrett Watson, D'Ericka Williams, Juliette Schweitzer, Taunjah Bell Neasman

Jackson State University, Jackson, MS, USA

Rap music is rooted in the African American tradition of speaking rhythmically (or "flowing") to a beat usually supplied by background music. Certain rap artists use this music genre to address the sense of powerlessness felt by some individuals to change existing social, political, and economic conditions. These issues have led lyricists and their fans to seek ways of expressing their discontent; thus, rap music has become a cathartic outlet. Other rap artists use misogynistic lyrics in their songs and elicit images in

music videos to perpetuate what some critics call America's culture of violence. Therefore, the present study was designed to examine the correlation between listening to certain types of rap music and endorsing specific psychological variables associated with self-esteem, anxiety, depression, mindfulness, and aggression. Individuals (*n*=95) were recruited to participate voluntarily in the current research. Data were collected using the Rap Music Attitudes and Perceptions Scale, Rosenberg Self-Esteem Scale, State-Trait Anxiety Inventory, Center for Epidemiologic Studies Depression Scale-Revised, Kentucky Inventory of Mindfulness Skills, and Buss-Perry Aggression Questionnaire. Data were analyzed using the IBM Statistical Package for the Social Sciences (version 24.0). A Pearson's product-moment correlation coefficient was performed on the data. Results revealed a significant correlation between attitudes and perceptions of rap music and some psychological variables included in the current research. Findings suggest that perhaps the lyrical and graphical analyses of songs and videos aligned with this music genre can be used to perhaps gain insight on the psychological, emotional, and social experiences of contemporary young adults.

P11.06

ADMINISTRATION OF KRM-II-81, AN A-1 SPARING GABA RECEPTOR LIGAND, EXHIBITS DECREASED RESPIRATORY DEPRESSING EFFECTS COMPARED TO ALPRAZOLAM

Patrick Davis[1], Sean Duke[2], Kevin Freeman[2], Jussara Do Carmo[2], James Rowlett[2]

[1]Millsaps College, Jackson, MS, USA, [2]University of Mississippi Medical Center, Jackson, MS, USA

Classic benzodiazepines act on receptors for the neurotransmitter, GABA, to facilitate GABA-induced dampening of neuronal activity. Previous studies have demonstrated that activation of certain GABA receptors in the brainstem can lead to a decrease in overall oxygen consumption. Due to the variety of α-subunits that make up GABA receptors, the exact mechanism behind this respiratory depression is still unknown. Several studies suggest that respiration is mediated by GABAA receptors preferentially expressing α-1 protein subunits. In the present study, we compared in rats (n=8) the respiratory effects of a classic benzodiazepine, alprazolam, to a novel, α-1 sparing benzodiazepine, KRM-II-81, at doses that produced equivalent levels anxiolysis in a previous study. Respiration rate and the maximum and minimum pressure in a whole-body plethysmography chamber were recorded for each drug, in each animal. Calculations of respiratory frequency, tidal volume, and minute volume were compared by a two-way ANOVA. Preliminary results demonstrate that administration of the α-1 sparing compound, KRM-II-81, produces less respiratory depression than alprazolam at doses that are equipotent for anxiolysis. Thus, α-1 sparing compounds may be safer option for the treatment of anxiety, particularly in patients who co-use other drugs with respiratory-depressant effects (e.g., ethanol, opioids).

P11.07

ATTITUDES OF AFRICAN AMERICANS TOWARD CRIME REPORTING IN JACKSON, MISSISSIPPI

Sheridan Snell and Meherun Laiju

Tougaloo College, Tougaloo, MS,, USA

This paper presented the results of a survey, which examined African Americans in Jackson, Mississippi attitudes toward crime reporting. Previous research has been done to better understand the attitudes of African Americans toward crime reporting. Researchers have studied the relationship between the police, the criminal justice system, and African Americans. The majority of research conducted has been to explain why African Americans do not report crime. W.E.B. DuBois' theory on double consciousness was used as the theoretical framework for this study. The hypotheses for this study were 1) women are more likely to report crime than men; 2) African Americans ages forty-five and older are more likely to report crime than those forty-four and younger; 3) African Americans who have had a negative experience with the police are less likely to report crime than those who have not had a negative experience with the police; 4) African Americans living in communities with rare crime are more likely to report crime than those living in communities with high crime; 5) The majority of respondents will report that they will report a crime if the need arises. A survey was conducted to test the proposed hypotheses. One hundred African Americans residing in Jackson, Mississippi participated in the study. The questionnaire consisted of twenty-two items which included demographic and attitudes toward crime reporting questions. Results are pending.

P11.08

USING ARCGIS TO MAP DISASTER EFFECTS ON MISSISSIPPI

Danielle Magee, Shanterell Redd, Alex Hopkins, Courtney Mangum, Santanu Banerjee

Tougaloo College, Tougaloo, MS, USA

In recent years disasters have increased more in numbers and intensity in the form of hurricanes (Katrina, 2005), floods (Mississippi River, 2011), wildfires (Tennessee, 2016), tornados (Mississippi, 2016), etc. causing considerable damage to life and property. ArcGIS, the focus of this research project, is a sophisticated geographical informational system which can be implemented to positively impact natural disasters. This project also focuses on demography and vulnerable populations that are affected by hurricanes, floods, wildfires, and tornados. In addition to mapping the disaster impact areas, this project links disaster areas to the availability of healthcare facilities near the damaged areas and show how the different types of natural disasters disproportionately affect different demographic groups. This research has helped us to understand the potential impact of possible natural disaster incidence in our nation and provide information necessary to make policy decisions on equitable allocation of disaster mitigation resources. This research has shown how the physics application in ArcGIS can be effective in assessing disaster areas. This work is supported by the interdisciplinary minor, Disaster Coastal Studies, funded by the Homeland Security Center of Excellence.

P11.09

MATE SELECTION PREFERENCES AMONG HBCU COLLEGE STUDENTS

Mahalia Crawford, Meherun Laiju

Tougaloo College, Tougaloo, MS, USA

The paper presented the results of a survey, which examined mate selection preferences among HBCU college students. Previous research has been done to better understand the factors that contribute to mate selection preferences. Researchers have studied the patterns and characteristics on how mate selection is done. The majority of research conducted has been to examine the differences in mate selection along with characteristics that might be present in a potential mate or marriage partner. The social exchange theory was used as the theoretical framework for this study. The

hypotheses for this study were 1) Women are more likely to prefer a partner with resources; 2) Men are most likely to select a mate who is more physically attractive; 3) Fresh persons are more likely to select a mate with an exciting personality; and 4) Students between the ages of 18-24 are more likely to prefer a mate with good financial prospect. A survey was conducted to test the proposed hypotheses. One hundred HBCU college students currently attending local HBCU's participated in the study. The questionnaire consisted of twenty-four items which included demographic and preferences in selecting a mate. Results are still pending.

P11.10

ROLE OF EFFECTIVE COMMUNICATION IN DISASTER PREPAREDNESS

Jamille Bryant, Courtney Hill, Madison Bibbs, Deja Boler, Shaila Khan

Tougaloo College, Tougaloo, MS, USA

This research covers the role of effective communication in disaster preparedness. The research investigated the factors the motivate residents to prepare in advance for any type of disaster, and factors that compel some residents to ignore evacuation order. It also investigated types of media that are effective to reach and convince residence to evacuate; effective ways to reach diverse populations and special factors to be considered in case of emergency evacuation for at risk population groups; and the knowledge of availability of resources such as health care facilities and emergency shelters within impact zones. A survey was constructed which covered all of the above factors as it relates to effective communication in disaster preparedness. It consisted of 33 questions including some demographic variables and was administered to the residents of Houston affected by hurricane Harvey. There was also a focus group discussion with the team Emergency Management Coordinator in Houston. Partial results showed that during a natural disaster the used of social media went up because people are seeking immediate and in-depth information. With the use of sites such as Twitter, Facebook, and Instagram information can be shared within seconds to millions of people. Not everyone uses social media which can be a limitation. Older individuals are not familiar with new technologies and devices. Therefore, they tend to rely on television which is subject to outage during a storm. This study suggested that social media can play a very significant role in affecting social vulnerability. This study was supported by interdisciplinary minor disaster coastal studies, Homeland Security Center of Excellence.

Friday, February 23, 2018
MORNING
Room TC210

10:00 Workshop

INCORPORATING ACTIVE LEARNING IN THE SCIENCE CLASSROOM - METHODOLOGY WORKSHOP FOR TEACHING

Organizers: Dr. Elizabeth Prewitt, Dr. Virginia Moore, & Dr. Amber McCoulough

Numerous active learning strategies for the science classroom at all levels of instruction will be and discussed during this workshop. We will also model the use of Team-Based Learning and Problem-Based Learning during this time. Finally, we will talk about strategies to improve engagement in online courses.

Seating is limited to 50 participants. Pre-registration fee of $25 guarantees admission and official certificate of training. On-site registration available until workshop is full.

Friday, February 23, 2018

AFTERNOON

12:00-1:00 Plenary Speaker

Friday, February 23, 2018

AFTERNOON
Room TC 218A

1:00- 2:00 WORKSHOP

MS COLLEGE AND CAREER READINESS WORKSHOP

Organizer: Dr. Jackie Sampsell, Mississippi Department of Education

During this workshop, an overview of the 2018 Mississippi College and Career Frameworks for Science Education will be discussed.

Friday, February 23, 2018

AFTERNOON

12:00-1:00- Plenary Speaker

1:00-3:00 Mississippi INBRE/ Millsaps HHMI Symposia

SCIENCE EDUCATION

Chair: Elizabeth Prewitt
Blue Mountain College
Vice-Chair: Shana Lee
Mississippi State University

Thursday, February 22, 2018

MORNING

Room TC 210

O12.01

8:00 GENERAL BIOLOGY STUDENTS' PERCEPTION OF THE EXISTENCE OF GLOBAL CLIMATE CHANGE

Johnny Mattox

Blue Mountain College, Blue Mountain, MS, USA

Is climate change now occurring on a global basis? This was the topic of study in a survey administered to a group of sixty-two college student enrolled in General Biology for Majors and General Biology for Non-majors. Questions on the survey included their beliefs as to whether or not climate change was actually occurring globally at the present time, if they were taught that this phenomenon existed when they were in high school, what humans might be able to do in order to slow down the progression of climate change, and the extent of their knowledge concerning the greenhouse effect. From the calculated percentages tabulated a majority of the students (90.3%) did believe that climate change existed on a global basis while only 10.7% did not believe that such an occurrence existed.

O12.02

8:20 AGASSIZ'S GLACIAL THEORY: HOW A PAST CONTROVERSY CAN INFORM MODERN CLIMATE CHANGE DISCUSSIONS

Renee Clary

Mississippi State University, Mississippi State, MS, USA

This research probed whether an earlier proposal of climate change in the history of science could facilitate climate literacy in modern climate discussions: Louis Agassiz's 1837 glacial theory proposal was received with initial skepticism, heavily debated, and eventually accepted by the majority of the scientific community 3-4 decades later. Within an online Earth History course, students (N = 24) participated in a 6-unit climate change discussion, with one unit focused upon the historical reception of Agassiz's glacial theory. Content analysis of students' online discussions documented that students addressed most understandings of the Nature of Science matrix, while content analysis of students' anonymous survey responses (n = 22) revealed three stable themes, including the benefits of the history of science for providing context for developing theories, facilitating broader understanding of the nature of science, and providing historical episodes that directly relate to modern debates. While students affirmed the importance of the historical climate change episode within their climate discussions, more research is needed to elucidate whether the history of science can also result in improved climate literacy.

O12.03

8:40 CAREER EXPLORATIONS IN THE STEM CLASSROOM

Shana Lee, Ryan Walker

Mississippi State University, Starkville, MS, USA

The acronym STEM (Science Technology Engineering and Math) has evolved to include a more creative aspect STEAM (Arts) and even a literacy aspect STREAM (Reading and writing) in efforts to support cross-curricular collaboration while encouraging and producing qualified students for pathways in the STEM job market. Currently, the United States has an increasing demand for STEM careers, but the number of undergraduates enrolled in STEM degree programs is not sufficient enough to fill this demand. Student's social views and misconceptions about STEM courses and career pathways may be one of the many factors that influence career choice. Providing opportunities to introduce students to the scientific community with the goal to encourage STEM career interest can start in the classroom. Embedding aspects of STEM career explorations into the classroom through research assignments, the use of device applications, and through inviting local STEM employers to share their career pathway experience, provides a student-centered approach to developing an understanding of careers associated with the scientific community. Providing in-service and pre-service teachers with tools to promote various STEM career pathways may help increase the retention rates in STEM degree programs and may help resolve social misconceptions about STEM careers.

O12.04

9:00 FRESHMAN BIOLOGY MAJORS KNOWLEDGE & PERCEPTIONS OF PHARMACY CAREERS

Brooke Lewis, Elizabeth Prewitt
University of Mississippi, University, MS, USA

Many freshman biology majors decide a career route they may not fully understand. This study examined students' knowledge of pharmacy as a career choice during a freshman level General Biology for Majors class. A questionnaire was given prior to a pharmacist coming out and discussing the details of the career and the preparation requirements. The completed questionnaire revealed that many of these students were not knowledgeable about basic details of a career many were planning on pursuing. This study examined the benefits of having guest-speakers come discuss career preparation day-to-day activities to lower-level biology majors.

9:20 BREAK

O12.05

9:35 EFFECTIVE DESIGN AND RENDERING OF PHOTOGRAMMETRIC ASSETS FOR VIRTUAL FIELD TRIPS

Youngwoo Cho, Renee Clary

Mississippi State University, Mississippi State, MS, USA

We used the aerial and the ground-based photogrammetries to create the high-resolution photorealistic meshes from the actual geology outcrops. These high-resolution meshes were then imported into serious games and 3D animations to create the virtual field trips (VFTs). These 3D meshes photogrammetrically created from the real world are commonly called the photogrammetric 3D assets. However, the high-resolution photogrammetric assets created for VFTs contain too many polygons to run in real-time. Having them run on a regular computer system would severely slow down the application because it would consume a lot of computer resources in terms of the CPU time and the GPU performance. Therefore, unlike the normal 3D assets, the photogrammetric assets need to be rendered before they can actually be used in games and animations. We researched how effectively we can design and render the photogrammetric assets in order to have them run faster without losing details in serious games and animations for VFTs. We have applied the different levels of details (LODs) from the photogrammetry stage. The 3D rendering techniques and in-game LODs have been used as well to speed up the games and the animations while keeping the details of the 3D assets.

O12.06

9:55 CHANGING STUDENTS' PERCEPTIONS OF THE TRUE NATURE OF SCIENCE

Johnny Mattox[1], Elizabeth Prewitt[2]

[1]Blue Mountain College, Blue Mountain, MS, [2]University of Mississippi, University, MS

Students enrolled in Science Methods classes sometimes have difficulty grasping what the nature of science actually means when constructing lesson plans on this subject. In many cases, they seem to think that it simply includes anything associated with nature. By discussing the concept of the nature of science, how science is continuously evolving and changing, and that it is never fixed, but always subject to revision, seems to help students establish the true meaning of this subject. Also, by discussing how scientists go about their work and, presenting the fact that there is not just one "scientific method" but many scientific methods, depending on the scientist, seems to help them grasp the actual meaning of the nature of science.

O12.07

10:15 IMPACT OF TEACHER PROFESSIONAL DEVELOPMENT IN THE SCIENCES: VARIATION IN TEACHERS' CONTENT RETENTION BY SCIENTIFIC DISCIPLINE

Renee Clary[1], Anastasia Elder[1], James Dunne[1], Svein Saebo[1], Debbie Beard[1], Charles Wax[1], Joshua Winter[1], Deborah Tucker[2]

[1]Mississippi State University, Mississippi State, MS, USA, [2]Independent Science Education Consultant, Nappa, CA, USA

The Teacher Academy in the Natural Sciences (TANS) provided Mississippi middle school teachers (N = 81, grades 6-8) with intensive professional development (PD) in chemistry, geosciences, and physics. Since some teachers were retained and rotated into different scientific disciplines, the TANS program investigated retention of science content 1-2 years beyond an instructional year. The PD program resulted in significant gains ($p < 0.001$) in all three scientific disciplines from teachers' incoming knowledge to the end of the intensive 10-day summer academy. Teachers retained chemistry and geosciences content gains at the end of the professional development year (February), but physics participants experienced a significant loss from the summer academy ($p < .001$), although gains from teachers' incoming knowledge were still significant. When retention was measured beyond the instructional year, only the geosciences content was retained. Regression in chemistry and physics content may result from persistent misconceptions. Alternatively, geosciences gains may reflect continued media exposure, better alignment to the science topics taught by teachers in their middle school classrooms, and/or better alignment of assessments with the TANS summer academy curriculum. Our research indicates that science content support is needed after professional development programs, and importantly, that the support differs between scientific disciplines.

O12.07

10:35 ACTIVE LEARNING'S IMPACT ON UNDERPREPARED STUDENTS

James Gerald

Delta State University, Cleveland, MS, USA

The goal of this study was to determine the impact of an active learning methodology on a group of underprepared students. The data covers a three year period of Physics for Life Sciences at Delta State University. During the first two years, a traditional lecture methodology was used. The third year, a group based approach using a flipped format became the primary method of delivery. Within this data, we selected a subset of students that were traditionally underprepared and compared their performance before and after the format change to that of the rest of the class. The results indicate significant improvements for some of the students in the underprepared group.

O12.08

10:55 THE SKIT BENEFIT: THE IMPACT OF ROLE PLAYING IN AN INTRODUCTORY UNDERGRADUATE BIOLOGY COURSE

Jada Mills

Itawamba Community College, Fulton, MS, USA

Science education extends from K-12 to our vibrant Community College System in Mississippi. Secondary biology classes are very similar in standards and scope to undergraduate non-majors biology courses; however, delivery methods often change from interactive and engaging to more expository teaching. Students and adults have many different learning styles and research suggests that many are visual and kinesthetic learners in addition to the typical auditory method used in lecture-based college courses. Skits and role playing activities can greatly affect student engagement, level of understanding, and enjoyment of hard-to-understand material for undergraduate students who are not majoring in a scientific field. An activity involving student actors to role play steps in photosynthesis has generated positive results for retention of information, student engagement and enjoyment levels.

O12.09

11:15 THE SCIENCE-HUMANITIES INTERFACE AT AN ACADEMIC HEALTH SCIENCE CENTER

Anna Grace Stout, Mary Elizabeth Butts, Amanitare Bailey, Caroline Compretta, Ralph Didlake

University of MS Medical Center, Jackson, MS, USA

Social and cultural characteristics of individuals and populations such as level of income, literacy, race, and gender are critical determinants of health and of health care outcomes. Humanities disciplines such as anthropology, philosophy, ethics, and literature can -strongly inform health care delivery regarding these determinants in ways that reduce variance in both health status and treatment outcomes. In an effort to teach students in the health professions about the social and contextual features of patients who seek treatment, and how these features may impact the way an illness or injury is experienced, three experiential learning activities were instituted at UMMC. First, the Poverty Simulation is an activity developed by the Missouri Community Action Network and is intended to promote awareness and understanding of poverty-related issues and to motivate community change on behalf of under-resourced individuals. When used as a teaching tool in an academic health science center, additional learning outcomes related to health and health care become possible. Second, Bafa' Bafa' is an interactive simulation that promotes discussion regarding diversity and inclusion. Participants recognize ways cultural stereotypes develop and function in professional and personal settings to foster an appreciation of difference and self-awareness. Third, a 5-week bioethics and medical humanities immersion experience was developed to produce a population of humanities scholars who are deeply informed regarding the challenges of modern bioscience research, patient care, and health sciences education. Review of the collective experience with these learning activities suggests they are value-added for learners in professional health science programs.

11:35 Science Education Business Meeting

12:00 General Session

Thursday, February 22, 2018

AFTERNOON

Room 210

2:00-3:00 Stemi Workshop

Thursday, February 22, 2018

EVENING

Ballroom

3:30 Dodgen Lecture and Awards Ceromony

General Poster Session

Immediately Following Dodgen Lecture

P12.01

REVIEWING THE IMPACT OF EDUCATIONAL TECHNOLOGIES AS IT RELATES TO VIRTUAL LABORATORIES: A META ANALYSIS

Shavonda McDaniel1

1Alcorn State University, Lorman, MS, USA, 2The University of Southern Mississippi, Hattiesburg, MS, USA

Online courses operate differently than traditional courses, thus they require teaching techniques and assessment techniques specifically geared for this educational experience. Because distance-education and internet-based learning are no longer novel concepts in the science field, many biology programs have designed courses to be taken online. The present analytical review addresses the impact and effectiveness of educational technology as it relates to virtual biological laboratories in comparison to traditional laboratories. The focus of this meta- analysis is to summarize the academic performance and achievements of collegiate students enrolled in biological virtual labs compared to traditional labs as demonstrated by course pre-test/post-test, quiz scores, and final exams. A number of experimental studies (N=15) met the criterion for inclusion in this meta-analysis with data reported from over 1,852 students. A paired t test was used to compare final lab scores. The final measure of the effect of virtual labs on achievement was found by calculating effect size d. Virtual laboratory effects on aptitude- achievement correlation was measured by calculating q, while effect size d was calculated from the differences in average scale scores of traditional and virtual groups for student attitudes. In 70% of these studies, students enrolled in the virtual laboratory outperformed those students in the traditional laboratory. The overall mean effect size was calculated as d=0.26. Although considered small, these positive results indicate that a biological virtual laboratory could be an effective method for delivering course content.

P12.02

CURRICULUM ENHANCEMENT OF THE ENVIRONMENTAL HEALTH PROGRAM AT MISSISSIPPI VALLEY STATE UNIVERSITY - EXPERIENTIAL INVESTIGATIONS OF NANOTOXICITY IN CHLAMYDOMONAS REINHARDTII

Mark Dugo, Grace Adegoye, Abigail Newsome, Ariel Jackson

Mississippi Valley State University, Itta Bena, MS, USA

The production of engineered nanoparticles (NPs) (particles <100nm in any one direction) has steadily increased over the past several decades. Some of the most abundantly produced NPs include, carbon based NPs and metal NPs such as silver, iron, copper, zinc and titanium. Applications range from skin creams, drug delivery, to agents of bioremediation and wastewater treatment. While NPs and nanotechnology holds great promise for a variety of applications, there remains significant question as to the impacts of accumulating of nanoparticles in the environment. With MS INBRE Curriculum Development support, we have incorporated experiential investigations of microbial nanotoxicity into MVSU's Environmental Health graduate program course, Environmental Microbiology. Specifically, we are exposing pure cultures of the unicellular algal species, Chlamydomonas reinhardtii, to titanium dioxide nanoparticles which are used as agents of bioremediation. Following acute exposure trials across various doses, a suite of toxicity endpoints will be investigated. Morphological changes will be assessed through bright-field and fluorescence microscopy. Viability and growth will be assessed through growth curves and enumeration procedures including traditional hemocytometer counts, optical density readings (750 nm) using a microplate reader, and through the use of an automated cell counter. The production of reactive oxidative species is commonly reported as a marker of metal toxicity and oxidative stress following titanium dioxide NP exposure will be assessed through a lipid peroxidation assay. Genomic modulations of select detoxification enzymes will be assessed at the mRNA transcript level through real time PCR and at the protein level through western blot analysis.

P12.03

EXPLORATION OF EXPERIENTIAL STEM EDUCATION PROGRAMS IN MISSISSIPPI AND THEIR USE IN MISSISSIPPI PUBLIC SCHOOLS

Randi Robison

Mississippi State University, Starkville, MS, USA

Emphasizing science, technology, engineering, and mathematics (STEM) education in schools has been shown to help students perform better in all standardized testing areas. Informal, experiential learning has also been shown to provide benefits for student performance and engagement. Where these two learning areas overlap for most students is in a STEM-focused field trip organized by a teacher. STEM centers, or places one can go to experience informal STEM learning, have never been fully catalogued in Mississippi. This research creates a dynamic map in Google Maps for teachers and parents to find STEM centers geographically near them. Early analyses indicate that multiple STEM-oriented facilities exist across the state, but many people are unaware of their location, usefulness, and/or variety. Surveys of Mississippi's STEM centers and educators across the state will determine a baseline for current usage, quality of usage, and improvement of programs available for Mississippians. These data will be organized into geodatabases for long term monitoring of informal education in Mississippi by the Mississippi Science Celebration. This research will also be the groundwork for a website that will help all lifelong learners in Mississippi connect to STEM education opportunities.

P12.04

EFFECTIVE DESIGN AND RENDERING OF PHOTOGRAMMETRIC ASSETS FOR VIRTUAL FIELD TRIPS

Youngwoo Cho, Renee Clary

Mississippi State University, Mississippi State, MS, USA

We used the aerial and the ground-based photogrammetries to create the high-resolution photorealistic meshes from the actual geology outcrops. These high-resolution meshes were then imported into serious games and 3D animations to create the virtual field trips (VFTs). These 3D meshes photogrammetrically created from the real world are commonly called as the photogrammetric 3D assets. However, the high-resolution photogrammetric assets created for VFTs contain too many polygons to run in real-time. Having them run on a regular computer system would severely slow down the application because it would consume a lot of computer resources in terms of the CPU time and the GPU performance. Therefore, unlike the normal 3D assets, the photogrammetric assets need to be rendered before they can actually be used in games and animations. We researched how effectively we can design and render the photogrammetric assets in order to have them run faster without losing details in serious games and animations for VFTs. We have applied the different levels of details (LODs) from the photogrammetry stage. The 3D rendering techniques and in-game LODs have been used as well to speed up the games and the animations while keeping the details of the 3D assets.

Friday, February 23, 2018

MORNING
Room TC 210

012.11

8:00 TRAINING GRADUATE STUDENTS FOR TEACHING BIOLOGY LABS: INCLUDING ACTIVE LEARNING STRATEGIES

Sarah Lanier

Mississippi State University, Starkville, MS, USA

It is easy to find research supporting active learning in the biology classroom. In fact, current trends in teaching are encouraging more discussions and writing activities within large lecture-type classes. Many universities rely heavily on graduate students to assist in teaching the lab components of these classes. The training conducted for these graduate students greatly varies. Because active learning has not always been practiced in the college, or even in the secondary, environment, graduate students need to be encouraged and trained to use active learning strategies within their labs to help engage students in the learning process. Using teaching seminars for graduate students, thereby implementing the training, biology students will be exposed to more active learning thus more engaged in their lab experiences. A proposed plan for implementing this training will be discussed and feedback from the audience will be requested.

O12.12

8:20 SHARING A SMALL WORLD: INTRODUCING PRE-SERVICE TEACHERS TO ACTIVITIES ON PEOPLE AND THE ENVIRONMENT

Virginia Moore

University of Mississippi, Oxford, MS, USA

Population Education Trainers have been presenting workshops and developing educational materials since 1975. The Population Education Program offers training, materials, and support for teachers to help them include population studies in their classes in appropriate ways. The purpose of this session is to provide information on human population, resource and environmental trends and to demonstrate a variety of hands-on activities and material that can be implemented in the classroom. Also, this session will give information for individuals interested in becoming a Population Education Trainer.

O12.13

8:40 ESCAPE ROOMS IN SCIENCE EDUCATION

Elizabeth Prewitt

University of Mississippi, Oxford, MS, USA

Escape Rooms are quickly popping up all over the country. These rooms involve puzzles, riddles, and a variety of challenges centered on a theme for a group of people to complete in a given period of time to win or "escape" the room. This study looks at using the idea behind escape rooms in science education by incorporating a storyline that has students working on challenges specific to MS College and Career Readiness Science Standards (2018). Students are engaged in critical thinking and problem solving skills to collaboratively solve a problem.

O12.14

9:00 USING THE 5E MODEL OF INSTRUCTION TO BRING OUT THE SCIENCE BEHIND DOING A PROBLEM BASED CHALLENGE

Joe Sumrall[1], Kelle Sumrall[2]

[1]University of Mississippi, University, MS, USA, [2]Lafayette Middle School, Oxford, MS, USA

This presentation will review a field-tested seventh grade problem based science challenge that focuses on using the 5E Model of instruction to improve science content attainment. Problem based challenges (PBCs) such as building paper roller coasters, miniature towers, catapults, and straw bridges are viewed as a popular way to teach science for multiple reasons. Increased student participation, increases in inquiry and added involvement of students with special needs are a examples of the benefits when teaching through a PBC. Despite the acknowledged benefits of learning engineering skills through a PBC some science educators have identified a lack of science content attainment as a major weakness. How each step of the 5E Model (Engage, Exploration, Explanation, Elaboration and Evaluation) is used to increase science content understanding through the explanation and elaboration phases are reviewed through analysis of student involvement and science content understanding data that initially challenges the students to build successful paper roller coasters. The specific PBC involving roller coaster construction, Next Generation Science Standards alignment and student success at understanding Newton's three laws of motion are reviewed. The paper (based on an accepted for publication manuscript in the National Science Teachers Association middle school journal Science Scope) with references will be disseminated.

O12.15

9:20 THE LOST ART OF INQUIRY-ABSTRACT

Elizabeth Martin[1], Chelsea Barber[2]

[1]Mississippi State University, Starkville, MS, USA, [2]Shannon High School, Shannon, MS, USA

Inquiry is a lost art in classrooms predominantly pertaining to the science curricula. Our experience in a Title I school district has led to the realization that students are reliant upon easy access to internet, smart devices, and social media. During this technological

age, youth lack the capability to think critically and make their own informed decisions regarding education and real-world events. What is the importance of a person's ability to inquire and think critically? Every person, young and old, gain knowledge and understanding of the world through a natural desire to ask the following simple questions: who, what, when, where, and why? Unfortunately, today's youth is either unable or unwilling to question the world around them and how it operates. The purpose of this seminar is to inform educators on how to incorporate inquiry into their daily classroom routine. We will explain the use of various activities that teachers can implement to encourage students to build upon and use prior inquiry capabilities. The first method introduced was the facilitation of the "mystery" box activity. The second method involved assisting students with the unknown object activity. The third method used was the overseeing of the characteristics of life activity using living organisms and inanimate objects. Each activity involved students using observation, problem-solving techniques, and inference to gather qualitative data in order to draw conclusions. In conclusion, these activities are great ways to stimulate students' curiosity and serve as an introduction to future educational endeavors.

9:40 BREAK

10:00 Workshop

INCORPORATING ACTIVE LEARNING IN THE SCIENCE CLASSROOM - METHODOLOGY WORKSHOP FOR TEACHING

Organizers: Dr. Elizabeth Prewitt, Dr. Virginia Moore, & Dr. Amber McCoulough

Numerous active learning strategies for the science classroom at all levels of instruction will be and discussed during this workshop. We will also model the use of Team-Based Learning and Problem-Based Learning during this time. Finally, we will talk about strategies to improve engagement in online courses.

Seating is limited to 50 participants. Pre-registration fee of $25 guarantees admission and official certificate of training. On-site registration available until workshop is full.

Friday, February 23, 2018

AFTERNOON

12:00-1:00 Plenary Speaker

Friday, February 23, 2018

AFTERNOON
TC 218A

1:00- 2:00 WORKSHOP

MS COLLEGE AND CAREER READINESS WORKSHOP

Organizer: Dr. Jackie Sampsell, Mississippi Department of Education

During this workshop, an overview of the 2018 Mississippi College and Career Frameworks for Science Education will be discussed.

ZOOLOGY

Chair: Alex Acholonu
Alcorn State University
Vice-Chair: Julius Ikenga
Mississippi Valley State University

Thursday, February 22, 2018
MORNING
Room TC 228

8:50 Welcome

O13.01

9:00 COMPARING METABOLIC RATES OF *PUNTIGRUS TETRAZONA*, TIGER BARB (CHARACIFORMES: CHARACIDAE) AND *HYPHESSOBRYCON EQUES*, SERPAE TETRA (CYPRINIFORMES: CYPRINIDAE) AT 21-22º C.

Amber Haymer, Julius Ikenga

Mississippi Valley State University, Itta Bena, MS, USA

Puntigrus tetrazona and *Hyphyssobrycon eques* are active tropical freshwater fishes that are naturally found in Southeast Asia and the Amazon basin of South America. Both are ornamental fishes of high commercial import in the aquarium trade. In this study, we used the indirect respirometry technique to measure and compare the metabolic rates of the two fish species at equal body weights and room temperature. The indirect metabolic rates were measured as the amount of CO_2 produced at 21-22^O C by each test fish, per the fish volume in milliliters per hour. The mean metabolic rate for *P. tetrazona* was 7.08 µM CO_2/ml/hr while 7.00 µM CO_2/ml/hr was recorded for *H. eques* at the same temperature. A t-test analyses showed no significant difference in the metabolic rates of the two fish species at 21-22^o C.

O13.02

9:15 POOL LEVEL REDUCTION SIMULATIONS ON THE FEEDING AND CONSPECIFIC BEHAVIOR OF PHYLLOICUS PULCHRUS (TRICHOPTERA:CALAMOCERATIDAE) FROM A TROPICAL RAINFOREST STREAM

Limarie Reyes-Torres[1], Alonso Ramírez[2]

[1]*University of Southern Mississippi, Hattiesburg, MS, USA,* [2]*University of Puerto Rico, Río Piedras, USA*

Increasing drought frequency and persistence around the world has prompted a better understanding of their effects on natural populations and ecosystem functioning. The main result of drought on streams is the fragmentation of stream ecosystems into isolated pools as streamflow and water depth decreases. There are limited studies on caddisfly response to reduced water levels and their effect on ecosystem functioning, and thus the goal of this study was to evaluate how reductions in water levels, similar to those associated with droughts, influence feeding and conspecific behavior of Phylloicus pulchrus. Laboratory experimental pool reductions, simulating the natural conditions of the species in the El Verde Field Station, Luquillo Experimental Forest, were carried out for two weeks. Four rectangular plastic aquaria were filled to one third of their volume with stream water that was maintained aerated. Ten circular plastic chambers (with screen windows) with senescent leaves of Guarea guidonea were placed inside each aquarium. Two

stream pool levels (normal, low) were simulated with two treatments (experimental, control). Experimental chambers (n=20) contained fourth instar larvae (n=80, 40=normal, 40=low) whereas control chambers (n=20) did not contain larvae. The effect of pool level reduction on leaf mass loss, aggressive interactions between larvae (> 25 % of their cases removed), and larval mortality were assessed. Reductions in pool level increased leaf mass loss, larval aggressive interactions, and mortality. This research contributes to our scarce knowledge on caddisfly larvae leaf litter processing behavior during early stages of water reductions, such as those caused by droughts.

O13.03

9:30 WATER QUALITY STUDIES ON OTAMIRI RIVER IN EGBU, IMO STATE, NIGERIA

Alex D. W. Acholonu

Alcorn State University, Lorman, MS, USA

Otamiri River is a first order river with its source at Egbu in Owerri North Local Government Area (LGA), Imo State. . At Nekede, it is joined by Nworie River which traverses Owerri, the Imo State Capital and on which several studies have been previously conducted. These studies showed that Nworie was polluted. Since Nworie empties into Otamiri, it is of interest to find out if this river is also polluted like its tributary. So the purpose of this study is to determine if Otamiri River is polluted like Nworie. It is also to find out if it meets the water quality criteria of Mississippi (MSWQC) or Environmental Protection Agency (EPA) standard. During the month of January 2017, three water samples were collected about 50 meters apart from Otamiri River in Egbu areas, Imo State with sterile plastic bottles and taken to the Alcorn State University Laboratory in Mississippi. The samples were tested according to the methods indicated in the LaMotte water pollution detection kits ordered from Carolina Biological Supply Company. Ten chemical parameters were tested. The average readings were recorded and the results analyzed and compared with the MSWQC /EPA standard. The biological profile was carried out by using MacConkey Agar and Lauryl Tryptose broth, ordered from Carolina Biological Supply, Company and as indicated by the manufacturers. Results of the chemical analysis showed that the Otamiri River met the MSWQC with the exception of alkalinity (35/3.08), carbon dioxide (13/10), and phosphate (1.0/0.1). The test for coliform bacteria was negative.

O13.04

9:45 COMPARISON OF WATER QUALITY OF LOWER MISSISSIPPI RIVER IN PORT GIBSON, MS AND OTAMIRI RIVER IN EGBU, IMO STATE, NIGERIA

Alex D. W. Acholonu, Stephanie Austin, Ashley Bonds, Katlyn James, Sharkiesha Jackson

Alcorn State University, Lorman, MS, USA

The Mississippi River is the third longest river in the world. It runs from Lake Itasca, Minnesota to the Gulf of Mexico. It is considered the US national principal River. Otamiri is a river that rises from Egbu, Imo State, reaches Ngo Okpula where it is joined by River Ogochia and then joins Imo River that empties into the Atlantic Ocean. Since these two bodies of water are located on the both sides of the Atlantic Ocean, there was a need to find out the similarities and difference in their water quality, hence, the study. During the month of July 2017 (summer) water samples were collected from three different sites, 50 meters apart, form the Mississippi River in Port Gibson area. They were taken to the Alcorn State University Laboratory and tested. In January 2017, water samples were collected from Otamiri River in Egbu, Imo State and transported to the US and examined in the Alcorn State University Laboratory. The results of the tests on the two rivers were recorded and analyzed. The Mississippi River met the Mississippi Water Quality Criteria (MSWQC) with the exception of Alkalinity (35/3.08), Carbon Dioxide (26.6/10), Dissolved Oxygen (3/4-5), Hardness (164/50), and Phosphate (1.0/0.1). Coliform bacteria were negative. Otamiri also met the MSWQC with the exception of Alkalinity (35/3.08), Carbon Dioxide (13/10), and Phosphate (1.0/0.1). Coliform bacteria were negative. Of all the differences, the most outstanding was the Mississippi River's very high water hardness concentration and Otamiri River with little or none-existence of hardness.

O13.05

10:00 INFECTION OF *IXODES SCALPULARIS* BY AN ARTIFICIAL MEMBRANE FEEDING SYSTEM

Latoyia Downs, Shahid Karim

University of Southern Mississippi, Hattiesburg, MS, USA

Tick-borne diseases are a public health issue and they affect people every day. A new tick-borne pathogen, Borrelia miyamotoi, has emerged. It is a relapsing fever spirochete that is considered a distant cousin to Lyme disease agent and has recently been found to cause disease in humans. This pathogen has been found in Ixoid ticks such as Ixodes rinicus (sheep tick) and Ixodes scapularis (black-legged tick). In humans, Borrelia miyamotoi causes recurrent fever, flu-like symptoms, and can also cause more severe illnesses such as meningoencephalitis. Unlike other Borrelia species, this pathogen can be vertically transmitted, passed from mother to offspring, which allows for the survival of the pathogen for many generations. There is very little to no research on B. miyamotoi that contribute to the understanding of vertical transmission phenomenon. To study the vector determinants of B. miyamotoi vertical transmission, we aim to infect Ixodes scapularis using an artificial membrane feeding system. Infection of Ixodes scapularis with B. miyamotoi, and vertical transmission will be discussed.

O13.06

10:15 FUNGI INHABITING YOUNG STEMS OF STANDING LOBLOLLY PINE (*PINUS TAEDA*) IN KEMPER COUNTY, MISSISSIPPI

Frank Mrema, Vennessa Valentine, Franklin Chukwuma, Leonard Kibet, Alex D. W. Acholonu

Alcorn State University, Lorman, USA

Assessment of loblolly pine (*Pinus taeda*) seedlings planted in Kemper County, Mississippi, one year after establishment showed 30% mortality. Many causalities were observed in seasonal water logged areas. Four years later, plant disease symptoms (root rot, black discoloration and sporadic yellowing of the needle leaves) were observed in the pine saplings growing on water logged location. The purpose of this study was to isolate and identify the fungi inhabiting loblolly pine trees. Three saplings with similar symptoms were uprooted and the length of black discoloration from the root collar to the end of the discoloration, measured. The discolored zone was sectioned into 1 inch disc samples, preserved in plastic bags and transported in a cooler to the laboratory. Wood samples were extracted from the disc and surface sterilized by slightly flaming it with alcohol burner for 2-5 seconds. These samples were separated into three categories, namely, healthy

sapwood (A), incipient discolored wood (B), and discolored wood (C). Each sample in each category was further divided into three portions and cultured in a growth medium (2% malt-extract agar). Isolation of fungal strains was conducted and single strain isolates, re-cultured on growth medium. All plates were incubated in darkness at 72°F. Sixteen (16) fungal morphological types were isolated from all cultured pine wood (*P.taeda*). The occurrence of fungi was observed in all wood sample categories (A-C), showing a higher frequency of fungi inhabiting region B. The identification and effect of these fungi on the pine trees is discussed.

10:30 BREAK

O13.07

11:00 RECENT ADDITIONS AND DEVELOPMENTS IN THE MISSISSIPPI ENTOMOLOGICAL MUSEUM

Ryan Whitehouse, Terence Schiefer, Richard Brown, JoVonn Hill

Mississippi State University, Mississippi State, MS, USA

The Mississippi Entomological Museum at Mississippi State University contains more than one million insect specimens, with strengths of the collection including microleoptera, ants, grasshoppers, and wood boring beetles. The insect collections of the University of Mississippi and the University of Louisiana, Munroe as well as some significant private collections recently have been acquired. The annual Cross Expedition, now in its 34th year, has added material from West Texas, the Florida panhandle, the Carolina Sandhills, and other locations. Annual trips to southeastern Arizona have increased holdings of southwestern taxa, and surveys throughout the Southeast have added many ants and grasshoppers. The Museum continues to serve as an APHIS regional identification center to screen samples from twelve states for exotic species, and these have supplied many wood boring beetles for the collection. The museum also hosts taxonomic websites that are used across the country.

O13.08

11:15 CAN TREES INFLUENCE MOSQUITO POPULATIONS? EFFECTS OF ACORNS ON *AEDES* PERFORMANCE

Rachel Rogers, Donald Yee

The University of Southern Mississippi, Hattiesburg, MS, USA

Aquatic container habitats are used by many medically important mosquitoes as breeding sites. Influx of detritus from the surrounding environment is an important factor in the production of these mosquitoes. Seeds from oak trees (acorns) can contribute to the detritus of the container habitats. However, no data exists to examine their effect on mosquito production. This study examined the effect of acorns from the southern live oak (*Quercus virginiana*) on the performance of non-native mosquitoes, *Aedes albopictus* (Asian tiger mosquito) and *Ae. aegypti* (yellow fever mosquito). Acorns were compared to oak leaves, amounts of which were based off tire samples from Mississippi. The mean, 50% of the mean, and 200% of the mean were used for each type alone, as well as two mixtures of leaf and acorn. The levels of tannins, secondary plant compounds that decrease herbivory, were measured across all treatments. Survival, development time, and adult mass of both species were measured. We found a significant treatment effect across tannin levels, with higher tannins in the highest leaf and acorn levels compared to lower amounts of detritus. Survival of both mosquito species was also affected by treatment, in which the fewest mosquitoes survived in acorn treatments compared to leaves or mixtures. Significant differences between *Aedes albopictus* and *Ae. aegypti* in development time and mass also existed. Thus, as tannin levels were similar across acorns and leaves, but acorns produced lower survival and affected mosquito growth, acorns could be a limiting factor in the production of mosquitoes in nature.

O13.09

11:30 STOICHIOMETRIC DIFFERENCES IN THE MOSQUITO SPECIES *AEDES AEGYPTI*: EFFECTS OF DETRITUS ENVIRONMENTS ACROSS BODY PARTS

Catherine Dean, Rachel Rogers, Donald Yee

The University of Southern Mississippi, Hattiesburg, MS, USA

Carbon and nitrogen are essential elements found in living organisms. Stoichiometry, or the ratio of carbon to nitrogen, has been found to differ in species of mosquitoes such as Aedes albopictus and Aedes aegypti in response to changes in food environments. Additionally, studies show that stoichiometry varies among different species, but does not vary between males and females of the same species. Aedes aegypti, the yellow fever mosquito, is of medical importance due to its ability to vector Zika, dengue, chikungunya, and yellow fever. We reared Ae. aegypti under six different detritus food treatments consisting of plant (red maple), animal (cricket), or a mixture of the two. Adults were separated into their different body parts (head, thorax, abdomen), dried in an oven at 50oC, and weighed; for each sample percent carbon, percent nitrogen, and C:N were analyzed. We identified significant differences in stoichiometry among the six treatments and across the different body part types, with the lowest amount of plant detritus leading to the lowest carbon values regardless of body part. In addition, abdomens had the lowest amount of carbon compared to the heads, thoraxes, and whole males, whereas the thorax has the highest amount of nitrogen compared to the heads, abdomens, whole male, and whole female. These results will likely lead to a deeper understanding of the physiological and anatomical changes across the ontogeny of mosquitoes

O13.10

11:45 TICK-PATHOGEN INTERACTION: CONNECTING THE DOTS BETWEEN INNATE IMMUNITY AND REDOX SIGNALING PATHWAYS.

Faizan Tahir, Shahid Karim

The University of Southern Mississippi, Hattiesburg, MS, USA

Dietary selenium, through its incorporation into selenoprotein, plays an important role in immunity and inflammation responses due to its crucial roles in regulating reactive oxygen species and redox status in almost all tissues. In previous studies, it has been shown that selenophosphate synthetase 2 (SPS2), a homologue of selenophosphate synthetase (SelD) identified in mammals, is essential for selenoprotein biosynthesis. Relish, a homologue of nuclear factor-kappa B (NF-kB), in the immune deficiency signaling pathway, regulates the expression of microplusin, an antimicrobial peptide (AMP). A knockdown of Relish would cause a decrease in AMPs and increase bacteria inside the tick. In this study, we hypothesize that silencing of SPS2 and Relish will cause an increase in *Rickettsia parkeri* level in infected *A. maculatum* ticks. To test this, the time-dependent relative expression was determined using qRT-PCR throughout blood-feeding on the host. To determine the functional role of identified AMPs in hematophagy, an RNAi approach was utilized to deplete AMPs transcriptional gene

expression. The transcriptional expression of target AMPs were confirmed in the knockdown midguts of both SPS2 and Relish. A significant decrease in replete weight, and a marked increase in distress in the host provided evidence for the critical role of these AMPs during feeding of knocked down ticks. Genomic data showed that the gene-silenced ticks had a greater percentage of *R. parkeri* than the control, proving that SPS2 and Relish play a role in immunity. Interplay between redox signaling and innate immunity pathways will be discussed in the context of tick-pathogen interactions.

Thursday, February 22, 2018

AFTERNOON

Room TC 228

O13.11

1:00 AN OVERLOOKED CRYPTIC HABITAT-OVIPOSITION PREFERENCE, LARVAL SURVIVAL, AND DEVELOPMENT OF THE ASIAN TIGER MOSQUITO IN HOUSEHOLD DOWNSPOUT EXTENSIONS

Joseph Nelsen, Donald Yee, Hunter Deerman, Taylor Price

University of Southern Mississippi, Hattiesburg, MS, USA

Aedes albopictus, the Asian tiger mosquito, is a significant vector for several important diseases of human medical importance. This species is a container specialist, and often occurs in close proximity to human habitation. The use of downspout extension tubes (DET) that fit onto existing rain gutters around residences and business have recently been identified as an important cryptic habitat for populations of Ae. albopictus. In this project we proposed to understand egg laying responses of gravid females and larval survival to different types and colors of commercially available DET, and also examine how flushing by rain events may dislodge larval populations within DET. Survival of Ae. albopictus larvae in response to pellet and dunk forms of the bacterial larvicide Bacillus thuringiensis israelensis (Bti) in corrugated and metal DET was also examined. Preliminary tests of larval survival in various extension materials show a higher mortality in aluminum versus flat and corrugated plastics. When compared to small rubber bowls in choice experiments, females showed some preference for flat plastic DET. However, when given a choice among DET types, females seemed to prefer either corrugated plastic or flat plastic over aluminum. When given a choice among three different colors of the same type of DET, females preferred oviposit in the darkest color (brown) over two lighter colors (light tan and white). Larvicide survival tests showed higher mortality from pellets versus dunks and higher mortality in metal versus corrugated. This work should provide a framework for future control strategies for DET and Aedes albopictus.

O13.12

1:15 OCCURENCE OF FLOUR BEETLE (TRIBOLIUM SP(INSECTA;TEREBRIONIDAE) IN PANCAKE MIX MARKETED BY ONE OF THE SUPERMARKETS IN VICKSBURG, MS

Alex D. W. Acholonu

Alcorn State University, Lorman, MS, USA

Flour beetles are darkling beetles belonging to the Tribolium or Tenebrio Genera. They are pests of cereal .They are believed to consume wheat and other grains. They are a major pests in the agricultural industry. They are said to be highly resistant to insecticides. In the month of March 2016, a box of pancake mix was bought from a super market in Vicksburg, Mississippi. When opened and some of it poured into a bowl, surprisingly some insects were seen and moving. Several of them were isolated and using a medicine dropper were transferred into a vial and preserved in 70% alcohol. This was taken to the Alcorn State University Laboratory. A couple were removed from the vial with a pipette and mounted, front and back, on a slide. A drop of water was put on the slide and it was covered with a cover slip. This was examined under a dissecting microscope, examined and identified to genera. It was identified as an insect belonging to the Genus *Tribolium sp*(Insecta;Terebrionidae). According to literature review, this is the first time the flour beetle is recovered from a marketed pancake mix and reported. It is recommended that people critically examined pancake mix and cereal products they buy before consumption.

O13.13

1:30 A PRELIMINARY STUDY ON THE IMPACT OF HYBRID BIOLOGICAL LABORATORIES ON COLLEGE STUDENTS' ACHIEVEMENTS, APTITUDES, AND ATTITUDES

Shavonda McDaniel

Alcorn State University, Lorman, MS, USA

Online courses operate differently than traditional courses, thus they require teaching techniques and assessment techniques specifically geared for this educational experience. Because distance-education and internet-based learning are no longer novel concepts in the science field, many biology programs have designed courses to be taken online or hybrid. A number of empirical studies have been highly influential regarding the impact and effects of educational technology in regards to virtual laboratories. However, very few studies focus on the impact of hybrid laboratories on student achievement or measure students' satisfaction of biology hybrid labs. The focus of this study is to begin the process of providing an objective and subjective analysis of findings of the impact of biological hybrid laboratories on student learning at the collegiate level. With the increase in number of colleges and universities offering hybrid courses, it is important to conduct research on the effectiveness of hybrid laboratory courses before a widespread of adoption occurs. Students' course averages will be used to measure achievement, pre-test and post-test scores will be used to measure aptitudes, and in- person interviews will be used to measure degrees of attitude. The information acquired will help determine the feasibility of replacing traditional and virtual labs with the new and emerging hybrid biological lab.

O13.14

1:45 ON DISTURBANCES: AQUATIC INSECT RECOLONIZATION OF *HELICONIA* SYSTEMS IN PUERTO RICO

Jaclyn Everly, Donald Yee

University of Southern Mississippi, Hattiesburg, MS, USA

The Island of Puerto Rico frequently experiences hurricanes, resulting in a process of rapid recovery and recolonization in its tropical ecosystems. To study the ecological effects of these hurricane disturbances, I examined the insect communities within the flowering herb *Heliconia caribaea*, which grows throughout the Luquillo Experimental Forest in eastern Puerto Rico. *Heliconia* act as invertebrate microcosms for a multitude of insects via their

flower clusters (racemes), which are made up of bracts. In studying the effects of disturbances on *Heliconia*, I answered questions regarding how recolonization occurs in *Heliconia* systems over time, the way in which raceme size and bract age of *Heliconia* affects recolonization, and how recolonization of natural *Heliconia* systems compares to recolonization of artificial *Heliconia* systems. I hypothesized that overall species richness and abundance would be lower in the disturbed systems than in the undisturbed systems, and that larger bracts would recolonize more successfully than smaller bracts, both of which were supported by my expierment. Initially, all bracts were disturbed via the removal of existing communities, and then after refilling with water were resampled every two weeks to assess recolonization patterns. At the same time, artificial *Heliconia* systems were established in order to compare their recolonization results with those of natural systems. Insights from this study allowed for a better understanding of invertebrate recolonization in *Heliconia* systems, and more broadly the ecological effects that hurricanes might have on tropical ecosystems.

O13.15

2:00 TRENDS IN THE PREVALENCE OF HIV/AIDS IN THE STATE OF MISSISSIPPI: A FIVE YEAR REVIEW

Alex Acholonu

Alcorn State University, Lorman, MS, USA

Acquired immune deficiency syndrome (AIDS) is a disease of grave concern all over the world caused by the human immunodeficiency virus (HIV). It is one of the dreaded sexually transmitted diseases (STDS). There is no current cure for it but available antiviral drugs can be used to mitigate its severity. Mississippi with a population of 2.9 million, ranked **6th** nationally in HIV infection cases in 2009. The purpose of this study is to assess the trend in the prevalence of HIV/AIDS in a period of five years (2006 - 2010). The study is based on statistical analysis of prevalence reports in literature and the Mississippi State Department of Health. The review shows that the prevalence of HIV/AIDS in Mississippi appears to have plateaued. There is no significant difference on year to year basis from 2006 to 2010 ($P > 0.05$). HIV infection by sex showed preponderance of males infected as against females ($P < 0.05$) for each of the five years reviewed. It also showed that reported cases of individuals living with HIV/AIDS by year did not show significant differences ($P > 0.05$). Cumulative cases of HIV/AIDS in the State of Mississippi from 1983 to 2009, is 12,989. Of this number 3,263 (26.1%) is white, 9393 (72.3%) is African American, and 197 (1.5%) is Hispanic. The trends show that the prevalence is high in African Americans. With the exception of a slight decrease in 2010, it appeared to be increasing. It is much less in whites and appeared to be decreasing.

O13.16

2:15 THE EFFECTS OF POPULATION DENSITIES AND TREE CANOPY ON MOSQUITO ABUDANCE AND SPECIES RICHNESS ACROSS SOUTHERN MISSISSIPPI

Nicole Mackey, Catherine Dean, Donald Yee

University of Southern Mississippi, Hattiesburg, MS, USA

Mosquitoes are medically important because they are responsible for vectoring many viruses such as yellow fever, chikungunya, and Zika. Some species of mosquitoes have been shown to breed in natural and artificial containers including tree holes, tires, and cemetery vases. *Aedes albopictus* (Asian tiger mosquito), a container species, is monitored in Mississippi because it's widespread range and its ability to vector viruses. The University of Southern Mississippi and The Mississippi State Department of Health have been working together to determine distributions of container mosquito species by collecting and identifying larvae from three locations in five different Southern Mississippi counties every two weeks beginning in May 2017. At the locations where larval samples were collected, a densitometer was used to quantify the tree canopy; tree canopy has been shown to influence oviposition preference. Using a Geographic Information System, abundance of *Aedes albopictus* as well as species richness of all mosquitoes encountered will be compared to human population density and tree canopy to determine their relationships. This study will be the first to attempt to understand how populations of *Aedes albopictus* and other species vary with human densities and environmental factors in Mississippi.

O13.17

2:30 CHARACTERIZING WATER QUALITY IN SOUTHWEST MISSISSIPPI WATERSHED

Leonard Kibet, Emary Smith, Lee Jones, Jacqualine McComb, Frank Mrema, Girish Panicker, Alex D. W. Acholonu

Alcorn State University, Lorman, MS, USA

Land use practices (i.e farming operations), may exacerbate the movement of sediment and soil nutrients from terrestrial land to surface water. Presently, approximately 39% of the nation's rivers and streams are impaired. Indeed, excess nutrients are known as a primary problem facing Gulf of Mexico estuaries and coastal waters, leading to nuisance algal blooms, depletion of dissolved oxygen, and other water quality impairments. Hence, establishing relationships between land use practices and its effect on water quality is critical for development of mitigation strategies to minimize land use impact on water quality. Thus, the objective of this study was to characterize water quality parameters in streams and water reservoirs across a watershed with multiple land use (e.g agriculture, forestry and urban setting). Sampling was conducted bi-monthly before and after rain events. Samples collected were stored in the fridge at $4^{\circ}C$ before analyses for physicochemical properties. Preliminary results show about 2 fold increase of nitrate concentrations in the rivers after rain events, indicating that nitrates from terrestrial land can be transported in runoff during rain events. However, the concentrations are below the EPA limits set for drinking water. Similarly, suspended solids in water also increased after rain events, suggesting that rainfall is the driver of suspended particles and sediment in water. Phosphates concentration in water before and after rain events exhibited variation, while dissolved oxygen and pH decreased. The details results from this preliminary study will be presented at the meeting.

O13.18

2:45 EGG LAYING MALE HAS ANDROGYNOUS SONG SYSTEM AND PLUMAGE COLORATION

John Aaron Howell[1], Richard Buchholz[2], Lainy Day[2]

[1]Mississippi INBRE Research Scholar, MS, USA, [2]University of Mississippi, Oxford, MS, USA

Zebra finches (*Taeniopygia guttata*) are oscine Passerine songbirds that have sexually dimorphic plumage, song nuclei, and behavior. The roles of chromosomes, hormones, and genes on sexual differentiation are not completely understood. A gynandromorph in our aviary had male plumage, a male partner, and produced viable offspring. Mate preference tests revealed lower preference for the gynandromorph lineage than controls, suggesting some traits that made them unattractive to other birds. Gynandromorph lineage

males had greater same-sex preference than control males. Male zebra finches are homozygous ZZ, and females are heterozygous ZW. All sampled gynandromorph tissues, including sexually dimorphic plumage regions, had ZW female chromosomes. Of zebra finches, males sing and females do not, thus the regions associated with song learning and production are larger in males than in females. We measured the volume, cell size, and cell number of sexually dimorphic song nuclei in our gynandromorph to compare to control males and females. Additionally, because birds can see in the ultraviolet spectrum of light, color spectra were analyzed to determine if the gynandromorph or its progeny had plumage differences that were undetectable by the human eye. Video analysis of the gynandromorph and its mate is being completed to determine if the gynandromorph sang and to observe nesting behaviors.

Acknowledgement: This work was supported by the Mississippi INBRE, funded by an Institutional Development Award (IDeA) from the National Institute of General Medical Sciences (NIGMS) of the national Institutes of Health (NIH) under grant number P20GM103476.

3:00-3:15 Divisional Meeting

Thursday, February 22, 2018

EVENING

Ballroom

3:30 Dodgen Lecture and Awards Ceromony

General Poster Session

Immediately Following Dodgen Lecture

P13.01

FRESHWATER RESOURCES: A CRITICAL FACTOR IN THE SUSTENANCE OF HUMAN HEALTH AND GLOBAL ECOSYSTEM

M. S. Zaman, Robert C. Sizemore

Alcorn State University, Lorman, MS, USA

Freshwater is defined as water that contains less than 1,000 milligrams per liter of dissolved solids. Even though, freshwater constitutes only 2% of total global water, it is essential for the existence of all terrestrial and freshwater lives, as well as marine lives. With the rapid expansion of human population, the demand for fresh water is on the rise. Additionally, shrinking water tables due to anthropogenic and various climatic factors will lead to further shortage of fresh water. To safeguard human health and the quality of the entire global ecosystem, appropriate management of freshwater resources is of utmost importance, particularly when scientists believe freshwater to be the most precious commodity in the future world. This paper will discuss the impacts of overpopulation and possible climate change on the distribution and availability of fresh water, and how freshwater shortage may impact the lives on earth.

P13.02

DO SQUALENE-CONTAINING VACCINES RESULT IN THE PRODUCTION OF POTENTIALLY HARMFUL ANTI-SQUALENE ANTIBODIES?

Robert C. Sizemore, M. S. Zaman

Alcorn State University, Lorman, MS, USA

Squalene is a natural 30-carbon molecule normally found in higher organisms. In humans, it is used in the synthesis of sterols such as cholesterol and for the production of vitamin D. The use of squalene as an adjuvant in vaccines to enhance immune responses has generated a great deal of controversy due to previous reports that anti-squalene antibodies were produced as a result. A 2000 report indicated that Gulf War Syndrome (GWS) was due to the presence of these antibodies in soldiers that had been immunized against anthrax, some of whom were never deployed to the Middle East. The Department of Defense conducted their own studies and did not find a correlation between anti-squalene antibodies and GWS. They also indicated that squalene was never added to the vaccine for our troops. Currently, a flu vaccine (Fluad) for patients over 60 years of age contains MF59, which has squalene in oil as an adjuvant. This review summaries the current data and evidence as to whether or not there should be a concern with squalene-containing vaccines.

P13.03

A PRELIMINARY STUDY ON THE IMPACT OF HYBRID BIOLOGICAL LABORATORIES ON COLLEGE STUDENTS' ACHIEVEMENTS, APTITUDES, AND ATTITUDES

Shavonda McDaniel

Alcorn State University, Lorman, MS, USA

Online courses operate differently than traditional courses, thus they require teaching techniques and assessment techniques specifically geared for this educational experience. Because distance-education and internet-based learning are no longer novel concepts in the science field, many biology programs have designed courses to be taken online or hybrid. A number of empirical studies have been highly influential regarding the impact and effects of educational technology in regards to virtual laboratories. However, very few studies focus on the impact of hybrid laboratories on student achievement or measure students' satisfaction of biology hybrid labs. The focus of this study is to begin the process of providing an objective and subjective analysis of findings of the impact of biological hybrid laboratories on student learning at the collegiate level. With the increase in number of colleges and universities offering hybrid courses, it is important to conduct research on the effectiveness of hybrid laboratory courses before a widespread of adoption occurs. Students' course averages will be used to measure achievement, pre-test and post-test scores will be used to measure aptitudes, and in- person interviews will be used to measure degrees of attitude. The information acquired will help determine the feasibility of replacing traditional and virtual labs with the new and emerging hybrid biological lab.

P13.04

ENDEMIC AND PROTECTED HONEY PLANTS IN MISSISSIPPI

Elena Kostyleva

Alcorn State University, Lorman, MS, USA

In the state of Mississippi we've found many endemic species of honey plants, which have been preserved mostly due to the pollination activity of the honey bee. In northern Mississippi we've registered the following endemic honey plants: *Magnolia acuminate* (L.) L., *M. macrophylla* L., *Claytonia virginica* L., *Polygonum spp*., *Viola spp.*, *Salix spp*., *Clethra spp.*, *Rubus spp*., *Prunus spp.*, *Crataegus spp*., *Tilia americana* L., *Gieditsia triacanthos* L., *Robinia pseudacacia* L., *Acer saccharum* L., *Aesculus glabra*

Willd., *Catalpa speciosa* (Warder), *Penstemon spp.*, *Solidago spp*., *Symphyotrichum spp.*, *Eupatorium spp*. et al. In the south, we've recorded endemics: *Magnolia grandljlora* L., *M. virginiana* L., *Nyssa biflora* Walter, *Asclepias tuberose* L. *Liriodendron tulipifera* L. and *Liquidambar styraciflua* L. are common for both parts. Many of the endemics registered are listed as threatened or endangered species in the state or federally protected plant lists (i.e. *Symphyotrichum concolor* (L.) G.L. Nesom**,** *S. divaricatum* (Nutt.) G.L. N.**,** *S. dumosum* (L.) G.L. N., *S. ericoides* (L.) G.L. N.**,** *S. novae-angliae* (L.) G.L. N., *S. pilosum* (Willd.) G.L. N.**,** *S. praealtum* (Poir.) G.L. N. var. *praealtum*, *S. racemosum* (Elliott) G.L. et al., some *Baccharis spp*., *Asclepias tuberose* L., *Magnolia acuminata* (L.) L., *M. macrophylla* L.). Species: *Symphyotrichum dumosum, S. ericoides, S. novae-angliae, S. pilosum, S. praealtum* var. *praealtum, S. racemosum, Vernonia fasciculata* Michx., *Helenium autumnale* L. *Nyssa aquatica* L. are also recognized as an integral (preserved) part of the wetland ecosystems in the region.

P13.05

THE FUNCTIONAL ROLE OF *AMBLYOMMA MACULATUM* INNATE IMMUNITY GENES IN THE REGULATION OF TICK PATHOBIOME

Kenneth Boucher, Faizan Tahir, Shahid Karim

The University of Southern Mississippi, Hattiesburg, MS, USA

A dynamic, multi-directional set of interactions between tick, transmitted pathogens, and hosts occur in both tick and host environments. While we are starting to characterize pathogen-induced gene expression, we have a poor understanding of tick's microbiome and innate immunity genes, which urgently needs to be addressed. The aim of this project was to suppress the ticks innate immunity genes to assess the associated consequences on the colonization of the tick pathobiome. An RNA interference (RNAi) approach was utilized to knockdown Relish, a homologue of nuclear factor-kappa B (NF-kB), in *Rickettsia parkeri*-infected female adult ticks. Pyrosequencing of the bacterial 16S rRNA was used to determine the total pathobiome in *A. maculatum* knockdown and control tick tissues. Interplay between Relish and pathobiome will be discussed in the context of tick-pathogen interactions within the tick vectors.

P13.06

SURFACE MICROBIOTA OF FISH PECTORAL, DORSAL, AND CAUDAL FINS

Leah Bowlin, Angela Whittom Reiken, Theodore Snazelle

Mississippi College, Clinton, MS, USA

Using the BIOLOG Gen III Microstation, 23 different bacterial species were isolated from the dorsal, pectoral, and caudal fins of hybrid catfish (*Ictalurus punctatus* [channel catfish]) X (*Ictalurus fucatus* [blue catfish]) and identified. Hybrid catfish dominate the catfish industry in many southern states including Mississippi, which is why the fin swabs that lead to specimen identification were obtained from these hybrid catfish. Fourteen different gram negative non-enteric species were identified. Also, 7 gram negative enteric bacteria were isolated and identified from the dorsal, pectoral, and caudal fins of hybrid catfish and, e.g. *Serratia sp.* (1), *Klebsiella sp*. (2), *Pantoea sp.* (2), *Proteus sp.* (2), and *Pseudomonas sp*. (3). Furthermore, two gram positive Cocci, *Enterococcus haemoperoxidus* and *Macrococcus caseolyticus*, were isolated from the dorsal, pectoral, and caudal fins of hybrid catfish. With regard to the bluegills (*Lepomis macrochirus*), 10 different bacterial species were isolated and identified from the dorsal, pectoral, and caudal fins. Of these 10 different species of bacteria isolated from fins of bluegills, 5 were gram negative enteric, e.g. *Pantoea sp.* (2), *Enterobacter sp.* (2) and *Citrobacter sp*. (1); 5 were gram negative non-enteric, e.g. *Pseudomonas sp*. (2), and *Aeromonas sp*. (3). Lastly, two isolates of *Photobacterium damselae ss damselae* were isolated from the marine hardhead catfish (*Ariopsis felis*) dorsal, pectoral, and caudal fins. These identified species demonstrated the diversity of the surface microbiota on the fins of hybrid catfish.

P13.07

A SURVEY OF MISSISSIPPI MOSQUITOES' FEEDING PATTERNS AND THEIR RELATION TO MALARIA PARASITES.

Jessica Aycock, Jerome Goddard, Diana Outlaw

Mississippi State University, Mississippi State, MS, USA

Malaria, along with many other pathogens, is transmitted to vertebrate hosts through the salivary glands of various mosquito species. Research on these vectors has been far behind that of the parasites and the vertebrate hosts, both of which have seen a resurgence in the last few decades, particularly in linking the relationship between the vertebrate host and the parasite. The purpose of this survey was to determine the vertebrate blood meal of various mosquito species throughout several counties in Mississippi and identify any malaria parasites carried by the mosquito. Of ~27,000 mosquitoes collected in Mississippi in 2013, 90 specimens were engorged with a viable blood meal. Each mosquito was identified and processed for DNA extraction, and three polymerase chain reactions were performed to identify the bloodmeal, the malaria parasite, and any ambiguous Culex spp. This project is the first of its kind in Mississippi and has provided substantial information on the transmission patterns of malaria within mosquitoes.

Index of Authors

AGRICULTURE AND PLANT SCIENCE

CELLULAR, MOLECULAR AND DEVELOPMENTAL BIOLOGY

Dhital, Saphala
Dieter, Lesa
Doughty, DeAmber
Downs, Latoyia
Duda, Kaitlyn
Dupuy, Braxton
Durfey, Casey
Elasri, Mohamed
Elasri, Mohamed O.
Elder, Steve
Ferris, Sarah
Feugang, Jean
Flynt, Alex
Franks, Katy
Fuentes, Ricardo
G C, Bibek
Garrett, Michael
Gavron, nancy
Gilfeather, Christa
Gordon, Donna
Grill, Raymond
Guerrier, Sabrice
Guo, Yan-Lin
Gurung, Chandan
Harper, Amanda
Harried, Amber
Holmes, Melody
Hussa, Elizabeth
Iyanobor, Esther
Jenkins, Johnie
Jiang, Jian
Joiner, Abbie
Jones, Kierra
Judge, Allison K.
Jurgenson, Christopher
Jurjus, G
Kaplan, Barbara
Karim, Shahid
Kay, Amber
Kennedy, Lauren
Kiam-Assato, Carol
Koceva, Hristina
Kummari, Evangel
Landrum, Shalonda
Langdon, Yvette
LeBeaux, Bryanna
Lee, Jung Kuen
Lewis, Breaunna
Li, Lianna
Ma, Din-Pow
Mahajan, Gouri
Mansfield, Kody
Mao, Yuhan
Martin, Ryan
McClure, Blake
McDowell, Lydia
Mcfield, Brianna
McKinney, Tanya
Meade, John C.
Miao, Qing
Miguel-Hidalgo, J. Javier
Mondal, Mosharrof
Mullins, Mary
Neupane, Biswas
Newberry, Madison
Nguyen, Tiffany
Nichols, James
Nunes, Lydia
Nutter, Chris
Nywening, Ashley
Overhoerls, JC
Page, Kierstin
Pandey, Shanti
Parker, Phenique
Patterson, Michael
Paul, Amber
Paul, Amber M.
Piletz, John
Poindexter, Shenika
Puckett, Austin
Rahat, Karam
Ramakrishna, Dasari
Reddy, K. Raja
Rice, Kayla
Ricke, Steven
Riggins, M. Erin
Rimmer, Sarah N.
Romero, Damian
Ross, Austin L.
Rushing, Benjamin
Ryan, Peter
Saha, Sukumar
Sahukhal, Gyan
Sahukhal, Gyan S.
Shasthree, Taduri
Shearer, Glen
Shearer, Glenn
Shearer, Jr Glenmore
Shivers, Michael
Si, Hong Park
Simpson, C. Lashan
Simpson, LaShan
Smith, Jesse
Smith-Walker, Erin
Spears, Chase
Spencer, Shauna
Stewart, James
Stockmeier, Craig
Stokes, John
Stray, Stephen J.
Swistek, Sabrina
Tan, Wei
Taylor, Nehemiah
Tchounwou, Paul
Thomas, Shantasia
Thompson, Dominique
Thompson, E. Ashley
Toyota, Cory G.
Trunnell, Brittany L.
Tucci, Michelle
Varela-Stokes, Andrea
Vallender, Eric
Vetter, Douglas
Vita, Sydney
Walker, Jaylyn
Walker, Scharri

Wallace, Kedra
Webb, Ian
Wildhaber, Jordan
Wilkening, Steven R.
Willard, Scott
Williams, Victoria
Wilson, George
Wilson, Gerri
Wilson, Gerri A.
Xu, Hao
Yedjou, Clement
Yee, Kathleen
Yray, Gabriella

CHEMISTRY AND CHEMICAL ENGINEERING

Alamgir, Saadman
Allen IV, Obie
Allred, Anna
Amato, Dahlia
Amato, Douglas
Armstrong, George
Arslan, Zikri
Aryal, Santosh
Bailey, Kayla
Barker, Sara
Barnes, Sandra
Beauti, Samer
Bee, Ja'Nautica
Begum, Salma
Bentley, Joseph
Bhopatkar, Anukool A
Bisen, Milind
Bishop, Reid
Bravenec, Ardith
Brown, Tia
Buschle-Diller, Gisela
Buti, Wisam
Carter, Chassidy
Ceesay, Saihou
Chavva, Suhash R.
Chavva, Suhash Reddy
Choi, Seong-O
Collins, Jasmine
Cooper, Jonita
Cordell, Katelyn
Corrao, Irene
Correia, John
Cowan, Terriona
Crull, Emily
Cruthirds, Alicia
Das, Prasanta
Dasary, Shareena
Dean, Dexter
Denmark, Iris
Dennis, Scottie
Detering, Lisa
Dias, Roger
Dillon, Alva
Donahue, Matthew
Dunn, Derrick
Ellis, Claire
Ellis, Clara
Eshete, Matthewos
Essue, Kalyani
Evans, Aysha
Feng, Manliang
Fitzkee, Nick
Frazee, Andrew S.
Frazee, Andrew
Ghag, Gaurav
Golius, Anastasiia
Gorb, Leonid
Gould, Ian
Griesbeck, Axel
Gude, Veera Gnaneswar
Guillory, Devin
Guo, Kai
Guo, Song
Hamilton, Sharon K.
Hamilton, Sharon
Hamme II, Ashton
Hammond, Neil
Han, Fengxiang
Harless, Tyler
Harrigill, Max
Hart, Alison
Hawkins, Deandrea
Hill Jr., Glake
Hood, John
Hossain, Alamgir
Hossain, Md. Alamgir
Hoth, Lauren
Isayev, Olexander
Izevbigie, Ernest B.
Jackson, Jabari
Jackson, Matthew
James, Logan
Janisse, Andrew P.
Jentsch, Nicholas
Jha, Sanjiv
Johnson, Brittany
Johnson, Corey
Johnson, John
Jones, Stacy
Jones, Yolanda
Kaminski, Amanda
Kar, Supratik
Karekezi, Leon
Kaur, Gurjit
Kelley, Ariel
Khansari, Maryam Emami
Kokabian, Bahareh
Kolodziejczyk, Wojciech
Kramer, Wolfgang
Lee, Ken S.
Leszczynski, Jerzy
Liu, Yongjian
Lott, Joseph
Luehmann, Hannah
Lusbcome, Christine
Mahone, William
Mao, Xinyu
Martin, William

Mavrodi, Dmitri
Mavrodi, Olga
McCullum, Cassandra
McFarland, Frederick
McKinnon, Sam
Miao, Wujian
Miller, Doug
Molitor, Sabrina
Muhammad, Maria
Mulins, Courtney
Nellore, Bhanu P. V.
Nellore, Bhanu Priya Viraka
Nyamwihura, Rogers
Ogungbe, Ifedayo Victor
Okunrobo, Maxwell
Oymak, Tulay
Palmer, Travis
Pang, Bo
Parsons, Keith
Patterson, Matthew
Patton, Derek
Pearson, Jade
Penton, Kathryn
Penton, Katie
Pham, Amy
Pigza, Julie
Portis, Bobby
Powell, Douglas R.
Pramanik, Avijit
Pratt, Geoffrey
Quach, Co
Rangachari, Vijay
Ray, Paresh
Ray, Paresh C.
Ray, Paresh Chandra
Razinoubakht, Donya
Rhaman, Md Mhahabubur
Rhaman, Mhahabubur
Robertson, Jeida
Rogers, Christian
Roth, Michael
Roy, Juganta
Salter, Scarlett
Scott, Colleen
Sen, Mukherjee Chirantan
Sengupta, Bidisha
Shao, Xiaohou
Sharma, Amit
Shukla, Manoj
Simon, Yoan
Singh, Anant
Sinha, Sudarson Sekhar
Sledge, Taylor
Sloan, Reese
Smithhart, Charles
Solomon, Melinda
Spencer, Hattie
Sridhar, Arun Siddarth
Stemer, Dominik
Stewart, Emily
Stuart-Dahl, Savannah
Subramanian, Gopinath
Swilley, Sarah
Tagert, Michael
Tantillo, Dean
Thompson, Amelia
Todde, Guido
Trammel, Jarred
Travis, Skye
Tucker, Nailah
Turner, Karla
Vangara, Aruna
Wadkin-Snaith, Dominic
Walley, Brianna
Ward, Timothy
Watkins, Dominique
Weeks, William
Weigand, Jeremy
Wells, Shenita
White, Jeremy
Wiggins, Jeffery S.
Wiggins, Jeffrey
Wiggins, Raeven
Williams, Dalvin
Williams, Spencer
Wilson, Amber
Winetrout, Jordan
Woldanski, Tyler
Xia, Younan
Yancey-Gray, Denise
Yu, Hongtao
Zai-Rose, Valeria
Zhang, Huaisheng
Zhang, Rong
Zhang, Shizhe
Zhang, Yazhou
Zhang, Yue
Zhao, Yongfeng

ECOLOGY AND EVOLUTIONARY BIOLOGY

Alford, Mac
Baghai-Riding, Nina
Beck, Christine
Bell, Sheketra
Blackwell, Eric
Bodden, Haley
Brewer, Heather
Carey, Jarrica
Chambley, Brady
Coleman, Mitchel
Davis, Kimberly
Day, Lainy
Diffey, John
Felton, DeAndra
Frew, Christian
Galloway, Matthew
Gulledge, Eric
Hamblin, Peyton
Han, Fengxiang
Harris, Taimei
Harvey, Mary
Husley, Brittany
Kimes, Roxy
Kulawardhana, Ranjani
Lacy, Bianca
Lambert, Karoline
Long-Aragon, A. Nichole

McGregor, Matt
McKenzie, Raveen
Outlaw, Diana
Pagart, Corey
Patterson, Alexis
Perkins, Susan
Price, Monique
Reza, AHM Ali
Stevenson, Jamal
Wahome, Joseph
Walker, Shannon
Zoeller, Madison
Alford, Mac
Baghai-Riding, Nina

GEOLOGY AND GEOGRAPHY

Ables, John
Berry, Tyler
Bograd, Michael B. E.
Bullock, Jared
Burch, Zack
Cho, Youngwoo
Clary, Renee
Davidson, Gregg
Deans, Jeremy
Dockery III, David T.
Galicki, Stan
Gratzer, Michael
Harris, James
Heitmuller, Franklin
Jenkins, Luke
Jordan, Patrick
Killian, Courtney
Kyler, Christopher
Lahiri, Chayan
Moore, Taylor
More, Taylor
O'Reilly, Andrew
Parker, Lauren
Puckett, Mark
Raber, George
Rosandich, Brooks
Schmitz, Darrel
Shaw, Calvin
Starnes, James
Voll, Kaitlin
Woolery, Edward

HEALTH SCIENCES

Abdul-Haqq, Deja
Adah, Felix
Addae, Leonard
Adewunmi, Yetunde
Allen, Paige
Amato, Dahlia
Amato, Doug
Armstrong, Liam
Assante, Andrew
Bagwell, Jana
Bai, Fengwei
Banerjee, Santanu
Bellaloui, Nacer
Benghuzzi, Ham
Benghuzzi, Hamed
Benghuzzi, Hamed A.
Bhanat, Eldrin
Bhatt, Abhay J.
Bhatt, Abhay
Blackmon, Laura E.
Boone, Joshua
Borland, C
Bradshaw, Jessica
Brown, Timera
Bullard, Rebekah
Bush, Jordan
Bush III, James
Butler, Kenneth
Cameron, Joseph
Carter, Kathleen
Chandler, Cassie
Chavez-Yenter, Daniel
Chukwuemeka, Edna
Chao, Shawn
Clark, Dominique
Clark, Johnlyn
Clayton, Ahsia
Clemmer, John
Commey, A.
Coon, Lauren
Cotton, Joshua
Covacevich, Anthony
Craft, Tara
Curtis, Tamika
Dai, Xuemei
Dasari, Shareena
Davis, H.
Davis, Leslie L.
Dawkins, Milton
Diggs, KiOsha
Donahue, Matthew
Donaldson, Janet
Duan, Yuanyuan
Duhe, Roy
Espinoza, Ingrid
Everett, Michelle
Fair, Logan
Famuyide, Mobolaji
Fan, Lir-Wan
Farah, Ibrahim
Feng, Yangzheng
Francisco, Cesar Paulo
Freeman, Kevin
Fuller, Henry
Funchess, Tanya
Gilmore, Robert

Gomez, Christian
Gong, Yongzhen
Green, John
Griggs, Jason A.
Grill, Ray
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Rucker, T'Juan
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HISTORY AND PHILOSOPHY OF SCIENCE

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MARINE AND ATMOSPHERIC SCIENCES

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ZOOLOGY AND ENTOMOLOGY

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