MISSISSIPPI

ACADEMY OF SCIENCES

EIGHTY FIRST ANNUAL MEETING

February 23-24, 2017

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 22-24, 2017

WEDNESDAY, FEBRUARY 22, 2017

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 23, 2017

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 24, 2017

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
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 1:00 PM	Graduate Symposium, Sponsored by	Ballroom I
	Mississippi INBRE-Workshop	
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
Take left at first traffic light

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2017 GOVERNMENT AND INDUSTRY DIAMOND EXHIBIT SPONSORS

2017 Dodgen Lecture

Thursday, February 23, 2017
3:30 p.m.

Our Good Earth: Soil, the Root of Food Security

by

Co-founder Eyes on Earth: An Educational Collaborative
Inspiring a New Generation of Environmental Photographers
@eyeson_earth

4707 6th Street South
Arlington VA 22204 USA

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twitter: @ddimick instagram: @ddimick
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For more than 20 years Dennis Dimick led creation of food and agriculture stories in *National Geographic* Magazine, and among them is a unique cover story on soil, "Where Food Begins," produced in collaboration with photographer Jim Richardson. In this visually powerful and fast-moving presentation Dimick will recount this story of the often-neglected soil beneath our feet that serves as our food supply's foundation. Protecting this fragile living skin of earth is key to our own survival in the face of a rising world population that has tripled from 2.5 to almost 7.5 billion people since 1950. "Feeding Nine Billion," a subsequent multi-year magazine series examines how our outlook and approach can help us meet the looming epic challenge of food security as population keeps rising in decades ahead.

A journalist for more than four decades, Dennis Dimick served for many years as executive environment editor at *National Geographic* magazine, and 35 years as a picture editor at the National Geographic Society. At National Geographic he guided major magazine projects including a 2010 issue on freshwater, a 2011 series on population, and the 2014-2016 Future of Food series on global food security. A faculty member of the Missouri Photo Workshop for 19 years, Dimick has received the Sprague Memorial Award from the National Press Photographers Association for service to photojournalism. He is a board member of the Society of Environmental Journalists, a member of the Committee for Research and Exploration of the National Geographic Society, and is co-founder of Eyes on Earth, an educational project to inspire a new generation of environmental photographers. Dimick grew up on an Oregon sheep and hay farm, and he holds degrees in agriculture and agricultural journalism from Oregon State University and the University of Wisconsin-Madison.

Plenary Speaker

Sponsored by HHMI and MS-INBRE

12:00 p.m.

Friday, February 24, 2017

"Encouraging Obesity in Plants for a Cleaner, Healthier, and More Sustainable Future".

Given by

Philip D. Bates, PhD,
Nina Bell Suggs Professor
Department of Chemistry and Biochemistry
University of Southern Mississippi

Dr. Philip Bates is a Nina Bell Suggs Professor in the Department of Chemistry and Biochemistry at the Univeristy of Southern Mississippi. Dr. Bates obtained his doctorate degree from Michigan State Universtiy in Biochemistry and Molecular Biology. He later completed a post-doc taining in the Institute of Biological Chemistry at Washington State University**.** Dr. Bates' research utilizes biochemical, genetic and molecular biology approaches to investigate how different plants or algae regulate fatty acid synthesis and control the flux of fatty acids through alternative metabolic pathways into oil biosynthesis. His research involves a variety of experimental organisms such as the model plant species (*Arabidopsis thaliana*), common oilseed crops (soybean), and plants that make industrially useful oils (castor bean). The long term goal of his research is to enhance the understanding of plant lipid metabolism to generate new engineering strategies for production of designer vegetable oils to meet the nutritional, bio-fuel or industrial demands of the future.

Dr. Bates has over 1 million dollars in current grant funding from the USDA and NSF and has been recognized for the following accomplishments:

1. **Arthur C. Neish Young Investigator Award,** Presented by the 55th Annual Meeting of the Phytochemical Society of North America. August 2016, Davis, California, USA.

   The Neish award is for Leading Early Career Scientists in the field of Plant Biochemistry.

2. **Nina Bell Suggs Endowed Professorship,** The University of Southern Mississippi. May 2015.

   The Nina Bell Suggs Endowed Professorship recognizes a junior faculty member for outstanding accomplishment and professional promise. The recipient will hold the title "Nina Bell Suggs Professor" until promoted to Associate Professor.

3. **The Aubrey Keith Lucas and Ella Ginn Lucas Endowment for Faculty Excellence**, 2015 - 2016 academic year. The University of Southern Mississippi.

4. **Paul K. Stumpf Award**, for Exceptional Early-Career Plant Lipid Scientist. Presented by the 21st International Symposium on Plant Lipids (held every two years around the world). July 2014, Guelph, Canada.

Links to Current Publications:

- **Google Scholar:** http://scholar.google.com/citations?user=2teh5A8AAAAJ
- **ResearcherID:** http://www.researcherid.com/rid/I-7550-2013
- **OCRID:** http://orcid.org/0000-0002-1291-3363

81st Annual Mississippi Academy of Sciences Meeting

February 23-24, 2017
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/HHMI Undergraduate Scholars Symposium

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

This symposium is intended to expand the scope and depth of opportunities for undergraduate student researchers to meet other student researchers and their mentors as well as 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. Howard Hughes Medical Institute (HHMI) is the largest private sponsor of education initiatives in the United States and seeks to strengthen all levels of science education. HHMI 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 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 24th 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 – 10th winners. Each selected presenter will receive a complementary one-year membership to MAS and 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: Ms. Caroline Iverson | Research Support Liaison, Mississippi INBRE
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 24th 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 – 10th winners. Each selected presenter will receive a complementary one-year membership to MAS and certificate of achievement.

81st 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. Caroline Iverson| Outreach Director
University of Southern Mississippi, MS

Symposium Program: All posters have to be assembled by **Thursday 2/23/2017 no later than 12:00 PM** and dismantled after **after 3:00 PM on Friday 2/24/2017**. 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

10:00-10:05	**Welcome and Introduction Remarks: Dr. Glen Shearer; Chair**
10:05-10:10	**President's Remarks, Sukumar Saha; MAS President**
10:10-11:10	**Workshop**
11:10-11:30	**Poster competition (Visit to Posters- if the Judges have not finished)**
11:30-11:55	**Presentation of Awards: Drs. Shearer and Sukumar Saha**
11:55-12:00	**Closing Remarks: Dr. Glen Shearer; Chair of the Symposium**
12:00-1:00	**Plenary Speaker and Lunch (Provided for Participants)**

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

81st Annual Mississippi Academy of Sciences Meeting

Millsaps/HHMI Undergraduate Scholars Symposium - Honoring Excellence in Science in Mississippi

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

Symposium Program: All posters have to be assembled by **Thursday 2/23/2017 no later than 12:00 PM** and dismantled after **after 3:00 PM on Friday 2/24/2017**. 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

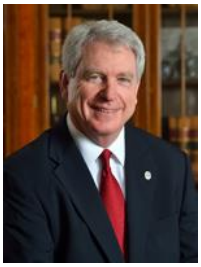
12:00-1:00	**Symposium Plenary Speaker and Lunch**
1:00-1:20	**Opening and Introduction Remarks, Dr. Tim Ward; Symposium Chair**
1:20-1:30	**President's Remarks, Sukumar Saha; MAS President**
1:30-2:15	**Poster competition (Visit to Posters- if the Judges have not finished)**
2:15-2:25	**Dr. Zelma Cason: MAS Past President**
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)

DIVISIONAL SYMPOSIA AND WORKSHOPS
Thursday, February 23, 2017

HEALTH SCIENCES
10:00 AM-12:00 PM
Room TC Ballroom II/III

"Population Health II"

10:00-10:25 AM Daniel W. Jones, MD. University of Mississippi Medical Center
Title: "Obesity and chronic diseases"



Dr. Daniel Jones will discuss clinical aspects of obesity management and the impact on many chronic diseases such as hypertension etc.

Dr. Jones is a Professor of Medicine, Physiology and Biophysics, as well as the Interim Chair, Department of Medicine.

Dr. Jones was born in Morton MS and grew up in Vicksburg MS. He earned his undergraduate degree in chemistry from Mississippi College, 1971. He earned his MD as well as his residency from University of Mississippi Medical Center. He was in private practice in Laurel, Mississippi from 1978 until he went to Korea in 1985 as a medical missionary to serve as director of the community health department and hypertension clinic at the Wallace Memorial Baptist Hospital in Pusan. In 1992, he returned to the University of Mississippi Medical Center as a faculty member.

Dr. Jones was appointed Chancellor of the University of Mississippi on July 1, 2009 after serving in several positions at the University of Mississippi Medical Center (UMMC) in Jackson, including Vice Chancellor for health affairs, Dean of the School of Medicine and Herbert G. Langford Professor of Medicine at UMMC. He is active in the American Heart Association (AHA). He served on the national board of directors, Council for High Blood Pressure Research, and a national spokesperson on high blood pressure. He was the 2007-2008 AHA National President.
His teaching career, research activities and patient care, was mainly focused on hypertension and prevention of cardiovascular disease. He was the first principal investigator for Jackson Heart Study, awarded by NIH for a population study focused on cardiovascular disease in African Americans at UMMC.
Dr. Jones is a member of the board of directors of Global Resource Services, a non-governmental organization providing professional consultation to East Asian nations including the Democratic Peoples' Republic of Korea (North Korea).
An internal medicine physician by training Dr. Jones has joined the Department of Physiology and Biophysics as the Director of Clinical and Population Sciences at the Mississippi Center for Obesity Research (MCOR). He holds the Mr. and Mrs. Joe F. Sanderson, Jr. Endowed Chair in Obesity, Metabolic Diseases and Nutrition.

10:30-10:50 AM Carol Connell, PhD. Department of Nutrition & Food Systems, USM
Title: "Food Insecurity and Population Health Impact"

Dr. Connell will discuss • Definition of food security and the 3 severity levels
- How it is measured nationally and on a state level
- Some basic demographic characteristics of households most likely to experience food insecurity
- Health impacts associated with food insecurity as reported in studies that have used national data (or large cohorts)
  - Diabetes management
  - Obesity
  - Children's health (absenteeism, ER visits etc.)
  - Mental health (depression, dysthymia)

Carol Connell, Ph.D., R.D. is Professor at University of Southern Mississippi, Hattiesburg MS. She is Registered Dietitian, Commission on Dietetic Registration, Licensed Dietitian/Nutritionist, at Mississippi State Board of Health. Dr. Connell earned her B.S. degree, 1983 and M.S. degree, 1991 in Nutrition and Foods, from Auburn University, Auburn,

Alabama. She earned her PhD. Degree, 2001 in Nutrition and Food Systems from the University of Southern Mississippi, Hattiesburg, Mississippi.

Dr. Connell's research focus has been on the nutrition needs of populations experiencing health disparities. Her particular areas of research have been in measuring food insecurity and food access in the rural Mississippi delta as well as developing, implementing and evaluating nutrition education programs in rural communities.

She has over 20 years of research experience with health disparity populations in the Lower Mississippi Delta. This includes research coordinator for the Lower Mississippi Delta Nutrition Intervention Research Initiative (Delta NIRI), a U.S. Department of Agriculture(USDA)/ Agriculture Research Service-funded cooperative agreement that included six research/higher education institutions in Arkansas, Louisiana, and Mississippi. The Delta NIRI research efforts were focused on identifying and addressing nutrition-related health problems through community-based research. In 2002, Dr. Connell was awarded a cooperative agreement with the USDA Economic Research Service to assess children's perceptions of food insecurity and develop a measurement tool that could be administered to adolescents to measure the extent of food insecurity among youth. In 2008, Delta NIRI became the Delta Obesity Prevention Research Unit (Delta OPRU) and she became lead scientist for USM on this project in 2009. Dr. Connell currently is a member of the Southeastern Consortium for Research in Food Security which focuses on research questions pertaining to federal food assistance programs under the direction of USDA Food and Nutrition Service.

10:55-11:15 AM Therese Hanna, MHS. Executive Director, Center for Mississippi Health Policy
Title: "Health Policy and Impact on Population Health"

Therese Hanna will discuss the significant impact of Policy on the health of a population. This presentation will review examples of policy changes in Mississippi that have been associated with health system and outcome improvements and discuss how research can help in the development of evidence-based policies.

Therese Hanna is a Phi Beta Kappa graduate of Rhodes College with a Bachelor's degree in biology and psychology and holds a Master of Health Sciences degree in health care administration from Mississippi College. Ms. Hanna is the founding director of the Center for Mississippi Health Policy. Prior to this position, she served as State Insurance Administrator for eleven years, where she was responsible for managing the State and School Employees' Life and Health Insurance Plan, the State Agencies' Workers' Compensation Trust, and the insurance component of Mississippi's Children's Health Insurance Program (CHIP). During this time she was named by The Mississippi Business Journal as one of Mississippi's Leading Business Women. Previous experience includes seventeen years with the Mississippi State Department of Health where she served as a health planner and analyst and as Director of Policy and Planning.

The Center for Mississippi Health Policy, established in 2005, is an independent, non-partisan, non-profit organization that provides objective research and analysis to inform health policy decisions. The Center's work involves communicating research, examining health status and health care delivery trends, and analyzing relevant health policy issues affecting Mississippi. The Center's projects have encompassed a variety of topics including the state's trauma care system, children's mental health, distracted driving, health insurance coverage, food and nutrition policy, prescription drug misuse, infant mortality, rural hospitals, governance of academic health centers, and childhood immunizations. The Center also directed a five-year grant project funded by the Robert Wood Johnson Foundation and the Bower Foundation, in collaboration with three Mississippi universities, to evaluate the impact of the Mississippi Healthy Students Act on childhood obesity in the state.

11:20-11:45 AM Joshua Mann, MD. Chair, Department of Preventive Medicine, UMMC

Title: "Mission, Structure, and Direction of the J.D. Bower School of Population Health at the University of Mississippi Medical Center"

Dr. Joshua Mann, will discuss the John D. Bower School of Population Health which is the newest school (# 7) at the University of Mississippi Medical Center. This presentation will include a summary of the School's mission, the departments and structure, and plans for educational programs and other activities of the School.

Dr. Mann, was born in Greenville, Miss., and raised in Perkinston, Miss. He completed his undergraduate degree at Delta State University in 1992, and his Doctor of Medicine degree at the

University of Mississippi Medical Center in 1996. He then completed a transitional year at Carraway Methodist Medical Center in Birmingham, Ala., followed by a residency in public health and general preventive medicine at the University of South Carolina, School of Medicine, with a Master of Public Health degree from the University of South Carolina's Arnold School of Public Health.

Dr. Mann served for three years as research director for the Medical Institute for Sexual Health in Austin, Texas, then joined the faculty at the University of South Carolina, School of Medicine in 2002, where he served as medical director of Employee and Student Health until June 2015. He served as Preventive Medicine residency director from August 2005 to June 2015. In that capacity, he led the work group that created ACGME-required milestones for Public Health and General Preventive Medicine residents.

Dr. Mann has made a substantial contribution as a researcher. His research interests include the health of people with disabilities, prenatal risk factors for childhood disabilities, epidemiology of mental health, and links between religion/spirituality and health. Dr. Mann joined the University of Mississippi Medical Center's faculty in July 2015 as professor and chair of the Department of Preventive Medicine.

GENERAL SYMPOSIUM
12:00 -1:00 PM
Room Ballroom II/III

ThermoFisher SCIENTIFIC

Technical Seminar and Virtual lab presented by:

Shelly West
Technical Sales Specialist for Synthetic Biology and Sample Prep
571-606-3013
shelly.west@thermofisher.com

Discover the full potential of CRISPR gene editing

The powerful CRISPR gene editing technology has the potential to transform research at an astonishing rate. For those interested in utilizing CRISPR-Cas9 gene editing to accelerate their discovery, getting started may not be as easy as it seems. This seminar and virtual lab workshop is designed for researchers just getting started with CRISPR genome editing and for those who want to learn troubleshooting tricks.

CELLULAR AND MOLECULAR
1:00 -3:00 PM
Room TC 214

BIOINFORMATICS SYMPOSIUM:

BIOINFORMATICS SYMPOSIUM:

February 23, 2017

1:00-3:00 PM

Room TC 214

INBRE Symposium: Metagenomics to Functional Microbiome
Section Symposia: Molecular and Cellular Biology Division
Organizer: Dr. Shahid Karim, Biological Sciences, The University of Southern Mississippi (Shahid.Karim@usm.edu)

Traditionally, microbes have been studied as cultures in the laboratory. However, the vast majority of organism-associated microbial species have never been isolated in the laboratory, presumably because their growth is dependent upon factors or conditions which have not been replicated in the laboratory. Advances in the field of DNA sequencing technologies have opened a new avenue of research, called metagenomics, allowing comprehensive examination of microbial communities without the need for cultivation. Other advanced 'omics' technologies like transcriptomics, proteomics and metabolomics, which measure the biological properties of whole microbial communities, are being used to gain insights into how the microbiome and host organism interact to support health or trigger disease. An emphasis on the approaches used in the field of metagenomics and functional microbiome would serve as an excellent addition to Mississippi Academy of Sciences Annual meeting.

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 molecular approaches used in the field of microbiome. Although, the focus of our proposed symposium will be on the "biomedical world", many of the molecular approaches 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 molecular microbiologists at the annual meeting, as well as expand the current research forum for an increased exchange of ideas across research disciplines within microbiology and computational biology. The symposium will consist of 20 minutes talks with an additional 5 minutes for Q & A session; the full symposium lasting approximately 120 minutes.

CHALLENGES AND ADVANCES IN THE METAGENOMIC AND MICROBIOME CHARACTERIZATION OF BACTERIA IN CLINICAL AND ARTHROPOD VECTOR SAMPLES

Gregory A. Dasch and Arunachalam Ramaiah
Rickettsial Zoonoses Branch, Centers for Disease Control, Atlanta, GA 30329

Many bacterial agents are found in human and animal clinical samples as well as in the arthropod vectors which transmit a wide variety of the bacterial pathogens that cause disease in humans and vertebrate hosts. Microbiome characterization exploits deep sequencing of portions of the *16S* rRNA genes of eubacteria. The sequences of bacteria found in each sample are detected by PCR amplification of various *16S* rDNA regions using highly conserved primer sites

in that gene. By using different barcodes to tag the amplicons, numerous samples can be pooled and sequenced together to allow cost efficient use of the power of next generation sequencing platforms. The sequences are then matched to databases of 16S rRNA genes to identify and bin the specific operational taxonomic units (OTUs) that are present in the samples. Although conceptually straightforward, there are significant challenges inherent in both the amplification and subsequent bioinformatic analysis: (1) The number of sequences may not be proportional to the bacterial load in the sample for different OTUs because of varying efficiency in amplification of different targets or varied efficiency in extracting different taxa. (2) Specific bacterial symbionts or pathogens may comprise >95% of the DNA in the sample so the sensitivity of detection of other agents may be subpar because of selective amplification of the dominant agent. (3) Samples may contain other molecules (e. g., mitochondrial rDNA) which amplify to varying degrees with some of the conserved *16S* rDNA primer sites and give background amplicons which render sample amplification inefficient. (4) Different conserved regions of *16S* rDNA may provide greater or lesser separation of specific OTUs and in general, the identification is at the genus level for many agents because of the intrinsic conservation of *16S* rDNA that allows the method to work at all. Several methods have been employed to overcome these difficulties. Improved quantitation of specific agent loads of interest may be obtained by qPCR or digital droplet PCR with agent and species-specific target assays once the community composition is known. Blocking PCR assays have been developed to suppress the amplification of overdominant agents. While many spurious human and animal background sequences can be filtered out using genome sequences for those hosts, for many vector arthropods those sequences are not yet available. An alternative approach is to DNase treat host DNA or preenrich bacteria from samples before nucleic acid extraction of the bacteria. Methods of reducing host rDNA concentrations have also been developed but these are expensive and limited in host species.

Metagenomic characterization of bacteria in target samples is effected by construction of libraries of different size from the DNA present in the sample. The basic limitation for the analysis is the cost of very deep sequencing and the amount of repetitive DNA in the sample which can make de novo bioinformatics assembly very challenging. Although the sequencing costs continue to drop, most of the attention for improving the metagenomic analysis falls in three areas: (1) improved library construction to achieve much longer reads or more readily assembled sequence sets. (2) Selective amplification of targets of interest. We have used this approach to improve arthropod mitochondrial genome and high load vector symbiont genome assemblies. (3) Selective target enrichment of bacteria can be effected by using antibody capture methods or nucleic acid capture baits, either completely synthetic tiled arrays or regions amplified from near bacterial relatives by long range PCR. A combination of these approaches promises to extend the power of metagenomics sequencing to complete genomic characterization of heretofore elusive bacterial agents of interest.

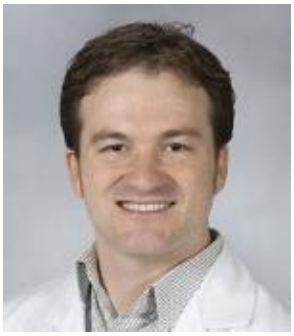
MICROBIAL COMMUNITIES ASSOCIATED WITH THE BIOTRANSFORMATION POTENTIAL OF INSENSITIVE EXPLOSIVES IN SURFACE SOILS

Fiona Crocker[1], Carina Jung[1], Karl Indest[1], Dawn Hancock[1], Alon Blakeney[2], and Jed Eberly[1]

[1] USACE Engineer Research and Development Center, Vicksburg, MS [2] Bennett Aerospace, Vicksburg, MS

New explosive formulations that are less sensitive to external stimuli are being incorporated into current munitions. However, very little is known about whether these new insensitive explosives could pose ecological or human risks, especially since many DoD lands are located in critical ecosystems. The objective of this project was to determine if molecular ecology approaches could be used to assess microbial community diversity and function as an early indicator of disturbance in ecosystems and the microbial populations associated with biotransformation. We evaluated the effects and biotransformation potential of the explosives 2,4-dinitroanisole (DNAN), 3-nitro-1,2,4-triazole-5-one (NTO), and the new IMX-104 formulation on soil microbial communities. High throughput sequencing was used to determine changes in community diversity and to infer which phylotypes were correlated with biotransformation of the explosives. Aerobic and anaerobic biotransformation of the explosives was observed in soil microcosms with and without supplemental carbon and nitrogen. With IMX-104, significant hexahydro-1,3,5-trinitro-1,3,5-triazine (RDX) degradation did not occur until DNAN and 50% of the NTO had been degraded. Principal Coordinates Analysis (PCoA) of the weighted UniFrac distances showed that the presence or absence of carbon explained 47.33% of the variation in microbial community diversity, indicating that carbon rather than IMX104 had the greatest effect on community diversity. Four families, Sphingomonadaceae, Rhizobiaceae, Comamonadaceae, and Bradyrhizobiaceae, exhibited a statistically significant increase in relative abundance in IMX-104 plus nitrogen supplemented microcosms compared to microcosms without IMX-104. Metagenomic analysis of soil communities is providing valuable information on the types of microorganisms

are associated with biotransformation of explosives which can be used to inform best management practices that sustain ecosystems on military lands.



THE RHESUS MACAQUE GUT MICROBIOME AS A MODEL FOR HUMAN HEALTH AND DISEASE

Eric J. Vallender, Xiao Zhang, Koji Yasuda, Donna M. Platt, Gregory M. Miller

University of Mississippi Medical Center, Jackson, MS USA

Outbred primates reared in shared environmental conditions, rhesus macaques (*Macaca mulatta*) are an exceptional model for understanding the human gut microbiome, the factors that effect it, and its effects on health and disease. Our work on the rhesus microbiome first characterized differences in the mucosal and lumenal samples from feces, the large, and small intestine. This work demonstrated the limits of studies focused on feces alone, while demonstrating the strong similarities between human and rhesus microbiota. More recently, we studied the effects of alcohol on the rhesus gut microbiome and metabolome, demonstrating significant and robust changes that occur during alcohol use, and the effects of stress on microbiome composition. These studies make evident the utility of a genetically diverse, but environmentally homogeneous, nonhuman primate model for understanding the human microbiota.

MISSISSIPPI: APPLICATION FOR METAGENOMICS/16S MICROBIAL SEQUENCING

Ashley C. Johnson[1], Jake Johnston[1], D. Ashley Robinson[2] and Michael R. Garrett[1, 3]

[1]Department of Pharmacology, [2]Department of Microbiology and Immunology, [3]Director, UMMC Molecular and Genomics Core, University of Mississippi Medical Center

The University of Mississippi Medical Center (UMMC) provides centralized access to molecular and genomics expertise and services through its Molecular and Genomics Core Facility (MGCF). The mission of the MGCF is to serve as a nucleus to develop research and educational programs to increase the competitiveness and enhance biomedical discovery of researchers at UMMC and across the State of Mississippi. In recent years, high-throughput genomic technologies, such as next-generation sequencing (NGS) has been increasingly useful to understand the complex interactions associated with living organisms. In addition, NGS has revolutionized our understanding of the vast microbial diversity in our environment and led to the new field of metagenomics. The MGCF is equipped with several genomics platforms, including instruments for NGS (Illumina MiSeq and NextSeq500). These instruments provide high-quality platforms for bacterial whole genome sequencing and 16S microbial sequencing (which will be the major focus of the presentation, including example studies), amplicon sequencing, mammalian level genome sequencing, and whole transcriptome analysis (RNAseq). Specifically, the MGCF provides investigators: (1) consultation for implementing genomic technology; (2) sample preparation, quality control, and storage; (3) sequencing and genotyping; (4) microarray, NGS, and validation via quantitative real-time PCR; and (5) preliminary bioinformatics analysis. In summary, the MGCF provides cutting-edge genomic technologies and genomics expertise to academic institutions throughout the State of Mississippi to enhance scientific discovery, including applications for metagenomics. Supported by P20 GM103476 [MS-INBRE-(Elasri)]; P30 GM103328 [CPN-COBRE (Stockmeier)]; and P20 GM104357 [Cardio-Renal (Hall)].

THE EFFECT OF SOIL MOISTURE ON THE STRUCTURE AND ACTIVITY OF MICROBIAL COMMUNITIES IN THE RHIZOSPHERE OF WHEAT

Olga Mavrodi[1], Janiece Rawalt[1], Liam Elbourne[2], Linda Thomashow[3], Dmitri Mavrodi[1]

[1]Department of Biological Sciences, The University of Southern Mississippi, Hattiesburg, MS; [2]Department of Chemistry and Biomolecular Sciences, Macquarie University, Sydney, Australia; [3]USDA-Agricultural Research Service, Pullman, WA, U.S.A.

Over 30% of the earth's surface is arid, and most models of climate change predict future increases in drought length and severity. Plants respond to drought in part by fostering root-associated microbial communities that enhance abiotic stress resistance, but how these bacteria adapt to arid habitats and the effect of water deficit on plant-microbe communication are virtually

unknown. We addressed this gap by conducting the 16S rDNA-based profiling of microbial communities from the rhizosphere of wheat grown in adjacent irrigated and non-irrigated field plots. Results of these experiments revealed that irrigation and plant monoculture lead to strong shifts in the composition of rhizobacterial communities. Among taxa with differential response to soil moisture were fluorescent pseudomonads that produce bioactive metabolites and protect wheat from soilborne fungal pathogens. We sequenced genomes of several *Pseudomonas* strains and screened them for pathways involved in water stress response. We also produced and analyzed plant root exudates and demonstrated that they contain diverse types of osmoprotectants. The amendment of culture medium with the sterile root exudates markedly improved growth of pseudomonads under conditions of water stress. Our findings suggest that rhizodeposition strongly modulates bacterial pathways involved in the mitigation of water stress and contributes to the selection of specific types of beneficial rhizobacteria in arid soils. Understanding how plants and rhizosphere bacteria respond under water stress will help to predict how climate change in the 21st century could impact the rhizosphere microbiome that contributes to the productivity of agroecosystems worldwide.

EVOLUTION OF THE GENOMES OF THE *COXIELLA*-LIKE ENDOSYMBIONTS OF TICKS

Arunachalam Ramaiah, Amanda J. Williams-Newkirk, Michael A. Frace, Maria L. Zambrano, Gregory A. Dasch

Centers for Disease Control and Prevention, Atlanta, GA 30329, USA

Introduction: Ticks transmit the second largest number of vector-borne pathogenic bacteria causing disease in humans and vertebrates. Many studies suggest that many ticks harbor and are obligately dependent on *Coxiella*-like endosymbionts (CLEs) that are closely related, but genetically distinct from the pathogen *Coxiella burnetii*, which causes Q fever in human and domestic ruminants. Understanding the interactions between arthropod hosts and these abundant endosymbionts is crucial for developing novel symbiont-based control measures for ticks and the pathogens they vectors. We assembled two CLE genome sequences from metagenomes of individual *Rhipicephalus sanguineus* (Rs) from Oklahoma (OK) and *Amblyomma americanum* from Georgia (AaGA) and bioinformatically compared them with two recent CLE assemblies from pooled tick DNAs (*R. turanicus* (Israel) Rt; AaOK).

Methods: The CLE-AaGA genome (CLC Genomics Workbench) was assembled from sequences from a 100 bp library obtained on an Illumina HiSeq. A partial CLE-Rs genome was assembled (Geneious) from sequences from a 200 bp library using Ultra REPLI-g amplified DNA on an Ion Torrent Personal Genome machine with an Ion 318 chip. Extensive bioinformatics approaches were employed to determine i) the phylogenetic relationships and the level of genome reduction in CLEs, ii) most affected functional categories of proteins encoded by the four CLE genomes, and iii) the genes involved in amino acid biosynthetic pathways.

Results: CLEs from AaGA and AaOK were quite similar but not identical. Phylogenetic and network analyses showed Rs-CLE and Rt-CLE clustered differently from AaGa/AaOK, suggesting CLE and *C. burnetii* are distantly evolutionarily related and thus probably derived from an ancient ancestor. The Rt (1.73 Mb, 38.2 % G+C), Rs (1.2 Mb, 38.0% G+C), and AaGA/AaOK (657 Kb, 34.6% G+C) CLE genomes are significantly reduced compared to the genomes of *C. burnetii* isolates (1.95-2.21 Mb, 42.3-42.8 % G+C). No plasmids or IS1111 sequences were found in the CLEs. The proteomes of each agent were annotated using BLAST-KOALA into 18 categories and pathways with KAAS and while the distribution of proteins CLE-Rt, CLE-Rs was different from that of CLE-AaGA/AaOK, *C. burnetii* had many more functional proteins. The CLE proteomes retained some major amino acid biosynthetic pathways. CLE appears to provide both essential amino acids and vitamins to its host but CLE-AaGA/AaOK appears to be more highly adapted than CLE-Rs or CLE-Rt to its tick host since it has undergone a much higher loss of functional proteins.

Conclusion: The loss of protein encoding genes in CLE genomes may contribute to their greater fitness in ticks. Small differences in closely related CLE proteomes may help identify those genes that are least critical to the endosymbiotic interaction. CLE-Rs and CLE-Rt may still be cultivable but this seems unlikely for the CLE-Aa given its advanced genome reduction compared to *C. burnetii*. It seems unlikely that horizontal exchange of CLE between ticks has contributed significantly to their evolution as current information suggests they are highly host-specific.

Acknowledgements: Drs. Ramaiah and Williams-Newkirk were both Bioinformatics Postdoctoral Fellows of the Association of Public Health Laboratories when they performed this work. The findings and conclusions in this report are those of the authors and do not necessarily represent the official position of the Centers for Disease Control and Prevention.

TARGETED NEXT GENERATION SEQUENCING OF MICROBIAL COMMUNITIES AS A TOOL FOR ECOLOGICAL INFERENCE

Bram W. G. Stone and Colin R. Jackson

Department of Biology, University of Mississippi, University, MS

Advances in high throughput sequencing technologies present many opportunities and challenges for researchers. Amplification and sequencing of specific microbial taxonomic marker genes (*e.g.*, the 16S rRNA gene, 18S rRNA gene, and the internal transcribed spacer or ITS) has become the *de facto* standard of microbiome characterization. These approaches often form the "first look" by researchers of a complex microbial community. As such, proper analysis and careful interpretation of the resulting data are crucial steps in the work flow from community description to functional inference and further application. We use results from an ongoing project analyzing the soil microbiome associated with two wetland plants, native boadleaf cattail (*Typha latifolia*) and invasive purple loosestrife (*Lythrum salicaria*), to illustrate the bioinformatics pipelines, ecological properties, and emerging analytical techniques associated with the characterization of microbiome data. Raw sequences are processed in mothur and the resulting ecological data analyzed in R, both open source software. Multivariate statistics andordinations are employed to quantify the changes in diversity and composition between native and invasive wetland plant microbiomes. Further, we demonstrate how emerging analyses through interactions networks can identify hub taxa that drive microbiome composition and dynamics.

HEALTH SCIENCES

1:30-2:45 PM

Room TC Ballroom II/III

POPULATION HEALTH III

MOSQUITO-BORNE INFECTIOUS DISEASES AND ASSOCIATED TOPICS

1:05 PM **Dr. D. Olga Mcdaniel, University of Mississippi Medical Center**
"Brief Introduction"

1:10-1:35 PM **Dr. Paul Byers, State Epidemiologist, Mississippi State Department of Health**
Title: "Updates on Mosquito-Borne Diseases in Mississippi and Elsewhere"

Dr. Byers will discuss disease outbreaks and planning for public health threats such as Niles and Zika.

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 (MSDH) Officer.

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

During his tenure at 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.

1:40-2:15 PM Dr. Jerome Goddard, Medical & Veterinary Entomologist, Departments of Biochemistry & Molecular Biology, Entomology & Plant Pathology, MSU
Title: "Mosquito Ecology and Control"

Dr. Jerome Goddard, Medical & Veterinary Entomologist, Mississippi State University
Title: "Mosquito Ecology and Control"

Dr. Jerome Goddard will discuss mosquito ecology and vector control, relating to population health.

Dr. Goddard is an Extension Professor of Medical and Veterinary Entomology in the Department of Biochemistry, Molecular Biology, Entomology, and Plant Pathology at Mississippi State University. Dr. Goddard was formerly the State Medical Entomologist at the Mississippi Department of Health, and also held two appointments in the School of Medicine, The University of Mississippi Medical Center - Clinical Assistant Professor of Preventive Medicine and Assistant Professor of Medicine. He served in the capacity of State Medical Entomologist at the Mississippi Department of Health, Jackson, Mississippi from 1989 to 2008.

He received his bachelor's and master's degrees in biological science from the University of Mississippi in 1979 and 1981, and his Ph. D. degree in medical entomology from Mississippi State University in 1984. In December of 1985 he was commissioned as an officer in the U.S. Air Force and served as a medical entomologist in the Epidemiology Division of the USAF School of Aerospace Medicine, Brooks AFB, Texas, for three and a half years. After Hurricane Katrina (2005), Dr. Goddard was the health department official responsible for the mosquito and vector control program along the Mississippi Gulf Coast. He is known for research on a number of medically important arthropods, most notably ticks and the common bed bug. His main research interests are the ecology and epidemiology of tick-borne diseases, but he has also published on a wide range of medically important arthropods.

2:20-2:45 PM Dr. Nacer Bellaloui, Crop Genetics Research Unit, USDA-ARS
Title: "Impact of Pesticides use in Agriculture, Environment and Health"
Dr. Nacer Bellaloui Research Plant Physiologist with the Crop Genetics Research Unit, USDA-ARS, Stoneville, MS.

Dr. Nacer Bellaloui will discuss pesticides, including herbicides and insecticides impact on environment and population health, insecticide resistance management as well as government regulation and so forth.
Dr. Bellaloui was born in Algeria, North Africa. He received his Diploma of Higher Studies in Plant Biology from the Institute of Biological Sciences, University of Constantine, Algeria in 1984, and his PhD in Plant Nutrition from the Department of Pure and Applied Biology, University of Leeds, UK in 1989. He received teaching assistant experience at the Department of Pure and Applied Biology, University of Leeds, UK; visiting scholar at the Institute of Plant Nutrition, University of Hohenheim, Stuttgart, Germany; and visiting scholar at Pomology Department at UC Davis, CA. Dr. Bellaloui also served as assistant professor at the Institute of Biological Sciences, University of Constantine, Algeria, and as lecturer in the Agricultural Faculty, Chico State University, CA.
Dr. Bellaloui joined USDA-ARS at Stoneville MS in 2004 as a Research Plant Physiologist working on identifying the physiological, genetic, and environmental factors controlling soybean seed nutrition (protein, oil, fatty acids, sugars, isoflavones, and minerals) under drought, heat, disease, and herbicide stresses. Dr. Bellaloui served as a member of Crop Science Research Award and Seed Science Award Committees with Crop Science Society of America. He is serving on several editorial boards of peer reviewed journals, and associate editor of Journal of Crop Improvement; Frontiers in Plant Nutrition; and Plant Chemistry and Ecophysiology. Dr. Bellaloui authored and co-authored more than 100 articles, including several book-chapters.

PSYCHOLOGY
2:00 -2:30 PM
Room TC 229

PANEL DISCUSSION: Research Challenges For Modern Day Slavery And Human Trafficking

Organizer: Gary Chong and Meriju Lu
Tougaloo College

The workshop will focus on understanding Physics and Engineering career opportunities in Mississippi and beyond and necessary preparedness at the undergraduate level. The program will be conducted by James L. Tracy Jr. - a Ph.D. student from Mississippi State University - and will have panelists from local industries and Universities

SCIENCE EDUCATION
1:00 -2:30 PM
Room TC 210

WORKSHOP: Advanced Teaching Methodologies

Organizers: Dr. Ryan M. Walker and Dr. Christina McDaniel
Mississippi State University, USA

The workshop will focus on the improvement and evaluation of science instructional strategies. This includes areas of consideration for curriculum implantation such as: the planned, the delivered and the received curricula. During this time we will engage participants to explore exactly how these three components can be integrated into any scientific discipline. Furthermore we will describe how the evaluation of curricula should align to college or career readiness in Science, Technology, Mathematics and Engineering (STEM) fields. Seating is limited to 50 participants. Pre-registration guarantees admission and official certificate of training. On-site registration available until workshop is full.

DIVISIONAL SYMPOSIA AND WORKSHOPS
Friday, February 24, 2017

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

WORKSHOP: PLANT BREEDING

Organizers: Dr. Victor Njiti and Dr. Raja Reddy

BREEDING AND PATHOLOGY FOR BIOTIC AND ABIOTIC STRESSES OF SOYBEANS

Today soybean producers are confronted with widespread occurrences of multiple economically important root and foliar diseases, along with increasing stresses from high heat and drought.

This workshop is being made available to all who have an interest in the pathology of soybean biotic and abiotic stresses, as well as in the amelioration of such stresses through breeding for resistance/tolerance to these stresses. It will be of interest not only to general audiences, but also to producers, extension workers, and industry and government professionals. It will be a show-and-tell of plant symptoms for the widely occurring diseases of charcoal rot, frogeye leaf spot and Phomopsis seed decay. Also, the recent appearance of soybean rust, a new disease for North America with the potential to severely impact soybean yield, will be presented. On the abiotic side, heat damaged seed samples will be displayed that depict wrinkling, green seed, hard seed, and brown discoloration. Methods used in quantifying and assessing these diseases and stresses will be on display. Breeding approaches used in developing resistant cultivars using traditional and molecular techniques will be presented. **Topics will cover:**

- Diseases: Charcoal rot, frogeye leaf spot and Phomopsis seed decay of soybean
  - Identification

- Disease Spread
- Ecological Impacts
- Management and Control

- Stresses: Heat damage

  -Identification
  -Area Affected
  -Economic Impact
  -Management

- Soybean Breeding; the most economical and environmentally friendly approach to ameliorate plant stresses.
  - Charcoal rot, Frogeye leaf spot and Phomopsis seed decay
  - Soybean rust
  - Heat damage

ECOLOGY/ZOOLOGY
9:00-11:35 AM
Union D

SYMPOSIA ON ECOLOGICAL DIVERSITY AND THE ENVIRONMENT

Organizers: Dr. AHM Ali Reza and Dr. Marta Piva
Delta State University and Alcorn State University

Nacer Bellaloui, PhD, Research Plant Physiologist with the Crop Genetics Research Unit, USDA-ARS, Stoneville, MS (see above for bio).

Title: "Seed Nutrition: Genetics and Environment Interactions"

SEED NUTRITION: GENETICS AND ENVIRONMENT INTERACTIONS

Nacer Bellaloui
USDA-ARS, Stoneville, MS, USA

Seeds of row crops such as soybean are major sources of protein, oil, fatty acids, isoflavones, and minerals for human nutrition and livestock feed. Although seed chemical composition is genetically controlled, the environment has significant effects on the amount and profile composition constituents. The objective of this research was to assess the contribution of genotype and environment for seed composition constituents such as protein, oil, fatty acids, carbohydrates, and minerals. Field experiments conducted in the midsouth, USA, on soybean, corn, and cotton showed that genotype by environment interaction resulted in a significant variability of these constituents, and that the magnitude of effects was constituent dependent. This variability was due to genotype (genetic background), environment (such as irrigation, soil, insect, and disease pressure), and their interactions. This presentation, using the results from field experiments with soybean, corn, and cotton, demonstrates the complexity of genotype and environment on seed composition. The presentation will also highlight the use of new technologies to overcome the gene by environment interaction challenges.

Dr. Katherine Parys, Research Entomologist with the Southern Insect Management Research Unit, USDA-ARS Stoneville, MS

Title: "BIODIVERSITY OF NATIVE BEES IN THE SOUTHEASTERN US"

Dr. Parys will discuss the biological diversity of bees that are native to the southeastern part of the United States.

Dr. Parys is a native of Virginia, and graduated with a bachelor's degree in Biology from the University of Rhode Island. She earned her master's in Environmental Science from Clarion University of Pennsylvania, and then completed a Ph.D. in entomology at Louisiana State University. She joined the USDA as a postdoctoral researcher focusing on the ecology of agricultural systems. Dr. Parys was hired as a research entomologist as part of the Southern Insect Management Research Unit, located in Stoneville, MS, and currently works on the ecology of both pest and beneficial insects across the agricultural landscape.

Dr. Marcus Lashley, Assistant Professor, Department of Wildlife, Fisheries, and Aquaculture, College of Forest Resources, Mississippi State University

Title: PREDATORS MEDIATE THE INDIRECT EFFECTS OF FIRE ON UNBURNED AREAS

Dr. Lashley will discuss how fire, herbivores, and predators interact to shape plant communities.

Dr. Lashley is broadly interested in disturbance ecology, focusing in research questions regarding the responses of wildlife to changes in plant communities following disturbances. Also, he is interested in how plant community structure influences interactions between competitors and predator-prey dynamics. Dr. Lashley graduated with a bachelor's degree in Forestry from Mississippi State University, earned his Master of Science degree in Wildlife Biology from the University of Tennessee, and a Ph.D. and Postdoctoral training in Wildlife Ecology from North Carolina State University.

Dr. Clint Allen, Research Entomologist with the Southern Insect Management Research Unit, USDA-ARS Stoneville, MS

Title: "INSECTICIDE RESISTANCE MANAGEMENT STRATEGIES"

Dr. Allen will discuss historical and current strategies for the management of insecticide resistance to synthetic insecticides and transgenic crops in row crop agriculture.

Dr. Allen is a native of Mississippi. He earned his undergraduate degree from Tulane University in Accounting. After working a short while, he pursued his interest in agriculture and particularly entomology and earned a MS degree in Entomology from Mississippi State University. After completing his PhD degree at the University of Arkansas, he returned to Mississippi State for a short while, before moving to Stoneville, MS. He has been employed by the USDA as a research entomologist since 2008 and the lead scientist on a research project involving the integrated pest and resistance management of important row crop insect pests of the Mississippi Delta.

SCIENCE EDUCATION
10:00-11:50 AM
TC 210

Symposium "Innovations in STEM Education Symposium– The Mississippi Perspective"

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

Awareness of the effectiveness of active learning techniques for the science, technology, engineering and mathematics (STEM) disciplines is growing in the secondary school environment. Active learning methods, such as problem-based learning (PBL), team-based learning (TBL) and flipped learning, develop skills and habits essential for success in the 21st century workplace, including promotion of student investment in their own learning, building characteristics essential for life-long learning, improving reasoning skills, increasing retention of knowledge, and fostering skills for working collaboratively in team environments. Of these methods, the flipped learning or flipped classroom technique is uniquely amenable to the high school learning ecology, recognizing and capitalizing on student expectations for presentation of high quality graphic media, ubiquity of use of mobile devices and 24/7 broad bandwidth access to cyberspace resources. Not all educators are fluent in the technologies for and best practices applications of successfully implementing flipped learning in the STEM classroom. "Innovations in STEM Education – The Mississippi Perspective" brings together Mississippi experts in STEM education, online learning platforms and flipped learning technologies to provide a state-of-the-art presentation of key elements and examples of flipped learning best practices. The symposium highlights university-based professional development for teachers in the underlying skills and showcases resources for flipped learning developed by Mississippi STEM educators.

Time	Event	Speaker
10:00 – 10:10	Welcome and Overview of Symposium	Rob Rockhold, Ph.D.
10:10 – 10:30	SEPA and NIH Support Mississippi PreK-K Science	Lori Staton, Ph.D.
10:30 – 10:40	The Pedagogy of Active Learning in STEM	Wendell Douglas
10:40 – 10:50	Flipping your Classroom as Active Learning	Terry Pollard
10:50 – 11:00	Video Techniques for Flipped Learning	Robert Anderson
11:00 – 11:10	**Break**	
11:10 – 11:20	Medical Case Studies for Flipped Learning	Susan Bender
11:20 – 11:30	*Wolbachia* Rodeos: Classroom Engagement	Kathy McKone
11:30 – 11:40	Trellis.com: A Novel Community Platform	Donna Sullivan, Ph.D.
11:40 – 11:50	The STEMI Project: New Kid on the Block	Denise Thibodeaux

This project was supported by the Office Of The Director, National Institutes Of Health under Award Number R25OD020215-01A1. The content is solely the responsibility of the authors and does not necessarily represent the official views of the National Institutes of Health.

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

Population Health Hands-on Workshop

Interactive workshop, Sponsored by the 23and ME, Inc.©
Modernizing Genetics in the Classroom

Friday 10:30-noon February 24, 2017

Ballroom I

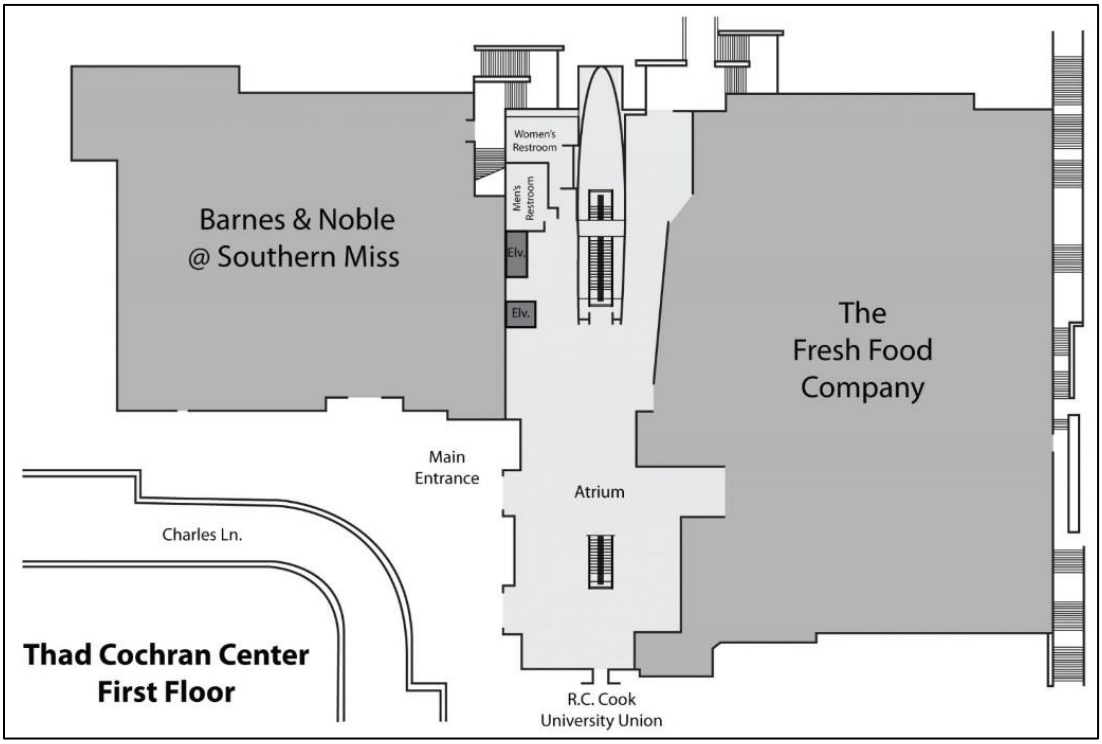
Friday 10:30 **Dr. D. Olga Mcdaniel, University of Mississippi Medical Center**
"Brief Introduction"

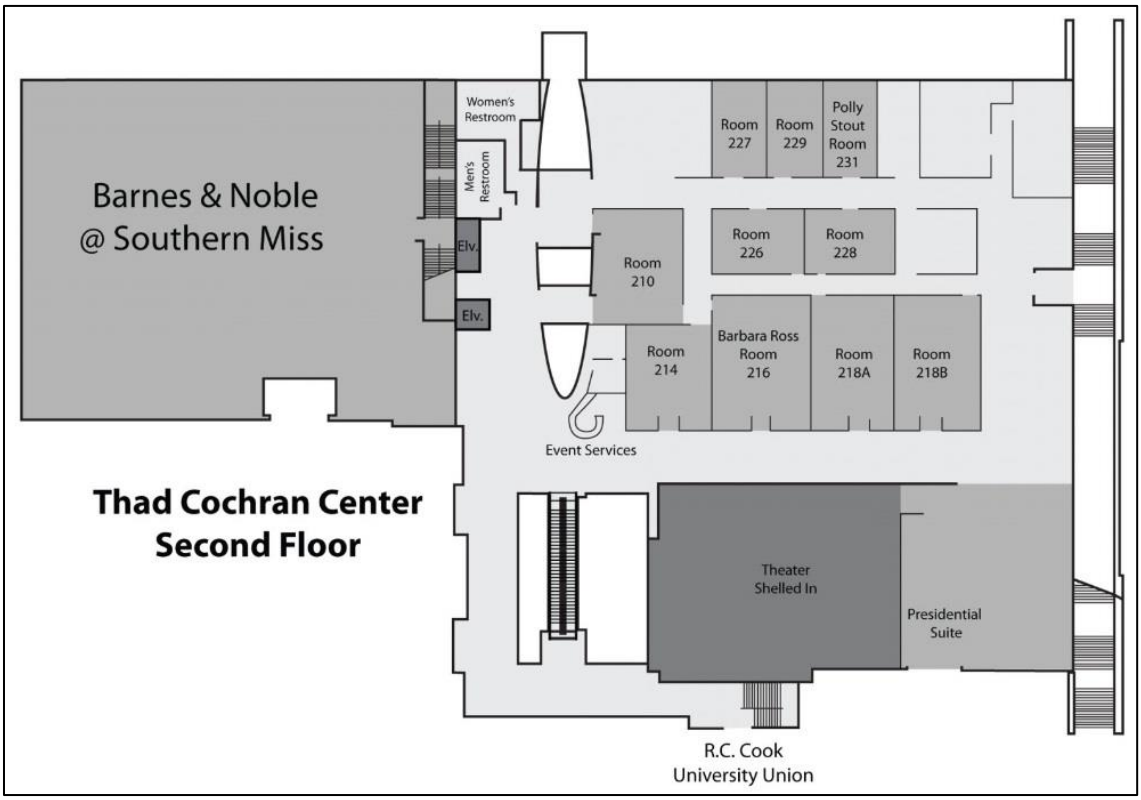
1:35-noon **Dr. Thao Do, 23andMe Education Program Manager**
Title: "23andMe: Preparing for the Genetics Frontier"

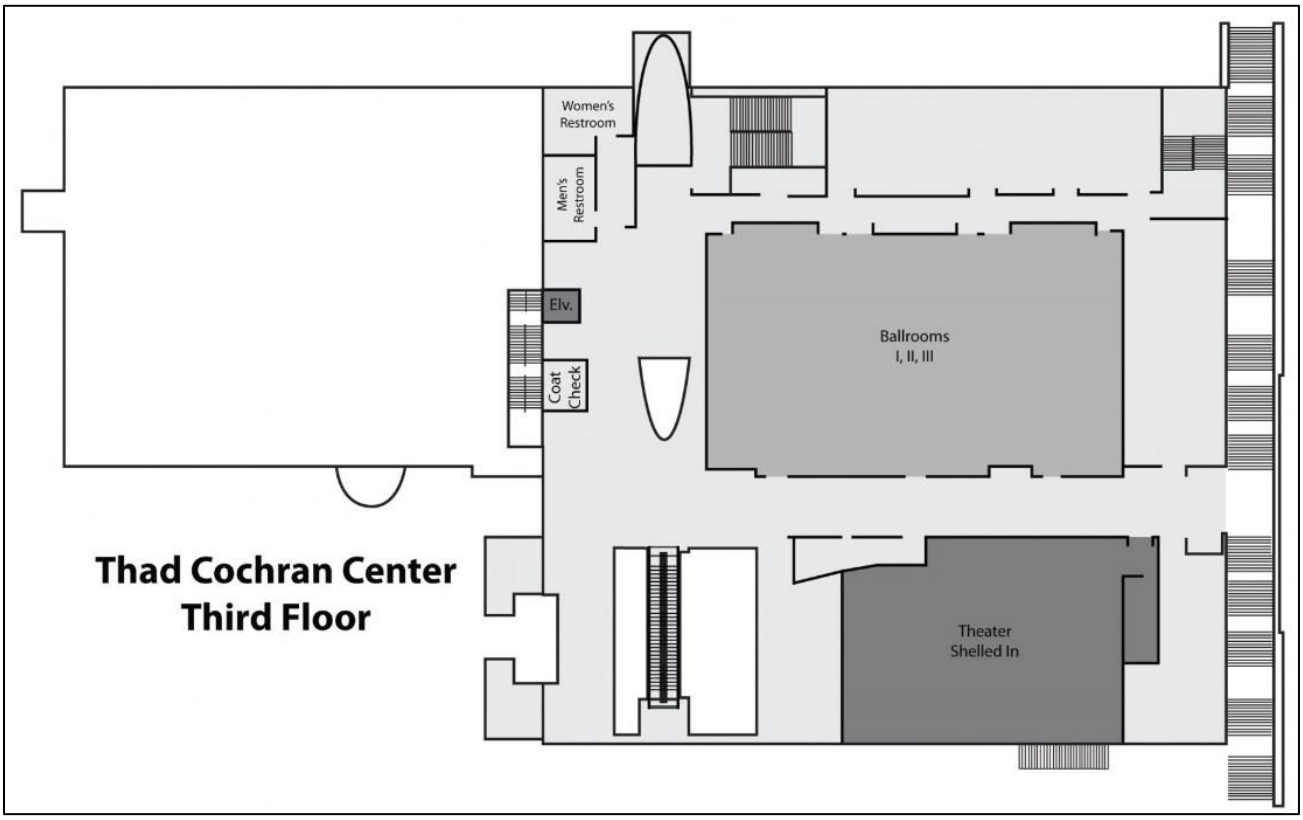
Dr. Thao Do will discuss the role of consumer personal genetics in education, research and health care. Learn how genotypic data, along with self-reported survey information, is used to drive new research discoveries. Join us in an interactive workshop to learn how to integrate 23andMe's educational resources into the classroom.

Dr. Do is the Education and Academia Program Manager at 23andMe, the leading personal genetics company. She has a Ph.D. in Biomedical Sciences from the U.S. National Institutes of Health (NIH) and the University of Oxford, with a fellowship from the U.S. National Science Foundation and a B.S. in Mechanical Engineering from Virginia Tech. She is a named inventor on a patent held by Harvard University and has co-authored several journal papers and a book chapter.

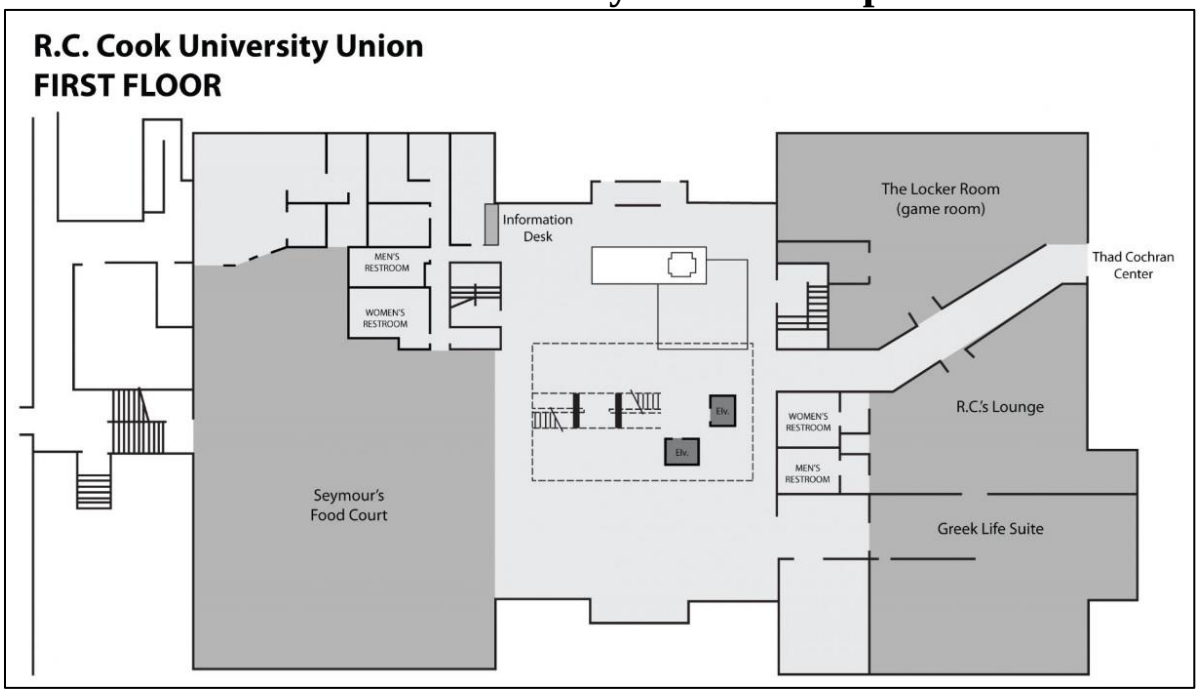
Thad Cochran Center Floorplans

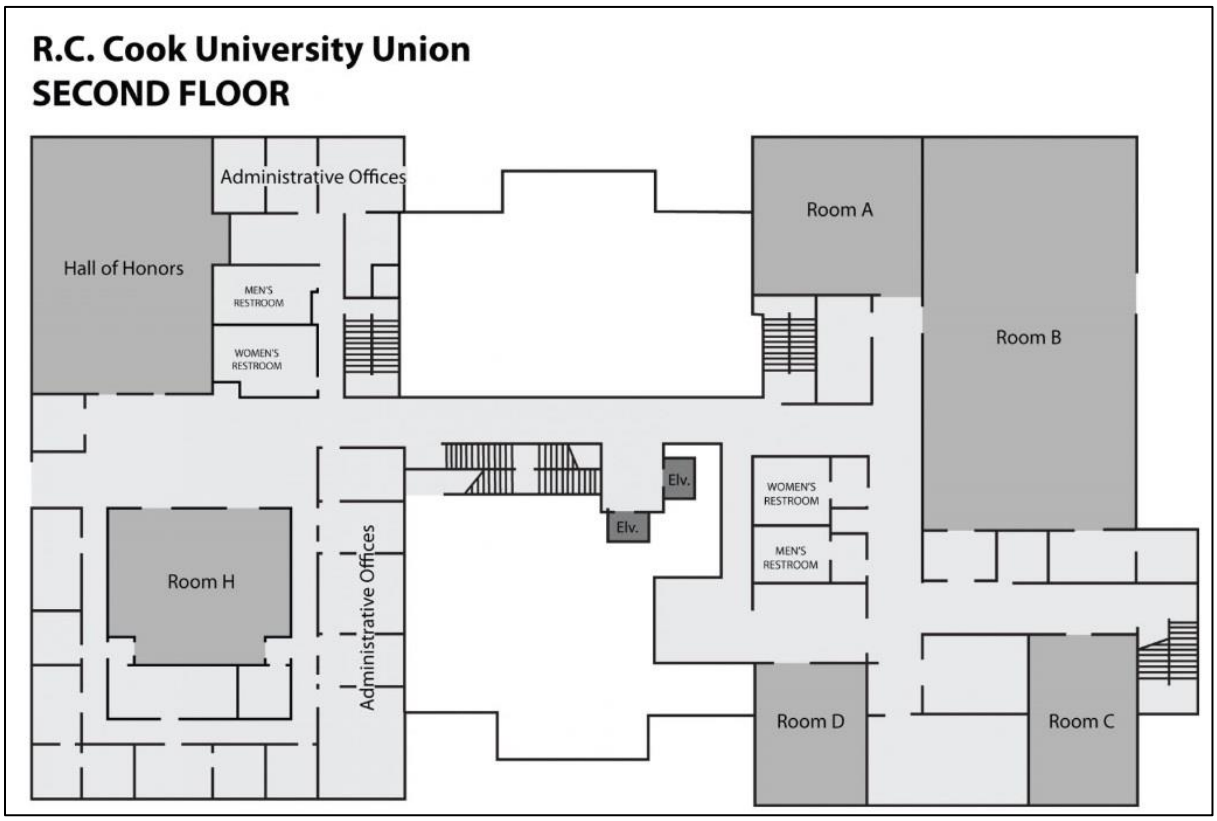





Women's Restroom
Men's Restroom
Elv.
Coat Check
Ballrooms I, II, III
Thad Cochran Center
Third Floor
Theater Shelled In

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: Victor Njiti
Alcorn State University
Vice-Chair: Raja Reddy
Mississippi State University

Thursday, February 23, 2017
MORNING
Room Union C

7:50 WELCOME

O1.01

8:05 EFFECTS OF DROUGHT AND UV-B RADIATION ON SOYBEAN EARLY SEEDLING GROWTH

Chathurika Wijewardana, Firas Alsajri, K. Raja Reddy
Mississippi State University, Mississippi State, MS, USA

Soybean growth and development are highly susceptible to global climate change components such as drought and ultraviolet (UV)-B radiation. The objective of this study was to study the effects of soil moisture stress and UV-B radiation on soybean early seedling growth and root morphology and to understand the genotypic variation among those cultivars. An experiment was conducted in sunlit controlled environment chambers using 64 soybean cultivars representing maturity groups III, IV, and V. Two soil moisture regimes including 100 and 50% evapotranspiration based irrigation and two levels of UV-B, 0 and 10 kJ were imposed immediately after emergence for plants grown at optimum temperature. Plants grown at +UV-B and 50% ET produced shorter plants, smaller leaf area, and reduced total dry matter. The production of phenolic compounds was increased under UV-B radiation. UV-B radiation had more adverse effects on soybean seedlings than drought according to the physiological and morphological parameters measured. Total stress response index (TSRI) for each cultivar, developed from the cumulative sum of response indices of vegetative and physiological parameters, varied among the cultivars. The 64 cultivars were classified as tolerant, intermediate, and sensitive to combined environmental stresses. Out of the 64 soybean cultivars, REV38R10 was identified as the most sensitive and NKS55Q3 as the most tolerant to combined drought and UV-B stresses. The differences in sensitivity identified among the soybean cultivars imply that there may be options for selecting cultivars with tolerance to drought and UV-B stresses projected to occur in future climates

O1.02

8:20 SILICON IMPROVES SOYBEAN GROWTH UNDER WATER LIMITING CONDITIONS

Saroj Sah, Meng Li, Muteb Alrifdi, K Raja Reddy, Jiaxu Li
Mississippi State University, Mississippi State, MS, USA

Water is a vital element for plant growth and development. Water deficit limits plant growth and is a major environmental factor limiting crop productivity. The growing scarcity of water available for irrigation caused by urbanization and the depletion of aquifers poses serious threats to sustainable crop production. Therefore, there is a great need to develop production systems to maintain consistent yields under water limiting conditions. Silicon has recently been recognized as a key element in plant nutrition. Plants with supplies of silicon generate stronger cell walls and show increased biomass production. In this study, we evaluated the effects of silicon application on vegetative growth of two soybean varieties (Asgrow 5332 and Progeny 5333) grown under reduced water conditions. Plants grown with potassium silicate were taller and had increased root volume than plants grown without potassium silicate under reduced water conditions. The results showed that percent increase in plant height is 43%, 19%, and 19% in 100% water, 66% water, and 33 % water respectively on potassium silicate treated plants as compared to control plants. Furthermore, these increases in vegetative growth in soybean grown under reduced water conditions were associated with increases in water use efficiency. These results indicate that silicon application can improve the growth of soybeans under reduced water conditions.

O1.03

8:35 HIGH TUNNEL GREENHOUSE FOR CROP PRODUCTION AND UTILIZATION

Patrick Igbokwe, Worlanyo Segbefia, Deon Holmes
Alcorn State University, Lorman, MS, USA

Mississippians who rely on fruits and vegetables produced for household food consumption often go through cycles of relative abundance and scarcity. For these Mississippians the period immediately prior to harvest is a "hungry period," when many families lack sufficient resources to meet their minimal nutrition needs. Measures that could reduce poverty to a manageable minimum, and enhance year-round physical activities are therefore needed in the State of Mississippi. Two different studies were therefore conducted in two separate high tunnel greenhouses at the Alcorn Experiment Station. The Studies were designed to evaluate high tunnel-grown tomatoes and culinary herbs for survival, growth, and yield potentials. Products developed with harvested herbs (meat seasoning) and Tomatoes (tomato paste) were evaluated for quality and consumer acceptance. Up -to-date findings suggest that culinary herbs transplanted into ground beds in a high tunnel greenhouse will provide quality marketable above-ground biomass, except for feverfew, two months from the transplanting date. Similarly, the tomato cultivars evaluated will produce marketable tomato fruits within the same period. Adding value to harvested culinary herbs and tomato cultivars led to the development of quality meat seasoning and tomato paste, respectively. The evaluated herbs and tomato cultivars can grows to maturity and provide marketable yields, two months from transplanting into ground-beds in high tunnel greenhouse, if factors of production are not limiting. Products developed are comparable in color, flavor, texture, and consumer acceptance to commercially available in supermarket.

O1.04

8:50 SOMATIC EMBRYOGENESIS AND PLANT REGENERATION FROM LEAF CULTURES OF CITRULLUS COLOCYNTHIS (L.)

Taduri Shasthree[1], Dasari Ramakrishna[2], K. Raja Reddy[1]
[1]Mississippi State University, Mississippi State, MS, USA, [2]Kakatiya University, Warangal, India

Sweetpotato is a very important crop because it has the potential for alleviating food security concerns. There are a lot of viruses that affect the crop production during growth and storage.Among these viruses,*Sweetpotato feathery mottle virus* (SPFMV) and *Sweetpotato leaf curl virus*(SPLCV) are two of the most wide spread and important viruses that reduce yield and quality. SPFMV (genus *potyvirus*, family of *potyviridae*)has a single stranded positive sense RNA genome. It is transmitted by aphids. A field isolate was collected from Alcorn State, Mississippi and the full genomic cDNA were cloned.Sequencing of the full length genomic cDNA clones showed that the SPFMV Alcorn State isolate has a genome about 11.5 kilo bases that contains a single open reading frame encoding 3481 amino acids. There are great genetic diversity amongst the full length SPFMV clones. The SPFMV genomic cDNA were placed between CaMV 35S promoter and Nos terminator to enable *in planta de novo* transcription. To test the infectivity of these clones, the clones were biolistically introduced into *Ipomoea Setosa* plants as

well as virus-free tissue cultured sweetpotato plants. Evaluation of the SPFMV cDNA clones infection was done visually and by the use of RT-PCR. Mosaic symptoms were documented and positive RT-PCR results were recorded. The results showed that SPFMV infectious clones were developed and can be further modified as plant viral transient gene expression vector for sweetpotato functional genomics.

O1.05

9:05 PEANUT AND COWPEA FOLIAR LEAF SPOT DISEASE DIAGNOSIS IN SOUTHERN MISSISSIPPI

Gerard Winters, Daniel Collins, Chunquan Zhang
Alcorn State University, Lorman, MS, USA

Peanut and cowpea are important legume crops used in cropping systems due to the fact that they form symbiosis with rhizobium for nitrogen fixation to increase nitrogen contents in soil. They are especially important for small farms in Southern Mississippi for rotation with horticulture crops. The production of peanut and cowpea is subject to a wide range of pathogen infections. Among them, the leaf spot foliar diseases induced by Cercospora arachidicola and Cercospora canscens infections are identified from research fields of Alcorn State University. C. arachidicola and C. canscens are widely distributed globally and has wide host range. They can cause leaves to fall off and serious yield losses of up to 50% in cowpea and peanuts. 20 C. arachidicola and C. canscens field isolates were isolated and cultured on Potato Dextrose Agar medium. Fungal genomic DNAs were extracted from mycelium grown on PDA plates following 5 days of incubation at 30℃. General and specific primers targeting the Internal Transcribed Spacers (ITS) between 5S RNA, 18S RNA, 5.8S RNA and 5S RNA were designed. Fungal genomic DNAs were used as template for PCR using the general and specific primers and the products were sequenced to confirm the fungal isolates. Further, phylogenetic analysis was conducted for Southern Mississippi C. arachidicola and C. canscens populations.

O1.06

9:20 EVALUATION OF ELITE RICE LINES FOR DROUGHT TOLERANCE DURING EARLY GROWTH STAGES

Salah Jumaa, Ajaz Lone, Taduri Shasthree, Edilberto Redoña, K. Raja Reddy
Mississippi State University, Mississippi State, MS, USA

Global Rice Production is severely challenged by various abiotic stresses including drought and limited moisture. 100 Elite Rice lines were evaluated for tolerance to drought stress under Mini Hop Polythene fabricated structures with 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, 25-30 DAS. Significant moisture stress X cultivar interactions were found for most of the parameters measured. A cumulative drought response index (CDRI) was developed by summing the individual response indices of all cultivars. The CDRI varied between 14.7 and 27.9 among the cultivars tested. Based on CDRI and standard deviation values, five and 28 lines were identified as most sensitive and sensitive to drought, respectively, 45 as moderately sensitive, and 16 and six as most tolerant and highly tolerant, respectively. Cheniere and RU1402174 were identified as the least and most tolerant to drought among 100 lines tested. Even though significant linear correlations were obtained between CDRI and root (R^2 = 0.91) and shoot (R^2, 0.48) parameters, root traits are important in studying and identifying drought tolerant lines during the seedling establishment stages in rice. The identified rice lines will be a valuable resource for rice breeders to develop new genotypes best suited for drought conditions. However, further studies are needed to test these lines at different growth stages under various growth conditions to identify the stability of these tolerant lines for drought.

O1.07

9:35 IDENTIFICATION AND CHARACTERIZATION OF COMPETITIVE TRAITS AMONG WEEDY RICE GERMPLASM

Swati Sherstha, Shandera Stallworth, Te-ming Paul Tseng
Mississippi State University, Mississippi State, MS, USA

Weedy red rice (Oryza sativa L.) is conspecific, aggressive weed that has been identified as a threat to global rice production. This weed has inherited high reproductive ability and high dormancy by outcrossing with modern rice cultivars and wild cultivars, respectively. Traits such as rapid growth, high tillering, enhanced ability to uptake fertilizers, asynchronous maturation, seed shattering, and long dormancy periods, makes weedy rice more competitive than cultivated rice. As weedy rice is more tolerant to stresses and has an elevated competitive ability than cultivated rice, we hypothesized that this species is more tolerant to herbicides and possesses weed suppressive ability. We evaluated 54 weedy rice accessions for tolerance to glyphosate at 1.12 kg/ha (1X rate). The same accessions were also evaluated for their ability to suppress a major weed in rice, barnyardgrass. Eight of the accessions showed less than 40% herbicide injury while 10 of them inhibited the growth of barnyardgrass by more than 70%. Accessions of weedy rice with glyphosate tolerance and weed suppressive traits were successfully identified. We will proceed in determining the molecular mechanisms associated with herbicide tolerance and weed suppressive ability, with the expectation of generating tools for rice breeding and crop improvement.

O1.08

9:50 GREENHOUSE SCREENING FOR DRIFTED HERBICIDES AMONG DIVERSE GERMPLASM OF TOMATOES

Gourav Sharma, Te-ming Paul Tseng
Mississippi State University, Mississippi State, MS, USA

Solanum lycopersicum, the domesticated species of tomato, are consumed and produced globally. It is one of the economically important vegetable crop worldwide. US produced ranked 2nd in the production worldwide. In commercial production of tomatoes weeds are controlled using herbicides; however, herbicide options are limited because tomatoes are sensitive to most herbicides, one of them being auxin herbicides. Injury on tomatoes from auxin herbicides and glyphosate were shown at rates as low as 0.01X. At present auxin herbicides and glyphosate have greatest potential of being drifted to tomato plants from adjacent fields. This results in significant reduction in yield, and plant growth. A diverse germplasm of tomato exists that includes wild relatives known to be tolerant to numerous biotic and abiotic stresses. Chemical stress is an abiotic stress, we hypothesized that wild tomato accessions may have natural tolerance to herbicides in addition to other abiotic stresses. One hundred and ten tomato lines were used for screening of herbicide tolerance. Plants from these accessions were sprayed with simulated drift rates of 2,4-D, dicamba, glyphosate, quincloarc, aminopyralid, aminocycloparachlor and picloram. The visual injury rating of each accession for each herbicide treatment was recorded after 7, 14, and 21 DAT on the scale of 0-100 %. 10 accessions for both 2,4-D and glyphosate, 11 for dicamba, and 5 for quincloarc. Further studies to determine the mechanism of herbicide tolerance will help us better understand chemical stress tolerance at the genetic and biochemical level.

10:05 BREAK

O1.09

10:15 PHENOTYPING WEEDY RICE FOR THE DISCOVERY OF DROUGHT AND SUBMERGENCE TOLERANCE

Shandrea Stallworth, Te-ming Paul Tseng
Mississippi State University, Mississippi State, MS, USA

Over the last 68 years, rice (Oryza sativa) production has continued to grow in Mississippi, placing it in fourth place after Arkansas, Louisiana and California. Approximately 250,000 acres of rice are planted in the Mississippi Delta area each year contributing to more than $130 million to the state's economy. Due to the high economic importance, it is imperative to protect rice from its very competitive neighbor, weedy rice (WR). WR is a noxious weed with increased competition to cultivated rice in the areas of plant height, shatter sensitivity, and panicle length. WR has also proved that it can withstand abiotic stresses such as drought and submergence. Tolerance to the aforementioned stresses in WR can serve as genetic sources for the development of drought and submergence tolerant rice cultivars. Fifty-four WR accessions were germinated for approximately 21 days, along with two positive controls, followed by drought (14) and submergence (7 days) stress treatment in the greenhouse. Plant height and injury were recorded weekly for a period of 28 days, and plants were harvested at maturity to determine the yield potential. Results show that some WR accessions were significantly tolerant to submergence and/or drought stress. These tolerant plants recovered significantly after the stress was removed, and performed similar to the non-stressed control plants. These tolerant WR accessions can potentially serve as valuable genetic resource for rice improvement that can be achieved either through conventional breeding, or through marker assisted breeding.

O1.10

10:30 EFFECT OF EXPOSURE TO SUBLETHAL QAC CONCENTRATIONS ON SURVIVAL OF LISTERIA MONOCYTOGENES

Amruta Jadhav, Ramakrishna Nannapaneni
Mississippi State University, Mississippi State, MS, USA

It is becoming increasingly common knowledge that *L. monocytogenes* cells exist in food processing environment predominantly as members of biofilms-structured, multicellular communities' adherent to surfaces. Such *L. monocytogenes* biofilm formation is known to cause contamination of drains, plumbing, cold rooms, and other systems in food processing environments. These strongly adherent *L. monocytogenes* biofilms to food-contact and non-food contact surfaces may survive antimicrobial treatments. Recently, the natural evolutions of *Listeria monocytogenes* resistant to one or more commonly used disinfectants have been detected within the environmental isolates. The factors that contribute to the innate ability of *L. monocytogenes* cells to produce such resistant subpopulations and their relation to persistence under various environmental conditions are not clearly known. The objective of this study was to determine the role of sublethal concentrations and exposure times on the survival of *L. monocytogenes* in lethal concentrations of quaternary ammonium compounds (QAC).The survival of *L. monocytogenes* Bug600 was increased by 1 to 2 log CFU/ml in lethal concentrations of QAC after 1 h pre-exposure to its sublethal concentrations compared to that of non-exposed control cells. These findings demonstrate that *L. monocytogenes* cells if exposed to sublethal concentrations may exhibit reduced killing efficacy to lethal QAC that are commonly employed during sanitation to kill this foodborne pathogen.

O1.11

10:45 CHARACTERIZATION OF ANTI-HERBIVORE PROPERTY OF SICKLEPOD

Ziming Yue, Te-ming Paul Tseng
Mississippi State University, Mississippi State, MS, USA

Deer damage to row crops such as soybean is a common problem in the US. The deer pressure in Mississippi can keep the forage soybean at half height. Currently, the only effective and widely used techniques to control deer from crop browsing are establishment of fences and application of repellents, which is expensive, labor intensive, and most of the time ineffective. Plants possess varying levels of herbivore defence mechanisms, and weeds, because of their vast genetic and phenotypic diversity, are a good resource for anti-herbivore traits. Studies have shown that sicklepod weed seeds and plants contain anthraquinone derivatives, and in separate studies were shown to repel herbivores mainly birds. This project selected sicklepod to characterize its anti-herbivore property and apply the property to protect soybean crop. We conducted tests at the Captive Deer Facility at MSU to confirm the anti-herbivore property of sicklepod weed. Soybean plants not applied with the sicklepod extracts were consumed completely, while plants applied with sicklepod extracts were entirely avoided. Using chromatographic techniques, we found the levels of these anthraquinone derivatives (chrysophanol, emodin, physcion) to be up to 11 times higher in sicklepod compared to soybean. These anti-herbivore properties can be extracted from sicklepod and applied on soybean to test their anti-herbivore efficacy on deer. Molecular markers can be developed and used in screening soybean germplasm for the anti-herbivore traits. Soybean with significant anti-herbivore property will prevent yield losses incurred due to herbivores such as deer.

O1.12

11:00 PLANT DENSITY EFFECT ON BIOMASS DEVELOPMENT AND RESIDUE DECOMPOSITION OF SWITCHGRASS (*Panicum virgatum* L.)

Rebecca Becker[1], Girish Panicker[1], Willie Mims[1], Mario Martinez[1], Timothy Carry[2]
[1]Alcorn State University, Lorman, MS,, USA, [2]US Army Cold Region Research and Engineering Laboratory, Hanover, NH 03755, USA

Soil erosion is the major conservation issue on croplands. Crop residue management has been established as a valuable technology for reducing erosion. As a part of the C-factor (cover and management) research being carried out at Alcorn, different varieties of Switchgrass are thoroughly studied to prevent erosion on U.S. Army's training lands. The main objective of this research is to study the plant density effects of four varieties of Switchgrass, Kanlow, Colony, Alamo, and BoMaster, on biomass development, leaf area index (LAI), percent canopy cover, dry biomass, carbon buildup, rate of residue decomposition, and C: N ratio. Plants were raised on Natchez silt loam soil at two plant densities without any fertilizer application; high density planting (HDP) and low density planting (LDP) of 10.16cm and 12.7cm between plants, respectively. Surface soil moisture and soil compaction were measured during long dry spell. Leaf area index (LAI) and percent canopy cover were recorded during the growth period and just before clipping down this cover crop in the fall. Percent canopy cover and leaf area index were not significantly different among treatments. LDP of Colony and HDP of BoMaster were high in upper biomass yield compared with HDP and LDP of Kanlow and Alamo. There was no difference in percent canopy cover, LAI, and soil compaction, and moisture. Over 60 percent of residue was left over the ground after six months of decomposition. Our data indicate that Switchgrass is an excellent perennial cover for heavy soils and HDP yields high biomass than LDP.

O1.13

11:15 ORGANIC MANURES ON QUALITY AND YIELD OF EXOTIC AND INDIGENOUS MELONS

Mario Martinez[1], Girish Panicker[1], Willie Mims[1], Padma Nimmakayala[2], Umesh Reddy[2], Yan Tomason[2]

[1]Alcorn State University, Lorman, Mississippi, USA, [2]West Virginia State University, Institute, WV 25112, USA

The demand for organic food is growing faster than ever before due to the severe health related problems from environmental pollution. Out of the 103 varieties of melons analyzed for quality, adaptability, and yield, two cultivars, Pride of Wisconsin and Charentais (French cultivar), were selected to raise on Natchez silt loam soil (Typic Hapludalf, silty, mixed, thermic) in southwest region of Mississippi. These melons received three treatments of composted organic manures (cow-C; poultry-P; cow and poultry-C+P) in a split-plot design. The parameters evaluated were fruit weight, skin pressure, fruit length/width, seed cavity length/width, flesh thickness, flesh pressure, TSS (degree brix), and vitamin C. Pride of Wisconsin and Charentais are high in fruit weight and skin pressure under organic P-treatment. Flesh thickness, seed cavity width, and TSS are high for both varieties of melons under C+P. Even though not significantly different, the vitamin C content in Pride of Wisconsin is high for cow manure, followed by poultry, and least in C+P. Fruit length, width, and seed cavity length are high for Pride of Wisconsin under poultry manure. Flesh pressure is high in Pride of Wisconsin for cow treatment. Both varieties of melons respond well to these organic manures and are highly adapted to this region, without any pests or diseases. Commercial organic production of these cultivars are strongly recommended for this region

O1.14

11:30 SWEETPOTATO AS FEEDSTOCK IN *TRICHOSPORONOLEAGINOSUS* FERMENTATIONFOR LIPID PRODUCTION

Christopher Finley, Ananda Nanjundaswamy, Keerthi Mandyam, Victor Njiti, Qun Xia, Franklin Chukwuma

Alcorn State University, Lorman, MS, USA

With the concern of global warming search for alternative energy source is the pursuit future. Department of Energy (DOE) and National renewable Energy Laboratory (NREL) consider biodiesel as one of the important solutions in developing clean burning biofuels. Biodiesel is a renewable, clean combusting, biodegradable fuel that can be produced from plant lipids, animal fat and microbial lipids. There is an increased interest in production of lipids from microbes specially yeast called oleaginous yeast due to the favorable spectrum of lipids for biodiesel and ease of production. For the large scale production of yeast lipids choice of cheap feedstock is very critical. Keeping the feedstock in mind sweet potato, an important crop of southern USA is being evaluated for oleaginous yeast *Trichosporonoleaginosus* fermentation. Response Surface Methodology (RSM) for process optimization, yield of lipid and spectrum of fatty acids and scale up strategies will be discusses.

O1.15

11:45 RED YEAST FERMENTATION OF SWEETPOTATO FOR HIGH CAROTENOID PRODUCTION

Destiney Crockett, Ananda Nanjundaswamy, Victor Njiti, Qun Xia, Franklin Chukwuma

Alcorn State University, Lorman, MS, USA

Carotenoids are tetraterpenoids with striking orange color. Several plants, fungi, bacteria and algae are known to produce carotenoids. In nature there are over 800 types of carotenoids known to exist. Carotenoids are known to bring about several biological benefits. Some of the benefits are carotenoids are antioxidants activity, pro-vitamin A, natural colorants to name a few. Due to their biological activity carotenoids have gained commercial importance. One of the most important carotenoids is Astaxanthin, produced by few algae and yeasts. Biochemically β-carotene serves as precursor for astaxanthin biosynthesis. Since sweet potato is rich in β-carotene, we investigated if sweet potato can serve as feedstock for high value astaxanthin enriched sweet potato. The astaxanthin enriched sweet potato has application in aqua and poultry feed industry. Fermentation optimization and nutritional profile of astaxanthin enriched sweet potato will be discussed.

12:00 -1:00 General Sessions

Thursday, February 23, 2017
AFTERNOON

O1.16

1:05 BREEDING FOR STRESS RESILIENCE IN CORN UNDER INDIAN SCENARIO

Ajaz Lone[1], Z.A. Dar[2], K. Raja Reddy[3]

[1]Mississippi State University, Mississippi State, MS, USA, [2]Sher-e-Kashmir University of Agriculture Sciences & Technology of Kashmir, Jammu and Kashmir, India, [3]Mississippi State University, Mississippi State, MS, USA

By 2050, the world's population is expected to increase by 35% and to sustain this growth major crop production levels should have to outpace it at all fronts. Demand for corn in Asia and climate change effects are, however surpassing most of the projections in Indian corn mega environments. As such, by 2050, corn yield is projected to be reduced by 17 % due to climate change induced high temperature and drought conditions. Climatic patterns over last decade reveals that there is no significant change in total rainfall, but reduction in rainy days and increased rainfall intensity are projected to increase in the future and these changes will further threaten corn production both in rain-fed and irrigated cropping systems. To augment this challenge, improvements are needed in several fronts; developing stress resilient cultivars and use of efficient resource management strategies. Constitution of base germplasm, elite productive line and applying relevant selection criterion using high throughput phenotyping is very important followed by integrating molecular tools for target products to hasten trait pyramiding into elite corn cultivars. Genomics appears to be a promising tool for deciphering the stress responsiveness of crop species with adaptation traits or in wild relatives toward identifying underlying genes, alleles or quantitative trait loci. Reorienting our breeding priorities for achieving maximized yields under stress environments is the only available approach for long term gains.

O1.17

1:20 VARIATION IN TOTAL CAROTENOID AND β-CAROTENE IN STORAGE ROOT OF SWEETPOTATO HYBRIDS

Lydia Batey, Ananda Nanjundaswamy, Victor Njiti, Qun Xia, Franklin Chukwuma

Alcorn State University, Lorman, MS, USA

Sweet potato (*Ipomoea batatas*) is an important food crop in the world and is especially important in of southern United States. Mississippi ranks third in the production. Sweet potato is known for its rich nutritional value. It is not only serve as chief source of energy containing over 70-80% starch on dry basis but also provide a spectrum of metabolites like vitamins, complex carbohydrates, dietary fiber, and β-carotene (USDA). Orange fleshed sweet potato is a rich source of β-carotene, which is a precursor to pro-Vitamin A, an important vitamin in eye health. β-carotene is an antioxidant and its level will be greatly influenced by storage and processing

conditions. The objective of the study was to evaluate the β-carotene levels in selected hybrids of sweet potato during storage and various processing conditions. Level of β-carotene among different hybrids during storage and different processing conditions will be discussed. The results from study help postharvest processing of sweet potato.

O1.18

1:35 BIOPROCESS OPTIMIZATION OF CORN STOVER-BASED CELLULOSIC ETHANOL PRODUCTION

Rodrick Patterson, Ananda Nanjundaswamy, Keerthi Mandyam, Victor Njiti, Franklin Chukwuma
Alcorn State University, Lorman, MS, USA

There has been a tremendous progress in renewable energy sector in the last decade. With the mandate of 36 billion gallons of ethanol production by 2030 set by Renewable Fuel Standard Association (RFA) and Energy Independence Security Act (EISA), production of biofuels from cellulosic feedstock is vital for achieving the set target. While corn ethanol production has achieved commercial limit of 15 billion gallons, the remaining deficit of 21 billion gallons of ethanol from cellulosic biomass is still in its infancy. Cellulosic Ethanol production is influenced by several factors, which include feedstock loading and enzymes loading. Increasing enzyme loading for saccharification can be quite expensive. Saccharificaion is critical to the success of cellulosic biofuel production, which determines primarily the amount of sugar released. Corn stover is an important feedstock for cellulosic ethanol production. The objectives of this study were to 1) determine the optimal substrate loading and 2) enzyme loading for maximum ethanol production. Study employed response surface methodology (RSM) for optimization process.

O1.19

1:50 ENHANCEMENT OF ANTIOXIDATIVE EFFICACY OF HYPER-ACTIVAYED CURCUMIN CARGO IN STABLE NANO-VESICULAR EMULSIONS

Soma Mukherjee, Zahur Haque
Mississippi State University, Mississippi State, MS, USA

Remarkable augmentation of antioxidative efficacy of curcumin (CU), a potent edible antioxidant, as affected by tautomeric shift through intra-molecular hydrogen atom transfer caused by ultra-violet (UV) radiation (290-310 nm) in stable O/W nanoemulsion systems was investigated. Emulsions, generated using ultra-high pressure homogenization (UHPH) were stabilized using a ternary system consisting of whey protein isolate (WPI) (1%, w/v), Tween 20 (20% w/w WPI) and casein hydrolyzate (1:50 of WPI, w/w). Continuous and dispersed phases were 200 mM phosphate buffer (pH 8.8) and peanut oil [containing CU (0.22%, w/v)] [fraction 0.01], respectively. Coarse emulsions, prepared by blending for three mins were subjected to UV radiation (0-60 min), followed by single-pass UHPH at 140 and 210 MPa. The UHPH treated CU-NVV exhibited significantly ($P<0.05$) greater short and long term antioxidative properties [antioxidant activity (AA) and persistence (AP), respectively] throughout the study, as determined from their efficacy to quench peroxyl and alkoxyl radicals *in vitro*. Even after16 days of storage, the CU-NVV treated at 210 MPa retained seven and 1.4% greater AA and AP, respectively, compared to the unpressurized CU-NVV. It also showed 4182 and 8986% augmentations in AA and AP, compared to the control (buffer alone). Best results were found in CU-NVV subjected to 15 min of UV exposure and UHPH of 210 MPa (66 and 73% enhancements in AA and AP, respectively, relative to the CU-NVV without UV exposure, other conditions being equal). Data showed dramatic potential of the use of nano-vesicular vehicles for stable delivery of UV treated hyper-activated CU cargo.

O1.20

2:05 GREENHOUSE DIRECT-SEEDED SWITCHGRASS ESTABLISHMENT IN LOWER MISSISSIPPI RIVER SOILS

L.A. Hodges[1]*; K.N. Reddy[2] and E.Z. Ford[2]

[1]Alcorn State University, Lorman, MS 39096, USA; [2]USDA-ARS Crop Production Systems Research, Stoneville, MS 38776;

As of October 2016, 32.61% of the Southern U.S. is listed under drought conditions. Drought conditions could adversely impact yields of the traditional crops, such as soybean and cotton. A potential alternative crop for this region is Switchgrass *(Pancium virgatum).* Switchgrass root systems which can grow 609.9-914.4 cm deep into the soil are water efficient during drought conditions, increase soil health, as well as, decrease global climate change by increasing carbon sequestration. The overall goal of this greenhouse study was to evaluate the ability of three direct-seeded switchgrass 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 varieties to produce direct-seeded seedlings in two Southern U.S. Lower Mississippi River Soils, (2) to evaluate the effect of soil type upon the establishment of three switchgrass variety direct-seeded transplants and (3) to evaluate the effect of light intensity and air temperature on the morphological development of direct-seeded seedling in three switchgrass varieties. Overall, temperature and soil type do influence the morphological development of in all varieties of direct-seeded switchgrass. All varieties displayed the ability to establish on Lower Mississippi River soils.

2: 20 BUSINESS MEETING

2:30-3:30 DIVISIONAL POSTER SESSION

P1.01

DEVELOPMENT OF A VIRUS-FREE SWEETPOTATO PROGRAM FOR LIMITED-RESOURCE FARMERS IN MISSISSIPPI

Kyler Holmes, Yan Meng, Rita Okoro, Victor Njiti, Chunquan Zhang
Alcorn State University, Lorman, USA

Sweetpotato (*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 sweetpotato production is the cumulative effect of virus infection causing cultivar decline and yield losses. Technology such as meristem-tip culture can provide farmers with healthy propagating materials that are free of detectable viruses. However, it has not been well practiced in Mississippi, particularly in the small farms. The overall goal of this project is to establish and employ a virus-free sweetpotato program in Mississippi for limited resource farmers, aiming at increasing the sweetpotato yield, quality and investment return for small holders. In this study, totally 13 lines of sweetpotato, for purposes of delivery to farmers or for breeding, have been collected from USDA, Louisiana State University or bred at Alcorn State University. All 13 lines were done or are processing with meristem-tip culture for removing the viruses. PCR was used to detect the tissue culture plantlets for *Sweet potato leaf curl virus* and *Sweet potato feathery mottle virus*. Protocols were developed and optimized. We have been conducting field practices for virus-tested sweetpotato since 2015. Roots harvested from virus-tested plants and from non-treated plants have been compared; leaf samples have been

collected for virus-detection. Virus-tested sweetpotato demonstration and virus disease diagnostics were held at ASU field day on August 25, 2016. Farmers showed great interests on the future collaboration on Nursery Company.

P1.02

TRANSGENERATIONAL INHERITANCE OF DROUGHT STRESS INDUCED LOSS ON SOYBEAN SEED GERMINATION

Chathurika Wijewardana, Firas Alsajri, K. Raja Reddy
Mississippi State University, Starkville, MS, USA

Seed germination in many plant species is governed by the environment under which its parent plants were raised and matured. Prior studies have shown that stress-induced responses are inherited through plants' trans-generational memory. Soil moisture stress that occurs during soybean seed fill greatly reduces seed yield, but less attention has been paid to determine its influence in expression of traits on offspring. In this study, we tested the hypothesis that soybean seeds formed after exposure to different soil moisture stress levels would affect the seed based traits in next generation. Initially, two soybean cultivars; Asgrow 5332 and Progeny 5333 were grown at five levels of evapotranspiration (ET) (100, 80, 60, 40, and 20% ET) of irrigation treatments under sunlit environmental conditions at flowering stage. Then, seeds obtained from these treatments were tested for seed germination vitality traits at five different in-vitro osmotic stress treatments using polyethylene glycol (PEG 8000) solutions which mimic water potentials ranging from 0.0 to −0.9 MPa with -0.2 MPa increments and incubated at 25 °C. Maximum seed germination, time to 50% germination, and seed germination rate were derived by using appropriate regression analysis. Cultivars differed significantly for the seed-based traits and significantly decreased with decreasing osmotic potential. Soil moisture stress induced irreversible change in seed quality of the offspring where the damage was increased further when exposed to same type of stresses. The results suggest that the stress-induced memory from previous generations can possibly be carried over, persuading flexibility to stress damage in the successive generations.

P1.03

MAPPING POPULATION TO IDENTIFY NOVEL QTLS FOR AFLATOXIN ACCUMULATION RESISTANCE IN MAIZE

Oluwaseun F. Ogunola[1], Marilyn L. Warburton[2], W. Paul Williams[2]
[1]Department of Plant and Soil Sciences, Mississippi State University, Mississippi State, MS, USA, [2]USDA Corn Host Plant Resistance Research Unit, Mississippi State University, Mississippi State, MS, USA

Aflatoxin is a secondary carcinogenic metabolite produced by Aspergillus flavus Link:Fr under favorable environmental conditions such as the hot and humid environments experienced annually in the Southern U.S and other countries. Aflatoxin accumulation causes economic hardship to farmers and poses serious health issues in developing countries that lack the infrastructure for proper grain testing. Identification of maize (Zea mays L.) germplasm with resistance to aflatoxin accumulation is one effective way of combating the problem. The highly quantitative nature of the trait makes it hard to transfer from resistant donor lines into elite cultivars. Markers linked to quantitative trait loci (QTL) for resistance is one way to hasten this task. To identify novel QTLs, a set of 238 F2:3 families was developed from CML69, an aflatoxin resistant inbred line from Centro Internacional de Mejoramiento de Maíz y Trigo (CIMMYT) and Va35, an aflatoxin susceptible inbred line adapted to the southern US. A total of 100 single nucleotide polymorphisms (SNP) markers linked to previously identified QTLs and spanning all 10 chromosomes in the maize genome was tested on the new QTL mapping population. Aflatoxin levels for each family were also determined in replicated field trials in four different locations. Results show that 60 SNP markers tested were polymorphic between the parents and were screened on all 238 families to create the initial genetic linkage map. These SNPs were mapped using the Joinmap software.

P1.04

MANAGEMENT EFFECTS ON SOIL MICROBIAL DIVERSITY: A CRITIQUE OF SOIL HEALTH

William Kingery, Shankar Shanmugam, Daniel Peterson
Mississippi State University, Mississippi State, MS, USA

This study was initiated to evaluate the effects of crop management on soil microbial diversity. Soil samples were collected from field experiments conducted in two major farming regions in Mississippi. The nature of soil disturbance caused by tillage treatments influenced bacterial community composition. Reduced-till soil was significantly different from the others as indicated by the axis of maximum variability from Bray-Curtis ordination (Axis 1= 76 %). The Simpson's reciprocal index, pointed to considerably higher bacterial diversity in these soils. Specifically, Proteobacteria were least abundant compared to other tillage systems. Also, there was a moderate effect in composition due to location as indicated by the minor axis of variation (Axis 2= 4 %). These results show that some aspects of crop management may create stable environments which favor diverse soil microbial communities. High soil microbial diversity has been attributed to desirable soil health conditions. However, soil health is constituted by integrative interactions among various functional niches, and therefore measurement of individual groups of organisms, processes or soil properties may insufficiently represent the state of the soil health.

P1.05

MORPHO-PHYSIOLOGICAL AND ROOT ARCHITECTURAL DIFFERENCES ASSOCIATED WITH DROUGHT TOLERANT CORN HYBRIDS

Hunt Walne, Chathurika Wijewardana, K. Raja Reddy
Mississippi State University, Mississippi State, MS, USA

Drought is an important abiotic stress in corn with around 40% of yield loss being due to suboptimal water availability. The objectives of this study were to assess drought tolerance among the six commercially available corn hybrids contained a drought tolerant gene package or known to perform better under rainfed conditions (P1498, DKC 65-81, and N59B-3111A) and three hybrids with similar maturity backgrounds without any reported drought or tolerance mechanisms (P1319, DKC 66-97, and N61X-3110) using morphological and physiological traits, and to classify hybrids into different groups of tolerance. Plants were subjected to three different irrigation treatments: 100%, 66%, and 33% and drought treatments were imposed five days after planting (DAP). Time series data was taken for plant height and number of leaves. Several physiological parameters were measured 3-weeks after planting. Root and shoot parameters were estimated at the final harvest, 22 DAP. Most growth and physiological parameters were reduced under drought stress condition and differed in their response to drought. A cumulative drought response index was developed by summing individual response indices for each parameter and was used to classify hybrids as drought tolerant, moderately drought tolerant, and drought sensitive. Among the six cultivars tested, DKC 66-97 proved to be the most drought tolerant and N61X-3110 was the most drought sensitive. The differences in sensitivity identified among the corn hybrids indicate the possibilities for validating the hybrids with drought tolerance as well as lead to future research on studying the effect of drought on other stages of growth.

P1.06

ASSESSING MORPHO-PHYSIOLOGICAL CHARACTERISTICS AND MOISTURE DEFICIT STRESS TOLERANCE OF RICE CULTIVARS

Bhupinder Singh[1], Timothy Walker[2], K. Raja Reddy[1], Edilberto D. Redoña[3]
[1]Mississippi State University, Mississippi State, MS, USA, [2]Horizon Ag. LLC, Memphis, TN, USA, [3]Delta Research and Extension Center, Stoneville, MS, USA

In an attempt to improve sustainability, many rice growers in the southern USA are adopting water saving strategies to increase rainfall capture and reduce water pumping. The majority of rice produced is dry direct seeded, grown in upland conditions until Vegetative-4 (V4) growth stage before a flood is established. However, this may expose rice seedlings to early-season moisture deficits that can severely affect the growth and physiological processes. An experiment was conducted in a greenhouse to evaluate 15 rice cultivars commonly grown in Mississippi for early-season moisture stress response. The three different soil moisture regimes, 100, 66, and 33% field capacity, were imposed during the early-seedling growth, from 10 to 30 days after sowing (DAS). During the stress period, morpho-physiological parameters including root traits were measured 25 to 30 DAS. Significant moisture X cultivar interactions were observed for most of the measured parameters. Total drought response indices (TDRI), developed as a screening tool to identify drought tolerance among the rice cultivars, and were between 22.87 and 30.72 among the cultivars tested. Based on TDRI and standard deviation, CLXL729 and CL142-AR showed the least and the most drought tolerance during the seedling growth among 15 cultivars tested in this study. Significant linear correlation (R^2 = 0.61) was obtained for root to shoot parameters using a regression analysis. The identified tolerance among the rice cultivars will help the rice producers to select the cultivars for dry direct seeding cultivation under variable soil moisture conditions.

P1.07

RICE CULTIVAR GROWTH AND DEVELOPMENTAL RESPONSES TO TEMPERATURE DURING EARLY-SEASON

Salah Jumaa, K. Raja Reddy
Mississippi State University, Starkville, MS, USA

Temperature is one of the major abiotic stress factors that affects plant growth and development at various stages of plants. In the US Midsouth, rice plants will be exposed to variable temperatures during the, depending on the planting date. We hypothesize that rice cultivars vary in their response to temperature. Four rice cultivars, CL152, Bowman, Antonio, and Mermentau along with two hybrids XL 753 and CLXL 745 most commonly grown in the US Midsouth evaluated in this study for temperature tolerance. Five day/night temperature treatments, 20/12 (very low), 25/17 (low), 30/22 (optimum), 35/27 (high), and 40/32°C (very high), were imposed after the seedling establishment, 13 days after planting (DAS). Growth and developmental including several root traits and physiological parameters using the WinRHIZO root image analysis system were recorded from plants harvested at 40 DAS. Based on total low- and high-temperature response index methods, relative temperature response scores were derived. Total low temperature index values ranged from 13.53 to 20.05 whereas total high temperature responses index values ranged from 30.03 to 47.11. Antonio, CL 152, and Mermentau were identified as sensitive to cold- and heat-sensitive and XL 753 as highly cold/heat tolerant hybrids, respectively, among the six cultivars tested. These results may be useful for breeders to develop new rice cultivars which could withstand low and high temperature conditions during seedling stages. However, further large scale studies are needed to evaluate all the cultivars in the controlled environments and field settings before recommending them to the producers and breeders.

P1.08

FIELD CHARACTERIZATION FOR DEVELOPING AUXIN AND GLYPHOSATE RESISTANT TOMATOES

Gourav Sharma[1], Zhiming Yue[1], Rick Synder[2], Casey Barickman[3], Te-ming Paul Tseng[1]
[1]Mississippi State University, Mississippi State, MS, USA, [2]Truck Crops Branch Experiment Station, Crystal Spring, MS, USA, [3]North MS Research and Extension Center, Verona, MS, USA

The United States is one of the world's leading producers of tomatoes, second only to China. In terms of consumption, tomato is the nation's fourth most popular fresh-market vegetable. In Mississippi it is grown on over 444 acres across 627 farms. Unfortunately, tomato yield is reduced by up to 25% because of herbicide drift mostly from row crops, thus discouraging the grower near Mississippi delta region from growing tomatoes even in the greenhouse. Major drifted herbicides are auxin herbicides and glyphosate. Thus, there is a need of herbicide tolerant tomatoes with better yield. We conducted a field experiment for characterization of herbicide tolerant lines of tomatoes, selected from our previous study. Ten different wild lines which were evaluated in the field. Plants were treated with stimulated drift rates of herbicide one week after transplant. The visual injury rating on the scale of 0-100% and height was noted every week after the spray till 56 days after treatment and in the end fruit yield was measured. Out of all these accessions TOM18 AND TOM35 which are tolerant to the dicamba have significant less injury then the commonly grown tomato but their yields are similar to cultivated tomatoes. Whereas, for quinclorac TOM129 was significantly different in terms of injury and fruit yield from cultivated tomato. These tomato line can be further use in the breeding programs, which will encourage farmers of Mississippi to grow tomatoes.

P1.09

SCREENING SOYBEAN CULTIVARS FOR LOW AND HIGH-TEMPERATURE TOLERANCE

Firas Alsajri, Chathurika Wijewardana, K. Raja Reddy
Mississippi State University, Mississippi State, MS, USA

Growth and yield of soybean are detrimentally affected by high and low temperatures during seedling stages, depending on the sowing dates. The objectives of this study were to evaluate 64 soybean cultivars representing maturity group III, IV, and V for temperature tolerance and to classify them in to different temperature tolerant groups. An experiment was conducted in sunlit controlled chambers by imposing three temperature regimes 20/12, 30/22, and 40/32 °C during seed germination and seedling establishment under optimum moisture and nutrient conditions. Physiological data including canopy temperature and SPAD were measured before harvest. Plant height, number of leaves on main stem, leaf area, and plant-component dry weights were measured at 17 days after planting. Several root morphological traits were assessed using winRHIZO root imaging system. Soybean cultivars varied significantly for many shoot and root parameters measured, particularly plant component weights and root morphological parameters among all temperatures. Cumulative low and high temperature response indexes, developed by summing individual response indices for each vegetative and physiological parameter, were used to classify the cultivars as sensitive, moderately sensitive, moderately tolerant, and tolerant. A strong and positive correlation (R^2 = 0.96) was observed between high and low temperature response indexes and implied that phenotypic characterization would be applicable and behaved almost similarly under both low and high temperatures. The identified heat- and cold-tolerant cultivars are potential candidates in breeding programs and would provide an option for the soybean producers to select cold and heat tolerant cultivars for the early and late planting systems.

P1.10

EVALUATION OF DROUGHT TOLERANT MAIZE GERMPLASM TO INDUCED DROUGHT STRESS

Chathurika Wijewardana, W. Brien Henry, K. Raja Reddy
Mississippi State University, Mississippi State, MS, USA

Corn is highly dependent upon soil moisture availability to generate consistent and favorable yield. The objective of this study was to assess photosynthesis responses of corn hybrids to drought stress intensities with and without known drought tolerance mechanisms. The six commercial hybrids, three drought tolerant, DKC 65-81, P1498, and N75HGTA, and three standards with similar

maturities, P1319, DKC 66-97, and N77P3111, were grown in four sunlit, controlled environmental chambers for 38 days. Four variable soil moisture treatments were achieved by manipulating irrigation based on evapotranspiration of control treatments starting at two weeks after planting. Plant biomass was measured at the final harvest, 38 days after planting. Photosynthesis and stomatal conductance and transpiration rates declined in all hybrids with declining soil moisture levels. Even though significantly higher values of these gas exchange parameters were observed under optimum and across a wide range of soil moisture conditions, the rate of declines of the parameters with unit decrease in soil moisture content were not different between the two groups of corn hybrids. These results suggest that greater rates of gas exchange properties and associated biomass production was achieved by increasing the potential photosynthesis under optimum conditions. The stress response, however, is not modified among the two groups of corn hybrids. This suggests that breeding should focus not only increasing potential photosynthesis, but also its response to drought conditions to be able produce higher biomass and great yield

P1.11.

SCREENING RICE LINES FOR SALINITY TOLERANCE AT EARLY STAGES

Naqeebullah Naqeebullah[1], Elberto Redoña [1], K. Raja Reddy[1]
[1]Mississippi State University, Mississippi State, MS, USA, [2]2Delta Research and Extension Center, Mississippi State University, Stoneville, MS, USA, [3]Mississippi State University, Mississippi State, 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 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 different salt concentrations and stress durations at seedling stage. Three rice genotypes, Rex, HHZ12, and BR47, with varied stress tolerance were grown in PVC pots, filled with sandy soil and irrigated through an automated computer controlled drip system. The treatments imposed included control, medium salt stress (EC 5 dS m-1) and high salt stress (EC 10 dS m-1) delived. The results showed significant decrease in most of the traits like shoots, roots and physiological growth with increasing salt stress. The 10 dSm-1EC daily caused the highest decline of shoot and root growth followed by 5 dSm-1daily salt stress level. Overall, the cultivars BR47 and Rex showed more tolerance to salt stress compared to HHZ12 cultivar. However, molecular analysis needs to be carried out to uncover the possible QTLs related to salt resistance. The information gained from this study may be useful in for the selection of salt tolerant cultivars at seedling stage in the field.

P1.12

EFFECTS OF SOIL-APPLIED CHELATES ON GROWTH AND CADMIUM ACCUMULATION IN *IPOMOEA LACUNOSA*

Davesha Doty, Kendrick Tobias, Gloria Miller, Maria Begonia, Gregorio Begonia
Jackson State University, Jackson, MS, USA

Phytoextraction is a cost-effective and enivronmentally-friendly phytoremediation strategy for reducing toxic metal metal levels from contaminated soils. This study was conducted to determine whether the addition of synthetic chelates, ethylene glycol bis (beta-aminoethyl ether)-N,N,N,N-tetraacetate (EGTA) and acetic acid (HAc), can further enhance the root uptake and subsequesnt translocation of Cd to the shoots. Seeds of morning glory (*Ipomoea lacunosa* L.) were planted in plastic tubes containing top soil and peat (2:1; v:v) spiked with various levels (0, 250, and 500 mg Cd/kg dry soil)of cadmium nitrate. At 6, 8, and 10 weeks after emergence, aqueous solutions of EGTA and HAc were applied to the root zone, and plants were harvested at 0, 5, and 7 days after chelate addition to coincide with the duration of maximum Cd availability as determined from a corollary chelate-induced metal solubility study. Our results revealed that morning glory was relatively tolerant to moderate levels of Cd as shown by non-significant differences in root and shoot biomass among treatments. An exception to this trend, however, was the slight reduction in root and shoot biomass of plants exposed to the highest Cd level in combination with the two chelates. Root Cd concentration increased with increasing levels of soil-applied Cd. Further, increases in root Cd concentration were attributed to chelate amendments. In conclusion, morning glory plants were grown to maturity in all treatments with no significant or apparent morphological disorders, which indicated that this species might be highly tolerant even at 500 Cd concentrations in soil.

P1.13

BIOAVAILABILITY AND UPTAKE OF LEAD BY *SESBANIA EXALTATA*

Kimberly Gilmore, Elsie Madison, Gloria Miller, Maria Begonia, Gregorio Begonia
Jackson State University, Jackson, MS, USA

Lead (Pb) binds strongly to soil particles and renders a significant soil-metal fraction insoluble and largely unavailable for plant uptake. This study was conducted to determine whether the application of chelates to the soil can increase the bioavailability of Pb for plant uptake. We mixed delta top soil and peat (2:1) and added lead nitrate to generate a Pb-contaminated soil concentration of 2000 mg Pb/kg dry soil. After incubating the Pb-spiked soil in the greenhouse at JSU for 6 weeks, *Sesbania* plants were grown in the soil and harvested at 6, 8, and 10 weeks after emergence. Six days before each harvest, chelating agents (ethylenediaminetetraacetic acid [EDTA] and acetic acid [HAc] alone or in combination) were applied to the root zone as an aqueous solution in a 1:1 ratio with the Pb concentration in the soil. Sequential extraction procedures were used to assess selective chemical fractions of Pb in the soil. Our results showed that a higher exchangeable fraction of Pb was available for plant uptake after chelate amendment compared to before chelate amendment. We also saw highe root and shoot Pb uptake after chelate amendment compared to before chelate amendment. Together these results suggest that chelate amendments can promote the bioavailability of Pb in the soil and increased the propensity for uptake by plants into roots and shoots. Further these results indicate that *Sesbania exaltata* can be grown under elevated Pb conditions and may be suitable as a potential crop rotation species for phytoextraction.

P1.14

SUSTAINABLE VEGETABLE PRODUCTION PRACTICES FOR SMALL-FARM FAMILIES

Chukwuma, Franklin; Njiti, Victor; and Nanjundaswamy, Ananda
Alcorn State University, Lorman, MS, USA

Alcorn State University sustainable vegetable production, management and marketing project works with small-scale vegetable producers to enhance the production and profitability of their vegetable crops while reducing the use of high-risk pesticides. The project utilized ten hand-on training sessions in 2014 and 2015 to educated small and limited-resource farmers on activities as it relates to sustainable vegetable production practices, good farm financial management and alternative marketing strategies of their farming operations. The trainings were conducted at Alcorn State University demonstration centers located in Mound Bayou, Preston, Marks, and Lorman Mississippi. A total of six hundred and fifty-three (653) farmers and agriculture professionals received hands-on training exercises. Pre-training survey indicated that70% of the farmers do not keep records of their farming operations; 80% produce and sell locally and 15% are engaged in some form of sustainable agricultural practices. The survey also revealed that the average age of the participating farmer is 45 years old. The farm size ranged from less than 3 acres (5%), upto10 acres (40%), 11-25 acres (35%) and more than 25 acres (20%) and majority of the participants (84%) reported that they receive just a fraction of their annual income from their

farming operation. Retrospective post surveys were utilized to determine the effectiveness of the trainings. Thus, the overall participants' knowledge was increased in all areas of instruction.

Thursday, February 23, 2017

EVENING

Ballroom

3:30 Dodgen Lecture and Awards Ceromony

General Poster Session

Immediately Following Dodgen Lecture

Friday, February 24, 2017
MORNING
Room Union C

8:00 **WORKSHOP ON PLANT BREEDING**

BREEDING AND PATHOLOGY FOR BIOTIC AND ABIOTIC STRESSES OF SOYBEANS

Friday, February 24, 2017

AFTERNOON

12:00-1:00- Plenary Speaker

1:00-3:00- Millsaps HHMI Undergraduate Symposium

CELLULAR, MOLECULAR AND DEVELOPMENTAL BIOLOGY

Chair: Davida Crossley
Alcorn State University
Vice-Chair: Donna M. Gordon
Mississippi State University
Vice-Chair: James A. Stewart
Mississippi State University

Thursday, February 23, 2017

MORNING

Room TC 214

O2.01

9:30 MSAB NUTRIENT-DEPENDENT REGULATION OF CAPSULE PRODUCTION IN *STAPHYLOCOCCUS AUREUS*

Justin Batte, Mohamed O. Elasri
The University of Southern Mississippi, Hattiesburg, MS, USA

Staphylococcus aureus has developed a complex regulatory network for controlling capsule. We identified a new regulator, MsaB, which specifically binds the *cap* promoter. Other regulators have also been shown to bind this region. Here, we explore the interactions between MsaB and other nutrient-sensing regulators (CodY and CcpE) binding *cap*. To explore the nutrient-dependent interactions between MsaB and CodY or CcpE, we constructed single mutations of *codY* and *ccpE* and double mutations of *msaABCR/codY* and *msaABCR/ccpE*. We compared the capsule phenotype of these mutants to *msaABCR* mutant under different nutrient conditions. We also explored binding of MsaB to *cap* in these mutants under nutrient-altered conditions. Under normal conditions MsaB binds to and activates *cap* in late-exponential/stationary phases. In the *codY* mutant we found that MsaB binds to *cap* in all phases yielding capsule production during all phases. Mutation of *ccpE* did not have any effect on MsaB binding. Additionally, mutation of either gene significantly altered transcription of *msaB*. Likewise, mutation of *msaB* significantly altered transcription of both genes, while mutation of any of the genes significantly altered transcription of *cap*. Here, we show that mutation of any individual gene has an effect on the other genes suggesting complex regulatory interactions between *msaABCR*, *codY*, and *ccpE*. Additionally, we found MsaB and CodY have nutrient-dependent competitive interactions to the *cap* promoter. These results suggest that CodY represses *cap* transcription under high nutrient conditions by blocking the MsaB binding site. When nutrients are limited, CodY becomes unbound allowing MsaB to bind and activate *cap*.

O2.02

9:45 DRUG DESIGNING FOR HORMONE THERAPY RESISTANT BREAST AND PROSTATE CANCERS

Pradip Biswas
Tougaloo College, Tougaloo, MS, USA

Hormone therapy resistant breast and prostate tumors are found to resume growth in hormone independent manner and present a major challenge in drug designing. In order to address the issue, we identify alternate protein targets by elucidating protein-protein and protein-DNA interfaces of ERα and AR and use them to develop new generation of anti-cancer agents. Using crystal structures of ERα and AR Ligand binding and DNA binding domains, molecular modeling, molecular dynamics simulations, and bioinformatics we identified the hydrogen-bonding contact motifs that are responsible for dimerization and/or DNA recognition. The crucial amino acids of a motif are then grafted on stable helices (alanine and glutamine) in order to develop peptidic inhibitors. Out of the three sequence motifs identified for ERα dimerization, we have used LQXXHQXXAQ (497-506) for peptide grafting and the designer peptides AAHQALAQAAAAAAAAA, AADQADAQAAAAAAAAA are tested in-vitro at collaborator's lab. In the presence of estrogen, both our designer peptides exhibit significant suppression of ER-expression in MCF-7 breast cancer cell lines. The designer peptides inhibit ERα dimerization – an essential process in ER mediated transcription. In AR, protein-protein binding contacts are insignificant to find a suitable target. The LCAXRXD motif (578-584) of AR that binds with AR and DNA is being studied for its suitability to develop designer peptide.Author acknowledges financial support from MS-INBRE funded by NCRR/NIH-5P20RR016476-11 and NIGMS/NIH-8P20GM103476-11.

O2.03

10:00 DETERMINING THE FUNCTION OF THE NITROGEN REGULATORY PROTEIN AREA IN *HISTOPLASMA CAPSULATUM*

Logan Blancett, Glenn Shearer
The University of Southern Mississippi, Hattiesburg, MS, USA

Histoplasma capsulatum (Hc) is the etiological agent of histoplasmosis, a common cause of respiratory mycoses in humans. *Hc* is a dimorphic organism existing as a mold (M) at 25°C and once inhaled by host (37°C) undergoes a dimorphic shift to the yeast (Y) phase. This dimorphic shift is essential for the pathogenesis of the organism within the host. The objective of this experiment to investigate the nitrogen regulatory protein *AreA* and determine its function. *AreA* has been found to be the key positive regulatory of Nitrogen Catabolite Repression in other closely related species. *AreA* transcript levels were determined under nitrogen-sufficient and nitrogen-free conditions using quantitative RT-PCR.The TOR inhibitor rapamycin was used to investigate it's use as an activator of *AreA*. Western blot was also performed to see changes, if any, in the *AreA* protein as well as any post-translational modifications. We have found that when subjected to a nitrogen-free environment *AreA* was up-regulated by 3-fold. When rapamycin was introduced into a nitrogen-sufficient environment *AreA* was up-regulated by 3-fold,

which mimics the results of a nitrogen-free environment. From these experiments we can conclude that *AreA* is playing a role in Nitrogen Catabolite Repression in *Hc.* It can also be concluded that TOR is an up-stream repressor of *AreA* since the addition of rapamycin, which inhibits TOR, leads to the de-repression of *AreA* in a nitrogen-sufficient environment.

O2.04

10:15 MOUSE EMBRYONIC STEM CELLS ARE INSENSITIVE TO THE CYTOTOXICITY OF INFLAMMATORY CYTOKINES

Bohan Chen, Yanlin Guo
The University of Southern Mississippi, Hattiesburg, MS, USA

The inflammatory response is a critical part of innate immunity and is presumably developed in most if not all, types of differentiated mammalian cells. However, recent studies from our laboratory have demonstrated that mouse embryonic stem cell (ESCs) lack responses to viral/bacterial pathogens and inflammatory cytokines. Together with similar observations in human ESCs by other investigators, we conclude that ESCs have underdeveloped innate immunity. This raises a fundamental biological question: why is such a vital defense mechanism not developed in ESCs? Based on the fact that immune and inflammatory responses generally have a negative impact on cell proliferation and viability of tissue cells, we hypothesize that the lack of innate immunity may protect ESCs from cytotoxicity from inflammatory cytokines. To test this hypothesis, we compare the effects of several major inflammatory cytokines induced by bacterial and viral infection, including TNFα, IFNα, IFNβ, and IFNγ, on ESCs and ESC-differentiated fibroblasts (ESC-FBs, which have partly developed innate immunity). Our results showed that individual cytokines caused a slight cell proliferation inhibition in ESC-FBs, but the combination of TNFα with IFNγ (or IFNα) caused dramatic cell death in ESC-FBs. On the other hand, none of these treatments showed apparent effects on ESCs. The responsiveness of ESC-FBs to TNFα and IFNγ was further confirmed by the activation of transcription factors NFκB and STAT1, respectively. However, none of these events took place in ESCs. These results support the hypothesis that the lack of innate immune responses could be a protective mechanism for ESCs during early embryogenesis.

10:30-10:45 Break

O2.05

10:45 CHARACTERIZATION OF PUTATIVE TICK SALIVARY ANTIGENS RESPONSIBLE FOR RED MEAT ALLERGY

Gary Crispell, 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 carbohydrate 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. In this study, an immuno-proteome approach was utilized to identify tick salivary antigens of interest. Western blot analysis was initially used to identify areas with proteins containing α-Gal. In-gel trypsin digestions and LC-MS/MS identified two putative glycoproteins from tick salivary glands. N-linked glycosylations of the identified proteins were confirmed using PNGase F to cleave the carbohydrates. Artificial feeding of ticks using human blood with a membrane feeding system provided additional evidence that α-Gal is induced upon blood feeding in the tick salivary glands. An RNA interference approach was utilized to knockdown one of the identified tick salivary antigens to assess its functional role in red meat allergy. The functional roles of the identified tick antigens will be presented.

O2.06

11:00 EXPRESSION STUDIES OF A MOLD-SPECIFIC GENE, IN THE DIMORPHIC FUNGUS *HISTOPLASMA CAPSULATUM*

Davida Crossley[1], Glenmore Shearer, Jr[2]
[1]Alcorn State University, lorman, MS, USA, [2]The University of Southern Mississippi, Hattiesburg, MS, USA

Histoplasma capsulatum (Hc) is a dimorphic fungus that is the causative agent for the respiratory infection histoplasmosis. The fungus is found in the environment as a multi-cellular saprophytic mold, and converts to a uni-cellular parasitic yeast in the lungs. The yeast is highly studied because the yeast is the pathogenic morphotype. Studies on *Hc* mold is highly overlooked. This research focuses on expression analysis of the *M46* gene in *Hc*. *M46* is up-regulated in *Hc* mold and is down-regulated in *Hc* yeast. Preciously, northern blot analysis with four commonly used *Hc* strains has shown that *M46* is up-regulated in strains G186AS and Downs mold, but is down regulated in strains G184AS and G217B mold. Reasons for lack of expression of *M46* in strains G184AS and G217B are unknown. Projects such as promoter analysis, and gelshift analysis, are currently being investigated to determine the reason for lack of expression. The *M46* promoter from all four *Hc* strains has been sequenced and has been fused to the reporter GFP to determine if the promoter is functional. A gel shift analysis by using the promoter regions of interest, will be used to help determine if there are transcription factors that may be the reason for lack of expression in the latter strains. Because the function of *M46* is unknown, the time of *M46* expression could correlate with the function of *M46*.

O2.07

11:15 ROLE OF MSAABCR OPERON IN CELL WALL BIOSYNTHESIS IN S*TAPHYLOCOCCUS AURESUS*

Bibek G C, Gyan S. Sahukhal, Mohamed O. Elasri
The University of Southern Mississippi, Hattiesburg, MS, USA

Staphylococcus aureus is an important human pathogen in both community and health care settings. One of the key problems with *S. aureus* as a pathogen is the acquisition of antibiotic resistance. Vancomycin has been used successfully to treat MRSA infections. However, vancomycin resistance in *S. aureus* is becoming increasingly prevalent. Previously, we have shown that deletion of the *msaABCR* operon effects cell wall thickness and vancomycin resistance in *S. aureus*. However, the mechanism by which this operon affects cell wall biosynthesis and vancomycin resistance in *S. aureus* is not known. We found that the *msaABCR* mutant cells and its respective purified Peptidoglycan (PG)-main constituents of cell wall, were more susceptible to lysozyme lysis compared to wild type strains. However, the *msaABCR* mutant cells showed increased tolerant to lysostaphin treatment. Additionally, HPLC analysis of peptidoglycan muropeptides of the *msaABCR* mutant showed significant reduction in the proportion of oligomeric muropeptides compared to wild type *S. aureus*. Results from this study shows that the *msaABCR* operon mutant are defective in PG-crosslinking most likely due to defective Penta-glycine chain in the cell wall. We will further characterize these phenotypes in genetic level to define the mechanism of regulation of cell wall biosynthesis and other cell envelope related stress by m*saABCR* operon.

O2.08

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 mis-expression of either BMP2 or BMP7 ligands, or by de-repression 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.

Thursday February 23, 2017
AFTERNOON
Room TC 214

1:00-3:00 Bioinformatics Symposium

Mississippi INBRE Symposium: METAGENOMICS TO FUNCTIONAL MICROBIOME

Organizer: Shahid Karim, Bioinformatics Director, Mississippi INBRE; Professor of Biological

Sciences, The University of Southern Mississippi (Shahid.Karim@usm.edu)

1:00-1:05 pm: Introduction

1:05 CHALLENGES AND ADVANCES IN THE METAGENOMIC AND MICROBIOME CHARACTERIZATION OF BACTERIA IN CLINICAL AND ARTHROPOD VECTOR SAMPLES.

Dr. Gregory Dasch,
Center for Disease Control and Prevention, Atlanta, GA, USA

1:25 MICROBIAL COMMUNITIES ASSOCIATED WITH THE BIOTRANSFORMATION POTENTIAL OF INSENSITIVE EXPLOSIVES IN SURFACE SOILS.

Dr. Fiona Crocker,
USACE Engineer Research and Development Center, Vicksburg, MS, USA

1:40 THE RHESUS MACAQUE GUT MICROBIOME AS A MODEL FOR HUMAN HEALTH AND DISEASE.

Dr. Eric J. Vallender,
University of Mississippi Medical Center, Jackson, MS, USA

1:55 RESOURCES FOR HIGH THROUGHPUT GENOMIC TECHNOLOGY IN MISSISSIPPI: APPLICATION FOR METAGENOMICS/*16S* MICROBIAL SEQUENCING.

Dr. Michael R. Garrett,
University of Mississippi Medical Center, Jackson, MS, USA

2:10 THE EFFECT OF SOIL MOISTURE ON THE STRUCTURE AND ACTIVITY OF MICROBIAL COMMUNITIES IN THE RHIZOSPHERE OF WHEAT.

Dr. Dmitri Mavrodi,
The University of Southern Mississippi, Hattiesburg, MS,

2:25 EVOLUTION OF THE GENOMES OF THE *COXIELLA*-LIKE ENDOSYMBIONTS OF TICKS.

Dr. Arunachalam Ramaiah,
Center for Disease Control and Prevention, Atlanta, GA,

2:40 TARGETED NEXT GENERATION SEQUENCING OF MICROBIAL COMMUNITIES AS A TOOL FOR ECOLOGICAL INFERENCE.

Bram Stone,
University of Mississippi, Oxford, MS, USA

2:55 CONCLUDING REMARKS

Thursday, February 23, 2017

EVENING

Ballroom

3:30 Dodgen Lecture and Awards Ceromony

General Poster Session

Immediately Following Dodgen Lecture

P2.01

CHARACTERIZING WILD-TYPE AND PHOSPHOMIMETIC MUTANT MUNC18 PROTEINS IN RECONSTITUTED DEGRANULATION ASSAY

Pratikshya Adhikari, Hao Xu
The University of Southern Mississippi, Hattiesburg, MS, USA

Mast cells require multiple Q and R-SNAREs to undergo compound degranulation and piecemeal degranulation, which underlie the selective release of proinflammatory mediators such as histamine and TNFα. We have previously identified six distinct exocytic trans-SNARE complexes relevant in mast cell degranulation: i) VAMP2/syntaxin3/SNAP-23,

ii) VAMP2/syntaxin4/SNAP-23,

iii) VAMP3/syntaxin3/SNAP-23,

iv) VAMP3/syntaxin4/SNAP-23,

v) VAMP8/syntaxin3/SNAP-23,

vi) VAMP8/syntaxin4/SNAP-23 and shown that Munc18a specifically activates VAMP2 and VAMP3 based reactions. In this

study we investigated the activities of Munc18b and Munc18c, both of which are also linked to mast cell degranulation. We showed that Munc18c exhibit the same specificity as Munc18a, albeit at lower salt concentrations. Meanwhile, Munc18b was able to stimulate VAMP8/syntaxin3/SNAP-23 based reaction. Since Munc18s are phosphorylated in various secretion cells including mast cells, we generated phosphomimetic mutants for each Mun18 isoform based on previously reported studies and tested their function in reconstituted fusion reactions. However, none of the phosphomimetic mutants appear to differ in activity or specificity as compared to the wild-type, suggesting these phosphorylation events affect Munc18 interaction with SNARE-independent partners in the fusion reaction.

P2.02

CHARACTERIZING THE IMPACT OF OCCIDIOFUNGIN ON MORPHOGENESIS OF *CANDIDA ALBICANS*

Aaron W. Albee, Donna M. Gordon
Mississippi State University, Mississippi State, MS, USA

Occidiofungin is a glycolipopeptide derived from *Burkholderia contaminans* shown to have broad fungicidal properties. This includes *Candida albicans*, a dimorphic fungus with potentially life threatening medical complications for immunocompromised individuals. This study focuses on the effects of occidiofungin on the dimorphic switching of *C. albicans*. Biological triggers shown to induce filament formation include pH, temperature, media conditions, and the presence of quorum sensing molecules. To determine the impact of occidiofungin on morphogenic switching, cells were grown to saturation in YPD media. To induce hyphae formation, cells were diluted into fresh media and placed at 37˚C. Occidiofungin, at 0.5X MIC, was added immediately prior to the temperature shift; an equal volume of DMSO was added to the control culture. Samples were removed at defined intervals for data collection. The results showed a reduction in cell count, inhibition of morphogenic switching with only a small abnormal hyphae growth in treated samples. Accompanying shorter hyphae are general defects in overall hyphal morphology. These defects will be further analyzed by calcofluor white and FITC-concanavalin A staining to monitor chitin and cell wall mannan distribution, respectively. Data from these experiments show occidiofungin has an inhibitory effect on the morphogenic switching of *C. albicans*. Given the importance of switching to *C. albicans* pathogenesis, these findings support the need for future studies aimed at detailing the impact of occidiofungin on cellular structural components, cell wall composition, and plasma membrane changes and their link to hyphae formation.

P2.03

LEAD NITRATE INDUCED CYTOTOXIC EFFECTS TO HUMAN LEUKEMIA CELLS THROUGH OXIDATIVE STRESS

Brandon Barner, Michael Shivers, Clement Yedjou, Paul Tchounwou
Jackson State University, Jackson, MS, USA

Lead is a heavy metal that is found naturally in the earth crust. Throughout history, lead has been used in various industrial applications including the manufacturing of fossil fuels, paint, plumbing materials, batteries, and cosmetics. Despite its beneficial industrial uses, lead has caused environmental contamination of the air, water, and soil. Recent studies conducted by US Environmental Protection Agency reported that children and pregnant women are the population most vulnerable to the toxic effects of lead exposure. Additionally, a widely cited scientific paper suggests that lead exposure during pregnancy can inversely affect fetal growth, neurological development, and cause spontaneous abortion. The present study was designed to use HL-60 cells as a test model to determine whether lead treatment induced toxicity to human leukemia cells is mediated through oxidative stress. Human leukemia (HL-60) cells were treated with different concentrations of lead nitrate for 24 hr. Live and dead cells was determined by trypan blue exclusion test and microscopic imaging. The role of oxidative stress in lead nitrate toxicity was assessed by lipid peroxidation, glutathione peroxidase (GPx) and catalase (Cat) assays, respectively. Oxidative stress biomarkers showed significant increase ($p < 0.05$) of malondialdehyde levels on one hand and gradual decrease of antioxidant enzyme activity (GPx & Cat) on the other hand with increasing lead nitrate concentrations. Taken together, finding from the present study demonstrates that lead nitrate treatment induced cytotoxic effects through oxidative in HL-60 cells.

P2.04

HYPERTENSION IN HELLP SYNDROME IS ASSOCIATED WITH INCREASED REACTIVE OXYGEN SPECIES

Allison Barnes[1], Kedra Wallace[2], Shauna Spencer[2], Teylor Bowles[2]
[1]Tougaloo College, Tougaloo, MS, USA, [2]University of Mississippi Medical Center, Jackson, MS, USA

HELLP syndrome is associated with oxidative stress which is suspected to play a role in the hypertension and endothelial dysfunction associated with the disease. The objective of the current study was to examine a role for reactive oxygen species (ROS) in mediating the hypertension associated with HELLP syndrome. To address this objective on gestational day (GD) 12 miniosmotic pumps infusing sEndoglin (7ug/kg) and sFlt-1 (4.7ug/kg) were implanted into normal pregnant (NP) rats to induce HELLP syndrome. On GD18 carotid catheters were inserted into HELLP and NP rats and mean arterial pressure (MAP) was recorded on GD19. Rats were treated with the superoxide dismutase inhibitor (Tempol) in their drinking water to determine if blockade of oxidative stress decreased hypertension. MAP was significantly increased in HELLP rats (120.6+7.86mmHg) compared to NP rats (94.25+2.58mmHg; $p=0.007$). Urinary isoprostane, a marker of lipid peroxidation, was increased in HELLP rats ($p=0.003$) compared to NP rats. Placental NADPH oxidase stimulated ROS increased from 3421+831.2 to 6840+1175 relative light units (RLU)/min/mg in NP to HELLP rats ($p=0.038$). Placentas from HELLP rats also had a significant increase in total antioxidant capacity (TAC; 155.4+39.42 CRE/mg) compared to NP rats (54.07+5.09 CRE/mg; $p=0.04$). Administration of Tempol to HELLP rats significantly decreased MAP ($p=0.04$), urinary isoprostane ($p=0.01$) and the placental TAC ($p=0.06$). These data support the hypothesis that hypertension in response to anti-angiogenic imbalance is mediated in part by oxidative stress.

P2.05

POPULATION OF OLIGODENDROCYTE PRECURSORS IN WHITE MATTER OF MICRORNA-21 KNOCK-OUT MICE

Hannah Bonner[1], Damian Romero[2], J. Javier Miguel-Hidalgo[2]
[1]Belhaven University, Jackson, Mississippi, USA, [2]University Mississippi Medical Center, Jackson, MS, USA

Micro-RNAs are small inhibitory RNAs that reduce expression of certain proteins by interfering with mRNA translation. Micro-RNA 21 (miR-21) is particularly enriched in oligodendrocytes, and our prior research has shown a reduction in miR-21 in the white matter (WM) of human subjects with depression. MiR-21's roles in glial cells are currently unknown. We hypothesized that reduction of miR-21 could cause alterations in oligodendrocyte precursors that would be reflected in miR-21-containing mature oligodendrocytes. To test this hypothesis brain tissue sections from mice with the miR-21 gene knocked out (KO) and wild-type mice (WT) were labeled by immunohistochemistry for neuron-glial antigen 2 (NG2) and platelet-derived growth factor receptor alpha (PDGFRA), both of which are markers for oligodendrocyte precursors. The corpus callosum, the main WM bundle connecting both cerebral hemispheres, was analyzed using StereoInvestigator to quantify cell morphology and number. Analysis of the labels showed a significantly greater density of PDGFRA-expressing cells in the KO mice. There was no significant difference in NG2 expression between the KO and WT mice. These results suggest that mi-R21 reduction might result in alterations in WM oligodendrocyte precursors. We speculate that reduction of miR-21 may inhibit maturation of some precursors to oligodendrocytes. The results from this research contribute to an

understanding of the mechanisms by which miR-21 may be involved in glial cell pathology observed in depression and alcoholism. Future directions may include analysis of PDGFRA and NG2 cells in the white matter from humans diagnosed with depression and alcoholism and correlation with miR-21 levels.

P2.06

THE *MSAABCR* OPERON MUTANT *STAPHYLOCOCCUS AUREUS* IS DEFICIENT IN PERSISTERS BY AMINOGLYCOSIDES

Aaliyah Cole, Shanti Pandey, Gyan Sahukhal, Mohamed Elasri
The University of Southern Mississippi, Hattiesburg, MS, USA

Persister cells comprise a phenotypic variant that shows extreme antibiotic tolerance resulting in chronic infections. While this phenomenon has posed a great threat in public health, mechanism underlying their formation in *Staphylococcus aureus* remains largely unknown. Increasing evidences of presence of persister cells in recalcitrant infections underscores the great urgency to unravel the mechanism by which these cells are developed. We characterized *msaABCR* operon that plays roles in regulation of virulence, biofilm development and antibiotic resistance. We hypothesized that the operon also plays role in persister cell formation. In this study, we tested whether the metabolites enhances the killing effect of aminoglycosides (gentamycin) and compared the number of persister cells formed between wild type (WT) USA300_LAC strain and *msaABCR* deletion mutant in gentamycin treatment. Our study shows that the *msaABCR* mutant is defective in persister cells while treating with gentamycin with fructose. The complemented *msaABCR* restored the phenotype thus showing strong effect of the operon enhancing the uptake of metabolites. Further, we will try to identify the molecular mechanism of regulation of transporter genes by *msaABCR* operon which enhances their uptake leading to higher killing effects of persisters. This study will bring new insights into the designing of effective drugs against the persisters overcoming failures of staphylococcal infections.

P2.07

AGMATINE CAUSES NEUROBLASTOMA PROLIFERATON, METABOLIC DOWN-REGULATION IN A 3-DIMENSIONAL INVITRO COLON MODEL

Jason Cooper, John Piletz
Mississippi College, Clinton, MS, USA

The gut microbiota has long been known to facilitate nutrient catabolism, vitamin synthesis, and pathogen elimination. Yet, these indwellers have more recently been realized to modulate our endocrine and enteric nervous systems. Agmatine, decarboxylated arginine, is an endogenous polycation, produced: (1) abundantly (mM levels) by enteric bacteria in a dynamic manner linked to bacterial pH control; (2) much less abundantly in human cells as a neurotransmitter acting on multiple receptors. Previous investigations have shown that mM agmatine leads to lowered proliferation *in vitro* when applied to a human gut epithelial cell line (C2BBe1) as well as lowered proliferation applied to another cell line from a human neuroblastoma (SH-SY5Y). Anti-proliferative mM effects of agmatine in endothelioma cells are also known to be linked to lowered intracellular polyamine levels, reduced DNA synthesis and arrested cells in S-phase and G2 phase. To more accurately model the physiological and anatomical environment of the gut, we now describe an *in vitro* 3-dimensional system using the same cell lines co-cultured. Millimolar agmatine added exclusively to overlayered C2BBe1 cells in this model caused a pro-proliferative response in the underlying SH-SY5Y cells which coincidentally displayed lowered metabolic activity per neuron than pretreatment. This unexpected response hinted that growth factors were released in the 3D cell model, a finding that we have followed-up with western dot blots of growth factor receptor kinase activations. This unfolding signaling pathway of agmatine from lumen-to-neurons may be one way that gut microbiota interact with our enteric nervous system and upward to the brain.

P2.08

THE NEUROPROTECTIVE ROLE OF MIR-1017, A 3' TAILED MIRTRON

Matthew de Cruz, Alex Flynt, Kody Mansfield
The University of Southern Mississippi, Hattiesburg, MS, USA

MicroRNAs (miRNAs) regulate the expression of most animal mRNAs. Due to the pervasive activity of these genes many roles have been identified in development and physiology, however many remain uncharacterized, especially non-canonical family members. Here we identify a function of a 3' tailed mirtron, miR-1017. miR-1017 is encoded within an intron of an Acetylcholine receptor, nAChRα2. Visualizing GFP driven by nAChRα2 transcriptional enhancer sequences showed the miR-1017 host transcript is present in adult gustatory organs and the associated region of adult brains, specifically the suboesophageal ganglion. Consistent with a role in neurobiology, many miR-1017 predicted targets have roles in neurons. Using mir-1017 knock out (KO) flies, we found derepression of two targets: nAChRα5 and its host transcript nAChRα2. GFP driven by nAChRα2 in the mir-1017 KO showed a broader expression pattern, suggesting a role in a negative feedback loop that modulates sensitivity of neurons to Acetylcholine (Ach). Numerous neurodegenerative diseases including Alzheimer's disease (AD) have shown that increased receptor activity causes reactive oxygen species to develop, which leads to neurodegeneration. Indeed, miR-1017 KO presents reduced lifespan, poor climbing ability, and an increase in Cleaved Caspase staining in the CNS. miR-1017 may function to limit Ach activity and protect from excitotoxic-induced neurodegeneration. Interestingly, ectopic expression of miR-1017 can rescue lifespan and neurological function in a fly AD model. This research demonstrates the importance of miRNA-mediated gene regulation, even when enacted by non-conventional species.

P2.09

THE EFFECTS OF TESTOSTERONE ON BEHAVIOR AND MUSCLE PHYSIOLOGY IN FEMALE MANAKINS

Braxton Dupuy, Lainy Day
University of Mississippi, Jackson, MS, USA

Testosterone plays a pivotal role in motivation to produce sexual courtship displays. However, it also has a strong influence on muscle physiology. In adult golden-collared manakin males which is a bird with an acrobatic courtship, particular muscles used in the display have upregulation of parvalbumin, insulin-like growth factor I, myogenic differentiation factor D, and myostatin which are responsible for increasing muscle activity, increasing muscle mass, regulating muscle composition, and negatively regulating cellular division, respectively, in response to testosterone treatment. Since testosterone also causes males to display, we cannot untangle the effects of testosterone versus exercise on gene expression. Testosterone treatment in juvenile male and female manakins can also activate a male-like courtship display. Because not all females perform the male-like display, we can determine the independent effects of testosterone and exercise on muscle gene expression and determine if testosterone affects male and female muscle physiological similarly. We used video analyses to measure the quantity of male-like display behavior performed by testosterone-treated and control females to separate them into testosterone plus exercise, testosterone no exercise, and control no exercise groups. We will then use quantitative PCR to determine if testosterone increases expression of our genes of interest, and to isolate the effects of testosterone and exercise on this gene expression. We hypothesize that due to the sexually monomorphic distribution of androgen receptors the response to testosterone will not differ between the sexes. Further, we predict that the highest gene

expression will occur in those birds that had testosterone and exercised.

P2.10

DIFFERENTIAL EXPRESSION OF *ASPERGILLUS FLAVUS* MILRNAS IN AFLATOXIN-RESISTANT MAIZE INBRED LINES

Amanda Harper, Katy Franks, Din-Pow Ma
Mississippi State University, Mississippi State, Mississippi, USA

Corn is frequently infected by a soil fungal pathogen *Aspergillus flavus* at both pre-harvest and post-harvest stages. Infected corn by *A. flavus* strains can produce aflatoxins B1 and B2, and ingestion of corn contaminated with aflatoxins causes aflatoxicosis that damages the liver and suppresses the immune systems. 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 by Dr. Williams's research group at USDA/ARS at Mississippi State. The maize inbred lines that are resistant and susceptible to *A. flavus* would provide excellent materials/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. One hundred and thirty-five miRNA-like RNAs (milRNAs) had been identified in *A. flavus* via Illumina deep sequencing, and the expression of them was found to be correlated with aflatoxin production. 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 had been used to inoculate kernels of resistant (Mp719) and susceptible (Va35) maize lines, and *A. flavus* milRNAs differentially expressed in corn kernels of the two lines were identified and further validated by real time RT-PCR.

P2.11

GARLIC EXTRACT INDUCES TOXICITY TO HUMAN LEUKEMIA CELLS (HL-60) THROUGH OXIDATIVE STRESS

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Garlic supplementation in diet has been shown to be beneficial to cancer patients. Recently, its pharmacological role in the prevention and treatment of cancer has received increasing attention. However, the mechanisms by which garlic extract induces cytotoxic effects in cancer cells remain largely unknown. The present study was designed to use HL-60 cells as a test model to determine whether garlic treatment induced toxicity to human leukemia cells is mediated through oxidative stress. Human leukemia (HL-60) cells were treated with different concentrations of garlic extract for 24 hr. Live and dead cells were determined by trypan blue exclusion test and microscopic imaging. The role of oxidative stress in garlic toxicity was assessed by lipid peroxidation, glutathione peroxidase (GPx) and catalase (Cat) assays, respectively. Oxidative stress biomarkers showed significant increase ($p < 0.05$) of malondialdehyde levels on one hand and gradual decrease of antioxidant enzyme activity (GPx & Cat) on the other hand with increasing garlic doses. Taken together, finding from the present study demonstrates that at therapeutic concentrations, garlic treatment induced cytotoxic effects through oxidative in HL-60 cells.

P2.12

IDENTIFICATION AND MUTAGENESIS OF SYMBIOTIC REGULATORS IN *XENORHABDUS NEMATOPHILA*

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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. In an attempt to more directly investigate the role of biofilm formation on mutualism and pathogenesis by *X. nematophila*, we identified genes with predicted roles in biofilm formation and targeted them for mutagenesis. These genes include two component signal transduction regulators homologous to *baeR*, which responds to *Escherichia coli* cell envelope stress, and *uvrY*, which is associated with a complex metabolic regulatory pathway and activates biofilm formation (also in *E. coli*). We also targeted *manA*, predicted to be involved in exopolysaccharide production, and XNC1_2836, a gene encoding a putative diguanylate cyclase enzyme. In addition, we screened a library of random transposon mutants for differences in biofilm formation relative to the wild-type strain. We obtained and examined two such transposon mutants with enhanced biofilm phenotypes, and preliminary results indicate that biofilm formation may be detrimental to initial colonization of the mutualistic nematode host, but provides an advantage for survival within the nematode host.

P2.13

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

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Colorectal cancer is a prevalent disease. Almost 50,000 people die from colorectal cancer each year. The current treatment for colorectal cancer includes surgical removal plus chemotherapy. However, about 50% of the patients will have recurrence within 5 years. The reason for this recurrence is believed to be 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. Specific stem cell markers have been identified for the stem cells in the gastrointestinal tract, and double cortin like kinase1(DCLK1) is one of them. To determine the correlation of DCLK1 with the tumorigenesis 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 dosage. 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 chemoresistance of colorectal cancer cells.

P2.14

A TWO-STEP RT-PCR ASSAY FOR QUANTIFYING *TRICHOMONAS VAGINALIS* VIRUS

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Purpose: Trichomoniasis is the most common non-viral sexually transmitted infection (STI) in the world. The flagellated protozoan *Trichomonas vaginalis* is the causative parasite of this infection. *T. vaginalis* itself can be infected with up to four strains of *T. vaginalis* virus (TVV1-4). Clinical isolates of *T. vaginalis* can be qualitatively determined to be virus-positive or virus-negative with literature primers that amplify regions specific to each virus. There is no method for quantitatively assessing viral RNA found in *T. vaginalis* cells. Methods: In order to assay viral RNA, plasmids constructed to

include cloned TVV1-4 specific regions were used to generate standard curves with a SYBR green-based qRT-PCR assay. For the assay, either the plasmid or cDNA synthesized from total RNA isolated from *T. vaginalis* cultures were used as the template. Results: This assay was effective for assessing viral RNA copies in *T. vaginalis* and was used to estimate the copy number in isolates from the American Type Culture Center used in numerous other studies. Initial data suggest that TVVs (particularly TVV1) are present only in a low percentage of an isolate's cells, evidence which may support the theory of strictly vertical transmission of *T. vaginalis* virus. Conclusion: We have developed a qRT-PCR based method for determining the copy number of TVV in *T. vaginalis* cultures. Acknowledgement: 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

P2.15

USING ROSETTA TO STUDY THE FOLDING OF MUTATIONS IN A SMALL ENZYME

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We studied protein folding in silico of a small enzyme using Rosetta by making mutations using the molecular grahics program PyMol. We chose to work with HPr15 – a structure with only 85 residues – and used the solved crystal structure (PDB ID: 3CCD) as a structural guide for protein folding simulations. HPr15 is a histidine-containing protein, which undergoes phosphorylation-catalyzed formation of a succinimide intermediate. Upon hydrolysis of this intermediate an aspartate intermediate exclusively forms rather than isoaspartate. In this project, I mutated the active site of the HPr15 protein by changing amino acids involved in catalysis. Amino acids mutations were made at positions 45K, 46S, 47L. Each residue was changed to each of the following amino acids: Ala, Leu, Pro, Phe, Asp, Glu, Lys and His. We took each mutant and ran a folding simulation using the Rosetta suite of programs. Rosetta is useful for predicting protein folding from a primary sequence. It is able to compare non-covalent interactions using the existing protein structure database and apply them to any primary sequence. The Rosetta software offers an opportunity to observe how folding may change if amino acid mutations are made without having to clone, overexpress, purify and assay the protein. Each mutation showed a shift in conformation of the β1 stand, which disrupted the central β-sheet. These results indicate that making mutations at the active site of HPr15 may disrupt the overall fold of the protein that could complicate overexpression, purification and therefore site activity relationship studies.

P2.16

LOSS OF FUNCTION OF MS95 INHIBITS *HISTOPLASMA CAPSULATUM* GROWTH UNDER OXIDATIVE STRESS.

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Histoplasma capsulatum is a pathogenic fungus that is the etiologic agent of the respiratory disease histoplasmosis in mammals. Histoplasma undergoes a morphogenic shift from mold to yeast which is crucial to the pathogenesis. This study is aimed at elucidating the function of the mold-specific gene, MS95, which shares homology with the *S. cerevisiae* DDR48 gene which is involved in DNA repair and resistance to oxidative damage. We plated 1.0 x 104 cells µL of G186AS (MS95+), G186AS (Δms95) G186AS (ms95/MS95) strains, in triplicates, on Histoplasma macrophage media (HMM) with varying concentrations of Paraquat dichloride, which create oxidative stress. Growth of the mold was monitored to determine the effect of loss of function in the MS95 gene in resistance to this oxidative attack. A significant (two-tailed student's T test) difference in growth was observed between the MS95+ and Δms95 strains on plates containing 40uM, 60uM, 80uM and 100uM concentrations of paraquat dichloride. Complementation of the knockout mutant with a functional copy of MS95 mostly restored the resistance to paraquat. Deletion of the MS95 gene resulted in paraquat sensitivity. Restoration of MS95 activity (confirmed by RT-PCR) restored paraquat resistance to near wild type levels thus indicating that MS95 plays a role in resistance of *H. capsulatum* to oxidative stress. Work is ongoing to determine if MS95 also plays a role in DNA repair.

P2.17

IDENTIFICATION OF BVES INTERACTING PROTEINS

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Adherens junctions (AJs) and tight junctions (TJs) mediate epithelial cell-cell contact. Loss of cell-cell contact leads to epithelial mesenchymal transition and regaining the contact results in mesenchymal to epithelial transition. AJs and TJs have also been shown to regulate Rho and WNT signaling respectively. Therefore, modulation of the AJs and TJs alter regulatory signaling for these pathways. BVES is a tight junction associated integral membrane protein that is under expressed in colorectal carcinoma. BVES expression has been shown to decrease anchorage independence, proliferation, invasion and migration in Lim 2405 cell lines. BVES knockdown in Caco-2 cell lines decreased trans-epithelial resistance and increased growth of tumors in a xenograph model. Although BVES has a role in colorectal carcinoma, little is known about molecular pathways that BVES regulates and even less about functional significance of BVES interacting proteins. To determine unknown protein –protein-interactions, a BVES yeast two-hybrid screen was employed. This screen revealed several candidate proteins. We aimed to determine the functional impact of BCAR3 on BVES. BCAR3 mapped to the GEF domain of BVES and has been shown to play a role in EMT. BCAR3 promotes migration and invasion; conversely, knockdown inhibits migration and invasion in a panel of breast cancer cell lines. To determine the functional significance of the BCA3-BVES interaction, I will confirm the interaction via co-IP and I will determine the effect of BCAR3 on the BVES dependent phenotypes in colorectal carcinoma cell lines using knockdown and overexpression approaches. The results will be discussed.

P2.18

DETERMINING WHEN M46 A PHASE-SPECIFIC GENE EXPRESSES IN THE FUNGUS *HISTOPLASMA CAPSULATUM*

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Histoplasma capsulatum (Hc) is a dimorphic fungus that can exist in the soils as mold, or in the human host as yeast. It is the yeast that is the causative agent for the respiratory infection histoplasmosis. Because the yeast is the pathogenic morphotype, it is highly studied. Therefore, the mold is over looked. This study focuses on the mold specific *M46* gene, a gene that is highly regulated in the mold and is down regulated in the yeast. A northern blot analysis from previous studies has shown that *M46* is expressed in *Hc* strains G186AS and Downs, and is down- regulated in strains G184AS and G217B. The reason for lack of expression in those two strains is unknown. The purpose of this project is to use gel shift analysis to determine if the reason for lack of expression of *M46* is due to the presence or absence of transcription factor(s). Two promoter regions of interest will be used in the gelshift study that have shown a slight difference in sequence, from the *M46* expression strain promoter. The expressing and non- expressing *M46* strains will be presented side by side, so that a comparison will be made based on a shift in signal. The work is currently ongoing. We do expect to see a difference in

size of shift when comparing the M46 expressing strains with the M46 non-expressing strains. Future directions after this project, will be to identify the protein that may be the cause for the lack of expression.

P2.19

CHARACTERIZING THE *E. COLI* PROTEINS YFDW, YFDU AND YFDX

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Studies show that the formation of kidney stones is due to the increased oxalate in the blood. Oxalate is an organic acid which promotes a moderate acid tolerance response in *E.coli* K-12. Scientists believe the presence of *Oxalobacter formingenes* plays a key role in mediating mammalian calcium oxalate homeostasis. *Oxalobacter formingenes* is a constrained anaerobe that lines the human gastrointestinal tract and uses oxalate as an origin of energy and carbon for cellular chemical compound production. We are interested in three proteins: YfdW, YfdU, and YfdX. YfdW and YfdU are needed for oxalate-induced acid tolerance response in E.coli, and they are homologous to proteins formyl-CoA(FRC) and Oxalyl-CoA decarboxylase(OXC) present in *O.formingenes*. FRC transfers coenzyme A to oxalate from formyl-CoA forming oxalyl-CoA which is subsequently decarboxylated by OXC. If *Oxalobacter* is present then it can be a mediator in the transformation of oxalate into formate and carbon dioxide in a coupled catalytic cycle which will lower the oxalate in blood and lessen the chance of kidney stone formation. YfdX is an unknown protein in *Escherichia coli*, but we do know it is located downstream to the yfdxWUVE operon which is needed for the long-term survival of the *E.coli* K-12 MG1655 strain. We are working to clone these genes in order to express and purify the active proteins. Before we are able to express recombinant proteins we first have to build the construct. Using a cloning method called In-Fusion allowed for the insertion of our PCR product into the PNH-TrXT vector.

P2.20

IDENTIFICATION OF MIRNAS DIFFERENTIALLY EXPRESSED IN FIBERS IN COTTON PHYA1 RNAI LINES

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Silencing phytochrome A1 gene (*PHYA1*) by RNA interference in upland cotton (*Gossypium hirsutum* L. cv. Coker 312) had generated *PHYA1* RNAi lines with improved fiber quality (longer, stronger and finer fiber). In this study, a total of 77 conserved miRNAs belonged to 61 families were identified in a *PHYA1* RNAi line and its parent Coker 312 by using multiplex sequencing. Of these miRNAs, seven (miR7503, miR7514, miR399c, miR399d, miR160, miR169b, and miR2950) were found to be differentially expressed in RNAi cotton. The target genes of these differentially expressed miRNAs were involved in the metabolism and signaling pathways of phytohormones, which included Gibberellin, Auxin and Abscisic Acid. The expression of MYB transcription factors was also affected by miRNAs in RNAi cotton. In addition, 35 novel miRNAs (novel miR1-novel miR35) were identified in fibers for the first time in this study. The target genes of the majority of novel miRNAs were also predicted. Of these, nine novel miRNAs (novel-miR1, 2, 16, 19, 26, 27, 28, 31 and 32) were targeted to cytochrome P450 like-TATA box binding protein (TBP). The qRT-PCR confirmed expression levels of some miRNAs, and inverse expression patterns of four miRNAs-targets pairs had also been detected via RNA deep sequencing. Together, the results imply that miRNA mediated fine-tune gene regulation might confer to the phenotype of the *PHYA1* RNAi line with improved fiber quality.

P2.21

KALE, A POTENTIAL TREATMENT FOR NEUROBLASTOMA SHOWN BY KILLING SH-SY5Y CELLS

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Kale juice was our focus in an earlier presentation (Qizilbash et al. MSAS 2015) showing arrest of B16F10 mouse melanoma cells at doses that have no effect on the growth of non-malignant epithelial cells. We hypothesized kale should also kill other human cancer cell lines, such as the CACO-2 colon cancer and SH-SY5Y neuroblastoma cell lines. To test this, we performed proliferative and metabolic experiments on these cells using the same kale extracts except filtered (0.2 µm) and adjusted the juice pH from 6.5 to 7.4. First, the SH-SY5Y cells were allowed to proliferate exponentially, then synchronized for 1 day by reducing from 10% to 1% fetal bovine serum, followed by a 5-day time-course experiment with 1.4% of full juice – a sub-optimal dose based on the melanoma cells. SH-SY5Y numbers dropped 54.6% after 4 days treatment with the 1.4% kale juice. Cell diameters in the SH-SY5Y cells following 1.4% kale juice were approximately 18% smaller than cells without kale. Trypan blue staining and metabolic assays from different doses of kale extract (0%, 0.7%, 1.4%, 2.8%, 4.2%) showed that higher concentrations of the juice decreased the SH-SY5Y numbers (avg. 90.1% drop) and cell viability dropped (avg. 57.3%). Despite this, CACO-2 cells had no such responses to the same kale juice treatments. These results broaden the range of cell types that are selectively killed by kale juice. If this finding holds *in vivo*, then oral kale ingestion may kill neuroblastomas but have no effect on colon cancers.

P2.22

DISTRIBUTION OF HORMONES IN THE BRAIN OF THE GOLDEN-COLLARED MANAKIN AVIAN SPECIES

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Steroid receptors and their synthetic enzymes modulate both reproductive and cognitive aspects of courtship displays. In vocal learning birds that have a song system compared with non-vocal learners the distribution of estrogen receptor alpha and beta, androgen receptors, and the estrogen synthetic enzyme, aromatase, are differentially distributed with far more expression of these proteins in vocal learners forebrain areas, song specific regions, and cerebellum. Recent studies have suggested that one species of non-song birds, the golden-collared manakin, that does an acrobatic courtship display may have distribution of these steroid proteins more like songbirds, with some unique localizations related to acrobatic (Fusani, Schlinger, et al). Across the family of manakins, courtship displays range in complexity from relatively simple hops and flights to flips and loud "wing snaps" produced faster than the human eye can see. We have been investigating neural and hormonal adaptations related to the complexity of these displays. We know that the volume of a number of brain regions is positively associated with display complexity and we are now trying to determine if steroid protein localization and quantity varies with behavioral complexity. We have begun by verifying that the distribution of aromatase mRNA seen in previous studies matches with the distribution of aromatase protein detected with immunohistochemistry and comparing this distribution between a songbird, the zebra finch, and the non-vocal golden-collared manakin. We will then examine this distribution in 12 manakin species that vary in display complexity.

P2.23

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

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Staphylococcus epidermidis is a nosocomial pathogen associated with infections of indwelling medical devices. Its biofilm provides antibiotic resistance and the ability to evade host immune response. A newly described operon, *msaABCR*, linked to biofilm development, virulence and antibiotic resistance in *Staphylococcus aureus* has been found to have good homology with *msaABCR* operon in *S. epidermidis.* Therefore, we hypothesized that *msaABCR* will play a similar role in both species. The mechanism of biofilm development, however, may be different between the species. The *S. epidermidis msaABCR* deletion was made by allelic replacement. The mutant strain does produce less biofilm than the wild-type. Environmental factors that reduce the biofilm of wild-type and mutant strains are DispersinB and DNaseI, suggesting that the biofilm attachment may be mediated by polysaccharides and eDNA. ProteinaseK and sodium metaperiodate also affect the biofilm early in development, further suggesting polysaccharide importance. The mutant has increased protease and lytic activity similar to that found in *S. aureus msaABCR* mutant suggesting that this operon may play similar roles in the two species. Further studies must be done to understand the mechanism of development for each strain. Studies must also be done to determine the mutant's virulence mechanism and ability for resistance. The findings may be therapeutically relevant to control biofilm-associated infections in *S. aureus* and *S. epidermidis* strains. 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.

P2.24

PROTEIN COMPARISON BETWEEN THREE MLST GENOTYPES OF *TRICHOMONAS VAGINALIS*

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Purpose: *Trichomonas vaginalis* is a protozoan parasite, which infects individuals with a sexually transmitted disease known as trichomoniasis. *T. vaginalis* exists as three MLST subtypes, designated Genotype 1 (GT1), GT1B, and GT2. Further, *T. vaginalis* may harbor any of four strains of double stranded RNA viruses-TVV1, TVV2, TVV3, and TVV4. The current study investigates whether *T. vaginalis* MLST genotype affects surface protein expression profile, which could affect interaction with the vaginal wall. Methods: Twelve isolates of *T. vaginalis*, 4 each from GT1, GTB, and GT2 were cultured in a horse serum media for analysis whole cell SDS-PAGE analysis and surface protein expression analysis. Cells were also exposed to varied concentrations of ribavirin, sparsomycin, and anisomycin for 7 days. Relative amounts of TVV were determined. Results: Growth profiles were similar amongst samples with the exception that PRA98 grew much more quickly. No gross differences were visible by SDS-PAGE analysis with either Coomassie or silver stain. Incubation with drugs resulted in increased copy number of TVV2 in each cell line with the exception of PRA98. Conclusion: *T. vaginalis* cell culture is not trivial, but we became proficient in growing cell cultures and preparing samples of known cell count for subsequent experiment. We hope LC-MS analysis of biotinylated surface proteins will result in significant differences between MLST genotypes. Acknowledgement: 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.

P2.25

ABSENCE OF THE PIWI/PIRNA PATHWAY IN THE HOUSE DUST MITES

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Dust mites are major health concern as they are the number one allergy-causing agent worldwide affecting more than 50% of all allergic patients. They are also exceedingly interesting due to their unusual evolutionary history. They have become free living descending from parasitic life style. Parasitic ecology is achieved by means of significant genome alterations that also hint potential genomic rearrangement during reverting to free living. Transposable elements (TE) activity can impair genome integrity by causing large-scale genomic alteration and eukaryotes have developed multiple mechanisms to ensure TE suppression. One of the major mechanisms is the RNA interference (RNAi) that degrades messenger RNA or block translation in a sequence specific manner. One major component of the RNAi biology is the piwi/piRNA pathway that is responsible for degrading TE derived RNAs in animal's gonad. Investigation of the dust mite's small RNA biology failed to identify this pathway, rather a small-interfering RNA (siRNA) like pathway has been found in place of the piwi/piRNA pathway. The novel siRNA like pathway has also evolved with some innovations such as siRNA producing TE control master loci. Piwi/piRNA pathway is present in other members of the Acari, which indicates that loss of the pathway is a recent event.

P2.26

HIGH SALT DIET CAUSES DECREASED PROGENY NUMBERS IN *DROSOPHILA MELANOGASTER*

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Drosophila melanogaster, a model organism, requires a multitude of minerals to function. While Ca^{2+}, Fe^{3+}, Mn^{2+}, and Mg^{2+} salts are found to be unnecessary for survival, salts containing Na^{+} are essential. Research has been done pertaining to the effects of dietary salt on *Drosophila melanogaster*, including attraction versus aversion behaviors and modulation of stress responses of an SLC5 symporter. However, research is still lacking in multiple areas pertaining to the effects of dietary NaCl on *Drosophila melanogaster* survival and development. We hypothesized that exposure of adult *Drosophila melanogaster* to a high salt diet would result in decreased reproduction and lifespan. To test our hypothesis, we separated equal numbers of male and female flies into two diet groups: a control standard diet containing 0.2 mM NaCl, and a high salt diet containing 64.0 mM NaCl. Egg, larvae, pupae and adult fly numbers were counted over a period of eleven to fifteen days. We observed a significant decrease in progeny at the third instar larval stage from adults on the high salt diet compared with those resulting from adults on the control diet (average of 16 less from adults on high salt diet). Additionally, there was a significant decrease in pupae (average of 32 less from adults on control diet). Future studies will include reproduction evaluation of second-generation high salt diet (F1 flies whose parents were started on a high salt diet), as well as evaluation of gene expression changes following the diet change.

P2.27

REGULATION OF MSAB PRODUCTION FROM MSAABCR OPERON IN *STAPHYLOCOCCUS AUREUS*

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Staphylococcus aureus causes a wide range of acute and chronic infections in humans. The msaABCR operon regulates biofilm

development, antibiotic resistance and virulence in *S. aureus*. Transcription of msaABCR generates several sub-transcripts including one that translates MsaB protein. However, the regulation mechanism of this operon and the role of the sub-transcripts is not yet understood. In this study, we investigate the role of 5' end and 3' end of the msaABCR operon in the regulation of production of MsaB. We constructed a series of truncated msaABCR operon constructs (TC-1 to TC-12) from both the 5' end and the 3' end and studied MsaB production and its role in proteases production, pigmentation and biofilm development. Our results show that full msaABCR operon transcript complemented to the wild type level in terms of pigmentation, protease production, biofilm development, and MsaB production. Two constructs, TC-5 and TC-9, complement the msaABCR deletion mutant and result in overexpression of MsaB. The constructs TC-1, TC-2, TC-3 and TC-4 did not complement the msaABCR deletion 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. These result also suggest that the 5' end and the 3' end of the transcript interact and play a role in the production of MsaB and biofilm development. In conclusion, this study defines the regulatory functions of the 5' and 3' ends of the msaABCR transcript in the production of MsaB and Biofilm development.

P2.28

QUANTITATIVE ANALYSIS OF RETROGRADE SIGNALING IN SELECT RTG2P MUTANTS OF *S. CEREVISIAE*

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In *Saccharomyces cerevisiae*, dysfunctional mitochondria can initiate a mitochondria-to-nuclear signaling cascade known as retrograde signaling. This pathway offers a means to compensate for mitochondrial deficiencies by initiating the transcriptional upregulation of select genes, such as *CIT2*, a peroxisomal isoform of citrate synthase. *CIT2* expression is regulated by the activity of several cytosolic proteins including Mks1p, Rtg1p, Rtg2p, and Rtg3p. Rtg2p functions as the cytosolic sensor that, when bound to Mks1p, allows the Rtg1p/3p complex to enter the nucleus. Nuclear localized Rtg1p/3p then functions as a transcriptional activator for select genes including *CIT2*. Using a random chemical mutagenesis approach, our lab has generated four *RTG2* mutants that exhibit reduced retrograde signaling. To expand on the qualitative differences in Rtg2p signaling identified through the use of growth on selective plates, quantitative data was obtained using classic promoter driven β-galactosidase liquid expression assays. For these studies, the β-galactosidase gene, *lacZ*, was placed under the *CIT2* promoter in strains that expressed each of the Rtg2p mutations. Cells were grown in non-inducing (+ glutamate) and inducing (-glutamate) conditions and the impact of each mutation on Rtg1p/3p transcription was quantified. For analysis, β-galactosidase activity was normalized to the wild-type Rtg2p expressing strain under non-inducing conditions. Data indicate that β-galactosidase activity for all but one *rtg2* mutant was below the level of detection, consistent with the observed defects in growth on selective plates. In the future, more sensitive methods (e.g. qPCR) will be needed to detect differences in transcriptional activities between these four mutants.

P2.29

MEDIA CONDITIONS THAT IMPACT CELLULAR SENSITIVITY TO THE ANTIFUNGAL OCCIDIOFUNGIN

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Occidiofungin is an antifungal compound shown to have cidal properties against various fungi including the nonpathogenic yeast, Saccharomyces cerevisiae. Previous work in the lab has shown that altered environmental conditions influence S. cerevisiae sensitivity to occidiofungin. For example, shifting cells to phosphate depleted media induced occidiofungin resistance while limiting carbon resulted in enhanced occidiofungin sensitivity. Since iron plays an essential role in fungal cell growth and phosphate signaling has been shown to influence cellular iron uptake, we were interested in determining whether extracellular iron had an impact on occidiofungin sensitivity. To this end, yeast were grown in Mes buffered iron-free media supplemented with increasing concentrations of iron and minimum inhibitory concentration (MIC) assays were used to measure cell susceptibility to occidiofungin. We found that regardless of the form or concentration of iron tested, there was no difference in occidiofungin sensitivity. To confirm cellular sensing of iron, an epitope tagged version of the iron reductase Fre2p was generated by homologous recombination. Using Fre2p:HA3 as a molecular tool to measure iron response, Fre2p half-life was compared in cells moved from iron-free media into phosphate- or glucose-depleted conditions. Monitoring Fre2p levels over a 40-minute time period found a minimal increase in protein half-life under glucose depleted conditions compared to glucose replete conditions. Results from this work will increase our understanding of cellular pathways important for responding to occidiofungin exposure which may be important for identifying potential modes of acquired resistance to this novel compound.

P2.30

CHEMOGENETIC MODULATION OF MESOLIMBIC DOPAMINERGIC NEURONS IN THE RAT

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Reward-related behavior is largely mediated by the mesolimbic dopaminergic pathway that originates in the midbrain ventral tegmental area (VTA). The VTA is comprised of multiple cell types, thus experimental stimulations of this region are typically non-specific. Here, we validate the use a Designer Receptor Exclusively Activated by a Designer Drug (DREADD) approach to specifically excite VTA dopamine (DA) neurons. Viral-mediated transfection of transgenic tyrosine hydroxylase::Cre rats was used to induce the expression of an excitatory DREADD receptor (AAV5-DIO-hM3D[Gq]-mCherry) in VTA DA cells. To confirm specific activation of these neurons, the effects of clozapine-N-ozide (CNO) administration on conditioned place preference behavior, locomotor activity, and cFos expression were examined at two times of day (zeitgeber time [ZT]11 and 23). Immunohistochemical analyses revealed specific expression of the DREADD receptor in DA neurons that was confined to the VTA region. Systemic CNO administration significantly induced a conditioned place preference at ZT11 but not at ZT23. In contrast, CNO administration significantly induced locomotor activity and VTA c-Fos expression at both times of day examined. CNO administration did not significantly affect these parameters in animals with misplaced viral injections. These results demonstrate that a chemogenetic approach can be used to specifically modulate the activity of mesolimbic dopaminergic neurons and suggest that time-of-day is an important factor to consider with these manipulations.

P2.31

ISOLATION AND IDENTIFICATION OF ANTIBIOTIC PRODUCING MICROBES FROM VARIOUS CULTIVATED FARMLANDS

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Antibiotics are substances produced by microorganisms that inhibit the growth of or destroy bacteria and other microorganisms. In spite of the many antibiotics available, a need still exists for the discovery/development of new ones. Soil, the most prevalent source of antibiotic-producing microorganisms, contains an astounding diversity of microbes, many of which have not been identified. The level of diversity is influenced by the types of plants present, temperature, moisture, soil texture and structure. In the current study soil samples obtained from five managed farmlands, rice, soybean,

corn, and cotton, and from 70 year old undisturbed forestland were diluted and plated on various types of media. Antibiotic producers were identified using the "crowded plate" method. Antibiotic activity was confirmed by testing these colonies against a bacterial panel consisting of *Pseudomonas aeruginosa, Escherichia coli, Staphylococcus aureus, and Bacillus subtilis*. Isolates with activity were further characterized by biochemical and morphological tests. To date, 13 isolates with antibiotic activity against the bacterial panel have been identified. Most were from the genus *Bacillus* with two being actinomycetes.

P2.32

FLORESCENT IMAGING OF CALCIFIED VASCULAR SMOOTH MUSCLE CELLS

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Vascular calcification occurs when large deposits of calcium mineral accumulate in the vascular arterial walls and obstruct blood flow. The smooth muscles cells of the arteries develop into osteoblasts and the calcification can lead to serious diseases such as cardiovascular disease and chronic kidney disease. In medical research today, scientists are investigating therapies that can reverse and inhibit calcification. By researching therapies for prevention, elevated calcium and phosphate levels must be observed at various aspects in order to examine the transformation of smooth muscle cells to osteoblasts. The fluorescent stain, Xylenol orange easily stains calcium mineral and could differentiate newly formed osteoblast-like cells from the smooth muscle cells. Cells will be grown in a calcification media containing dibasic sodium phosphate, which induces calcification. The Xylenol orange fluorescent stain will then be used to identify mineral deposits. The stain will make it clear where the calcification is located in the cell culture, as well as how quickly the transformation occurs once the calcification media is added. In the future, the detection of the mineralization using Xylenol orange will be used to determine alternative markers that will signal the transformation of smooth muscle cells into osteoblasts. We will perform a time course study to determine the earliest onset of calcification. Once the studies have been conducted on the mineralization and transformation of the smooth muscle cells, the staining will be used as an efficient indicator of various therapies that will reduce calcification effectively.

P2.33

GENERATION OF RETICULON KNOCKOUT *TETRAHYMENA THERMOPHILA*

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Autophagy is a process by which cells degrade cellular material for recycling in the absence of nutrients. Recent evidence has suggested that this process can be used to selectively degrade specific organelles. This selectivity may arise from the interaction of specific proteins on the surface of organelles and the membranes used to expand the autophagosome. It remains unclear whether these models apply to autophagy of the nucleus (nucleophagy) despite the recently discovered role of nucleophagy in many disorders. Using the ciliate, *Tetrahymenathermophila* as a model system we aim to identify novel proteins that regulate autophagy of the nucleus. To this end, we have identified Reticulon, as potential regulator in autophagy of the macronucleus since reticulon family proteins have been shown to tubulate endoplasmic reticulum membranes (the most widely observed source of autophagosomal membranes) and related proteins were recently shown to act as autophagosome receptors in yeast. Based on these observations, we aimed to determine the effects of reticulon deletion on nucleophagy in Tetrahymena. To do this we amplified using PCR and cloned the 5' and 3' untranslated regions (utr) of reticulon into regions of a plasmid. This plasmid was introduced into Tetrahymena using biolistic transformation in the presence of drug for the purposes of selection. Future experiments will focus on the effects of reticulon deletion on the degradation of the parental macronucleus. Acknowledgement: This work was funded by an Institutional Development Award (IDeA) from the NIGMS under grant number P20GM103476 and HHMI award granted to Millsaps College.

P2.34

BVES AND BCAR3 SIGNALING IN COLON CANCER

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Tight junctions have been implicated in colon tumorigenesis. Silencing Blood Vessel Epicardial Substance (BVES), a tight junction associated protein, in epithelial cell lines promotes cancer-like properties through poorly understood mechanisms. We hypothesize that BVES interacts with BCAR3, a BVES interacting proteins, to promote epilthelial-like phenotypes. The objectives for this study include: 1) determining whether BVES modifies epithelial phenotypes via interactions with BCAR3- an oncoprotein that interacts with BVES, and 2) examining the role for the BVES-BCAR interaction in regulating pathways linked to colon cancer. A yeast two-hybrid screen and biochemical assays confirmed the BCAR3 - BVES interaction. BVES inducible cell lines were transduced with BCAR3 lentiviral constructs and evaluated for cell attachment, detachment, apoptosis, migration and invasion. Following induction of BVES, there was a trend toward increased cell attachment to the culture dish at Day 11 as compared to non-induced cell lines, suggesting that BVES affects cell adhesion. Constitutive expression of BCAR3 in BVES induced cell lines resulted in increased cell attachment when compared to uninduced cell lines, suggesting BVES impacts apoptotic programs. BVES expression in a highly metastatic cell lines resulted in a significant increase in migration and invasion. BCAR3 augmented these effects in BVES inducible cell lines. In summary, this data suggests BVES induction impacts cell adhesion and apoptotic programs. The results also reveal that BCAR3 augments these effects in BVES inducible cell lines. Taken together, these results support a role for BCAR3 in modulating BVES phenotypes.

P2.35

***TRICHOMONAS VAGINALIS* VIRUS TAGGING FOR EFP-FUSION FLUORESCENCE MICROSCOPY**

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Enhanced green fluorescent protein (EGFP) and enhanced red fluorescent protein (ERFP) genes can be inserted with portions of the TVV genome at different loci and cloned into a plasmid vector (pNH-TrxT) at the Nco1 restriction site and transfected into *Trichomonas vaginalis*. Different strains will be tagged with red and green and observed through fluorescence microscopy. The presence of fluorescence within successive generations, the color, and specific location of each color will provide insight into the method of genetic exchange and the nature of inheritance of *Trichomonas vaginalis*. Comparison between different strains and control groups may assist in determining the influence TVV carries in these processes. Different growth and expression patterns are expected in viral cells carrying the fluorescent protein genes at different loci in relation to the viral capsid and polymerase genes. This variable and the inclusion or exclusion of untranslated regions can be used to examine gene regulation protocol of TVV.

P2.36

THE EFFECTS OF TRIAMCINOLONE ACETONIDE ON A549 CELLS

Kayla Rice[1], Dominique Thompson[2], Victoria Williams[2], Michelle Tucci[4], Hamed Benghuzzi[4], Gerri Wilson[4], Austin Puckett[4], Esther Iyanobor[5]
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We hypothesize that inhaled corticosteroids are widely used for the treatment of patients with inflammatory lung disorders including asthma, chronic obstructive pulmonary disease, and sarcoidosis. Corticosteroids effectively reduce the production of inflammatory mediators such as cytokines and chemokines. In this study A549 type II pneumocytes were challenged with low (5 µg/mL), medium (25 µg/mL), or high (50 µg/mL) doses of triamcinolone acetonide (TA) for 24, 48, and 72 hours. Cellular protein levels were not affected at 24 and 48 hours following treatment with TA when compared to control untreated cells. Cellular protein levels showed a significant reduction after 72 hours following treatment with all doses of TA when compared to control cells. A decrease in nitric oxide was seen by 24 hours and remained suppressed after 48 hours. Morphological assessment of the cells indicated an increase in the number of karyolitic cells by 48 hours in all TA treated cells when compared to control untreated cells. There also appeared to be a dose-dependent increase in the number of pyknotic cells when compared with control untreated cells. Overall, the data shows that increased concentrations of TA have adverse effects on type II pneumocytes, which is important information because an intact pulmonary surfactant system is necessary for normal respiratory function. Our data suggest that increasing doses of TA may increase the loss of the surfactant producing cells and further impair the respiratory function. This work was funded by an Institutional Development Award (IDeA) from the NIGMS under grant number P20GM103476.

P2.37

THE ROLE OF ADVENTITIAL FIBROBLASTS IN DIABETES-MEDIATED VASCULAR CALCIFICATION

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Type II diabetes mellitus and the role of Advanced Glycation End-Products (AGEs) and their receptor, Receptor for AGEs (RAGE), has been identified as one of the key mediators of diabetic complications. Diabetic patients experience a higher level of cardiovascular complications than the general population, particularly vascular calcification. Vascular calcification has been demonstrated to occur in the arterial medial layer; however, the adventitial layer, once thought to be a static layer composed of fibroblasts and nerve endings, has been shown to play a dynamic role in vascular function. Fibroblasts are responsible for the underlying extracellular matrix and serve as progenitor cells for myofibroblasts. When vascular injury occurs, the fibroblast undergoes a phenotypic switch to myofibroblasts where they can travel to the site of injury and continue to excrete a matrix to support cell attachment. Fibroblasts and myofibroblasts are investigated in a variety of diseases and have been implicated in vascular calcification. The purpose of this research is to elucidate the role of adventitial fibroblasts in diabetes-mediated vascular calcification. Primary mouse adventitial fibroblasts of non-diabetic (Het^{RWT}) were isolated and placed in conditioned media from vascular smooth muscle cells in a diabetes-mediated vascular calcification cell culture model. Western blotting analysis revealed increased RAGE, smooth muscle actin (SMA) expression, and bone morphogenic protein-2 in Het^{RWT} cardiac fibroblasts exposed to conditioned calcification media for 24-hours. Thus, demonstrating a potential positive correlation between RAGE expression and changes in adventitial fibroblast phenotype to support vascular calcification.

P2.38

HIGH EFFICIENT SOMATIC EMBRYOGENESIS AND REGENERATION FROM LEAF CULTURES OF *CITRULLUS COLOCYNTHIS*

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An efficient protocol was developed for plant regeneration through somatic embryogenesis from leaf explants of *Citrullus colocynthis* (L.) by combining the plant growth regulators, supplemented with 2,4-dichlorophenoxyacetic acid, 1-naphthaleneacetic acid, gibberellic acid alone and along with combination of 6-benzylaminopurine. The different forms of calli such as compact, white friable, creamy friable, brownish nodular, green globular and green calli were induced from the leaf explants on MS medium containing different concentrations of auxins and gibberellins. Subsequently initial callus was subcultured at 1.5 mg L^{-1} BAP + 1.0 mg L^{-1} 2, 4-D which resulted in 25 % somatic embryos from 85 % nodular embryogenic nodular callus that is highest percentage. Similarly the lowest percentage of somatic embryos was recorded at 2.5 mg L^{-1} BAP + 0.5 mg L^{-1} NAA from 55 % embryogenic globular callus i.e., 16 %. High frequency of embryo development takes place at intermittent light when compared with continuous light in the individual subcultures. The cotyledonary embryos were developed into complete platelets on MS medium. The *in vitro* grown plantlets were transferred to greenhouse and survival rates of *in vivo* plants up to 60%.

P2.39

FOLLOWING SCI: AN ASSESSMENT OF CRF AND A NOVEL BLOOD-TESTES BARRIER TEST

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Two projects are presented, both dealing with secondary effects of spinal cord injury (SCI) using fluorescent immunohistochemistry (IHC). Project 1 hypothesized that SCI affects the corticotropin-releasing factor (CRF) system. In a limited characterization, a CRFR1-GFP linked mouse model of spinal contusion injury was examined 6 days post-SCI. CRF and CRFR1, as well as GFAP (an astrocytic marker), were visualized in sagittal sections using IHC. We found that (1) CRF co-localizes with GFAP in white matter and vascular-like structures in grey matter of the uninjured spinal cord. In addition, following SCI, (2) CRFR1 labeling decreased drastically in neuronal and axonal grey matter, as well as (3) in the spleen. This suggests undiscovered interplay among CRH, the spinal cord, and SCI, including new (1) sources or binding sites within the cord, (2) neuronal actions, and (3) roles in the massive immune activation following SCI. All warrant further study. In Project 2, the same contusion model as described above was used, now at 48 hours post-SCI. 10 kD dextran was circulated prior to sacrifice and was subsequently visualized with IHC. Uninjured mice showed dextran limited to blood vessels and outer sheaths of seminiferous tubules, while injured mice showed intrusion of dextran into the lumen. These findings are highly consistent with MRI-based methods for detection of BTB deficits. Following SCI, BTB dysfunction may be a cause of infertility in males; this method provides a new, sensitive means of assessing deficits and measuring the efficacy of therapeutics designed to combat SCI's effects on fertility.

P2.40

EVALUATION OF MAGNETIC NANOPARTICLE EXPOSURE ON BOAR SPERM MOTILITY AND VIABILITY

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Semen ejaculates contain a mixture of viable and non-viable spermatozoa, which imbalance influences male fertility. However,

current techniques for detection of non-viable spermatozoa lack specific targeting for their removal. Previously, we used specifically designed magnetic nanoparticles to selectively target and remove non-viable spermatozoa from insemination doses (nanopurification). The present study assess the impacts of the nanopurification process on the viability of residual spermatozoa. Insemination doses (n=5) were obtained at a local boar stud and semen were mixed with or without magnetic nanoparticles designed to target moribund (apoptotic and acrosome reacted) spermatozoa. Control and mixed semen were incubated, allowing sperm-nanoparticle interactions. Afterwards, mixed semen were placed against a powerful magnet trapping moribund spermatozoa and allowing elution of viable spermatozoa. Before and after incubations, sperm motion and viability parameters were respectively analyzed with a Computer-Assisted-Sperm-Analyzer (CASA) and flow cytometry after specific staining. Data (mean±sem) were analyzed with Statistical Analyzing Software (SAS). $P<0.05$ indicated threshold of significance. There was a decreased proportion of static sperm after purification (8.95±0.46% vs. 11.28±0.49% for the control; $P<0.05$). In comparison to the control, the motion parameters (total and progressive motility, straightness, linearity, VSL, and BCF) were significantly increased in the purified group, while ALH was decreased ($P<0.05$). Viability parameters (plasma membrane integrity, acrosome and mitochondrial potential) were similar between control and nanopurified spermatozoa ($P>0.05$). In conclusion, findings indicate the successful removal of damaged spermatozoa (static) through nanopurification without impairing viability of residual spermatozoa, but having beneficial effects on sperm motion. Work supported by USDA-ARS Biophotonics Initiative #58-6402-3-018.

P2.41

UNDERSTANDING THE PROMOTER OF A PHASE SPECIFIC GENE IN *HISTOPLASMA CAPSULATUM*

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Histoplasma capsulatum (Hc) is a dimorphic fungus, that causes the respiratory infection histoplasmosis. In the environment, the fungus is a multi-cellular saprophytic mold, and shifts to a uni-cellular parasitic yeast in the mammalian host. The objective of this project is to analyze the promoter of a mold -specific gene in *Hc*. Northern blot analysis has previously shown that *M46* is up-regulated in strains G186AS and Downs mold, but is down regulated in strains G184AS and G217B mold. The reasons for lack of expression of *M46* in the latter strains is unknown. The M46 ORF was sequenced to determine if *M46* exist in all strains. The M46 ORF sequenced was conserved in all four strains, therefore the *M46* ORF is not a reason for lack of expression of *M46*. Sequencing of the *M46* promoter region from all four strains revealed a 12 bp deletion and 10 bp insertion upstream from the TATA Box sequence of *M46* non -expressing strain G217B. The promoter sequence of *M46* in *M46* expressing strain G186AS is identical to the promoter sequence of *M46* in non-expressing strain G184AS. The reason for lack of expression of *M46* in strains G217B and G184AS mold is unknown. Current work is consisting on fusing the *M46* promoter from all four strains to the reporter GFP to determine if the *M46* promoter is functional or is a reason for lack of expression in strains G184AS and G217B.

P2.42

USING SERS ASSAY TO DETECT DENGUE VIRUS SEROTYPE 2

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Dengue Virus (DENV) is a flavivirus spread by mosquitoes that is endemic in the tropic and subtropic climates. It is the causative pathogen of Dengue Fever, Dengue Hemorrhagic Fever, and Dengue Shock Syndrome, and has been classified as a reemerging pathogen. There have been several reports of the virus being spread via blood transfusions. Due to the expense on expertise needed to run infield tests like ELISA and rapid detection tests (RDT), as well as the variable percentage of correct results, we developed a system of detection using the surface-enhanced Raman spectroscopy (SERS) with gold nanoparticles to detect DENV and West Nile Virus (WNV). After the promising results of the SERS application and further research into the specificity of the assay, we hypothesized that SERS could be used to distinguish between four different serotypes of DENV. To test this, specific antibodies for DENV 2 were produced from the HB46-ATCC cell line and collected from the medium of the cell line. Using HiTrap™ Protein G HP columns, the antibodies were purified from the medium. Concentration was performed via Spinx centrifuge filters, after which the concentration was measured by Bradford assay. SDS-PAGE confirmed no protein contamination, and immunostaining confirmed antibody specificity for DENV 2. Jackson State University is providing the gold nanoparticles, and due to the lack of those parti42cles for the moment, only the antibody work was confirmed.

P2.43

THE EFFECTS OF A VOLATILE ANESTHETIC AGENT AND LPS ON A549 CELLS

Dominique Thompson[1], Esther Iyanobor[2], Victoria Williams[1], Kayla Rice[3], Gerri Willson[4], Austin Puckett[4], Michelle Tucci[4], Hamed Benghuzzi[5]
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Inhaled anesthetics are fairly common all over the world for minor and extensive surgical procedures in patients. Volatile anesthetics have been shown to exhibit anti-inflammatory effects in the lungs and have significant non-anesthetic physiologic effects. This study evaluated the response of A549 cells to a 30 minute exposure with isoflurane followed by a challenge with either low (2 ng/mL), medium (5 ng/mL), or high (10 ng/mL) dose of an inflammatory agent, LPS. Cell viability markers (protein concentration and cell number), cell function markers (intracellular glutathione and nitric oxide production), and cell morphology were evaluated after 24, 48, and 72 hours. Cell number and cellular protein concentrations were similar for the duration of the experiment. Cellular glutathione was increased in those treated with LPS at 24, 48, and 72 hours compared to the isoflurane control. Interestingly, the nitric oxide response was lower in LPS treated cells after 48 hours when compared to isoflurane control, which suggests that the inflammatory response was attenuated. Cell morphology was evaluated, and our results showed an increase in the number of anucleated cells in the medium and high groups after 24 hours. Hydropic swelling, karyolysis, and karyohexis at 24, 48, and 72 hours were not different from isoflurane-only treated cells. Overall, LPS following isoflurane treatment did not increase cell damage or decrease viability. Isoflurane appeared to reduce the pro-inflammatory nitric oxide response, often associated with acute lung damage. Acknowledgement: This work was funded by an Institutional Development Award (IDeA) from the NIGMS under grant number P20GM103476.

P2.44

OSTEOCHONDRAL XENOGRAFT CROSSLINKING

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The purpose of the research was to determine the effects of treatment on Epigallocatechin Gallates (EGCG), and Genipins degree of crosslinking, as well as to achieve concentration to 30-60-

90% degree of crosslinking. Researchers speculate that using acellular osteochondral xenografts are a better alternative than allografts for the repairing of focal articular cartilage lesions in the knee. To make a xenograft resistant to chronic immune responses of the body, researchers must stabilize the xenograft through crosslinking the cartilage. The study uses Genipin and EGCG to crosslink decellularized porcine articular cartilage plugs or discs. Genipin is a chemical compound found in gardenia fruit extract, and Epigallocatechin Gallate is a compound found in many dietary supplements as well as dried leaves of white tea, green tea and, in smaller quantities of black tea. The methods used for the study started off by harvesting plugs and discs from the stifle joints of pigs, the collected discs/plugs are then washed and frozen for preparation for the Genipin and EGCG solution. Plugs/discs are then placed in both solutions to incubate at 37°C for a duration of 24 to 72 hours where they then turn red (EGCG) and blue (Genipin). Plugs/discs are washed in distilled water after which a ninhydrin assay is run determine the amount of free amino groups in uncrosslinked control and experimental discs/plugs. The results of this research could be used to develop a new treatment alternative for localized articular cartilage injuries in the knee.

P2.45

THE EFFECTS OF ISOFLURANE AND TRIAMCINOLONE ACETONIDE ON A549 CELLS

Victoria Williams, Kayla Rice, Dominique Thompson, Esther Iyanobor, Gerri Wilson, Austin Puckett, Michelle Tucci, Hamed Benghuzzi

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The integrity of the lung alveolar epithelial barrier is required for the gas exchange and is important for immune regulation. Alveolar epithelial barrier is composed of flat type I cells, which make up approximately 95% of the gas-exchange surface, and cuboidal type II cells, which secrete surfactants and modulate lung immunity. The goal of the experiment was to evaluate the effects of isoflurane treatment of type II pneuomyctes that were subsequently treated with low (5 µg/mL), medium (25 µg/mL) or high (50 µg/mL) triamcinolone acetonide (TA) for 24, 48, and 72 hours. The results show a decrease in cell number in all treated groups after 48 hours. At 72 hours after treatment TA treated groups had significant reduction in cell numbers. Intracellular glutathione content was not statistically different in the TA treated groups compared with the isoflurane treatment alone for the duration of the experiment. Nitric oxide showed a significant decline after 48 hours in all TA treated groups when compared with isoflurane only treated cell. Cellular morphological changes were also evident by 24 hours in the TA+ isoflurane treated groups when compared to isoflurane only treatment. There was a dose dependent increase in the number of karyolitic and pyknotic cells. Overall, the data suggest that increases in TA administration following isoflurane exposure causes an alterations in cell morphology by 24 hours and reductions in cell numbers by 48 hours. The data also suggests that an increase in cell loss as the dose of TA increases.

P2.46

DEVELOPMENT OF A MILD AUTOIMMUNE DISEASE MODEL FOR EVALUATION OF CANNABIDIOL EFFECTS

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Cannabidiol (CBD), a known immune suppressor, is being investigated as a treatment for multiple sclerosis (MS), an autoimmune disease in which the immune system attacks cells in the central nervous system (CNS). Mouse model experimental autoimmune encephalomyelitis (EAE), simulated MS to determine effects and mechanisms of CBD. Previous in vitro studies demonstrated that CBD differentially regulated cytokine production depending on the strength of T cell activation. We induced EAE with two different amounts of a self-antigen to determine if CBD also differentially altered EAE disease. Thus, EAE and "low EAE" were induced with 100 µg or 20 µg of the self-peptide, myelin oligodendrocyte glycoprotein (MOG_{35-55}), respectively. We hypothesized that CBD would attenuate EAE and enhance low EAE. In EAE, clinical scores were delayed by CBD by 2 days, and low EAE, clinical scores were delayed entirely. At necropsy, splenocytes (SPLC) and lymph nodes (LN) were stimulated with MOG or MOG plus 3/28 beads. CBD did not produce a significant effect on either IL-17A or IFN-γ production in response to either disease state as assessed by ELISA. CBD slightly decreased intracellular IFN-γ production from splenic CD4+ cells and LN-derived CD8+ cells in both disease states, as shown by flow cytometry. A milder disease course was induced with the lower dose of self-antigen, but CBD attenuated disease regardless of disease state. Attenuation might involve modest effects on IFN-γ production in peripheral T cells, though either immune responses in the CNS or direct attenuation of neuronal demyelination likely accounts for CBD's effectiveness.

P2.47

EVALUATING AMBLYOMMA MACULATUM FOR THE PRESENCE OF BORRELIA SPP. AND OTHER MICROBIOTA

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The Gulf Coast tick *(Amblyomma maculatum)* is known to carry the tick-borne pathogens *Rickettsia parkeri* and *Hepatozoon americanum.* In addition, a previously undescribed *Borrelia* species was recently identified from *A. maculatum* in Mississippi and also from *A. maculatum* collected in Texas. Today, public health significance of this *Borrelia* sp. in *A. maculatum* is unknown; however, other tick-borne *Borrelia* spp. include *B. burgdorferi,* the agent of Lyme disease, and *B. hermsii,* the agent of relapsing fever. The purpose of this study was to continueto assess *A. maculatum* fromMississippi for *Borrelia* and to furthermore investigate other bacterial species in the microbiome. In this research, we used *A. maculatum* previously collected in 2015 in a nested PCR targeting the *Borrelia* spp. 16S rRNA gene. Any tick extracts that produced amplicons were processed for sequencing. For the microbiome portion of this study, we collected adult questing *A. maculatum* from Mississippi and submitted DNA extracts for microbial analysis using Illumina MiSeq. A total of 63 *A. maculatum* were tested using nested PCR. Of these, five were submitted for sequencing; all sequences were identical to *Borrelia lonestari*, which was the positive control for the PCR and likely a contaminant. We then modified our approach to perform only the primary PCR to avoid contamination and tested 32 ticks. A total of 100 ticks were collected for the microbiome assay, and 55 extracts were submitted for MiSeq analysis; results are pending. We anticipate that these data will contribute to our understanding of microbial diversity in *A. maculatum*, including rates of a *Borrelia* sp. of unknown pathogenicity. Acknowledgement: This work was funded by an Institutional Development Award (IDeA) from the NIGMS under grant number P20GM103476.

P2.48

ROLE OF MSAB AND CODY IN REGULATION OF CAPSULE IN *STAPHYLOCOCCUS AUREUS*

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There are many transcriptional regulators in *Staphylococcus aureus.* Many of these regulators are essential for the organism's ability to switch from the commensal to the pathogenic form. A main regulator identified linking metabolism and virulence is CodY. We have shown that MsaB, of the *msaABCR* operon, binds to the *cap* promoter region as a transcriptional activator and is a likely a co-regulator of capsule production along with CodY. To examine regulatory relationship between MsaB and CodY we mutated *codY* individually and produced a double mutation of *msaABCR/codY*. We compared these mutants with the *msaABCR* mutant and tested the effects on growth and the regulation of capsule. We have observed that both MsaB and CodY bind to the *cap* promoter region in very close proximity. CodY binds to this region in early phases of growth (high nutrients) as a repressor of *cap* transcription and MsaB binds to this region in the later phase of growth (low nutrients) as an activator of *cap* transcription. CodY is known to respond directly to nutrient availability, specifically branched chain amino acids and GTP. Using a chemically defined medium (CDM), we have also shown that MsaB is also likely involved in sensing nutrient availability. These interactions between MsaB and CodY are likely important in the regulation of sensing environmental nutrients and regulating virulence in *S. aureus.* Ultimately, we have observed that the regulation of *cap* transcription is based upon the binding of a transcriptional repressor and activator under growth phase and nutrient dependent conditions.

Friday, February 24, 2017

MORNING

TC214

O2.09

9:30 A POTENTIAL ROLE FOR TTSNX4 IN MACRONUCLEAR DEGRADATION IN *TETRAHYMENA THERMOPHILA* CONJUGATION

Sabrice Guerrier, Michael Patterson, Allison Arriati, Brianna Mcfield
Millsaps College, Jackson, MS, USA

Autophagy is a process by which cells degrade cellular material for recycling in the absence of nutrients. Recent evidence has suggested that this process is not limited to cases of nutrient depravation, but that selective degradation of specific organelles in the presence of nutrients may also occur. However, the mechanisms by which organelles are marked for degradation remain poorly understood. The ciliate, *Tetrahymena thermophila* represent an ideal system to study organelle autophagy since *Tetrahymena* degrade their nuclei by an autophagy like mechanism as part of their normal mating program. Using the expression profiles within the *Tetrahymena* Gene Expression Database (TGED) we were able to identify TtSNX4, as a gene that could play a role in autophagy of the macronucleus. Through the generation *Tetrahymena* that endogenously express TtSNX4-GFP we were able to demonstrate that TtSNX4 localizes to the degrading macronucleus. In addition, to localizing to the degrading macronucleus, TtSNX4 colocalized with mitochondria. Interestingly, deletion of TtSNX4 caused reduced nuclear condensation consistent with a role in trafficking mitochondria to the degrading macronucleus. Acknowledgement: This work was funded by an Institutional Development Award (IDeA) from the NIGMS under grant number P20GM103476 and HHMI award granted to Millsaps College.

O2.10

9:45 DIFFERENTIATION-INDUCED MICRORNAS NEGATIVELY REGULATE INNATE IMMUNITY DEVELOPMENT DURING EMBRYONIC STEM CELLS DIFFERENTIATION

Chandan Gurung, Yan-Lin Guo
The University of Southern Mississippi, Hattiesburg, MS, USA

Embryonic stem cells (ESCs) are characterized by their potential to differentiate into various cell lineages and unlimited capacity for proliferation. These properties make them a promising cell source for regenerative medicine. However, ESCs and their differentiated cells significantly differ from somatic cells in many aspects. We have recently reported that mouse ESCs do not express interferons and inflammatory cytokines in response to viral infection or bacterial endotoxins. Using ESC-differentiated fibroblasts (ESC-FBs) as a model system, we have investigated the innate immunity development during differentiation and demonstrated that ESC-FBs acquired limited responsiveness to viral infection and inflammatory cytokines, but they are completely unresponsive to LPS (lipopolysaccharides, a bacterial endotoxin). MicroRNAs (miRNAs) are a new class of gene expression regulators. By binding to their target mRNA, miRNA lead to the degradation and/or translational repression of the target mRNA. In this study, we investigated whether innate immunity development is regulated by miRNAs, Here, we report that the miRNAs that are known to negatively regulate innate immunity: miR-21, miR-146a, and miR-155 were induced during differentiation of ESCs to ESC-FBs. More importantly, the mRNA of TLR4, which is the receptor that mediates the effects of LPS, was detected in ESC-FBs, but TLR4 protein was not expressed. This result represents a typical profile of miRNA-mediated translation inhibition and explains the lack of response of ESC-FBs to LPS. We propose that differentiation-induced miRNAs negatively regulates innate immunity development during ESC differentiation.

O2.11

10:00 BIOFILM FORMATION AND SYMBIOTIC HOST ASSOCIATION IN *XENORHABDUS NEMATOPHILA*

Elizabeth Hussa, Abbie Joiner, Ryan Martin
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. The pleiotropic effects of Lrp manipulation make it difficult to establish a causal relationship between biofilms and host association, however. In an attempt to more directly investigate the role of biofilm formation on mutualism and pathogenesis by *X. nematophila*, we identified genes with predicted roles in biofilm formation and targeted them for mutagenesis. In addition, we screened a library of random transposon mutants for differences in biofilm formation relative to the wild-type strain. We obtained and examined two such transposon mutants with enhanced biofilm phenotypes, and preliminary results indicate that biofilm formation may be detrimental to initial colonization of the mutualistic nematode host, but provides an advantage for survival within the nematode host.\

O2.12

10:15 IDENTIFICATION OF AMINO ACIDS IN RTG2P REQUIRED FOR RETROGRADE SIGNALING

Jian Jiang, Donna M. Gordon
Mississippi State University, Mississippi State, MS, USA

In *Saccharomyces cerevisiae*, defects in mitochondrial activity that lead to an insufficient supply of glutamate results in the activation of a cytoplasmic cascade referred to as 'retrograde signaling'. Cytosolic regulators that function in this cascade include Rtg1p, Rtg2p, Rtg3p, and Mks1p. Association between Rtg2p and Mks1p is important for the activation of downstream signaling that includes the nuclear localization of the Rtg1p/Rtg3p transcriptional complex. Previous studies have also shown that the amino-terminal ATP binding domain of Rtg2p has a role in retrograde signaling. To identify additional amino acids in Rtg2p that are critical for its signaling activities, the RTG2 gene was randomly mutagenized and a phenotypic screen was carried out to identify defects in retrograde signaling. Of the 14,000 colonies screened, four mutants were selected for further analysis. We found that each mutant varied in the amount of Rtg2p protein expressed, but all had reduced Mks1p interaction and low or absent Cit2p protein levels. Real-time quantitative PCR showed decreased CIT2 transcript levels for all four mutants relative to wild type, confirming that each had defects in activating retrograde signaling. Sequencing results placed all mutations within the carboxy-terminal third of the Rtg2 polypeptide. These findings extend our understanding of Rtg2p functional domains beyond the previously identified amino-terminal ATP binding domain to now include amino acid residues within the carboxy terminus that are important for stable Mks1p interaction.

10:30-10:45 Break

O2.13

10:45 AGE/RAGE SIGNALING IN DIABETES-MEDIATED VASCULAR CALCIFICATION IN VASCULAR SMOOTH MUSCLE CELLS

Amber Kay, Benjamin Rushing, LaShan Simpson, James A. Stewart, Jr.
Mississippi State University, Mississippi State, MS, USA

Advanced Glycation End-Products (AGEs)/Receptor for AGEs (RAGE) signaling has been a well-studied cascade in different pathologies, particularly type II diabetes mellitus. The complex nature of the receptor, ligand specificity, and intersecting pathways of AGE/RAGE signaling is still not well understood. AGE/RAGE signaling influences both cellular and systemic responses to increase bone matrix proteins through p38 MAPK and ERK1/2 signaling pathways in hyperglycemic and calcification conditions. AGE/RAGE signaling has also been shown to increase oxidative stress by promoting diabetes-mediated vascular calcification through NOX-1 activation and decreased SOD-2 expression to promote a phenotypic switch of vascular smooth muscle cells (VSMCs) to osteoblast-like cells. The purpose of this research is understand AGE/RAGE mediated vascular calcification as a complication of diabetes. Calcification was induced in primary mouse VSMCs of non-diabetic (Het^{RWT}), diabetic (db/db^{RWT}), non-diabetic RAGE knockout (Het^{RKO}), and diabetic RAGE knockout (db/db^{RKO}), and then subsequently treated with AGEs to activate RAGE. Intracellular calcium levels were quantified and showed a pronounced calcification in db/db^{RWT} and loss of RAGE resulted in a decrease in calcification in db/db^{RKO}. Western blotting analysis revealed VSMC marker protein (a-smooth muscle actin) was decreased in db/db^{RWT} calcified cells indicating an osteoblast-like phenotypic switch and this was not observed in db/db^{RKO} VSMCs. These data demonstrated that RAGE has a role in diabetes-mediated vascular calcification. By understanding the role, the AGE/RAGE signaling cascade plays diabetes-mediated vascular calcification will allow for possible targets for pharmacological intervention to be identified that may decrease the severity of this diabetic complication.

O2.14

11:00 CORRELATION OF DCLK1 WITH THE STEMNESS AND CHEMORESISTANCE OF COLORECTAL CANCER CELLS

Lianna Li, Kierra Jones, Shantasia Thomas
Tougaloo College, Tougaloo, MS, USA

Colorectal cancer (CRC) is the third most common cancer diagnosed and the second leading cause of cancer-related deaths in the United States. Cancer stem cells (CSCs) are believed to be the primary reason for the recurrence of CRC due to their resistance to adjuvant chemotherapy after surgical resection. Here we aim to further elucidate the identity of a putative intestinal stem cell marker, doublecortin-like kinase 1 (DCLK1) and its correlation with the chemoresistance of CRC cells. Briefly, a human colorectal cancer cell line, HCT116, with stably over-expression of human DCLK1 variant 1 cDNA was used. Cell proliferation was assessed using MTT assay, specific markers associated with pluripotency were determined by quantitative real-time PCR, and IC50 of 5-Fluorouracil (5-Fu) was evaluated using MTT assay. Our results demonstrated that DCLK1 over-expression significantly inhibited the cell proliferation, which is a key property of stem cells. Several of the markers for pluripotency of cells were up-regulated after DCLK1 over-expression. Another intriguing findings is that over-expression of DCLK1 was correlated with increased IC50 of 5-Fu, which indicates that DCLK1 results in chemoresistance of colorectal cancer cells. Based on all of these findings, it can be concluded that DCLK1 is correlated with stemness of colorectal cancer. Up-regulation of DCLK1 in the colorectal cancer cells may contribute to the chemoresistance of the colorectal cancer patients. DCLK1 can be an intriguing chemotherapy target for CRC treatment and become extremely beneficial in raising the survival rate and quality of CRC patients.

O2.15

11:15 ALTERED GENOMIC EXPRESSION IN THE HIPPOCAMPUS IN DEPRESSION

Gouri Mahajan[1], Eric Vallender[1], Michael Garrett[1], Lavanya Challagundla[1], JC Overhoerls[3], G Jurjus[2], Lesa Dieter[2], Hamed Benghuzzi[1], Craig Stockmeier[1]
[1]University of Mississippi Medical center, Jackson, MS, USA, [2]Case Western Reserve University, Cleveland, OH, USA, [3]Louis Stokes Cleveland VA Medical Center, Cleveland, OH, USA

Major Depressive Disorder (MDD) has a lifetime prevalence of 17% among US adults, and the available pharmacotherapies are not effective for many depressed patients. Suppression of neurogenesis - related genes may underlie the decrease in hippocampal volume noted with increasing duration of illness. Tissue punches were collected from the dentate gyrus from 23 subjects with MDD (medication-free) and 24 age-matched psychiatrically normal controls. Whole transcriptome paired-end RNA-sequencing was performed using an Illumina NextSeq 500 to quantify expression of mRNA in a region of hippocampal neurogenesis. A Cuffdiff bioinformatic algorithm was used in an initial analysis to statistically compare the two cohorts. Controlling for false discovery, 32 genes were differentially expressed. The following genes were decreased in expression in MDD: several with inflammatory function (e.g. ISG15, IFI44L, IFI6 related to interferon function; NR4A1) and the GABA(B)R1 gene. The following genes were increased in expression in MDD: two genes with cytokine function (SOC3, CCL2), two genes inhibiting angiogenesis (ADM, ADAMTS9) and the KANSL1 gene, a member of the histone acetyltransferase (HAT) complex. Gene Ontology analysis will be used to identify altered gene products in terms of biological processes, cellular components and molecular functions. Additional bioinformatic analyses will also be performed to assess the impact of potentially confounding factors

such as postmortem interval, age, gender, death by suicide, duration of depression, and age of onset of depression. qRT-PCR will also be used to validate altered gene expression in MDD. Supported by COBRE P30 GM103328

O2.16

11:30 AN ANTIVIRAL DRUG CANDIDATE INHIBITS ZIKA INFECTION IN VITRO AND IN VIVO

Biswas Neupane, Dhiraj Acharya, Amber M. Paul, E. Ashley Thompson, Fengwei Bai
The University of Southern Mississippi, Hattiesburg, MS, USA

Zika virus (ZIKV) has been causing a major public health concern as it has been linked with microcephaly in the newly born infants. Currently, there are no approved and specific antivirals or vaccines against ZIKV infection. Here, we report that an antiviral candidate HT04 can block ZIKV binding to host cells and inhibit ZIKV replication in cell culture. In addition, we also found that HT04 had therapeutic effects against ZIKV infection in mice. Four hours after ZIKV inoculation, mice were fed with 1.5g/Kg and 0.75g/Kg body weight of HT04 daily for 6 days. The level of ZIKV was found lower in blood and other tissues of 1.5g/Kg group than those of mock control group. The results showed that HT04 inhibited ZIKV in both *in vitro* and *in vivo*, suggesting it may be a promising drug candidate to combat ZIKV infection.

12:00- 1:00 General Sessions

Friday, February 24, 2017
AFTERNOON
Room TC214

O2.17

1:00 THE MSAABCR OPERON MUTANT *STAPHYLOCOCCUS AUREUS* IS DEFICIENT IN PERSISTER CELLS

Shanti Pandey, Gyan Sahukhal, Mohamed Elasri
The University of Southern Mississippi, Hattiesburg, MS, USA

Microbial infections are the leading cause of mortality worldwide primarily caused by the persister cells; a phenotypic variant that shows extreme antibiotic tolerance resulting in chronic diseases. While this phenomenon has posed a great threat in public health, mechanism underlying their formation in *Staphylococcus aureus* remains largely unknown. Increasing evidences of presence of persister cells in recalcitrant infections underscores the great urgency to unravel the mechanism by which these cells are formed and survived. We characterized *msaABCR* operon that plays role in regulation of virulence, biofilm development and antibiotic resistance. We hypothesized that the *msaABCR* operon also plays role in development of persister cells. In this study, we observed the phenotypic difference between WT USA300 LAC *S. aureus* and *msaABCR* deletion mutant while treating with single and combination of clinically-relevant antibiotics. The numbers of persister cells in *msaABCR* deletion mutant were significantly reduced relative to the wild type strain while the complemented mutant restored the phenotype suggesting a key role of *msaABCR* operon in development of persisters. We ultimately seek to define the mechanism by which the operon regulates the persister cells formation. This study will bring new insights into the development of persistence and treatment failures of staphylococcal infections.

O2.18

1:15 ROLE OF MSAABCR OPERON IN CHRONIC STAPHYLOCOCCAL OSTEOMYELITIS PATHOGENESIS

Gyan S. Sahukhal[1], Michelle Tucci[2], Gerri A. Wilson[2], Hamed Benghuzzi[2], Mohamed O. Elasri[1]
[1]The University of Southern Mississippi, Hattiesburg, MS, USA, [2]University of Mississippi Medical Center, Jackson, MS, USA

Staphylococcus aureus is a major cause of both health care associated and community-associated infections. *S. aureus* is a primary agent of chronic bone infection also known as osteomyelitis. Treatment of osteomyelitis is very complicated, which may include one or more surgical debridement followed by prolonged antibiotic treatment. Osteomyelitis patients often experience serious life threatening complications like septicemia, thrombosis and pathological fractures thus leading to high mortality and morbidity. In this study, we have investigated the role of the *msaABCR* operon in osteomyelitis pathogenesis. We used the modified chronic osteomyelitis infection model using SD rats. Medical implants (K-wire pin) were coated with *S. aureus* biofilm (Wild type, *msaABCR* deletion mutant and the *msaABCR* complement), and surgically transplanted transcortically through the metaphysis in the tibia. The infected tibias were harvested after 4, 8 and 15 days and were used for microbiological, X-ray and Microcomputed tomography (MicroCT) analysis. X-ray and MicroCT images revealed that the wild type *S. aureus* strain was heavily colonized and triggered significant bone damage of the infected tibia in rat model of osteomyelitis, whereas the *msaABCR* deletion mutant of *S. aureus* was attenuated and unable to cause chronic osteomyelitis. This study shows that the *msaABCR* operon plays a role in biofilm formation in vivo and in the pathogenesis of osteomyelitis. The ultimate goal is to explore the possibility of exploiting the *msaABCR* operon as a target to treat recalcitrant chronic staph infections.

O2.19

1:30 CHARACTERIZATION OF *TRICHOMONAS VAGINALIS* VIRUS IN ATCC AND MISSISSIPPI STRAINS

Allison K. Judge[1], Stephen J. Stray[2], John C. Meade[2], Cory G. Toyota[1]
[1]Millsaps College, Jackson, MS, USA, [2]University of MS Medical Center, Jackson, MS, USA

Trichomonas vaginalis, a flagellated protozoan parasite, is the causative agent of trichomoniasis, the most common non-viral sexually transmitted disease in the world. The parasite itself is infected with up to four strains of a dsRNA virus called *Trichomonas vaginalis* virus (TVV1-4). Trichomoniasis responds well to metronidazole treatment, however, the presence of TVV has been shown to alter susceptibility to metronidazole as well as alter *T. vaginalis* surface protein expression. Our work, in collaboration with researchers at UMMC, aims to further understand *T. vaginalis* reproduction, the relationship of TVV presence with clinical symptoms, and characterize TVV in *T. vaginalis.T. vaginalis* was cultured anaerobically. Total RNA was isolated from 7 ATCC strains and 5 local strains and the presence of TVVs was determined by qRT-PCR against standard curves of pNH-TVV DNA plasmids. Amplicons were sequenced. The presence of TVVs in ATCC strains as well as clinical isolates has been confirmed. We have determined the absolute copy number for each strain. So far TVV1 is found in significantly lower amounts that TVV2-4. We compare TVV sequences from MS to ATCC samples. Preliminary work has demonstrated that TVV levels can be determined from *T. vaginalis* cultures. In the isolates tested, these data suggest that TVV1 infects less than 10% of the total culture. Acknowledgement: 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.

O2.20
1:45 PRECLINICAL EVALUATION OF A SYNTHETIC NATURAL PRODUCT DERIVATIVE IN PEDIATRIC CANCER

Scharri Walker
Tougaloo College, Tougaloo, MS, USA

Brain tumors are the most common solid tumors and exhibit relatively high recurrence and mortality rates in the pediatric patient population. Furthermore, resistance to current therapies may develop over time, giving rise to the development of advanced and drug-resistant cancers. Therefore, there is an urgent and unmet need to find new anti-cancer treatments in the pediatric indication. The objective of this research is to investigate the anti-cancer potential of synthetic derivatives of natural products and their pharmacological properties in pediatric brain cancers. The anti-cancer activity of the compound was tested in in various brain cancer cell lines established from pediatric patients. A decrease in cell viability was observed in all medulloblastoma and astrocytoma cell lines tested. Additional studies revealed that cabazitaxel decreases cell proliferation, induces apoptosis, and decreases cell migration. Further proteomic studies will be conducted to determine the molecular mechanisms responsible for the anti-cancer efficacy of the compound in these cell lines. Collectively, these data will further establish the rationale of cabazitaxel as a chemotherapeutic agent in the pediatric population

2:00-2:30 Break

2:30 Cellular, Molecular, Developmental Biology Division Meeting

Student oral and poster awards are sponsored by the School of Arts and Sciences, Alcorn State University, and the Department of Biological Sciences, Mississippi State University

CHEMISTRY AND CHEMICAL ENGINEERING

Chair: Song Guo
University of Southern Mississippi
Vice-Chair: Julie Pigza
University of Southern Mississippi

Thursday, February 23, 2017

MORNING
Room TC 218B

7:55 Welcome

Thursday, February 23, 2017
MORNING
Room TC 218A

Session 1. Invited Symposium I, Chair: Julie Pigza

O3.01
8:00 DISORDER WITHIN CYSTEINE-RICH PROTEINS: CURIOUS CASE OF GRANULINS

Gaurav Ghag, Vijay Rangachari
University of Southern Mississippi, Hattiesburg MS, USA

Granulins (Grns) are a family of small, cysteine-rich, pro-inflammatory proteins that are generated upon proteolytic cleavage of their precursor, progranulin. All seven Grns (A-G) contain twelve conserved cysteines (~ 20% per molecule) that is believed to form six intramolecular disulfide bonds, rendering this family of proteins unique. Grns are involved in multi-functional roles, including wound healing, embryonic growth, and inflammation. Recently, they are also implicated in neurodegenerative diseases such as frontotemporal dementia (FTD) and Alzheimer disease. Despite their manifold functions, there exists a dearth of information regarding their structure-function relationship. We sought to establish the role of disulfide bonds in structure and function by studying the native, oxidized (intramolecularly disulfide bonded) form of GrnB and the completely reduced GrnB (rGrnB). We establish that rGrnB is intrinsically disordered (IDP) at low concentrations and at elevated concentrations forms a fuzzy homodimer without a net gain in the structure- a characteristic increasingly believed to be a hallmark of some IDPs. Interestingly, rGrnB also activates inflammatory receptor, NF-kappaB in human neuroblastoma cells in a concentration-dependent manner, which correlates with the observed monomer-dimer dynamics. With native GrnB, we observed that only les thank 10% of recombinantly expressed protein is present in the form intramolecularly disulfide bonded monomers. A majority of the expressed protein are multimeric with intermolecular disulfide bonds. Furthermore, surprisingly monomeric GrnB also largely lacks structure suggesting disulfide bonds do not facilitate folding, and resemble kringle-like domains. These data will be presented and discussed.

O3.02
8:18 STRESS RELAXATION IN A BEAD-SPRING ELASTOMER

Gopinath Subramanian
University of Southern Mississippi, Hattiesburg, MS, USA

We present results from the generalized parallel replica method applied to the process of stress relaxation in bead-spring elastomers. The statistics of chain breakage show that individual chains, after a relatively short dephasing time, follow an exponential distribution of breakage times over a wide range of extension ratios, allowing us to exploit the notion of the quasi-stationary distribution and apply the method to study stress relaxation in a representative volume element of an elastomer.

O3.03
8:36 IMBUING POLYMERS WITH A FLUOROMETRIC STIMULI RESPONSE

Joseph Lott
University of Southern Mississippi, Hattiesburg, MS, USA

A new approach to optically active stimuli responsive polymers is presented. The materials are based on precisely engineered "molecular reporters" that exhibit vibrationally-dependent emission intensity. For these molecules, no fluorescence is observed when molecular motions are unhindered, yet when vibrational freedom is impinged, fluorescence emission is turned on. Owing to the many stimuli that can be used to perturb the vibrational (and therefore the fluorescence) ability of the small molecules, innovation over a broad portfolio of polymer-based systems is enabled. In aqueous solutions of methylcellulose, heating above the lower critical solution temperature (LCST) of ~ 60 °C caused an increase in blue fluorescence at ~ 435 nm. Additionally, the softening of poly(methyl methacrylate) around the glass transition of 96 °C was monitored optically as well as via differential scanning calorimetry (DSC). Lastly, by tracking the increase of fluorescence at 440 nm, the curing of an epoxy at 180 °C was optically monitored *in situ.*

O3.04
8:54 GOLD NANOPARTICLE ASSAY FOR MULTIPLE MYELOMA PROTEINS

Yolanda Jones, Anant Singh, Sandra Barnes
Alcorn State University, Alcorn State, MS, USA

Multiple myeloma is the second most deadly blood cancer. It is a plasma cell dyscrasia that is characterized by abnormal production of monoclonal (M) immunoglobulins (M-Proteins), each consisting of two heavy chains and two light chains (κ and λ). In most patients with a monoclonal plasma cell disorder, the monoclonal light chains secreted by the clone remain soluble in the bloodstream. However, in some patients, free light chains may infiltrate tissues, inducing a myriad of impairments. Early detection, diagnosis, and treatment are critical to increase the survivability of multiple myeloma and associated amyloidosis. This research describes gold nanoparticle based detection assays that induce changes in optical properties the presence of kappa and lambda light chain immunoglobulins that can be measured with optical methods. Spherical gold nanoparticles and gold nanorods were synthesized and functionalized with antibodies to kappa and lambda light chains. After optimization, the performance of the assays for detecting the light chains was evaluated using optical spectroscopy. The assays showed a predictable response to the light chain immunoglobulins that was proportional to protein concentration. The gold nanorod based assays showed greater sensitivity than assays based on spherical gold particles.

O3.05

9:12 C60: COMPUTATIONAL STUDY

Jerzy Leszczynski
Jackson State University, Jackson, MS, USA

Fullerene represents an outstanding example when a discovery of a single compound had been recognized by the Nobel Committee. Unfortunately, pristine (i.e. non-functionalized) C60 fullerene has very limited possible applications. In contrast, fullerene's derivatives with various functional groups are promising candidates for various applications. As always, a prediction of possible effects of newly studied species on biological targets should precede their commercial applications. The talk summarizes the results of recently performed comprehensive computational study of interactions between fullerene nanoparticle derivatives with the large group of proteins that are responsible for various diseases. We determined a set of fullerene derivatives which are most likely to be very potent against some target proteins. This conclusion is augmented by a list of fullerene derivatives that could be potentially toxic because of low selectivity and high binding activity for a number of target proteins.

Thursday, February 23, 2017
MORNING
Room TC 218A

Session 2. Contributed Talks I (concurrently held with Section 3), Chair: Jeremy White

O3.06

9:40 TOUGHENING LIQUID PROCESSABLE BENZOXAZINE MATRICES

Travis Palmer, Andrew S. Frazee, Jeremy Weigand, Jeffrey S. Wiggins
University of Southern Mississippi, Hattiesburg, MS, USA

Epoxy-amine formulations have historically been the dominant matrix chemistry in aerospace composites due to their exceptionally high moduli. However, they are inherently brittle and plagued by a high degree of volumetric shrinkage upon curing. Benzoxazines offer an exciting alternative that has only recently begun to be explored for high performance applications. They offer significantly better dimensional stability during cure than epoxy-amine chemistries, however, current benzoxazine monomers still suffer from lack of processability and brittleness. Traditional approaches generally include the dispersion of liquid rubbers or particles as reinforcements in a matrix, which sacrifice the homogeneity of the network and require additional processing. To overcome this, toughened monomers have been synthesized using a novel continuous high-shear reactor that provide alternative mechanisms of energy dissipation. These monomers have been shown to increase toughness when added to the baseline bisphenol-A based benzoxazine system at low loading levels (ca. 5-20 wt%) without sacrificing Tg. This is believed to be due to the homogeneity of the final matrix, and offers an alternative to existing approaches to toughening.

O3.07

9:52 TOWARD THE FIRST TOTAL SYNTHESIS OF 11-DEOXYFISTULARIN-3 AND ITS ANALOGUES

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

The spiroisoxazoline containing natural products and their analogues have stimulated much interest in medicinal chemistry owing to their huge herbicidal and plant hormonal activity. Within the broad arsenal of structurally diverse α-oximinotyrosine derived spiroisoxazolines containing natural products, particularly 11-deoxyfistularin-3, purealidin P and Q are cytotoxic against the MCF-7 breast cancer cell line (LD_{50} = 17 μg/L), murine lymphoma K1210 (IC_{50} 2.8 and 0.95 μg mL^{-1} respectively) and human epidermal carcinoma KB (nasopharynx) (IC_{50} 7.6 and 1.2 μg mL^{-1} respectively) cell lines. Owing to their structural complexity and diverse biological activities, the synthesis of this unique and challenging spiro-skeleton has been of great interest to many chemists. In this conference, we will demonstrate an unconventional route involving a base promoted Dieckmann type keto-ester condensation strategy to construct the spiroisoxazoline moiety. The consecutive excess bromination, elimination and bromination of the corresponding spiro-moiety has been utilized to furnish the desired spiroisoxazoline core structure and the total synthesis of 11-deoxyfistularine-3. Subsequently, this strategy has also been directed to construct dibromo "quinone" based spiroisoxazoline derivatives as novel analogues for biological interest. This strategy could serve as an efficient alternative to previously developed oxidative-dearomatizing spirocyclization of phenol as the essential step to synthesize this class of natural products. The project described was supported by NIH/NIGMS (Award Number: 2SC3GM094081-05) and NIH/NCRR (Award Number: G12RR013459) and NIH/NIMHD (Award Number: G12MD007581).

O3.08

10:04 USE OF RT-NIR TO MONITOR GROWTH OF EPOXY/DIAMINE NETWORKS THROUGHOUT CURE

Andrew P. Janisse, Jeffrey S. Wiggins
University of Southern Mississippi, Hattiesburg, MS, USA

Global efforts in the composites community are towards a reduction in manufacturing cycle times through the implementation of rapid cure. As a result, the development of advanced analytical techniques to quantify the effect of cure protocol on matrix formation and performance is necessary. Full understanding of network formation in an epoxy/diamine matrix has previously not been achieved due to a limitation in directly studying the creation and consumption of secondary amine during cure. In this work, the development of epoxy/diamine networks was monitored throughout cure and the effect of ramp rate studied. Networks were heated at slow and rapid ramp rates and held at 180 °C for 2 hours with functional group consumption monitored throughout. Networks cured with difunctional or tetrafunctional epoxy monomers were also compared in order to determine the effect of chemical gelation on final network formation. Molar absorptivity was determined to be dependent on temperature and was adjusted during analysis to allow for more representative results of functional group consumption and overall network conversion. This is a crucial effect to account for when monitoring the cure of networks with Real Time Fourier Transform

Infrared Spectroscopy in the near-infrared region (RT-NIR) cured with varied thermal profiles. The accuracy of this method to measure network conversion was validated using dynamic scanning calorimetry. This work establishes a means to view a complete picture of the development of epoxy-amine networks throughout cure, which allows for a more complete understanding of the effect of cure protocol on final network structure.

O3.09

10:16 INVESTIGATION OF THE DEHYDRATION PRODUCTS OF ATROPINE AND SCOPOLAMINE IN ARCHAEOLOGICAL PIPES

Sara Barker, Amanda Kaminski, Co Quach, Scottie Dennis, Max Harrigill, Timothy Ward
Millsaps College, Jackson, MS, USA

Atropine and scopolamine are alkaloids that serve as biomarkers for the hallucinogen *Datura stramonium*, a ceremonially important plant for many ancient cultures throughout Mesoamerica. Plants such as jimson weed were often smoked in accordance to the religious practices of the ancient world. Through the use of gas chromatography-mass spectrometry (GC-MS) and liquid chromatography – mass spectrometry (LC-MS) traces of hallucinogen *Datura stramonium* left behind in pipe stems can be characterized. It was discovered that both alkaloids dehydrate into apoatropine and aposcopolamine respectively during GC-MS analysis, while dehydration products appear absent in the pipe stems by LC-MS analysis. A study was performed to characterize the appearance of dehydration products in GC-MS methods. In addition, a distillation of atropine was performed in order to force the dehydration to occur.

O3.10

10:28 DOPING-INDUCED AGGREGATION OF POLY(3-HEXYLTHIOPHENE) NANOFIBERS

Frederick McFarland[1], Claire Ellis[2], Song Guo[1]
[1]University of Southern Mississippi, Hattiesburg, MS, USA, [2]Oak Grove High School, Hattiesburg, MS, USA

P3HT is widely considered to be an archetype for organic semiconductor molecules due to its anisotropic properties and variety of electronic applications. Chemical doping of P3HT will increase its overall conductivity but will also create doped products that are difficult to process. We herein investigate the doping-induced aggregation rate of P3HT nanofibers using UV-Vis kinetics and their stage-wise morphological evolution using atomic force microcopy (AFM). Our UV-Vis kinetic results indicate that aggregation will begin with an initial rate-limiting self-folding of individual polymer chains which then form multi-chained aggregates. Under doping conditions, the process will greatly accelerate and is likely to be a consequence of attractive coulombic interactions between doped species. Furthermore, doping will form fibers with distinctive morphologies that appear more disordered and are likely the result of intercalation of F4TCNQ molecules which could disrupt the native P3HT lamella ordering. Our results highlight the importance of understanding the aggregation kinetics of similar systems that are doped in the solution phase. We hope that more research on this topic will lead to more control over the aggregation and doping process of organic semiconductors, and lend more efficient doped devices.

Thursday, February 23, 2017
MORNING
Room TC 218B

Session 3. Contributed Talks II (concurrently held with Section 2), Chair: Andrew Frazee

O3.11

9:40 CONTROLLING THE MORPHOLOGY IN POLYACRYLONITRILE BASED COPOLYMER PRECURSORS FOR CARBON FIBER

Katelyn Cordell, Jeffrey Wiggins
University of Southern Mississippi, Hattiesburg, MS, USA

Carbon fiber reinforced polymers are used today in high performance polymer matrix composite applications including aerospace, energy, and general infrastructure materials. Although the demand for carbon fiber is high, continued research is necessary to advance current mechanical properties towards their theoretical values. These mechanical limitations are due to morphological defects within the fiber which are most often associated with precursor molecular design, comonomer composition and distribution, and precursor white fiber processing. Reversible Addition Fragmentation Chain Transfer (RAFT) serves as a modern technique to control precursor molecular design as well as comonomer distribution. Here we employed semi-batch RAFT to synthesize well-defined Polyacrylonitrile (PAN) copolymers with acrylamide type comonomers to systematically disrupt semi-crystalline morphologies, and correlate crystalline structure with extent of ring-closing stabilization and exotherm. These acrylamide comonomers afford new copolymers that eliminate the usage of additional comonomers typically seen in commercial PAN precursors. Fourier transform infrared spectroscopy was used to measure the extent of stabilization, or the ladder formation of pyrolyzed ring structures, and differential scanning calorimetry determined cyclization temperature, breadth, and exotherm peak intensity. Our copolymers showed higher extents of stabilization due to an increase in cyclized ring formation during stabilization as well as a reduction in exotherm peak intensity in comparison to homopolymer PAN. Outcomes from this work provided new knowledge on the effect of semi-crystalline morphology on exotherm and ring closing stabilization, as well as provided a new synthetic pathway for preparing well-defined copolymers with new comonomers for PAN based carbon fiber.

O3.12

9:52 PHOTOELECTROCHEMICAL STUDIES ON ELECTRODEPOSITED Cu2O/MnSe FOR SOLAR WATER REDUCTION

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

The present contribution reports results from photoelectrochemical studies on Cu2O photocathodes for solar water reduction in the presence of manganese selenide thin film electrocatalysts. Cu2O/MnSe thin films were prepared in-situ on F:SnO2 (i.e., FTO) by a facile electrodeposition technique, and scanning electron microscopic (SEM) studies were employed for surface morphological characterization. Photoelectrochemical studies were performed in a quartz cell holding the three electrode setup containing Ag/AgCl (3M KCl) as the reference electrode. A standard AM 1.5G solar simulator was used as the simulated solar light source for photocurrent and electrochemical impedance spectroscopic measurements on FTO/Cu2O/MnSe electrodes. In addition to a significant anodic shift in the water reduction potential, a maximum photocurrent of 2.1 mA/cm2 was obtained from the FTO/Cu2O/MnSe electrode at -0.4 V vs Ag/AgCl. These results can be attributed to the effect of catalyst in decreasing electron-hole recombination and facilitation of faster electron utilization kinetics

on the semiconductor-electrolyte interface upon light illumination, as indicated by Mott Schottky plots and electrochemical impedance spectroscopy. This is the first report on the use of water reduction catalyst MnSe as a functional co-catalyst for photoelectrochemical water reduction with semiconductor photocathodes. Financial support from the NSF CAREER Award (CHE-0955878) is gratefully acknowledged.

O3.13

10:04 INVESTIGATION OF THE TSUJI-TROST WINSTEIN-MASAMUNE INTRAMOLECULAR PHENOLIC ALLYLATION TOWARD SYNTHESIS OF SPIRO[4.5]DECANES

Nicholas Jentsch, Matthew Donahue
University of Southern Mississippi, Hattiesburg, MS, USA

The total synthesis of natural products, especially alkaloids, remains a vigorous area of research. With the advancement of new reaction technologies even the most daunting molecular structures are being synthesized with a pace unrivaled in history. Pursuant to these endeavors we have initiated a research program aimed at transforming simple aromatic phenols into increasing complex spirocyclic compounds. The intramolecular para-alkylation of a phenol with a carbon chain bearing a suitable leaving group, known as the Winstein-Masamune reaction, results in a spiro[4.5]deca-6,9-dien-8-one. Of notable consequence of this reaction is the synthesis of a sterically congested spirocyclic quaternary carbon. In this talk, we will discuss the merging of this reaction with the Tsuji-Trost allylic alkylation to afford a spirocycle containing a pendant alkene. This functional handle thereby allows for elaboration of the spirocycle to tricyclic motifs. We will outline our approach to the functionalization of the pendant alkene and subsequent ring closure to develop a tricyclic core. The cyclization methods to be discussed include the use of both free radical conditions as well as zirconocene promoted addition to α,β-unsaturated ketones.

O3.14

10:16 THE IMPACT OF CONJUGATED POLYMER AGGREGATION ON THEIR CHEMICAL DOPING KINETICS

Skye Travis, Frederick McFarland, Song Guo
University of Southern Mississippi, Hattiesburg, MS, USA

Organic electronic materials thus far have proven to be less efficient than the inorganic versions, but researchers are trying to find a way around that issue by using a method called chemical doping. This method consists of an organic material, usually a polymer, being "doped" or exposed, to an oxidant/reductant, called a dopant. Electron transfer between host polymer and dopant molecules increases the charge carrier density in the doped host material, making it a more efficient conductor. The effects of doping on poly(3-hexylthiophene-2,5-diyl) (P3HT) in varying ratio of decane/toluene solvent was investigated. Increasing the fraction of decane, a bad solvent, forces the P3HT to aggregate very quickly. By comparing the chemical doping behavior between aggregated and non-aggregated forms of P3HT, the influences of P3HT aggregation on their chemical doping kinetics are elucidated.

O3.15

10:28 SYNTHESIS OF (3R,4R,5R)-DIHYDRO-3-HYDROXY-4-METHOXY-5-VINYLFURAN-2(3H)-ONE FROM D-GLUCOSE AND IT'S BIOLOGICAL STUDIES

Md Mhahabubur Rhaman, Ernest B. Izevbigie, Ken S. Lee
Jackson State University, Jackson, MS, USA

Vernonia amygdalina (VA) is an edible medicinal plant grows in central Africa. Our research laboratory has conducted the systematic chemical analysis of VA leaves for finding the chemicals having anticancer activity. Several compounds, phytosteroids and others, were isolated from water extract of VA and characterized. The mixture of phytosteroids showed the promising activity against the MCF-7 cell lines. Among them, vernoside consists of steroid, glycoside, and epoxide on γ-lactone moiety. We believe glycoside and steroid parts of the vernoside make this compound soluble in water and cell permeable respectively, and γ-lactone moiety with epoxide may be the active part of biological activities. Their biological activities depend on their structural features related with functional groups attached to the ring such as alcohol, ether, α-methylene; and side chains such as chain length, chain branching, functional group, substitution, and stereochemistry. So synthetic methods for structurally modified γ-lactones will be useful in producing new molecules with improved pharmacological properties. Therefore, we focus on the γ- lactone for a partial synthesis with the purpose to test the bioactivity of such structural moiety. In our research, we designed a synthetic pathway of (3R,4R,5R)-dihydro-3-hydroxy-4-methoxy-5-vinylfuran-2(3H)-one from D-glucose and it's biological studies. After synthesis of it, hydrophilic and hydrophobic groups will be attached with γ-lactone ring in order to improve the solubility in water and cell permeability respectively. Moreover, vinyl group will be converted to epoxide expecting that will be the tool to prohibit the proliferation of MCF-7 cell lines and ER(+) breast cancer cells.

Thursday, February 23, 2017
MORNING
Room TC 218A

Session 4. Invited Symposium II, Chair: Joseph Lott

O3.16

10:50 ELECTRO-KINETIC REMEDIATION OF HEAVY METAL CONTAMINATED SOIL

Fengxiang Han[1], Xinyu Mao[2], Xiaohou Shao[2], Zikri Arslan[1], Kai Guo[1]
[1]Jackson State University, Jackson, MS, USA, [2]Hohai University, Nanjing, China

Pb, As and Cs in soils damage ecosystems and human's health. Soil washing is the most conventional remediation method and its efficiency depends on metals solubility in soil. This study aims to optimize operating variables of electro-kinetic field (EKF) enhanced soil washing procedures. Soil samples from a Mississippi River Delta rice field were homogeneously spiked with Pb, As and Cs and contaminated soil was aged for thre months. The remediation involved an initial electro-kinetic process, followed by a soil washing procedure. Soil pHs changes under EKF were studied. Effects of citric acid and reversed EKF were investigated for alleviating possible alkaline precipitation. In the washing procedure, soil washing time and cycles with different extractants were examined. The overall EKF enhanced soil washing efficiencies were discussed as well. The implement of EKF offered an acidic soil environment around the anode areas for solubilizing metal(loid)s. Combined with EKF, citric acid was more conductive to desorb metal(loid)s. In addition, the reversed EKF effectively alleviated metal(loid) precipitation caused by alkalization in the initial cathode areas. The EKF significantly enhanced metal(loid) extractions in the anode area of soils using Na_2EDTA, $CaCl_2$ and citric acid at pH 2. The most preferable removal of Pb (80 % - 98 %), As (48 % - 63 %) and Cs (10% % - 13 %) were achieved with three extractants. The $CaCl_2$ and citric acid were proved to be suitable alternatives to Na_2EDTA for Pb extraction. A washing process of 2 h extraction with double washing cycles was optimized.

O3.17

11:08 ELUCIDATION OF ANAMMOX/MICROALGAE ACTIVITY FOR ADVANCED WASTEWATER TREATMENT IN BENEFICIAL BIOELECTROCHEMICAL SYSTEMS

Veera Gnaneswar Gude, Bahareh Kokabian, Savannah Stuart-Dahl
Mississippi State University, Mississippi State, MS, USA

Microbial desalination cells (MDCs), a form of bioelectrochemical systems, allow for simultaneous wastewater treatment and desalination of saline water with concurrent electricity production. The premise for MDC performance is based on the principles that bioelectrochemical (BES) systems convert wastewaters into treated effluents accompanied by electricity production and the ionic species migration (i.e. protons) within the system facilitates desalination. To eliminate the need for expensive catalysts and toxic chemicals, this research focuses on biological cathodes to enhance the system performance in an environmentally-sustainable manner. This study describes the use of autothrophic microorganism such as Anammox bacteria and microalgae as sustainable biocatalyst/biocathode in MDCs. Three different process configurations of photosynthetic MDCs (using Chlorella vulgaris) were evaluated for their performance and energy generation potentials. Static (fed-batch, SPMDC), continuous flow (CFPMDC) and a photobioreactor MDC (PBMDC, resembling lagoon type PMDCs) were developed to study the impact of process design on wastewater treatment, electricity generation, nutrient removal, and biomass production and the results indicate that PMDCs can be configured with the aim of maximizing the energy recovery through either biomass production or bioelectricity production. In addition, the microbial community analysis disclosed considerable spatial diversity in microbial communities which is a critical factor in sustaining the operation of MDCs. This study also provides the first proof of concept that anammox mechanism can be beneficial in enhancing the sustainability of microbial desalination cells to provide simultaneous removal of ammonium from wastewater and contribute in energy generation. Experimental studies and microbial community analyzes will be discussed in detail.

O3.18

11:26 SEQUENTIAL COPRECIPITATION WITH TRIETHYLAMINE FOR ULTRATRCAE ELEMENTAL ANALYSIS IN SEAWATER BY ICPMS

Zikri Arslan[1], Tulay Oymak[2], Jeremy White[2]
[1]Jackson State University, Jackson, MS, USA, [2]Cumhuriyet University, Sivas, Turkey

Trace elements in seawater are indicators in understanding environmental pollution in coastal waters and the biogeochemical cycling of metals in oceanic waters. However, direct determinations in seawater are difficult by ICP-MS because of low elemental concentrations and the heavy salt (ca. 3.5%). Co-precipitation is a matrix removal technique based on separation of elements of interest in the presence of carrier element. Mg(OH)2 coprecipitation is an attractive approach utilizing Mg matrix of seawater to isolate trace elements from salt matrix. Yet, Mg(OH)2 coprecipitation is influenced by pH and formation of ammonia and hydroxide complexes preventing isolation of certain elements. In this study, we used triethylamine (TEA) as an aprotic base for Mg(OH)2 precipitation. A large suit of elements, including transition metals and rare earth elements were successfully precipitated within Mg(OH)2 quantitatively. Precipitation was virtually independent of solution pH. H2 and He were examined for reducing the molecular ion interferences associated with residual Mg and Na. H2 performed better than He for Fe, Cu and Zn and other problematic elements. A sequential coprecipitation scheme was developed to minimize Mg in analyses solutions. Matrix components, including Ca, Na, Cl, K were eliminated effectively. A volume of 10 mL seawater was preconcentrated to 1 mL affording 10-fold enrichment in elemental concentrations. Detection limits varied from sub-pg/L to pg/L. The method was validated with seawater (CASS-4) reference sample and applied to determination of trace elements in seawaters collected from coasts of Florida.

O3.19

11:44 CONTRASTING BEHAVIOR OF FLAVONOL FISETIN AND ISOFLAVONE DAIDZEIN IN γ-CYCLODEXTRIN NANOCAVITY

Bidisha Sengupta
Tougaloo College, Tougaloo, MS, USA

The present study establishes the effectiveness of γ-cyclodextrin (γ-CDx) as a drug carrier and investigates the interactions between the nanocavity of γ-CDx and the drugs. Steady state and time resolved fluorescence anisotropy along with induced circular dichroism (ICD) spectroscopy provide useful tools to observe and understand the behavior of the therapeutically important plant flavonoids fisetin and daidzein in γ-CDx. The fluorescence emission properties of these two flavonoids are significantly different in γ-CDx environment. Although Benesi-Hildebrand plots indicated 1:1 stoichiometry for both the supramolecular complexes, the mode of the binding of fisetin significantly differs from daidzein in γ-CDx, as is observed from ICD spectra which is further confirmed by docking studies. The interaction with γ-CDx proceeds mainly by the phenyl rings and partly by the chromone ring of fisetin whereas only the phenyl rings takes part for daidzein. The binding of flavonoids with γ-CDx cavity allows an increase in the aqueous solubility of the hydrophobic flavonoids, which are determined by gradual increase in the ICD signal, fluorescence emission as well as increase in fluorescence anisotropy with increasing γ-CDx. This supports γ-CDx as a nanovehicle for flavonoids fisetin and daidzein in improving their bioavailability in physiological system.

12:00 General Sessions

Session 5. Contributed Talks III (concurrently held with Section 6), Chair: Nicholas Jentsch

Thursday, February 23, 2017
AFTERNOON
Room TC 218A

O3.20

1:00 DIASTEREOSELECTIVE SYNTHESIS OF 2,4,6-TRISUBTITUTED PIPERIDINES VIA PRINS CYCLIZATION

John Hood, Matthew Donahue
The University of Southern Mississippi, Hattiesburg, Mississippi, USA

Nitrogen heterocycles account for nearly 60% of all FDA approved small molecules with the six-membered piperidine scaffold representing the largest minority of those rings. The synthesis of piperidines is an active field of research because this ring system with various substituents and stereochemistry is an important building block for many therapeutic indications, such as antihistamines and analgesics. While there are many known reactions to produce substituted piperidines, the objective of this research is to employ a four-step method to generate a 2,4,6 tri-substituted piperidine ring that bears three stereocenters. The first step is a condensation between an aldehyde and (R)-2-methylpropane-2-sulfinamide to create the Ellman N-sulfinyl imine. Carbons C3-C5 of the nascent ring are installed by stereoselective allylation that generate a homoallylic amine. Our findings of different imine allylation conditions will be presented through examination of solvent, metal, and allylating agent. The nitrogen is subsequently alkylated with ethyl propiolate to access an N-sulfinyl vinylogous

amide. The ring closure step is initiated by acidic activation of the enamine to the N-sulfinyl iminium ion that is subsequently attacked by the pendant alkene. Finally, trapping of the resultant carbocation with the conjugate base affords the. tri-substituted piperidine ring with stereogenic carbons at positions 2, 4, and 6. A small library of aldimines has been synthesized to examine how different substituents at C2 affect the stereochemical outcome of this process. We are investigating this strategy as a tunable method to prepare a wide variety of stereochemically diverse piperidine derivatives.

O3.21

1:12 ELECTROSPINNING PARAMETERS FOR ALGINATE- AND CHITOSAN-BASED NANOFIBERS

Kathryn Penton, William Weeks, 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 promote tissue regeneration while imitating body tissue which make it ideal for modern wound healing dressings. Several of these water soluble natural polymers, including alginate and chitosan, show promise as tissue scaffolds and drug delivery vehicles. However, formation of nanofibers is difficult due to the inherently charged biopolymers. In this project, optimal parameters for electrospinning alginate- and chitosan-based nanofibers were investigated. Co-solvents such as glycerol and ethylenediamine, and co-polymers such as poly(vinyl alcohol) and agarose were used at various concentrations to assist in overcoming the innate charges of the natural polymers. Additional electrospinning parameters were altered, including voltage, distance from the needle to the collection plate, and polymer flow rate. In the future, the optimal electrospinning parameters will be used to produce drug-loaded nanofibers. These parameters coupled with release rate studies of the drug-loaded fibers will then be used to create a catalog of small molecule release profiles. The cataloged profiles can be applied in the further development of biomaterials used in drug delivery and modern wound healing dressings. 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.

O3.22

1:24 HIGH PURITY HETEROCYCLIC MONOMER SYNTHESIS VIA CONTINUOUS HIGH-SHEAR REACTOR

Andrew Frazee, Jeffrey Wiggins
University of Southern Mississippi, Hattiesburg, MS, USA

This research develops a continuous high-shear reactor adept to synthesize heterocyclic monomers, and alloys thereof, under solvent-free conditions. Validated by 1H NMR, the continuous high-shear reactor demonstrates throughputs that are 6-40x faster with increased efficacy in reaction kinetics, such as targeting specific monomeric conformations, as compared to current batch and continuous reactor technology. Furthermore, comparison of purified 1H NMR spectra of monomer synthesized in a batch reactor to the unpurified 1H NMR of monomer synthesized in the aforementioned reactor design, demonstrates that utilization of the continuous high-shear reactor for benzoxazine monomer synthesis yields a high purity product eliminating the need for post-processing purification. Synergistically, these attributes significantly increase the throughput, synthetic control, and reduce the cost of melt synthesized heterocyclic monomers.

O3.23

1:36 EFFECTS OF GOLD NANOPARTICLES ON STRENGTH OF CHEMICALLY TREATED HAIR FIBERS

Yolanda Jones, Alicia Cruthirds, Amelia Thompson, Anant Singh, Sandra Barnes
Alcorn State University, Lorman, MS, USA

The aim of the project is to study the potential for strengthening hair fibers using gold nanoparticles. The work takes advantage of the ability of gold to form pseudocovalent bonds with sulfur to investigate the potential for using the nanoparticles to form bonds between sulfur containing amino acids in hair fiber proteins. The work studies the kinetics of uptake/binding of particles of varied size and shape with hair fiber and the effect of the particles on protein loss during chemical treatments. Gold nanoparticles of varied sizes and shapes were prepared and characterized using optical spectroscopy. Optical spectroscopy was also used to monitor the particle uptake. The Bradford Assay was used to study the kinetics of protein removal of gold-treated hair when exposed to chemical straightening agents. Our early results show rapid uptake of the particles in hair strands and the delay improved resistance to chemical treatment.

O3.24

1:48 SELECTIVE ZINC (II) SENSING RAMAN PROBE FOR SCREENING OF PROSTATE CANCER CELLS

Avijit Pramanik, Suhash R. Chavva, Bhanu P. V. Nellore, Stacy Jones, Paresh Chandra Ray
Jackson State University, Jackson, MS, USA

Early stage identification of cancer is very important to cure from the chronic disease. Mobile zinc signatures can be used as a biomarker for prostate cancer prediction, opening the route for the early diagnosis of cancer. Clinicians need a reliable tools which can offer fast, highly sensitive and selective mobile Zn(II) concentration in live cells. Raman sensor hold high promise for in-vivo sensing of cancer, where near IR light can be easily used to avoid tissue auto-fluorescence and to enhance tissue penetration depth. The current work report to design of novel and highly efficient surface enhanced Raman spectroscopy (SERS) probe using *p*-(imidazole)azo) benzenethiol attached gold nanoparticle as a Raman reporter, which has the capability to identify prostate cancer cells based on Zn(II) sensing. Reported data show that after binding with Zn(II), Raman reporter attached gold nanoparticle forms assembly structure, which allows selective detection of Zn(II) even at 0.1 parts per billion (ppb) concentration. Experimental data shows that SERS probe can distinguish metastatic cancer cells from normal prostate cells very easily. Reported results demonstrated that this sensor's sensitivity is as low as 5 cancer cells/mL. Designed Raman probe has the capability to be used as chemical toolkit for determining Zn(II) concentrations in the biological sample.

Thursday, February 23, 2017

AFTERNOON

Room TC 218B

Session 6. Contributed Talks IV (concurrently held with Section 5), Chair: Rogers Nyamwihura

O3.25

1:00 ATOMISTIC STUDY OF GRAPHENE-CARBON NANOTUBE-POLYMER COMPOSITE

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

Graphene is a single atom thick two dimensional carbon sheet where sp^2-hybridized carbon atoms are arranged in a honeycomb

structure. The functionalization of graphene and carbon nanotubes (CNTs) with polymer is a route for developing high performance nanocomposite materials. We study the interfacial interactions among graphene, CNT, and Nylon 6 polymer using computational methods based on density functional theory (DFT) and empirical force-field. Our DFT calculations are carried out using Quantum-ESPRESSO electronic structure code with van der Waals functional (vdW-DF2), whereas the empirical calculations are performed using LAMMPS with the COMPASS force-field. Our results demonstrated that the interactions between (8,8) CNT and graphene, and between CNT/graphene and Nylon 6 consist mostly of van der Waals type. The computed Young's moduli indicated that the mechanical properties of carbon nanostructures are enhanced by their interactions with polymer. The presence of Stone-Wales (SW) defects lowered the Young's moduli of carbon nanostructures.

O3.26

1:12 MONITORING CHROMATOGRAPHIC SEPARATIONS USING VERTICAL COLUMNS WITH UV-VIS DETECTION

Karla Turner, William Mahone
Mississippi Valley State University, Itta Bena, MS, USA

Separation and chromatography go hand-in-hand. Column chromatography, which was the basis for our project, was carried out by packing a column with cotton. The mobile phase was chosen to be a dilute alkaline solution (sodium hydroxide). The sample was injected using a pipette and allowed to elute through the column by gravity feed. Two substances were used as analytes (phenolphthalein and methyl orange) because of their different spectrums and then the samples were placed together. To record what was coming off the column at any given time, an ultraviolet-visible spectroscopy (UV-Vis) was used because it generates a signal when an analyte is detected. This section was repeated with methyl orange and multiple samples were collected every five minutes while the analytes were eluting through the column. We observed what was happening when the samples were eluting from the column for both samples. Phenolphthalein and methyl orange were then placed in the column and, again, multiple samples were collected. Using uv-vis absorption techniques a spectrum was generated for each sample. Using the wavelength of max absorption a chromatogram was generated specific to each substance. This allowed the elution behavior of each substance to be monitored both as single analyte samples and as mixtures. Comparison of the chromatograms showed that the elution behavior changed for the substances in the mixture versus when they were alone in the column. We have concluded that intermolecular interactions between the analytes are responsible for this behavior.

O3.27

1:24 ELECTRO-SPINNING ALGINATE-BASED NANOFIBERS

William Weeks[1], Katie Penton[1], Amber Wilson[1], Scarlett Salter[1], Sharon Hamilton[1], Gisela Buschle-Diller[2]
[1]Delta State University, Cleveland, MS, USA, [2]Auburn University, Auburn, AL, USA

Recent evolutions in the field of biomaterials have focused on developing materials that can interact with biological systems to aid in wound healing. Natural polymers have been investigated as possible biomaterials to mimic physiological conditions and aid tissue regeneration as well as facilitate controlled drug delivery. Electrospinning natural polymers, like alginate, yield nanofibers that have shown promise as tissue scaffolds and drug delivery molecules. However, this renewable biopolymer contains inherent charges that make it difficult to electrospin, which is why researchers continue to investigate the optimal electrospinning conditions for pure biopolymer fiber formation. In this project, the formation of natural polymer nanofibers was explored using alginate solutions with glycerol or ethylenediamine as co-solvents. Other electrospinning parameters were also explored including distance to the target, flow rate, and voltage. It was found that the negatively charged alginate formed the best fibers when it was electrospun with a co-solvent system. Additionally, oxidized alginate was prepared from the commercially available alginate. The oxidized alginate was characterized and its electrospinability explored. It is conjectured that the oxidized alginate polymer will have an increased hydrolysis rate as compared to alginate which should result in a more preferred drug release profile. It is expected that these fiber structures could be useful/applied towards the controlled delivery of small drug molecules.

O3.28

1:36 SINGLE PARTICLE ICP-MS FOR NANOPARTICLE CHARACTERIZATION: INVESTIGATION OF SOLVENT EFFECTS ON NANOSILVER

Jeremy White, Zikri Arslan
Jackson State University, Jackson, MS, USA

Inductively coupled plasma spectrometry (ICP-MS) is developing as a powerful technique in nanoparticle characterization owing to its high sensitivity and real-time data collection capability. Unlike TEM and DLS, ICP-MS can detect individual particles from very dilute suspensions and elucidate the size accurately when operated judiciously in single particle mode (sp-ICPMS). In this study, we examined the performance of sp-ICPMS on uncoated, PVP-coated and oleic (OLA)-coated silver nanopowders (AgNPs) within a size range of 20-30 nm. Dilute suspensions of the AgNPs were prepared in water, methanol (MeOH), dimethylsulfoxide (DMSO) and tetramethylammonium hydroxide (TMAH). Visually inspection indicated no difference among stability of dispersions and aggregation patterns. Suspensions were further examined by sp-ICPMS to determine the most suitable medium providing accurate size determination. Sp-ICPMS was optimized for suspension flow rate and sample transport efficacy. Calibration of sp-ICPMS was performed using in-house aqueous AgNPs (25-35 nm). The results indicated that water and TMAH were the most suitable solvents affording stable suspensions and accurate particle size distribution. MeOH yielded smaller particles than listed particle sizes, while DMSO was not suitable for ICP-MS measurements. In DMSO, results were sporadic due to the degradation of signals. Various concentration of TMAH was examined for all AgNPs. A concentration of 5 and 10% provided accurate estimate of AgNPs.

O3.29

1:48 IMPACTS OF SOLVENT AND TEMPERATURE ON P3HT AGGREGATION

Raeven Wiggins, Frederick McFarland, Song Guo
University of Southern Mississippi, Hattiesburg, MS, USA

Poly(3-hexylthiophene-2,5-diyl) is a long carbon based polymer that aggregates under various circumstances. The packing of this polymer is critical in its many optoelectronic applications such as photovoltaics that converts solar energy to electricity. Different solvents allow P3HT to aggregate in two forms: H-aggregates and J-aggregates. When dissolved in anisole and toluene, P3HT forms H-aggregates and J- aggregates, respectively. Here we study how the change in temperature and solvent choice affect the formation of P3HT aggregates. The absorption of P3HT solution is measured through an UV-vis spectrometer. The absorption spectrum is then analyzed to obtain a quantitative view of the aggregation process. The change in temperature and solvents will control the rate at which the polymer aggregates and alternate the (0-0) and (0-1) absorption ratios. Our results will shed lights on the impacts of temperature and solvent on the type of P3HT aggregation formed in solution, which in turn affects the electronic properties of P3HT.

2:05 PM Business Meeting

Thursday, February 23, 2017
AFTERNOON
Room TC 218A

Session 7. Invited Symposium III, Chair: Yolanda Jones

O3.30

2:10 STRUCTURAL MOTION OF DI-HEME PROTEIN MAUG REVEALED BY VARIABLE TEMPERATURE SPECTROSCOPY

Manliang Feng
Tougaloo College, Tougaloo, MS, USA

MauG is a di-heme protein that contains two distinct heme groups. One heme is pentacoordinated with His35 as the proximal ligand. The other heme is hexacoordinated with His205 and Tyr294 as the proximal and distal ligand. The penta-coordinated high-spin heme is believed to directly react with oxygen donating substrates (H_2O_2 or O_2) leading to the formation of a bis-Fe(IV) species through charge-resonance. In the present study resonance Raman spectra of MauG reveals two structural sub-states of the high-spin heme site. The two species exhibit temperature dependent equilibrium due to the structural motion. At lower temperature, the high spin heme is mainly 5-coordinated while at higher temperature it appears as a mixture of penta/hexa coordinated high-spin heme. The presence of two structural sub-states was further confirmed by Fourier Transformed Infrared (FTIR) spectra of ferrous MauG-CO and UV-Vis spectrophotometric titration of MauG with cyanide ions. The frequencies of the $\nu_{Fe\text{-}CO}$ and $\nu_{C=O}$ point to two distinct structures of the high-spin heme that differ both in the proximal and distal structures. Further investigations show that the structure motion does not involve a major conformational change. Therefore it is likely that there is a constant chain movement near the heme site or a rapid reorganization of distal site H-bond network. The kinetic experiment has also performed to study the protein motion. The protein motion may play a role in the charge-resonance and fast long range electron transfer. This work is supported by NSF Research Initiation Award under HBCU-UP program (Award number: 1505446).

O3.31

2:28 NANOARCHITECTURE BASED SERS FOR BIOMOLECULAR FINGERPRINTING AND LABEL-FREE DISEASE MARKERS DIAGNOSIS

Paresh Ray
Jackson State University, Jackson, MS, USA

Here we will discuss our recent report on the development of nanoarchitecture based highly reproducible and ultrasensitive detection capability SERS platform via low-cost synthetic routes. Using one-dimensional (1D) carbon nanotube (CNT), two dimensional (2D) graphene oxide (GO) and zero-dimensional (0D) plasmonic nanoparticle, 0D to 3D SERS substrates have been designed, which represent highly powerful platform for biological diagnosis. We will discuss the major design criteria we have used to develop robust SERS substrate to possess high density "hot spots" with very good reproducibility. After that, we will introduce exciting research findings by our group on the applications of nanoarchitecture based SERS substrate for the capture and finger print detection of rotavirus from water and Alzheimer's disease biomarkers from whole blood sample. The SERS detection limit for β-amyloid (Aβ proteins) and tau protein using 3D SERS platform is several orders of magnitude higher than the currently used technology in clinics.

O3.32

2:46 INVESTIGATING ELECTROSPUN ALGINATE- AND CHITOSAN-BASED FIBERS

Sharon Hamilton, William Weeks, Kathryn Penton, Scarlett Salter, Amber Wilson, Tia Brown, Doug Miller
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, like alginate and chitosan, yields nanofibers that have shown promise as tissue scaffolds and drug delivery vehicles. 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 two-pronged approach towards the investigation of natural polymer-based fibers. One facet focuses on the development of novel alginate-based, degradable nanofibers. It is anticipated that the degradable alginate nanofiber scaffolds can be used for drug delivery and future studies will investigate the time-release of small molecules from these fibers. Another facet focuses on the preparation of a variety of drug loaded, alginate- and chitosan-based fibers via electrospinning and the exploration of the release profiles of these novel scaffolds. This represents a first attempt to create a drug release profile catalog from negatively and positively charged natural polymer-based electrospun scaffolds. Studies from both approaches will lead to improved understanding of alginate- and chitosan-based wound healing materials, especially in the field of modern drug-laden, wound dressings.

O3.33

3:00 AGGREGATION OF P3HT INTO NANOWHISKERS

Song Guo
University of Southern Mississippi, Hattiesburg, MS, USA

The morphology of conjugated polymer aggregates has been shown to have a profound impact on their optoelectronic properties. Poly(3-hexylthiphene) (P3HT) has been reported to be capable of self-assembling into nanowhiskers and nanofibers, which provide superior optoelectronic properties compared to its amorphous film. Here, the local morphology evolution of the P3HT nanostructures at different stage of aggregation, are investigated by atomic force microscopy (AFM) and its advanced modes. Higher concentrations appear to lead to more presence of multi-chain aggregates, which will further pack into nanowhiskers with more protruding segments from the edges. The findings here provide insights on molecular packing of conjugated polymer aggregates that are difficult to resolve in bulk thin films.

Thursday, February 23, 2017

EVENING

Ballroom

3:30 Dodgen Lecture and Awards Ceromony

General Poster Session

Immediately Following Dodgen Lecture

P3.01

ELUCIDATING STRUCTURE IN THE EARLY STAGES OF AGGREGATION IN ELASTIN-LIKE PROTEINS

Geoffrey Pratt[1], Yue Zhang[2], Nick Fitzkee[2]
[1]Northeast Mississippi Community College, Booneville, MS, USA, [2]Mississippi State University, Starkville, MS, USA

Elastin-Like Proteins (ELPs) have been proposed as a novel drug delivery vector for treating cancer. These proteins aggregate reversibly above a specific temperature, allowing ELPs to be thermally targeted to cancerous tumors. Though proven successful in mouse models, without a molecular understanding of how ELPS aggregate, it remains extremely difficult to optimize these molecules for drug delivery in humans. Our hypothesis is that ELPs have a close interaction between the amino- and carboxy-termini in the ELPs aggregated phase. Using dynamic light scattering, Electron Paramagnetic Resonance (EPR) and multi-dimensional Nuclear Magnetic Resonance (NMR) we have begun characterization of the temperature dependent transition in our ELPs. In addition, we have labelled our protein using MTSL, a paramagnetic spin label that allows us to monitor protein association at a genetically specified cysteine location. Our dynamic light scattering experiments confirm that aggregation is occurring on the macromolecular scale for each variant. Preliminary EPR results indicate that the protein termini are associating at the early stages of aggregation. This is supported by the observation that the EPR spectra of a mixture of terminal cysteine-MTSL variants A4C+A4C, T204C+T204C, and A4C+T204C each possess an additional peak by which Markham et. al.1 state is indicative of electronic dipolar interactions. Other mixtures of variants including T44C+A84C, and A84C+A84C do not show this additional peak. In the near future we intend to complete EPR and NMR experiments on every mixture of variants, and draw conclusions based on these results.

P3.02

ACYCLICTHIOUREA-BASED COMPOUNDS AS SULFATE ION RECEPTORS

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

The design of artificial receptors for sulfate ion is of great interest because of the importance of sulfate in environmental and biological systems. Among the various receptors, dipodal and tripodal acyclic molecules bearing urea/thiourea functional groups could be employed due to the directional conformation of two NH groups that favors the formation of a stable host–guest complex. During the course of this study three acyclic thiourea-based receptors with different sizes and dimensionalities including bis([(4-cyanophenyl)N-methylamino]ethyl)thiourea (**L1**), tris([(4-cyanophenyl) amino]ethyl) thiourea (**L2**) and tris([(4-cyanophenyl)amino]propyl) thiourea (**L3**) were synthesized and their binding affinities for sulfate have been studied by ^{1}H NMR titrations, 2D NOESY NMR experiments and single crystal X-ray diffraction analysis. Results from ^{1}H NMR titrations revealed that the receptors bind sulfate with different binding strengths through hydrogen bonds showing a 1:1 binding mode in solution. Among the investigated ligands, the highest binding affinity for sulfate was observed by the tripodal receptor (**L2**), due to the high basicity and complementary size and geometry of tetrahedral sulfate and the receptor. 2D NOESY NMR experiments and X-ray crystal structures also confirmed H-bonding as the main interaction for sulfate binding. Acknowledgement: The project described was supported by Grant Number G12MD007581 from the National Institutes of Health, through the RCMI Center for Environmental Health at Jackson State University (JSU).

P3.03

SYNTHESIS AND SENSING PROPERTIES OF 4-NITROPHENYL BASED DIPODAL UREA FOR ANIONS

Chassidy Carter, Maryam Emami Khansari, Md. Alamgir Hossain
Jackson State University, Jackson, MS, USA

Anion binding by synthetic neutral artificial receptors has been a topic of major discussion in recent years because of their significant importance and potential applications in biological, environmental and supramolecular chemistry. These artificial receptors can be used for detection, sensing, extraction, and separation of biologically and environmentally relevant anions. In general, molecules with directional H-bond donors, such as urea are known to bind anions by hydrogen-bonding interactions under neutral conditions. They also benefit from the presence of electron withdrawing oxygen atom, which makes them potential receptors to complex an anion. In an effort to design neutral receptors with multiple binding sites for hosting anionic guests, we have synthesized a dipodal urea-based ligand from the reaction of 2,2'-diamino-N-methyldiethylamine and 4-nitrophenyl isocyanate in dichloromethane, which was studied for a variety of common anionic species by 1H NMR and UV-Vis spectroscopy in DMSO. We have also performed naked-eye colorimetric studies of this compound for anions, showing a distinct color change for fluoride and di-hydrogen phosphate in solution. Acknowledgement: The project described was supported by Grant Number G12MD007581 from the National Institutes of Health, through the RCMI Center for Environmental Health at Jackson State University (JSU).

P3.04

ADSORPTION OF SIMAZINE AND ATRAZINE ON THE SURFACE OF NANOPARTICLES

Dominique Watkins, Maxwell Okunrobo, Hattie Spencer, Matthewos Eshete
Mississippi Valley State University, Itta Bena, MS, USA

Particles with the size range of between 1 and 100 nanometers are called nanoparticles. Due to large surface area to mass ratio they have unique physical and chemical properties. This makes them superior for many applications than the corresponding standard particles. The goal of this research was to explore the interaction of Simazine and Atrazine with the surface of metallic oxides, nanoparticles of metallic oxides and carbon. The effort will help us understand the fate of these compounds in water system and also allow us to identify the metallic oxide that has potential application for water purification. Simazine and Atrazine are selective triazine herbicides currently in use to control broad-leaved weeds and annual grasses in USA. Both herbicides are known to increase the risk of cancer and cause other health problems. Atrazine is banned in Europe since 2004 due to adverse reproductive effect in mammals, birds and humans. In recent years, they have become some of the principal agents of contamination in water bodies around the Mississippi through herbicide runoff. We studied the adsorption of Simazine and Atrazine on the surface of nanoparticles of iron oxide, nanoparticles of carbon, regular iron oxide and aluminum oxide at pH 6 and pH 8 using UV-Visible spectroscopy. Our result shows that the surface of carbon nanoparticles has the highest adsorption of simazine at pH 6. Both herbicides displayed better adsorption on the surface of nanoparticles than the regular metallic oxides at both pH 6 and pH 8.

P3.05

UHPLC-MS METHOD DEVELOPMENT FOR CAFFEINE ANALYSIS IN BEVERAGES

Dalvin Williams, Charles Smithhart
Delta State University, Cleveland, MS, USA

A method for analyzing caffeine (1,3,7-trimethylxanthine) was developed using solid-phase extraction (SPE) followed by ultra high pressure liquid chromatography – mass spectrometry (UHPLC-MS). Caffeine is a stimulant found in many beverages, and a simple method suitable for the undergraduate laboratory was desired as a teaching tool. Several solvent systems were used with Waters C18 Sep Paks to separate the caffeine from the matrix and clean-up the sample prior to introduction to the UHPLC-MS (Thermo Scientific LCQ Fleet). Calibration and optimization of the electrospray ionization (ESI) source was performed using prepared calibration solutions in order to optimize instrument response. Several solvent gradient systems were employed to elute caffeine peaks suitable for quantitation from the C18 reverse-phase analytical column. The method developed provides a good lab experiment to introduce the concepts of solid-phase extraction, mass spectrometry, and application of the standard addition quantitative method to undergraduates. In the future, other solvent systems may be tested to further improve the current method, and the use of Ms^n techniques may be employed to explore the details of ion fragmentation in caffeine. Successfully developing an accurate procedure for performing such a method with the UHPLC-MS would be the ultimate goal. [Support provided by the US Department of Education Title III program and the NASA Space Grant Consortium.]

P3.06

QUANTUM MECHANICAL INVESTIGATIONS OF MECHANOPHORES

Logan James, Guido Todde, Yoan Simon, Gopinath Subramanian
University of Southern Mississippi, Hattiesburg, MS, USA

Mechanochemistry is the study of the effects of mechanical energy on chemistry. It can be described as the study of the "wear and tear" on objects or certain molecules. A dithiomaleimide (DTM) and a sulfonate ester were tested in this study. DTM is a highly fluorescent molecule that has been used to tag proteins, while sulfonate esters are known in organic chemistry as excellent leaving groups. The purpose of the study was to determine the maximum force that a particular bond in the molecule can endure. We used a Nudged Elastic Band (NEB) method to calculate the energy barriers for bond breakage as a function of external mechanical forces. For DTM, we hypothesized that 50 piconewtons would be the maximum force the molecule could withstand. After further testing, 35 piconewtons proved to be the maximum force that DTM could withstand. We also concluded that higher force values cause lower activation energies. Preliminary studies on sulfonate ester show similar trends. Acknowledgement: 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

ADSORPTION OF CS IN WATER USING FUNCTIONALIZED, TEMPLATED AND MAGNETIC MESOPOROUS COMPOSITES

Kai Guo, Fengxiang Han, Zikri Arslan, Rong Zhang, Yazhou Zhang, Christian Rogers
Jackson State University, Jackson, MS, USA

As nuclear power becomes tremendous energy source for human kind, incidents also have been drawing people's concerns. Several nuclear incidents, Mayak (1956), Chernobyl (1986), and Fukushima (2011), released common radioactive pollutants such as ^{134}Cs and ^{137}Cs. The current project aims at developing novel efficient meso-silica based nanomaterial to remove Cs from contaminated water . Results showed that functionalized commercially available meso-silica, MCM-41, with -SH groups significantly increased its maximum adsorption capacity (MAC) (29 mg/g). The newly synthesized mesosilica templated nano carbon using ferulic acid as a carbon source reached 33 mg/g MAC adsorption of Cs. The novel magnetic meso-silica modified with upper-rim functionalized calixarene had the MAC of Cs at 200 mg/g. Moreover, the magnetic meso-silica with upper-rim functionalized calixarene also showed an excellent capacity to Sr and Co, other two major nuclear wastes. This study expanded the application area of calixarene since previous studies only showed the efficiency of lower-rim functionalized calixarene in the removal of Cs.

P3.08

CHARACTERIZATION OF EPOXY/AMINE SYSTEMS WITH G-POSS SURFACE MODIFIED SILICA NANOPARTICLES

Reese Sloan, Amit Sharma, Jeffrey Wiggins
University of Southern Mississippi, Hattiesburg, MS, USA

Silica nanoparticles will be surface modified with varying amounts glycidal polyhedral oligomeric silsesquioxane (G-POSS) and incorporated into epoxy/amine matrix systems to gain a fundamental understanding of macroscopic properties. In doing so, varying amounts of 3-aminopropyltrimethoxysilane (APTMOS) will be reacted to the surface of the silica nanoparticles (at weight percents of 1, 2, 5, and 10%) to functionalize their surfaces with primary amines. G-POSS will then be reacted at ratios of 1:10 and 1:5, APTMOS:G-POSS to modify the surface of the silica nanoparticles. The surface modified silica nanoparticles will then be incorporated into an epoxy/amine matrix at weight percents of 5% and 10%. It is hypothesized that by chemically binding the surface modified silica nanoparticles into the matrix material, the mechanical properties of the resulting material will be increased with an increase in the amount of G-POSS on the surface of the silica nanoparticle. It is also hypothesized that the mechanical properties will increase with an increase in the weight percent of the surface modified silica nanoparticles in the matrix material. However, it is also expected that with an increase in the weight percent of the surface modified silica nanoparticles, a decrease in the Tg of the material will be observed due to an increase in the free volume of the material caused by the silica nanoparticles themselves. It is further hypothesized that the cure kinetics of the materials will not be affected by the incorporation of the surface modified silica nanoparticles.

P3.09

METHODOLOGY DEVELOPMENT FOR THE REDUCTION OF ESTERS TO ETHERS VIA IN-SITU REACTIR

Alison Hart[1], Sarah Ariel Kelley[2], Tyler Harless[1], John Hood[1], Michael Tagert[1], Julie Pigza[1]
[1]*University of Southern Mississippi, Hattiesburg, MS, USA,*
[2]*University of Alabama, Tuscaloosa, AL, USA*

The ether functional group is ubiquitous in natural products and other constituents due to its lack of reactivity and overall general compatibility. The development of a tunable ester to ether reduction is highly desired, as conventional methods such as the Williamson ether synthesis does not work with bulky alkyl halides, and the acid-catalyzed condensation of alcohols is limited to making symmetric ethers. In the current literature, the reduction of esters to ethers has been explored, however its broad applicability has been hindered, especially for one-step conversions. Because of these difficulties, we are interested in developing a general and tunable one-pot method for the reduction of esters to ethers, with a large ester substrate scope including bulky side groups, aromatic, and non-aromatic esters. By using in-situ reaction monitoring with React IR, the acetal intermediate can be observed by following the loss of the carbonyl peak, allowing for the shortest possible reaction times. A brief outline of the current ester substrates will be given, as well as our results for the two step reduction of non-aromatic esters to ethers.

Additionally, progress towards developing a tunable one-pot methodology for the reduction of aromatic and non-aromatic esters will be discussed.

P3.10

SYNTHESIS AND BINDING EVALUATION OF TRIS(2-AMINOETHYL) AMINE-BASED SEMITHIOCARBAZIDE RECEPTORS FOR ANIONS

Corey Johnson[1], Md. Alamgir Hossain[1]
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Overabundance of anions in the environment pose a dire threat to land structures and mammalian health. Supramolecular chemosensors are effective alternatives for detecting anions through complexometric titrations. A new class of anion receptors were synthesized from the reactions of tris(2-ethylthiosemicarbazido)amine with 4-nitrophenyliso-thiocyanate and 4-nitrophenylisothiocyanate in DMF. Titrations of these receptors were performed in DMSO. UV-Vis titrations unveiled the strong binding affinities for F^-, AcO^-, $H_2PO_4^-$, SO_4^{2-}, and HSO_4^-. Colorimetric studies exhibited increasing intensity of color changes via the trend: F^-> AcO^-> $H_2PO_4^-$> SO_4^{2-}. 1H-NMR titrations revealed immediate deprotonations of the thiosemicarbazide core with addition of anion. Crystallography studies of the receptors and receptor-ligand complexes are pending.

P3.11

INTERACTION OF BIODEGRADABLE NANOPARTICLES WITH BOVINE SERUM ALBUMIN

Kayla Bailey[1], Santosh Aryal[2], Seong-O Choi[2], Matthewos Eshete[1]
[1]Mississippi Valley State University, Natural Science and Environmental Health, Itta Bena, MS, USA, [2]Kansas State University, Nanotechnology Innovation Center of Kansas State (NICKS), Manhattan, KS, USA

Biodegradable polymeric Nanoparticles (NPs) such as poly (D, L-lactide-co-glycolide) (PLGA) are attracting a great deal of research interest due to their potential to deliver therapeutic molecules such as vaccines, drugs and genes to target cells. The use of biodegradable NPs in drug delivery systems arises from their unique and various properties including biocompatibility, versatility, and better drug stability. Several studies for particle uptake by target cells have demonstrated that properties of NPs such as shape, surface modification and particle size significantly affect the intracellular uptake as well as their interaction with various proteins. Upon their entry in to the biological system, they encounter with various serum proteins. Their efficacy in drug delivery depends on these interactions therefore; understanding the binding interactions between protein and biodegradable NPs is critical. Investigating their interaction with the biological system helps to determine appropriate surface modifications, size and shape. We have used fluorescent marked Bovine serum albumin, (BSA-FITC) as a model protein to investigate its binding to unmodified PLGA. Various concentrations of unmodified PLGA nanoparticles were incubated with a constant concentration of BSA-FITC then Fluorescence plate reader was used to determine the emission intensity for each of the nanoparticle-protein samples. Our result shows a decrease in fluorescence emission as the concentrations of nanoparticles increased, indicating strong binding of BSA to the surface of PLGA-NP. Study done using Dynamic Light Scattering (DLS) also show an increase in size of the PLGA as the proportion of BSA and PLGA increased indicating protein corona formation.

P3.12

ANALYSIS OF THE DNA-CLEAVING EFFICIENCIES AND MECHANISM OF BIFUNCTIONAL DNA-CLEAVING REAGENTS

Deandrea Hawkins, Leon Karekezi, Courtney Mullins, Lauren Hoth, Emily Stewart
Millsaps College, Jackson, MS, USA

Current photodynamic therapy uses sensitizers to generate singlet oxygen which causes cell death. The hypoxic environment of most cancer tissues makes oxygen a limiting reagent for this approach and several methods have recently been developed to circumvent this problem. The photoinduced homolytic N-O bond cleavage of N-Heteroaromatic compounds with an N-alkoxy substituent (onium salts) leads to the formation of a heteroaromatic radical cation and an alkoxy radical. Both of these species have been shown to induce DNA cleavage, each with a different mechanism. To increase the DNA cleaving efficiency by enhancing ground-state association we synthetically attached a known DNA-binder, 1,8-naphthalimide. Several binfunctional compounds have been synthesized and their photochemistry has been investigated. Here we present the DNA cleaving efficiency of a series of bifunctional DNA-cleavers which has been analyzed by gel electrophoresis and CD spectroscopy. The bifunctional compounds can be used to efficiently initiate DNA-cleavage. Oxygen appears to inhibit the reaction and thus the compounds could exhibit and increased activity in hypoxic tissues. "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."

P3.13

1,8-NAPHTHALIMIDE FLUORESCENCE IN REVERSE MICELLES

Shizhe Zhang, Melinda Solomon, Anna Allred, Irene Corrao, Wolfgang Kramer
Millsaps College, Jackson, MS, USA

The moderate fluorescence of 1,8-naphthalimides can be used to localize conjugated compounds in various environments. Our DNA-cleaving nitrogen onium salts are connected to 1,8-naphthalimides which should allow us to track their movement in tissues due to the variable fluorescence intensity and wavelength. 1,8-naphthalimide fluorescence is strongly influenced by solvent polarity, an ideal requirement for a fluorescence sensor system. To obtain more information about the quenching process, intermolecular quenching experiments are employed. Quenching of N-methyl 1,8-naphthalimide with various pyridine derivatives with electon donating and withdrawing substituents shows that certain substitution positions are more efficiently quenching than others. The electron-rich N-oxides are efficient flourescence quenchers. To mimic the membrane environment we analyzed the fluorescence of 1,8-naphthalimides in reverse micelles. AOT as an anionic surfactant in reverse micelles electrostatically attracted the cationic nitrogen onium moiety, but the fluorophor appears to localize in the hydrophobic part of the system. Further experiments in various reverse micelles need to be undertaken to verify these findings. "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."

P3.14

MALEIMIDE-COUPLED DOXORUBICIN

Saihou Ceesay[1], Valeria Zai-Rose[2], John Correia[2], Wolfgang Kramer[1]
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Doxorubicin is a common cancer chemotherapy drug. It is a strong DNA intercalator and targets topoisomerase II. Topoisomerase II relaxes supercoiling during transcription by inducing temporary double-strand breaks to relieve the high superhelical density. Doxorubicin stabilizes the temporary double-strand breaks, the DNA does not get resealed and thus the transcription process comes to an end. Doxorubicin is often administered intravenously, but serious side-effects make a more targeted delivery method desirable. ELPs (Elastin-like Polypeptides) are thermoresponsive macromolecules than can be equipped with

cell-penetrating peptides and allow for the attachment of compounds via cysteine-maleimide crosslinking. Consequently, compounds can be delivered by hyperthermia to target cancer cells. Maleimide linkers can be attached to doxorubicin via a ketone and or an amine. The ketone has been connected to maleimide via a hydrazone, which is susceptible to hydrolysis. The amine is connected to maleimide via an amide linkage which has a much higher stability. Herein we present our efforts to optimize the coupling reaction and work-up, based on a literature known procedure. "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."

P3.15

SYNTHESIS OF AMINOALKYL-SUBSTITUTED AROMATIC HETEROCYCLES

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. 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 made. The goal is to extend the absorption maximum to longer wavelengths and have a flexible linker size connecting the heterocycle to the naphthalimide. Several synthetic approaches are presented. "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."

P3.16

TESTING AND MAPPING LEAD CONCENTRATION OF TAP WATER IN JACKSON METROPOLITAN AREA

Spencer Williams, Kalyani Essue, Kai Guo, Fengxiang Han, Zikri Arslan
Jackson State University, Jackson, MS, USA

Unlike gut wrenching food poisoning, lead poisoning has irreversibly negative effects on the human body. Children, infants, pregnant women and the elderly are most vulnerable to lead poisoning. Unfortunately, some areas of Mississippi, including parts of Jackson, have water systems that leach lead, contributing to the possibility of lead poisoning. As aging infrastructure and economic disparities converge, prevention of widespread lead poisoning remains an important issue to address. The nature and purpose of this research is to discover if there are harmful levels of lead in potable water within the Jackson metropolitan area. The research methodologies that will be used are, the collection of samples from homes of Jackson, MS and surrounding areas' residents, the testing of the samples in our chemistry laboratory at Jackson State University and the comparison of results with the existing body of lead contamination research. Especially in areas of older infrastructure, we recommend increases in the number of homes sampled for lead in water, and of children tested for blood lead levels. Where problems of high lead levels in water or blood are discovered, there should be chemical treatment to make the water less corrosive to pipes, or replacement of lead pipes altogether.

P3.17

ELECTRONIC PROPERTIES AND CHARGE MOBILITY OF 4-([2,2'-BITHIOPHENE]-5-YL)PYRIDINE AND 4-[5-FURAN-2-YL)THIOPHENE-2-YL]PYRIDINE

Alva Dillon, Glake Hill
Jackson State University, Jackson, MS, USA

Organic chemists are now, possibly more than ever, getting their hands wet with organic-based electronics gaining the chance to produce more cost effective and efficient materials than their inorganic competitors. Though, not as efficient, they give way to physical possibilities such as flexible electronic devices. The current state of organic optoelectronics is to engineer efficient semiconducting light sources that are more powerful than the conventional incandescent and fluorescent lighting. For example, using OLEDs as a light source is more environmentally friendly, energy efficient, safer, and has broad applicability in a multitude of electronics. The purpose of the project is to evaluate the efficiency of various organic semiconductors for use in organic field-effect transistors. This study characterized several ordered and disordered halogen-bonded crystals for various chemical properties including reorganization energies, ionization potentials, electron affinities, and electron mobilities via theoretical, density functional theory (DFT) methods. From the aforementioned characteristics, one is able to obtain metrics on electron and hole transporting capabilities. This work, in conjunction with analytical techniques, aim to standardize an efficient means for developing new nanomaterials for use in electronics. In this work, the DFT/B3LYP level of theory indication that the engineered semiconductor materials exhibit ambipolar characteristics.

P3.18

SYNTHESIS OF CONTROLLED POLYACRYLONITRILE (PAN) PRECURSORS FOR CARBON FIBER

Roger Dias, Katelyn Cordell, Jeffrey Wiggins
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While recent advancements have been made to increase carbon fiber mechanical properties, current leading industry carbon fibers still exhibit only a small fraction of their theoretical potential. This reduction is due to morphological defects that are introduced during polymerization and is controlled by precursor chemistry which includes comonomer choice. To control precursor chemistry and therefore morphological defects, we used a semi-batch Reversible Addition Fragmentation Chain Transfer (RAFT) polymerization technique to synthesize well defined polyacrylonitrile (PAN) precursors with high molecular weights and low polydispersities by varying the RAFT agent, reaction temperature, and monomer to chain transfer agent to initiator ratio. Our results showed that utilizing the RAFT agent CPDT at 30°C with a ratio of 10,000:1:0.22 yielded the most controlled polymers. The semi-batch RAFT technique was used to copolymerize commercially available comonomers acrylic acid and methyl methacrylate as well as a new copolymer containing N-isopropylacrylamide which was shown to have a decreased cyclization exotherm as seen via differential scanning calorimetry. This new copolymer was scaled to appropriate quantities via a free radical reaction and sent to our collaborators at the University of Kentucky and spun into high-quality white fiber. These white fibers were oxidized, stabilized and carbonized into high-quality black fiber at Deakin University with their pilot-scale and scientific expertise in converting white fiber to carbon fiber through well-controlled stabilization and pyrolysis processes. Our combined scientific capabilities provided a unique academic capability which linked precursor chemistry and morphological control with carbon fiber morphologies and ultimate properties.

P3.19

SELECTIVE SENSING OF CITRATE WITH A SYNTHETIC HOST

Saadman Alamgir[1], Md Mhahabubur Rhaman[2], Alamgir Hossain[2]
[1]Madison Central High School, Madison, MS, USA, [2]Jackson State University, Jackson, MS, USA

Binding and sensing of small biological relevant anions by synthetic receptors is of considerable interest because of the significant roles played by anions in biochemical reactions. In particular, a citrate anion is known as an important intermediate

during the metabolic process in human body. Low urinary citrate excretion has been shown to be important in the pathogenesis of nephrocalcinosis and nephrolithiasis. Citrate has also been identified as an *in vivo* marker for the discrimination of prostate cancer. Thus, the development of artificial receptors for citrate sensing is important in the field of supramolecular chemistry. In our work, we synthesized a thiophene-based hexamine macrocycle and converted to dinuclear copper(II) complex. The structure of the metal complex was characterized by single crystal X-ray diffraction technique. This copper(II) complex was used for different biological anions, showing high selectivity for citrate anion in water at physiological pH. Acknowledgements: The project described was supported by Grant Number G12MD007581 from the National Institutes of Health.

P3.20

CELL IMAGING AND FLUOROMETRIC DETECTION OF NITRIC OXIDE BY A RUTHENIUM COMPLEX

Salma Begum, Avijit Pramanik, Stacy Jones, Paresh C. Ray
Jackson State University, Jackson, MS, USA

Nitric oxide (NO) is ubiquitous, short lived, water soluble and highly reactive free radical gas which plays a key role in various physiological as well as pathological processes. It is known that NO plays an important role as a intra and intercellular signaling molecule in the cardiovascular, immune and nervous system at low concentrations, whereas at a high level it can react with various reactive oxygen species (ROS) to form reactive nitrogen species (RNS) which cause damage DNA, Lipids and Proteins, thus there is an acute need to develop suitable devices that can detect NO in the cell. During this study, a unique phenanthroline based ruthenium bipyridine complex has been designed and synthesized as a highly sensitive and selective luminescence probe for the imaging of NO production in the cell. Nitric oxide is quantitatively determined in platelets prior to and after, stimulation with adenosine triphosphate (ATP) or activation with adenosine diphosphtate (ADP). Monitoring NO release inside the cell by using a fluorescence probe is advantageous over other forms of measuring NO production from platelets because once activated, a platelet's ability to adhere to surface dramatically increased. Catalytic cyclization using ruthenium bipyridine complex quantified NO releases in the cell, moreover this ruthenium complex itself has yellow fluorescence, which turns into red noticeable color after passing through NO. Acknowledgements: We would like to thank National Science Foundation (PREM NSF DMR-1205194) and NIH/NCRR (Award Number: G12RR013459) & NIH/NIMHD (Award Number: G12MD007581) for supporting the Analytical Core Laboratory Facilities.

P3.21

RESIDUE ANALYSIS OF ARCHAEOLOGICAL PIPE STEMS FOR HALLUCINOGENIC BIOMARKERS

Co Quach, Sara Barker, Amanda Kaminski, Max Harrigill, Scottie Dennis, Timothy Ward
Millsaps College, Jackson, MS, USA

Biomarkers are specific compounds which can be utilized to characterize archaeologically-significant ingredients theorized to be a part of ancient ritualistic and cultural practice. For example, mescaline in peyote (*Lophophora williamsii*), atropine and scopolamine in jimson weed (*Datura stramonium*), and nicotine and anabasine in tree tobacco (*Nicotiana glauca*) were known flora used as part of religious ceremonies and often smoked, brewed into teas, or eaten dried. Through the use of gas chromatography-mass spectrometry (GC-MS) and liquid chromatography – mass spectrometry (LC-MS) these hallucinogenic biomarkers can be characterized in pipe stems used by ancient civilizations. In this study, Mesoamerican pipe stems were analyzed for hallucinogenic biomarkers by GC-MS and LC-MS. N,N-Diethyl-meta-toluamide (DEET) was often found in many real-world samples. This highlights the fact that contamination of archaeological artefacts with modern substances makes trace analysis more difficult.

P3.22

SYNTHESIS OF GRAPHENE OXIDE AND EXPLORATION OF ITS POTENTIAL BIOMEDICAL APPLICATIONS

John Johnson, Brittany Johnson, Manliang Feng
Tougaloo College, Tougaloo, MS, USA

Graphene oxide (GO), an oxidized form of graphene, is a graphene-like material. Its high aspect ratio has attracted significant research and commercial interest in recent years. The oxygen groups introduced to GO through the oxidation process make it soluble in water while the graphene-like body of GO make it a good carrier for hydrophobic molecules. This feature is highly sought in developing controlled drug-delivery vehicles. However, one key problem that must be addressed is the bio-compatibility of GO. There have been contradictory reports on this topic. In this research, we have synthesized GO using a modified Hummers and Offeman method. The contents of oxygen on GO was varied by the duration of the oxidation process and the acid used. The different sizes of GO were separated by gradient centrifugation. FTIR-Spectra of the synthesized GO show absorption band at ~1100 cm^{-1} region conforming the introduction of oxygen groups. The bio-compatibility of GO with various O contents and sizes were tested using several *E.coli* bacteria and mammalian cancer cells. It was found GO has no negative effects on the growth of all the bacteria cells. Larger size GO and high concentration GO have shown some suppressing effects on cancer cells. The structural and functional effects of GO on proteins have also been assessed using mono-heme myoglobin and diheme MauG protein. Our studies indicate that GO has minimal effects on the structure and function of these proteins. This work is supported by NSF Research Initiation Award under HBCU-UP program (Award number: 1505446).

P3.23

ANALYSIS OF CAFFEINE AND NICOTINE CONTENT IN E-LIQUID AND E-CIGARETTE BY GC-MS

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Recently, e-liquid and e-cigarette products have been presented as a substitute for traditional cigarettes, and have become more widely used by the public. From 2010 to 2013, the number of e-cigarettes consumers in the US has increased from 1% to 2.6%. In another report, the usage of e-cigarettes among high school students has risen from 1.5% to 16.0% from 2011-2015. Manufacturers advertise e-liquids and e-cigarettes as a healthier alternative to normal tobacco products, with focus on the stimulatory effects of caffeine in addition to as an alternative to nicotine as "energy enhancers". However, the ingredients of e-liquid and e-cigarette products and their relative amounts are not regulated by the FDA. In this study, we analyzed caffeine and nicotine content in a variety of e-liquid and e-cigarette products by GC-MS analysis in order to compare our results with the products' labelled concentrations. This research provides greater insight into the content of these products and could have further implication regarding public health and safety. The continued research of e-cigarette products is essential in building a better and more effective regulation over e-cigarette products.

P3.24

UV-VISIBLE SPECTROSCOPIC STUDIES ON BINDING OF VARIOUS LIGANDS ON DIFERRIC MAUG

Nailah Tucker, Manliang Feng
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MauG is a diheme protein containing two c-type heme centers, one of which is a penta-coordinated high spin heme with histidine as the proximal ligand and the other is a hexa-coordinated low spin heme with histidine and tyrosine as the axial ligands. The high spin heme reacts with the oxygen donating species (such as hydrogen peroxide) to generate the high-valent Bis-Fe(IV) intermediate leading to the biosynthesis of TTQ, a reaction involving cross-

linking of two tryptophan groups and insertion of oxygen to one of the indole ring. In this research, the binding of several exogenous ligands (hydrogen cyanide, imidazole, thiocyanide and azide) to MauG was investigated. It was found that MauG has a higher binding constant to molecular ligands (such as HCN, Kd = 0.00073 M, 20ºC) than ionic ligands (such as imidazole Kd=0.024 M, 20ºC). The measured Kd is significantly affected by temperature. This is inconsistent with the resonance Raman results indicating the presence of two structural sub-states of MauG. The pH effects on the ligand binding and enzyme reaction with natural substrates have also been studied. The results indicate that the two structural sub-states are interchangeable through the re-organization of the H-bonding network at the high-spin heme site rather than conformational change. A kinetic study on the reaction of di-ferric MauG with molecular oxygen was also performed. The result indicates that the reaction is a two-step process. This work is supported by NSF Research Initiation Award under HBCU-UP program (Award number: 1505446).

P3.25

MOLECULAR SIMILARITY-BASED IDENTIFICATION OF NON-COVALENT AND ANTITRYPANOSOMAL INHIBITOR OF CYSTEINE PROTEASE RHODESAIN

Jasmine Collins, Ifedayo Victor Ogungbe
Jackson State University, Jackson, MS, USA

The tropical protozoan parasites trypanosomes are responsible for two neglected tropical diseases, human African trypanosomiasis (HAT) that is endemic to Sub-Saharan Africa, and American trypanosomiasis endemic to Latin America. Cases of American trypanosomiasis (Chagas disease) have increased in southern United States in recent years. Although both diseases are caused by kinetoplastids, the disease vectors and pathology are different. African trypanosomiasis is caused by the *Trypanosoma brucei* and American trypanosomiasis also known is caused by *Trypanosoma cruzi*. Both parasite are susceptible to similar chemotypes, although the effectiveness of the chemotypes differ. Current treatment options are ineffective for HAT. Newer and safer medications are needed. The vinyl sulfone, K11777, was a promising candidate to treat Chagas disease, until recently. In this work, a molecular similarity search was used to identify structural analogues of the cysteine protease inhibitor K11777. The analogues were used for *in silico* based screening, and the top-ranked compounds were tested for inhibitory activity against the papain-like cysteine protease, rhodesain, a drug target in *Trypanosoma brucei*. A non-covalent inhibitor was identified out of the structural analogues and it also displayed antitrypanosomal activity. This non-covalent inhibitor has been used as template to design new generation of antitrypanosomal agents that can serve as drug leads.

P3.26

STUDIES TOWARDS CHARACTERIZING THE ANTIMICROBIAL PRINCIPLES IN TROPICAL PLANT TERMINALIA GLAUCENCENS PLANCH

Rogers Nyamwihura, Ifedayo Victor Ogungbe
Jackson State University, Jackson, MS, USA

Compounds derived from natural sources or their synthetic analogues have long been used to treat a wide range of medical conditions, especially infectious diseases. The purpose of this work is to isolate and characterize the antibacterial principles present in the leaf extract of *Terminalia glaucencens* Planch. The leaf extract have growth inhibitory activity on methicillin resistant *Staphylococcus aureus* (MRSA). Several rounds of chromatographic separations have identified the most fractions and compounds. Structural elucidation of the isolated and purified compounds from these fractions are structurally are currently being carried out. The bioassay and spectroscopic data will be presented.

P3.27

COMPUTATIONAL INVESTIGATION OF GRAPHENE-CARBON NANOTUBE NYLON 6 COMPOSITE

Michael Roth[1], Sanjiv Jha[1], Guido Todde[1], Gopinath Subramanian[1], Manoj Shukla[2]
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The functionalization of carbon nanotubes (CNTs) and graphene with Nylon 6 is a possible route for improving the strength of composites. This research studies the properties of composites of Nylon 6 with CNTs and graphene using empirical force fields. These calculations are performed using LAMMPS with the COMPASS force-field. We aim to explain how Nylon 6 polymer embedded with 1%-5% (by weight) CNT/graphene affects the performance of these composite materials. The performance of these composites is evaluated by calculating the elastic constants of both the pristine nylon, and the nanocomposite. Initial calculations indicate that the presence of Stone Wales (SW) defects lower the Young's moduli of carbon nanostructures.

P3.28

ELECTROSPINNING OF BIOCOMPATIBLE, NATURAL POLYMER FIBERS

Scarlett Salter[1], Amber Wilson[1], William Weeks[1], Katie Penton[1], Sharon Hamilton[1], Gisela Buschle-Diller[2]
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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, which are capable of mimicking body tissues as well as facilitating tissue regeneration. Although electrospinning natural polymers with a co-polymer is an established process, electrospinning some natural polymers using only a co-solvent has yet to be perfected, but shows great promise. In this project, parameters were explored for the creation of both alginate and oxidized alginate fibers through electrospinning in the presence of co-solvents glycerol and ethylenediamine (EDA). Oxidized alginate was selected for this project based on the reported degradation of oxidized natural polymer fibers and hydrogels. The alginate and the oxidized alginate were characterized via gel permeation chromatography (GPC) and the percent of oxidation in the oxidized alginate was analyzed via ultraviolet-visible spectrophotometry (UV-vis). Based on the results of the established electrospinning parameters for both alginate and oxidized alginate, a small drug molecule has been incorporated into the electrospinning solutions to engineer drug-loaded fibers. Drug release profiles are being constructed based on degradation study results for both fiber types. It is anticipated that natural polymer-based, electrospun fiber mats from polymers like alginate and oxidized alginate will have biomedical applications related to drug release, tissue scaffolding, and wound healing.

P3.29

SYNTHESIS OF HYBRID IRON (III)-POLYDOPAMINE NANOPARTICLES FOR IMAGING-GUIDED PHOTOTHERMAL THERAPY ON CANCER CELLS

Devin Guillory, Terriona Cowan, Yongfeng Zhao
Jackson State University, Jackson, MS, USA

Cancer is the second most common cause of death in the United States behind heart disease. Magnetic resonance imaging (MRI) is a favorable method for cancer screening offering superior morphological detail on large regions of soft tissue as well as virtually no radiation compared to positron emission tomography (PET). Photothermal therapy (PTT) has been gaining visibility in cancer therapy, eliminating invasive and inconvenient side effects of

current treatments. PTT uses photo-absorbers that take near-IR wavelength and can convert this light energy into heat energy. Nanoparticles for utilization in PTT are being researched, but concern about the safety of heavy metals has hindered further medical inclusion. Polydopamine (PDA) is a naturally derived product from eumelanin, the dark pigment found in dark hair and skin. Literature has highlighted PDA as a photothermal agent; it has strong optical absorption and high photothermal efficiency; PDA will provide photo-absorption for photothermal therapy. This product also has low toxicity, high biocompatibility/degradability. Our lab has designed a natural product nanoparticle which will be chelated with iron for imaging guided photothermal therapy. The approach to PTT guided by imaging requires a high-contrast component, like iron. Iron has a lower toxicity than other metals used for MRI as the body is biologically capable to metabolize this metal. The proposal of this work is to produce a natural product PDA nanoparticle chelated with iron for magnetic resonance imaging-guided photothermal therapy. We hope to simultaneously diagnose the disease and destroy the cancer cells.

P3.30

SPECIATION OF METHYLMERCURY IN CONTAMINATED TOP SOILS FROM OAKRIDGE TENNESSEE BY ICPMS

Iris Denmark, Zikri Arslan, Fengxiang Han
Jackson State University, Jackson, MS, USA

During the 1950s and early 1960s, elemental mercury (Hg) was used at Y-12 National Security Complex of Department of Energy in Oakridge TN for manufacturing components of various nuclear weapons systems. Large amounts of Hg was released to the environment contaminating soil, sediment, surface water around the Y-12 Complex and the downstream environment along the 23-km long East Fork Poplar Creek (EFPC). Past studies focused on speciating Hg within different compartments of soil minerals. To date, there is no information about the distribution of methyl mercury (MeHg) in the contaminated soils. We have measured total Hg levels in EFPC top soils after acid digestions by ICP-MS. Elevated Hg concentrations were found in the top soil, but MeHg fraction of total Hg is unknown. The objective of this study is to quantify MeHg, the most toxic form of Hg, from the contaminated soils. Extractions with water and dilute HCl were performed with Hg-free soils spiked with Hg and MeHgCl to find extent of extraction of MeHg and inorganic Hg from soil matrix. Spiked soil were treated with water, 5, 10 and 20% HCl. In another set, spiked soils were exposed to ultrasounds at 20, 30, 40 and 50ºC in water. In cold water extraction of MeHg was incomplete, recoveries increased with increasing extraction temperature. Quantitative extraction was achieved with 5% HCl, but inorganic Hg also leached into water. Studies are now underway to selectively determine MeHg in the extracted fraction using cold vapor ICP-MS.

P3.31

MOLECULAR WEIGHT DEPENDENCE ON CHEMICAL DOPING OF A SEMI-CONDUCTIVE POLYMER

Clara Ellis[1], Frederick McFarland[2], Song Guo[2]
[1]Oak Grove High School, Hattiesburg, MS, USA, [2]University of Southern Mississippi, Hattiesburg, MS, USA

The relationship between the aggregation of poly-(3-hexylthiophene), P3HT, and its electronic properties is still not completely understood. Fully solubilized or isolated P3HT and its aggregated form have distinctive optical absorption behaviors and, accordingly, likely different electronic properties. This presentation will explore how the doping susceptibility of these two forms of P3HT may be differentiated by chemical doing with the strong p-dopant F4TCNQ (2,3,5,6-tetrafluoro-7,7,8,8-tetracyano-quinodi-methane).Isolated P3HT p-dopes at a considerably slower rate than aggregated P3HT, which brings attention to the implications of polymer aggregation forms on the chemical doping process.

P3.32

COMBINATION EFFECT OF SILVER NANOPARTICLES AND NEOMYCIN AGAINST GRAM-POSITIVE AND GRAM-NEGATTIVE BACTERIA

Denise Yancey-Gray, Shareena Dasary, Hongtoa Yu, Zikri Arslan
Jackson State University, Jackson, MS, USA

Within the last decade, studies to increase the efficiency of drugs against bacterial infections have grown. With the help of technology and new ways to target certain harmful microorganisms without harming anything else in the body has been the driving force for studies such as this one. The synergistic effect between silver nanoparticles (AgNP) and antibiotics has been studied for over a decade. Preliminary studies have shown that the combination of AgNP with neomycin a higher antibacterial efficiency on bacteria than when they are used alone. This study evaluates the synergistic effect of neomycin at concentrations of 0.1, 0.5, 2.5, 7.5, and 12.5 µM with 50 µM AgNP using the spread plate method. These combinations are used against gram-positive *Methicillin-resistant Staphylococcus aureus (MRSA)* and *lactobacillus fermentum* and gram-negative *E. coli 1161* and *Salmonella DT-104*. We examined that Ag^+ and the AgNP composition of the culture media and found high levels of Ag^+. Cytotoxicity increased with the increasing neomycin concentration. Evidence suggests that both Ag^+ and neomycin act synergistically to inhibit bacterial growth.

P3.33

EFFECT OF CURE PATH ON THERMAL AND THERMOMECHANICAL TRANSITIONS OF GLASSY THERMOSETS

Tyler Woldanski, Andrew P. Janisse, Jeffrey S. Wiggins
University of Southern Mississippi, Hattiesburg, MS, USA

High Performance epoxy/amine networks represent the dominant chemistry used as matrix in carbon fiber composites. Multifunctional epoxy matrices are typically characterized by high strength, a high glass transition temperature, and excellent chemical resistance. A common network formulation used by the aerospace industry combines tetraglycidyl 4,4'-diaminodiphenyl methane (TGDDM) with either the 3,3' or 4,4' isomer of diaminodiphenylsulfone (DDS). Industry standards dictate that these networks be cured with slow, controlled temperature ramp rates in an effort to insure homogenous properties through the part. Due to this conservative strategy very little is known about these systems when cured using protocols aimed at reducing the times of part turn over (i.e. rapid cure protocols). This work investigates the effects of rapid cure of TGDDM/DDS networks on macroscopic matrix thermomechanical properties and thermal transitions. This was achieved through the use of dynamic mechanical analysis (DMA) and dynamic scanning calorimetry (DSC). It was determined that faster cure protocols of TGDDM/DDS networks do not affect the viscoelastic properties or thermal transitions.

P3.34

PROTEIN LOSS IN HAIR FIBERS FOLLOWING CHEMICAL STRAIGHTENING TREATMENTS

Amelia Thompson, Alicia Cruthirds, Cassandra McCullum, Yolanda Jones, Sandra Barnes
Alcorn State University, Lorman, MS, USA

Hair fibers undergo significant chemical and physical changes as a result of cosmetic treatments and physical manipulation. The aim of this research is to assess the amount of protein removed from hair fibers following application of various chemical straightening treatments. Hair from a human donor was treated with commercially available straightening products. Sodium hydroxide (lye) based chemical relaxers, no-lye relaxers, and keratin protein treatments were evaluated. All instructions were followed to complete the full treatment processes as specified by the manufacturers. Following the treatments, proteins released from the

hair fibers were isolated and quantified using the Bradford Assay and optical spectroscopy.

P3.35

TRACE ELEMENTS AND HEAVY METALS IN ASIAN RICE-DERIVED FOOD PRODUCTS

Shenita Wells, Kai Guo, Fengxiang Han, Zikri Arslan
Jackson State University, Jackson, MS, USA

Heavy metals in rice products are a continuous subject of concern for consumers. Asia, the world's leading continent for rice production suffers from an increase of heavy metals in the water supply. The current research discusses distribution of trace elements Cr, Cu Zn, As, Se, Cd, Hg and Pb in Asian rice derived food products. Three types of food products, rice vinegar/wine, rice noodles, and rice snacks were chosen for inspection. Since liquid rice products are usually diluted many times to reach the pH requirement for food, Se and Cr were found below or on 0.008 mg/kg. Trace elements Zn, Cu, Se, Cr, Cd and Hg were found in Asian rice noodles at a low level. Among rice snacks none of the products contained most toxic trace elements, Hg, Pb, and As. The highest level of Se was found at 0.3 mg/kg. Cd, As, Hg, and Pb were existent within the safe level of EPA. Rice noodles and snacks are consumed with obvious Se content and they are possible for human Se source addition. This study is for the first time reporting a thorough understanding of safety concern of rice-derived foods.

P3.36

MINIATURE OPTICAL SENSOR FOR CANCER DETECTION ASSAYS

Derrick Dunn, Yolanda Jones, Anant Singh
Alcorn State University, Alcorn State, MS, USA

This project investigates the development of a detection device for that is compatible with optical nanoparticle based cancer detection assays. The device is designed around a microfluidic cell. The sensor utilizes LED based excitation coupled with an optical fiber and a photocell detector. Early results show that the optical signal for the device with gold nanoparticles shows a predictable linear detection response that is proportional with the optical density of nanoparticle solutions.

P3.37

HYBRID NANOMATERIALS FOR TARGETED DRUG DELIVERY

Aysha Evans, Yolanda Jones, Anant Singh
Alcorn State University, Lorman, MS, USA

The efficacy of a series of functional nanoparticle configurations was evaluated for use in targeted drug release systems. The series included organic and inorganic hybrids and biofunctional materials. The performance of these materials was evaluated *in-vitro.* Kinetic properties of drug release and nanoparticle degradation was evaluated spectroscopically.

P3.38

EXPERIMENTAL AND COMPUTATIONAL STUDIES ON AMYLOID-BETA PEPTIDE AGGREGATION USING TRYPTAMINES AND HYDROXYFLAVONES

Brianna Walley, Ja'Nautica Bee, Bidisha Sengupta
Tougaloo College, Tougaloo, MS, USA

Highly abnormal conformations of proteins are a continuous threat to the viability of cells and the functions. Abnormal amyloid-beta (Aβ) deposits are responsible for the loss of biological function and death of neuronal cells and hence there have been many studies on understanding and controlling these deposit formations. The unfolding process of Aβ peptide is followed by oligomerization, protofibril formation producing aggregated plaques at the end. These fibrils develop Alzheimer's disease. Salt concentrations, types and pH play varied and important roles in the overall unfolding process of the peptide. Neurotransmitter tryptamines serotonin and melatonin play mixed functions in inhibiting the aggregations. Plant flavonoids also show interesting effects when present in the peptide solutions. The hypothesis of this research is that hydroxy and methoxy derivatives of tryptamines and hydroxyflavones decrease the rate of the formation of aggregates to a significant extent, while when they are present together, can prevent aggregation. We have performed experimental and computational studies on these systems. Further studies are underway.

P3.39

SYNTHESIS AND CHARACTERIZATION OF CHIRAL ALKYLATED-ANILINE

Jonita Cooper, Jabari Jackson, Maria Muhammad, Chirantan Sen Mukherjee, George Armstrong, Bidisha Sengupta
Tougaloo College, Tougaloo, MS, USA

Aniline, arylamines and heterocyclic aromatic amines are known carcinogens. Recently aniline mustard has come into prominence as novel anticancer agent. This research aims at synthesizing a novel, chiral, alkylated aniline using microwave irradiation. The reaction is rapid and inexpensive with almost 70% yield. NMR spectra and HPLC chromatogram indicated purified product. Solvent dipolar relaxation mechanism was studied on the product using solvents of varied polarity which proved that the aniline derivative is an excellent fluorescent probe. The binding behavior of the derivative in naturally occurring drug carrier protein human serum albumin (HSA) and duplex and tetraplex DNAs, was studied in order to understand its potentialities as therapeutics. Spectroscopic and molecular modelling tools are used to find out the binding constant, sites and energy for the association. Several binding sites have been noted by docking studies and some amino acids namely lysine, alanine, leucine, and glutamic acid have been found to play crucial role in the binding process with protein. Further studies are underway.

P3.40

VARIOUS APPROACHES TO MODELLING THE ELECTRONIC STRUCTURE OF PORPHIN

Joseph Bentley
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The porphin molecule ($C_{20}H_{14}N_4$) belongs to a family of biochemically significant compounds. The electronic structure of porphin is first studied by hand calculations using the undergraduate "particle-in-a-2D square well" and "particle-on-a-ring" quantum models. The second of these models gives better results due to the geometry of the molecule. Subsequently, these are compared with state-of-the-art quantum chemistry RHF calculations using the SPARTAN electronic structure package.

P3.41

UV-VIS SPECTROSCOPIC ANALYSIS OF 3-NITROFLUORANTHENE AND FLUORANTHENE BASED ON AB INITIO CALCULATIONS

Obie Allen IV, Wojciech Kolodziejczyk, Glake Hill Jr.
Jackson State University, Jackson, MS, USA

Polycyclic Aromatic Hydrocarbons (PAH's) have been well documented to be linked to various cancers, diseases, and abnormal fetal development from their exposure. PAH are distributed through our environment by soil sediments, flowing bodies of water, and through the air from burning fossil fuels. Spectroscopic analysis was performed on 3-Nitrofluoranthene and Fluoranthtene with ab initio calculations using MP2 method with 6-31G(d,p) basis-set. In addition, analysis of thermodynamic properties (heat capacity, entropy, enthalpy, and Gibbs free energy) were investigated with the same basis-set.

P3.42

FLUORESCENT-MAGNETIC NANOPROBES FOR DETECTION AND MULTICOLOR IMAGING OF CIRCULATING TUMOR CELLS

Aruna Vangara, Avijit Pramanik, Bhanu Priya Viraka Nellore, Sudarson Sekhar Sinha, Suhash Reddy Chavva, Stacy Jones, Paresh Chandra Ray
Jackson State University, Jackson, MS, USA

Recently circulating tumor cells (CTC) are gaining huge attention for their complexity and metastasis relapse in cancer development. The CTCs are found low range in blood sample about 1-10 cells/ml and also possess heterogeneity due to epithelial mesenchymal (EMT) transitions. Our current findings are a new approach to detect accurately and capture these complex CTCs from the blood samples. This article reports the development of a new class of multifunctional fluorescent-magnetic nanoprobes for targeted capturing and accurate identification of heterogeneous CTC. A facile design approach for the synthesis and characterization of these multifunctional nanoprobes that exhibit excellent magnetic properties and emit very bright and photostable multicolor fluorescence at red, green, and blue under single excitation wavelength 380 nm is reported. We demonstrated with experimental results that multicolor fluorescence imaging can be used for mapping epithelial, mesenchymal and stem cell CTCs simultaneously, which indicates that nanoprobes are capable of characterizing circulating tumor cells heterogeneity by accurately identifying the multiple subpopulations of CTC from blood samples. The current clinical methods in the market are for CTCs detection but our method can separate and detect simultaneously via fluorescence imaging technique. We performed CTC detection on spiked 15ml whole blood samples so we are in progress towards a better design of this nanoprobe to enhance sensitivity of CTCs detection in about 7.5 ml of blood sample.

P3.43

ANALYSIS OF HEMODIALYSES CONCENTRATES FOR TRACE AND HEAVY METAL IMPURITIES BY ICPMS

Jeida Robertson, Zikri Arslan
Jackson State University, Jackson, MS, USA

Various hemodialysis solutions utilized in treatment of kidney failure are products consisting of aqueous solutions of one or more of several salts, such as sodium, potassium, calcium and magnesium chlorides, sodium acetate, sodium lactate, and may contain dextrose and other substances. Quality control of these products involves a large number of analytical determinations and many analytes in a number of different matrices. Trace and heavy metals are also part of these solutions originating as impurities of dialysates salts. Determination of metallic impurities is a challenging task in highly saline hemodialysis concentrates, and requires removal of matrix salts and sugars. In this study, we developed a coprecipitation procedure based on sequestering trace and heavy metals as metal hydroxide with Mg of hemodialyses solution. The performances of triethylamine (TEA), tripropylamine (TPA) and tributylamine (TBA) were investigated. TEA was effective in scavenging metal hydroxides while no precipitation occurred with TPA and TBA. Magnesium concentration was optimized for quantitative scavenging the metals. Recovery studies were performed with a commercial hemodialyses concentrates. Recoveries were quantitative for Al, Cr, Fe, Mn, Ni, Cu, Zn, Co, Sn, Cd, and Pb. Precipitation removed 99.9% of the total salt matrix. Mg levels were about 600 µg/mL in analysis medium. The procedure was applied to several commercial hemodialysis concentrates. Al, Fe, Zn were the most abundant elements, while other elements were at trace levels.

Friday, February 24, 2017
MORNING
Room TC 218A

7:55 Welcome

Session 8. Invited Symposium IV, Chair: Song Guo

O3.34

8:00 COLORING UP: BETTING ON LOW-POWER LIGHT UPCONVERSION

Yoan Simon
University of Southern Mississippi, Hattiesburg, MS, USA

Light upconversion (UC) via triplet-triplet annihilation (TTA) is a compelling photophysical process that bears great promise for many applications, from solar harvesting to imaging. The development of this phenomenon in the solid state is recent despite its discovery over 50 years ago in solution. TTA-UC is based on the use of two chromophores with carefully matched electronic levels to promote a series of energy transfers. This presentation will provide an overview of our latest realizations in the field towards the development of polymers which promote efficient TTA-UC. Multiple systems will be discussed e.g. rubbery and glassy polymeric blends and copolymers with suitable chromophore pairs, upconverting (nano)particles, organogels, and nanostructured polymers. The data presented will be used to depict the structure-property relationships of upconverting polymeric materials and outline global design principles.

O3.35

8:18 CHEMOKINE RECEPTOR CCR5 TARGETED PdCu@Au TRIPODS FOR IMAGING GUIDED PHOTOTHERMAL THERAPY

Yongfeng Zhao[1], Bo Pang[2], Lisa Detering[3], Hannah Luehmann[3], Younan Xia[2], Yongjian Liu[3]
[1]Jackson State University, Jackson, MS, USA, [2]Georgia Institute of Technology, Atlanta, GA, USA, [3]Washington University School of Medicine, St. Louis, MO, USA

This work reports a facile synthesis of PdCu@Au tripods with radioactive ^{64}Cu directly incorporated into the crystal lattice for both PET imaging and photothermal treatment. The tripods have a morphology determined by the PdCu tripods serving as the templates for Au coating, together with controllable sizes and optical properties. With the conjugation of D-Ala$_1$-peptide T-amide (DAPTA) peptide to their surfaces, the nano-sized tripods showed an elevated active targeting capability toward the novel therapeutic target of C-C chemokine receptor 5 (CCR5) up-regulated on triple negative breast cancer. Specifically, the DAPTA-conjugated tripods with an arm length of 45 nm showed a tumor to muscle uptake ratio 6.9 times higher than that of their non-targeted counterparts in a mouse 4T1 triple negative breast cancer model at 24 h post injection. The targeting specificity was also demonstrated via the competitive blocking study. The PdCu@Au tripods also exhibited widely tunable localized surface plasmon resonance peaks in the near-infrared region. Successful photothermal therapy was then demonstrated for the tripods, as validated by the significant reduction in tumor metabolic activity revealed by ^{18}F-flourodeoxyglucose (^{18}F-FDG) PET/CT imaging. Combined together, our work suggested that the ^{64}Cu-doped PdCu@AuCu tripods could serve as a promising platform for both imaging and photothermal cancer therapy.

O3.36

8:36 CONSTRUCTION OF SPIRO[4.5]CYCLOHEXADIENONES VIA INTRAMOLECULAR PHENOLIC ALLYLATION FOR NATURAL PRODUCT SYNTHESIS

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

The synthesis of stereogenic quaternary carbons remains a significant challenge in organic synthesis. Alkaloid and terpene natural products containing such carbons embeded in a spiro[4.5]decane substructure are amongst the most difficult to synthesize. In this presentation we will discuss our on-going efforts to employ the Tsuji- Trost variant of the Winstein-Masamune (TTWM) intramolecular phenolic allylation in the context of total synthesis. The TTWM spirocyclization involves dearomatization and desymmetrization of a 4-substituted phenol derivative bearing an allylic carbonate to access the spiro[4.5]decane scaffold. Based upon the recent work of Hamada (Pd-catalysis) and You (Ir-catalysis), we have been investigating the palladium catalyzed TTWM of phenols in the context of complex molecule synthesis. We are specifically interested in fawcettimine class lycopodium alkaloids such as magellanine, cyclopiane terpenes such as conidiogenone and the acorane terpene colletoic acid. We have demonstrated a six-step synthesis of dimethyl 8-oxo-4-vinylspiro[4.5]deca-6,9-diene-2,2-dicarboxylate from 4-hydroxybenzaldehyde as a platform to construct more complex tricylic molecular architectures. Additionally, we are interested in the asymmetric synthesis of spirocyclic pyrrolidines starting from Ellman N-sulfinyl imines of 4-hydroxybenzaldehydes using the TTWM reaction.

O3.37

8:54 HETEROAROMATIC SALTS AS PRECURSORS OF REACTIVE SPECIES

Wolfgang Kramer[1], Ian Gould[2], Irene Corrao[1], Courtney Mulins[1], Melinda Solomon[1], Anna Allred[1], Lauren Hoth[1]
[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.

Laser 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.

O3.38

9:12 DESIGN AND EVALUATION OF MONOTERPENOIDS AND AROMATIC ANIMES-BASED COMPOUNDS AS ANTITRYPANOSOMAL AGENTS

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

The neglected tropical disease human African trypanosomiasis (HAT) 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 effect. Safer medications are needed. In this work, a series of drug-like molecules with a vinyl sulfone motif was designed, synthesized, and evaluated. The compounds were evaluated against *T. brucei* and most of them show good inhibitory activity. Compound with homomyretenoyl and quinolinyl moiety shows particularly good low-micromolar inhibitory activity, and the cytotoxicity assays using mammalian cells suggest selective antitrypanosomal activity. To improve the bioactivity of the compounds and their physico-chemical properties, structural analogues and physico-chemical congeners are currently being synthesized and evaluated. These results will be presented as well.

Friday, February 24, 2017
MORNING
Room TC 218A

Session 9. Contributed Talks V (concurrently held with Section 10), Chair: Alison Hart

O3.39

9:40 EXPLORING *IN SILICO* APPROACHES TO DESIGN ORGANIC DYES FOR DYE-SENSITIZED SOLAR CELLS

Juganta Roy, Supratik Kar, Jerzy Leszczynski
Jackson State University, Jackson, MS, USA

Due to the flexibility in the aspect of cheap fabrication and environmental-friendly properties, dye-sensitized solar cells (DSSCs) have received increasing attention in recent years. In DSSCs, a photosensitizer (dye), adsorbed on the mesoporous semiconductor surface (here TiO_2), which is responsible for capturing the sunlight. In the presented work, we have employed a series of computational study to design new and higher power conversion efficient photosensitizer than the existing DSSCs. The quantitative structure-property relation (QSPR) approach and first principles density functional theories (DFT) were combined to understand the basic electron transfer mechanism as well as material properties of a huge number of arylamine organic dyes acting as dye-sensitizers from diverse chemical classes for the DSSCs. We developed QSPR models for each chemical classes to link the quantitative relationship between the overall power conversion efficiency (PCE) and computed quantum as well as structural descriptors for the studied arylamine derivatives. Identified properties and structural fragments derived from QSPR employed to design the new dye-sensitizer with higher PCE. We have employed first principle approach with Perdew-Burke-Ernzerhof (PBE) functional in conjunction with on-site Coulomb interactions corrections to get atomistic insight of the interface of newly designed photosensitizers/TiO_2. Computed partial density of state and band gaps are used to evaluate the newly designed photosensitizers. Therefore, the combined techniques can accelerate the design of new dye sensitizers with higher PCE for DSSCs.

O3.40

9:52 CORRELATING MOLECULAR ARCHITECTURE TO PHYSICAL STATE VIA MOLECULAR DYNAMICS SIMULATIONS

Jeremy Weigand[1], Andrew Frazee[1], Jordan Winetrout[1], Dominic Wadkin-Snaith[2], Matthew Jackson[2], Jeffrey Wiggins[1]
[1]University of Southern Mississippi, Hattiesburg, MS, USA, [2]Cytec Solvay Group, The Wilton Centre, Redcar, UK

Polybenzoxazines are a new emerging class of thermoset chemistry that are an attractive alternative to traditional phenolic and epoxy chemistries. Polybenzoxazine systems offer key advantages over epoxy based systems such as low chemical shrinkage values upon curing and low water absorption while maintaining the advantageous properties of epoxy systems such as heat resistance and flame retardance. Despite these advantages benzoxazine systems suffer from processing limitations as they are commonly glassy solids at ambient temperatures. Through the use of molecular dynamics simulations, this research develops a correlation between

molecular architecture and physical state (i.e solid or liquid) of benzoxazine monomers. Monomers were varied by changing the substitution on the phenolic portion of the monomer with either electron donating or withdrawing substituents while keeping the amine constant. Simulations determined the most energetically favored, relaxed, and unstrained system at 300K for each monomer, which was then used in the mean-squared displacement (MSD) analyses. Results from the MSD analyses afforded an estimation of the physical state of the monomer at 300K, which correlated with the physical state of the monomers synthesized in the lab.

O3.41

10:04 INSENSITIVE MUNITIONS ADSORBED ONTO CELLULOSE, CHITIN AND CELLULOSE TRIACETATE: A DFT STUDY

Guido Todde[1], Sanjiv Jha[1], Gopinath Subramanian[1], Manoj Shukla[2]
[1]University of Southern Mississippi, Hattiesburg, MS, USA, [2]Environmental Laboratory, Engineer Research and Development Center, Vicksburg, MS, USA

Insensitive munitions (IM) like DNAN (2,4-dinitroanisole), NTO (3-nitro-1,2,4-triazol-5-one), NQ (nitroguanidine) and FOX7 (1,1-diamino-2,2-dinitroethene) reduce the risk of unintentional detonations due to shock and high temperature exposure. These compounds are used as replacement for TNT (2,4,6-trinitromethylbenzene) and RDX (1,3,5-hexahydro-1,3,5-trinitro-1,3,5-triazine). IM are more soluble than TNT or RDX, hence they can easily spread in the environment and get dissolved by precipitation. Due to the abundance of cellulosic biomass in the environment it is important to investigate the adsorption of these new contaminants onto cellulose and cellulose derivative surfaces. Using Density Functional Theory methods we have studied the adsorption of TNT, DNAN, NTO, NQ and FOX7 onto cellulose Iα and Iβ, chitin and cellulose triacetate. Solvent effects were also taken into account using the CPCM method. Our calculations show that all contaminants are adsorbed onto chitin and cellulose Iα. FOX7 is very weakly absorbed onto cellulose Iβ which is mainly found in wood and ramie fibers.

O3.42

10:16 PREPARATION OF ETHYL 6-BROMO-4-HYDROXY-2METHYLQUINOLINE-CARBOXYLATE AS A SCAFFOLD FOR HIV-INTEGRASE INHIBITORS

Amy Pham[1], Matthew Donahue[1], Nicholas Jentsch[1], Samer Beauti[1], Emily Crull[1]
[1]University of Southern Mississippi, Hattiesburg, MS, USA, [2]Oak Grove High School, Hattiesburg, MS, USA

Considering 36.9 million people are infected by HIV-1, clinical care for HIV is crucial. Highly Active Antiretroviral Therapy (HAART) is one method of treatment but only manages the infection allowing for improved quality of life and a longer life span. Due to the virus's ability to rapidly develop a resistance to almost all antiviral agents, finding a permanent treatment is an arduous endeavor. We are investigating strategies for the synthesis of new quinoline derived small molecules to be tested against the HIV-integrase enzyme. With a new collaboration with Professor Jacques Kessl of the USM Department of Chemistry and Biochemistry, we have initiated a concise structure-activity relationship study of ethyl 4-hydroxy-2-methylquinoline-3-carboxylate as a platform for new quinoline derivatives. From commercially available anthranilic acid derivatives, isatoic anhydrides are ready prepared through condensation with triphosgene in tetrahydrofuran. Subsequent treatment of these isatoic anhydrides with ethyl acetoacetate under basic conditions with sodium hydroxide in dimethylacetamide followed by aqueous quench has led to a rapid method for accessing solid quinolines in high yield. The two-step procedure has been employed for a select scope of anthranilic acids to synthesize quinolines on a gram scale. These quinolines will serve as platforms for further synthetic elaboration in the SAR studies with Dr. Kessl's laboratory.

O3.43

10:28 COMPUTATIONAL APPROACHES TO STUDY PERMEABILITY OF BIOLOGICAL MEMBRANE TO ENERGETIC COMPOUNDS

Anastasiia Golius[1], Olexander Isayev[2], Leonid Gorb[3], Jerzy Leszczynski[1]
[1]Jackson State University, Jackson, MS, USA, [2]Division of Chemical Biology and Medicinal Chemistry, Eshelman School of Pharmacy, University of North Carolina at Chapel Hill, Chapel Hill, NC, USA, [3]HX5, LLC, Vicksburg, MS, USA

In the present work, we focused on interaction of energetic compounds with cell membrane with different computational approaches. Five energetic compounds were chosen for the study: TNT, DNT, DNAN, NTO and anion of NTO. Those compounds were chosen based on the fact that there is not enough data available about their interaction with biological systems and at the same time they are widely used nowadays for different purpose. One of the computational tools that were used is all-atom Molecular Dynamic simulation with NAMD 2.10 program package. In order to obtain free energy profiles for penetration of small molecules through the lipid bilayer, Umbrella Sampling technique was implemented. Estimated free energy profiles have shown the location in the membrane where is the highest probability for the compound to be found. Additionally, partition coefficients were calculated from the profiles and results are in good agreement with experimental data. COSMOmic is another computational approach that allows to predict permeation for small molecules for relatively short period of time however it was shown that it has difficulties in estimation of the free energy profiles.

Friday, February 24, 2017
MORNING
Room TC 218B

Session 10. Contributed Talks VI (concurrently held with Section 9), Chair: Frederick McFarland

O3.44

9:40 EXPRESSION AND PURIFICATION OF Aβ42 PROTEIN IN E.COLI

Anukool A Bhopatkar, Wisam Buti, Dexter Dean, Vijay Rangachari
University of Southern Mississippi, Hattiesburg, MS, USA

Alzheimer disease (AD) is a neurodegenerative disorder characterized by dementia and a gradual cognitive impairment in affected individuals. Despite its widespread prevalence and the debilitating nature, the precise mechanisms of the disease are far from clear. The biochemical hallmarks of the disease are the presence of neuritic plaques and neurofibrillary tangles in patients. Neuritic plaques are composed of aggregates of the amyloid-β protein (Aβ) while the tangles are composed of aggregates of hyperphosphorylated tau. Study of the Aβ protein and its interactions with neurological components as well other cellular factors could give us a better understanding of the disease. The purpose of this project is to recombinantly express and purify Aβ42 from *E.coli*, a variant of Aβ chiefly implicated in the pathology of the disease, on a sufficient scale that will allow further biophysical and biochemical studies. Briefly, the expression Aβ42 was optimized using the BL21DE3pLysS *E.coli* cell line containing the pET-Sac Aβ CMI-42 plasmid and was purified using the protocol previously described by Walsh et al. The purification protocol was further modified and optimized to achieve better yields. Using the modified protocol, a yield of 0.25 mg/ml was achieved. The purity of the protein was confirmed using SDS-PAGE, western blotting using an Aβ42 specific antibody and Matrix Assisted Laser Desorption /Ionization-Time of Flight (MALDI-ToF)Mass Spectrometry(MS).

O3.45

9:52 LONG-LIVED PYROMELLITIMIDE RADICAL ANIONS IN AQUEOUS SOLUTION

Donya Razinoubakht[1], Gurjit Kaur[1], Sabrina Molitor[2], Axel Griesbeck[2], Wolfgang Kramer[1]
[1]Millsaps College, Jackson, MS, USA, [2]University of Cologne, Koeln, Germany

Pyromellitdiimides are used as electron acceptors in photochemical applications due to their reduction potential and prominent radical anion absorption. The similarity to phthalimide might make it a suitable chromophore for the decarboxylative photocyclization, a preparative photochemical method for the synthesis of small to medium rings. The strong one electron acceptor properties can be used to oxidation and thus selective cleavage of biomolecules. Pyromellitic diimide undergoes decarboxylative photocyclization to yield a large number of regio- and stereoisomers. Interestingly, the radical anion formed after the first PET is extremely stable and has a lifetime of several days in deoxygenated solution. The radical anion was confirmed by EPR and NMR. An interesting spacer dependency was observed. The long-lived radical anion of pyromellitic diimide makes it an ideal electron trap after oxidation of a donor. The dianion is a species with strong reducing power and can thus be used to selectively reduce acceptors. 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."

O3.46

10:04 HYBRID DIAMINE ALLOYS FOR INCREASED EPOXY SOLUBILITY AND CURED NETWORK MECHANICAL PROPERTIES

Matthew Patterson, Jade Pearson, Jarred Trammel, Jeffrey Wiggins
University of Southern Mississippi, Hattiesburg, MS, USA

In the present work, binary eutectic curative alloys were investigated for their solubility, reactivity and cured network mechanical properties with diglycidyl ether of bisphenol-F (DGEBF). Curative alloys were composed of 4-[(4-aminobenzene)sulfonyl]aniline (4,4'-DDS) with 3-[(3-aminobenzene)sulfonyl]aniline (3,3'-DDS), 3,3'-DDS with 1,4-bis(4-aminophenoxy)benzene (1,4,4-APB) and bis[4-(4-aminophenoxy)phenyl]methanone (pAEK) with bis[3-(3-aminophenoxy)phenyl]-methanone (mAEK). Alloys were reprecipitated from acetone and isolated through simple filtration. Phase transitions were measured using differential scanning calorimetry (DSC) and verified with thermomicroscopy. For selected networks, thermomechanical properties were characterized using dynamic mechanical analysis (DMA) and uniaxial compression testing. Endothermic phase transitions measured with DSC were used to construct phase diagrams for reprecipitated alloys. Alloys produced from 4,4'- and 3,3'-DDS had a eutectic composition of 50% 4,4'-DDS and a eutectic melting temperature of 130.97 °C. The eutectic curative alloy fully solubilized before the epoxy reached 96 °C. Between 1,4,4-APB and 3,3'-DDS, a eutectic composition of 40% 1,4,4-APB and 60% 3,3'-DDS was found to have the greatest solubility and a eutectic melting temperature of 146.25 °C. A eutectic mixture of 50% pAEK with 50% mAEK melted at 134.02 °C and also had the greatest solubility in DGEBF. For cured networks containing 4,4'- and 3,3'-DDS, yield stress and strain at yield were found to increase with 4,4'-DDS content. Although significant differences were observed in β, γ and α transitions between networks, more precise compression test methods are needed for complete network property analysis.

O3.47

10:16 DFT INVESTIGATION OF MECHANISTIC PATHWAYS OF THE VINYL S-OXIDE HETEROALLENE REARRANGEMENT

Nicholas Jentsch[1], Matthew Donahue[1], Dean Tantillo[2]
[1]University of Southern Mississippi, Hattiesburg, MS, USA, [2]University of California Davis, Davis, CA, USA

The vicinal diamine substructure which is found within a wide variety of natural products, is shown to have antibiotic, anti-cancer and neurologic therapeutic indications. Therefore, the development of efficient reaction methodologies targeting this vicinal diamine substructure are essential for further drug development. We have been investigating a new synthetic tool for the creation of carbon-nitrogen bonds to afford 1,2-diamines as the protected cyclic urea. Our hypothesis is that an electron deficient heteroallene, such as a carbodiimide, will engage the nucleophilic oxygen of a vinyl sulfoxide resulting in a zwitterionic species. This species is proposed to undergo a [3,3]-sigmatropic rearrangement to produce an electrophilic thionium ion intermediate. Subsequently, an intramolecular 5-exo-trig cyclization will yield the cyclic urea. DFT calculations were performed on two systems to study the mechanistic characteristics of these heteroallene rearrangements. First, a previously reported reaction of phenyl vinyl sulfoxide and dichloroketene to produce γ-lactones was studied, providing support for the experimental observations and the mechanistic hypothesis. Additionally, studies for the reaction of symmetric carbodiimides and phenyl vinyl sulfoxide were performed. Initial results revealed an energy of activation of 45 kcal/mol supporting the necessity for carbodiimide activation via exogenous acid.

O3.48

10:28 UV PHOTOLYSIS STUDIES OF 3-NITROFLUORANTHENE BY HPLC, GCMS, AND NMR TECHNIQUES

Neil Hammond[1], Md Mhahabubur Rhaman[1], Hongtao Yu[2], Reid Bishop[3], Ken S. Lee[1]
[1]Jackson State University, Jackson, MS, USA, [2]Morgan State University, Baltimore, MD, USA, [3]Belhaven University, Jackson, MS, USA

Polycyclic Aromatic Hydrocarbons (PAHs) are produced during the combustion of fossil fuels in modern society and also by natural processes, such as volcanic activity and forest fires. These compounds are decomposed by sunlight in the environment and produce different derivatives which are sometimes more toxic than their precursors. However, the photo-degradation mechanisms and products of many PAHs have not been sufficiently studied for example, 3-nitrofluoranthene (3-NFA). It is formed through atmospheric reactions of fluoranthene with nitrogen oxides and during the combustion of fossil fuels that contain fluoranthene. In our research, we studied the photo-degradation of 3-NFA using UV-A light. First, 3.5 mL of 100 μM 3-NFA in acetonitrile was irradiated with UV lamps. Then photo-products were analyzed by HPLC, GC-MS and NMR techniques. A series of HPLC analysis showed that 3-NFA was initially observed with a retention time of 12.23 min but did not appear at all after 8 hours of irradiation. After complete photo-degradation, major chromatographic peaks observed were at retention times 1.71, 2.44, 5.63, and 6.1 min. The plot of degradation based on first order kinetics resulted in a rate constant of 0.28 hr-1 and a half-life of 2.45 hr. GC-MS analysis determined two photoproducts; the first peak had a retention time of 22.48 min with m/z 217 and the second had a retention time of 27.7 min. with m/z 236. Furthermore, 3-NFA and its photoproducts were characterized by NMR spectroscopy. In this oral presentation, I will present the mechanism of photo-degradation of 3-NFA in detail.

Friday, February 24, 2017
MORNING
Room TC 218A

Session 11. Invited Symposium V, Chair: Ifedayo Victor Ogungbe

O3.49

10:50 PRO-ACTIVE NETWORKS FROM DEGRADABLE ACETALS (PANDAS) VIA THIOL-ENE PHOTOPOLYMERIZATION

Derek Patton, Dahlia Amato, Douglas Amato, Olga Mavrodi, William Martin, Sarah Swilley, Keith Parsons, Dmitri Mavrodi
University of Southern Mississippi, Hattiesburg, MS, USA

Antimicrobial resistance (AMR) - attributed in part to overuse and misuse of antibiotics in medicine and food animal production - is a global crisis that threatens the sustainability of public health and agricultural ecosystems. The continuous emergence of resistant pathogens, scarcity of new antimicrobial drug scaffolds in the pharmaceutical discovery pipeline, and public demand for antibiotic-free food production have led to growing interest in natural, plant-derived extracts as alternatives to synthetic antibiotics. This presentation will describe a new paradigm for sequestration and release of biologically-active phytochemicals within covalently crosslinked polymer systems - an approach that draws inspiration from well-established "pro-drug" and "pro-fragrance" strategies employed successfully in pharma and cosmetic industries. Specifically, we report the synthesis of degradable poly(thioether acetal) polymer networks in which aldehydes (essential oil derivatives) are covalently incorporated into the network structure via an acetal linkage. These materials serve as pro-antimicrobial networks that release active antimicrobial aldehydes upon exposure to conditions conducive to acetal degradation (e.g., change in humidity/pH). The antimicrobial activity is shown to increase with increasing concentration of the acetal monomer for gram-positive (S. aureus) and gram-negative (E. coli, P. aeruginosa and B. cenocepacia) bacteria.

O3.50

11:08 SYNTHETIC RECEPTORS FOR ANION SENSING

Alamgir Hossain, Maryam Khansari, Corey Johnson, Bobby Portis, Mhahabubur Rhaman
Jackson State University, Jackson, MS, USA

Anion sensing is an active area of research, because of the fundamental roles played by anions in chemistry, biology and environment. In particular, selective binding of anions is important from the views of both fundamental and technological aspects. Although, a several classes of synthetic receptors have been known showing high affinity for anions, synthetic anion sensors are still limited in the literatures. In our studies, we synthesized several types of chemical sensors using conventional synthetic protocols, and characterized by NMR, mass and elemental analysis. The new compounds were then 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 new receptors are capable of selective binding of anions, displaying spectroscopical and visual color change. Acknowledgements: The project described was supported by Grant Number G12MD007581 from the National Institutes of Health.

O3.51

11:26 DIRECT ARYLATION POLYMERIZATION SYNTHESIS OF A SERIES OF NEW SILOLE-BENZAZOLE COPOLYMERS

Colleen Scott[3], Milind Bisen[1], Sam McKinnon[3], Dominik Stemer[2], Christine Lusbcome[2]
[1]Southern Illinois University, Carbondale, IL, USA, [2]University of Washington, Seattle, WA, USA, [3]Mississippi State University, Mississippi State, MS, USA

Electron withdrawing substituents such as fluoro and cyano groups play an important role in organic electronics, due to their ability to change the optoelectronic properties of organoelectronic materials. Particularly, difluoro-benzothiadiazole (DFBT), difluorobenzo-selenadiazole (DFBSe), difluorobenzo-triazole (DFBTA) have received much attention as they have been shown in some cases to improve the performance of optoelectronic devices. Due to the harsh reaction conditions that are usually used to prepare polymers containing these compounds, direct arylation provides an environmentally benign alternative method to prepare these high performance optoelectronic materials. Siloles are another set of compounds that have continued to generate much attention in materials science due to their unusual electronic and photophysical properties. It is well known that siloles possess lower lying LUMO energies compared to other similar heteroles such as thiophene and pyrrole. These low LUMO energies are a result of the overlap between the s* orbital on the silicon atom and the p* orbitals of the butadiene unit. Siloles are therefore being explored in p-conjugated polymers as a means of lowering the LUMO orbitals thus leading to lower band gap materials. In this presentation we will discuss the preparation of a series of p-conjugated polymers containing a silole unit copolymerized with strong electron acceptors units of the benzozole family using the direct arylation polymerization reaction, including the relatively unexplored acceptor 5,6-dicyano-2,1,3-benzothiadiazole (DCBT). These polymers possess long absorbance and emission wavelengths resulting in low band gaps – below 1.8 eV and respectable hole mobilities, ~ 3.51 x 10^{-2} cm^2/V.s.

O3.52

11:44 REDUCTIVE CONVERSION OF ESTERS TO ACYCLIC ETHERS USING REACTIR

Julie Pigza
University of Southern Mississippi, Hattiesburg, MS, USA

Ethers are commonly observed in pharma, agro, and fine chemicals as they impart desirable steric and electronic properties on them. It is therefore advantageous to have a robust synthesis of ethers from readily available materials. The direct conversion of an ester to ether is one such transformation. Esters are easily prepared by condensation reactions between acids and alcohols. The typical ester reduction proceeds through hydride addition to the carbonyl resulting in a tetrahedral acetal intermediate. Under normal conditions this acetal will collapse, ejecting the ether oxygen and resulting in an aldehyde or over-reduction to the alcohol. We will utilize the tetrahedral intermediate resulting from the reduction of an ester to chemoselectively generate an oxocarbenium ion that can be reduced to form an ether. This will demonstrate a non-traditional reactivity of esters that is similar to amide reduction to an amine. While this reaction has been explored in the literature, significant drawbacks include long reaction times, the inability to use aromatic esters, significant and unwanted side products, and/or low yields to form substituted ethers. The goal of this study is to define the variables for a predictable method for ester to ether conversion that may be used in academia and industry. Using *in-situ* ReactIR reaction monitoring to monitor disappearance of the ester carbonyl group in real time, we aim to develop a one-pot strategy that has potential benefit for shortening long reaction times and increasing product throughput. Acknowledgement: This work was supported by the Eppley Foundation for Scientific Research of New York.

Friday, February 24, 2017
AFTERNOON

12:00-1:00	Plenary Speaker
1:00-3:00	Millsaps HHMI Undergraduate Symposium

ECOLOGY AND EVOLUTIONARY BIOLOGY

Chair: AHM Ali Reza
Delta State University
Vice-Chair: Jeanne C. Jones
Mississippi State University

Thursday, February 23, 2017
MORNING
Room Union D

10:45 WELCOME

O4.01

10:50 WHAT CAN AFFECT THE MOVEMENT PATTERNS OF WHITE-TAILED DEER IN CENTRAL MISSISSIPPI?

Christian Frew, AHM Ali Reza
Delta State University, Cleveland, MS, USA

The White-tailed Deer (*Odocoileus virginianus*) are very rhythmic animals that are subject to a few circadian rhythms such as the crepuscular pattern. Most people believe that deer will base their movement around the lunar phases causing them to move predominately at night during phases with high visibility (i.e. Waning Gibbous, Full Moon, or Waxing Gibbous). We took an effort to test this belief with our designed experiment in central Mississippi. Several factors were tested that could influence deer movement patterns: lunar phase, temperature, and hunting pressure. We used camera-trapping technique to record deer movement in a 320 acre pine plantation in Montgomery County, Mississippi. The cameras were placed on established feed stations set to feed same amount of food at fixed time of a day for two months (Sep-Oct 2016) covering two full lunar cycles. The results were much different than the popular belief on the deer movement. The days around the full moon lunar phase resulted in lower numbers of night-time movement as to days with lower lunar visibility (i.e. on Sept 15, we had 157 daytime pictures, 39 night-time). The number of daytime pictures actually increased during the full moon. The only substantial night-time movement changed on the 3 days when heavy hunting pressure was applied in October during the archery season. Night-time pictures were only higher on the third day of hunting pressure (112 day pictures, 126 night pictures). The results show that the only influence on an increase in night-time deer movement was substantial hunting pressure.

O4.02

11:05 WATER QUALITY PARAMETERS IN A FRESHWATER POND

Bianca Lacy, Joseph Wahome
Department of Natural Sciences, Mississippi Valley State University, Itta Bena MS 38941.

Recently established ecosystems undergo ecological changes as they mature. Such changes impact productivity. This study investigated changes in a manmade freshwater pond at Mississippi Valley State University. Nitrate levels were 0.25ppm. Phosphate levels fluctuated. The pH of the water was slightly alkaline. The mean water temperature was 65·F. Dissolved Oxygen levels were steady. Overall water quality was normal. This environment appears conducive for aquatic life. Further studies will conducted as a means of monitoring water quality.

O4.03

11:20 IMPACT OF URBANIZATION ON BIRD NEST MATERIALS IN MISSISSIPPI DELTA

Heather Brewer, Alexis Patterson, AHM Ali Reza
Delta State University, Cleveland, MS, USA

Variation in the behavioral repertoire of animals is acquired by learning in a range of animal species. In nest-building birds, the assemblage of nest materials in an appropriate structure is often typical of a bird genus and availability of the nest materials. Such variation in the behavioral repertoire of animals can arise from purely ecological causes (e.g. when local environmental conditions limiting the range of possible behaviors differ among populations), but may also be acquired by learning in a wide range of animal species. Despite the great avian species diversity in the Mississippi Delta, the detailed study on bird nests is still uncommon. We studied the nest materials of various passerine birds from Cleveland, which is located in the heart of Mississippi Delta. A total of 17 bird nests were collected in spring 2016 from urban, suburban, and rural areas. Our results show that there is a significant variation among nest materials in three different habitat types. The urban area has the lowest diversity in bird nest materials (total 6 types: stick 49%, cigarette butts 1%). The nest materials diversity is much higher in suburban and rural areas (12 types in both cases). The highest amount of materials recorded from suburban was mud/dirt (36%) whereas lowest was aluminium, feather, paper and plastic sheet (1% each). The nest material composition is somewhat different in rural area, the highest was mud/dirt (43%) and the lowest was aluminium, cloth, fishing net, paper towel, plastic sheet, rope, Styrofoam (1% each).

Thursday, February 23, 2017
AFTERNOON
Room TC Ballroom II/III
Population Symposium III

1:05 – 3:00 pm Population Health Symposium II

Invited Speakers

"UPDATES ON MOSQUITO-BORNE DISEASES IN MISSISSIPPI AND ELSEWHERE"

Paul Byers, MD. State Epidemiologist, Mississippi State Department of Health

"MOSQUITO ECOLOGY AND CONTROL"
Jerome Goddard, PhD. Medical & Veterinary Entomologist, Departments of Biochemistry & Molecular Biology, Entomology & Plant Pathology, MSU

"IMPACT OF PESTICIDES USE IN AGRICULTURE, ENVIRONMENT AND HEALTH"
Nacer Bellaloui, PhD. Crop Genetics Research Unit, USDA-ARDS

Thursday, February 23, 2017

EVENING

Ballroom

3:30 Dodgen Lecture and Awards Ceromony

General Poster Session

Immediately Following Dodgen Lecture

P4.01

IDENTIFICATION AND TRANSCRIPTOME SEQUENCING OF HAEMOSPORIDIANS

Haley Bodden[1], Diana Outlaw[1], Susan Perkins[2]

[1]Mississippi State University, Mississippi State, MS, USA, [2]American Museum of Natural History, New York, 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. Many novel lineages of Haemosporida have been identified that have no corresponding genome or transcriptome sequences in GenBank. To combat this, tissue samples from amphibians, reptiles, birds, and mammals have been collected. The samples will be extracted using DNeasy Blood and Tissue protocol. Polymerase chain reactions will be used to amplify the mitochondrial cyt *b* gene for any tissue samples that are positive for haemosporidians. The samples will then be sequenced for identification of the haemosporidian species. The transcriptome sequencing will be done by using Illumina sequencing. The species that will be sequenced belong to the genera *Plasmodium*, *Haemoproteus, Parahaemoproteus*, *Polychrompohilus*, *Hepatocystis*, and *Nycteria*. The sequencing of these transcriptomes will provide data for further studies such as the revaluation of phylogenies.

P4.02

A COMPARATIVE STUDY TO THE WATER QUALITY ASSESSMENTS IN THE PASQUOTANK WATERSHED.

Raveen McKenzie, Jamal Stevenson

Mississippi Valley State University, Itta Bena, Mississippi, USA

The Pasquotank River Watershed is found in Northeast North Carolina beginning in the Great Dismal Swamp at the Virginia/North Carolina border and flows into the Albemarle Sound. The watershed provides a transition between spawning grounds and the waters of the Albemarle Sound. The sound serves as a nursery area for many fish species and is home to numerous sport and commercial species. Due to indications of rising global temperature and the monitoring of melting ice sheets, these coastal watersheds could be a leading indicator of rising sea levels as their chemical compositions changes. The effects of sea-level rise were also taken into consideration for monitoring.

The 2014 Research Experience for Undergraduates Pasquotank River Watershed Team completed two sets of tests of five tributaries and the river itself. These test points were derived from the 2011 and 2013 Watershed Team research projects with the addition of four points created to sample further downstream in the Pasquotank River itself. Results were compared with previous readings utilizing a Water Quality Index (WQI). The streams tested were the Pasquotank River, Newbegun Creek, Knobbs Creek, Areneuse Creek, Mill Dam Creek, and Sawyers Creek. These streams, cover a large portion of the watershed and provide a wide area of study for the watershed.

Tests performed in the laboratory on this year's samples included pH, salinity, total dissolved solids, and conductivity. Air/water temperature, dissolved oxygen, wind speed/direction, and turbidity/clarity measurements were taken in the field. The data were then compared to the 2011 and 2013 project results.

P4.03

WETLAND LAND COVER CHANGES: CASE STUDY FROM GRAND BAY NATIONAL ESTUARINE RESEARCH RESERVE

Eric Gulledge, Ranjani Kulawardhana, Taimei Harris, Fengxiang Han

Jackson State University, Jackson, MS, USA

Coastal habitats of the Gulf of Mexico have been recognized as increasingly vulnerable to changing climate and human disturbances. The Gulf of Mexico's wetlands have experienced significant declines in recent decades and projections are expected to further increase the rate and magnitude of wetland loss [1]. The goal of our study is to assess the land cover changes in the GB NERR wetland extent and it's adjacent landscape over the last decade. Our study area, the Grand Bay NERR is one of the largest estuarine ecosystems and is a representative of wetland habitats of the Mississippi coast. We implemented a remote sensing based approach using Landsat 7 & 8 imagery to map land cover classes and to evaluate their changes over the last decade (from 2005 to 2015). LULC classes were mapped and identified using supervised-unsupervised classifications performed on Landsat 7 image of May 2003 and Landsat 8 image of May 2015. We identified seven major LULC classes within our study area. Our analyses based on the total areal extent under each LULC class reveal that these LULC classes have not being changed significantly over the study period. However, further analyses are necessary to evaluate any changes in the spatial patterns and the relative distribution of the wetland LULC as well as the upland areas of the wetland boundary.

P4.04

CORRELATION OF BRAIN SIZE AND ACROBATIC DISPLAY COMPLEXITY IN MANAKINS

Mary Harvey, Lainy Day

University of Mississippi, University, MS, USA

While much is known about the neural connections and pathways involved in vocal courtship displays in songbirds, we know much less about the neural pathways involved in non-vocal courtship displays. In manakins, a family of non-songbirds, the complexity of the mating display appears to be a sexually selected behavior. The complexity of the mating display varies greatly across the family. Some manakins perform fairly simple dances, whereas others have elaborate displays that consist of acrobatic movements and mechanical sound production. We have found that display complexity is positively associated with body size, the volume of whole brain, and with the volume of two motor regions, the arcopallium and the cerebellum, but not with an amygdalar nucleus or a visual thalamic nucleus. The cerebellum is a particularly complex brain area with 3 layers containing varied cell types, and several folia that are thought to be biased to particular aspects of motor coordination. And, while large volume measures suggest neural complexity, we need neuron counts and cell sizes to validate computational power. Thus, I will measuring total neuron number and neuron size in molecular layer, granular layer, and Purkinje layer of the cerebellum segregated into three foliar divisions. This data will validate the volumetric measures. In addition, because each cell type and folium has particular functions, these measures will help us understand the particular role the cerebellum plays in complex non-vocal courtship displays. These are the first studies to examine the specific contributions of cerebellum structures to a sexually selected motor behavior.

P4.05

PHYLOGENETIC RELATIONSHIPS OF THE CLOSEST RELATIVES OF WILLOWS (*SALIX*) AND COTTONWOODS (*POPULUS*)

John Diffey, Mac Alford

University of Southern Mississippi, Hattiesburg, MS, USA

Salicaceae are an economically and ecologically important family of flowering plants. The family includes willows and cottonwoods and was recently enlarged to include a large number of tropical species. Relationships of these tropical relatives relative to willows and cottonwoods has been explored at a basic level, but to date no molecular phylogenies have been constructed with significant sampling of nuclear DNA. For this project, I sampled several regions of nuclear DNA across the family to infer relationships among the genera of Salicaceae, and several more nuclear regions and a small chloroplast region with a focus on the seven genera hypothesized to be the closest relatives of the willows and cottonwoods.

P4.06

PHYLOGENETIC RELATIONSHIPS OF ACHARIACEAE BASED ON ANALYSES OF MORPHOLOGICAL AND DNA DATA

Corey Pagart, Mac Alford

University of Southern Mississippi, Hattiesburg, Mississippi, USA

Achariaceae are a mostly tropical family of flowering plants consisting of about 29 genera and 150 species of trees and shrubs. Although they are closely related to passionflowers (Passifloraceae) and willows and cottonwoods (Salicaceae), relationships of the genera have never been studied, and few studies of the family in general have been conducted, except for a few on species that produce chaulmoogra oil, a commonly used treatment for leprosy in the past. For my study, I investigated the relationships of the genera within the family using morphological and molecular data. For morphology, I created a data matrix of 35 features, and for DNA, I collected data from two chloroplast regions (ndhF and trnH-psbA) and one nuclear region (GBSSI). Phylogenetic analyses of these data indicate that the tribes within the family are not monophyletic and that the family consists of two major clades.

P4.07

CHARACTERIZATION OF AN UNUSUAL POPULATION OF *ISOETES* (LYCOPODIOPHYTA), A POTENTIAL NEW SPECIES

Shannon Walker, Mac Alford, A. Nichole Long-Aragon

University of Southern Mississippi, Hattiesburg, MS, USA

A large and unusual population of *Isoetes* within the DeSoto National Forest along Hall Branch in Wayne County, Mississippi, was studied in order to determine if it is a new species of quillwort or a variation of the one primary species of the longleaf pine belt, *I. louisianensis*. *Isoetes louisianensis* is an endangered species of quillwort found in Louisiana and Mississippi. The Hall Branch population and specimens of known *I. louisianensis* were examined comparatively based on morphology, leaf anatomy, megaspore characterization, examination of habitat characteristics, chromosome counts, characterization of the rhizosphere, and analysis of DNA sequences. In addition, the study contributes to enhanced scientific understanding of *I. louisianensis*, as much about this species is still unknown because *Isoetes* species are similar in appearance, readily cross-fertilize to form sterile hybrids, and exhibit polyploidy. Morphological characterization of the megaspores has been used traditionally to identify different species of *Isoetes*, but the megaspores of separate species are often similar in appearance and are therefore challenging to differentiate without scanning electron microscopy. Plants of the genus *Isoetes* also vary widely depending on environmental factors, and a single species can exhibit a range of morphologies depending on external factors. Our results indicate that there is variation between them.

P4.08

COMPARISON OF DENTAL CHANGES IN *VARANS EXANTHEMATICUS* TO ONTOGENETIC SHIFTS IN DIET

Brittany Husley, Christine Beck, Nina Baghai-Riding, Eric Blackwell

Delta State University, Cleveland, Mississippi, USA

Savannah monitor lizards, *Varanus exanthematicus* Bosc., are native to savannah grasslands and woodlands of South Africa. They are capable of reaching lengths up to five feet and possess numerous small teeth (<1 mm in length) in their upper and lower jaws. The morphological development of their teeth changes with age and reflect dietary feeding adaptations. As juveniles, they possess teeth more capable of shredding and consume mainly softer bodied insects like crickets. As adults their teeth are more adaptive to crushing larger hard shelled prey items allowing them to consume a larger variety of organisms with bones and hard outer shells: small rodents, scorpions, snails, beetles, and mollusks. This study analyzes a collection of teeth from a five-year old male monitor lizard that is living in a bio-active enclosure in Cleveland, Mississippi. The monitor was obtained when it was a month old and was 5 inches in length and has grown to a length of 2 feet 8 inches over the course of five years. It is living on a diet of mealworms, superworms, frogs, earthworms, mice, and crickets. Over 10 teeth, mostly back teeth, were obtained as the savannah monitor naturally shed and replaced them. The teeth are broken into two categories; teeth collected before the monitor was a year old and teeth collected between the ages of 4-5 years old. Changes in the teeth morphology reflect a shift dietary behavior.

P4.09

EFFECTS OF WILD HOGS AT DAHOMEY NATIONAL WILDLIFE REFUGE, MISSISSIPPI

Matthew Galloway, Peyton Hamblin, Mitchel Coleman, Brady Chambley, Matt McGregor, Nina Baghai-Riding

Delta State University, Cleveland, Mississippi, USA

One of the many issues modern biologists face is the control of invasive species. An invasive species is defined by the NISIC (National Invasive Species Information Center) as a non-native to the ecosystem under consideration whose introduction causes, or is likely to cause, economic or environmental harm or harm to human health. One of the most well-known invasive species in the southern United States is the wild hog (Sus scrufa). Wild hogs cause millions of dollars in damage to forestland as well as farmland. For this research project, we employed a camera trap survey combined with a visual assessment to better monitor wild hog movements and assess the level of damage to affected areas. The areas surveyed in this study include: Christmas Lake, Saw Dust Road, Happy Hollow Lake, and the Pawpaw Trail at Dahomey National Wildlife Refuge, 15 miles southwest of Cleveland, Mississippi. As a result of this study, we determined the wild hog damage to be mainly concentrated around major water sources. Most of the damage occurred around the edges of lakes, ponds, and creek bottoms.

P4.10

BIRD SURVEYS CONDUCTED AT BEAR PEN PARK, CLEVELAND, MISSISSIPPI

Sheketra Bell, Jarrica Carey, DeAndra Felton, Monique Price, Kimberly Davis, Nina Baghai-Riding

Delta State University, Cleveland, Mississippi, USA

Birds are often indicators of environmental health including disease, biodiversity, and pollution. An assemblage of birds in a region often signifies habitat quality. For example, some bird species are specialists and require specific diets and nesting sites. The Mississippi Flyway is a highly used migratory route for ducks, geese,

passerine birds, and more. Birds take this migratory route from their breeding grounds in Canada and the northern United States to their wintering grounds along the Gulf of Mexico and in Central and South America. Bear Pen Park in Cleveland, Mississippi is along the Mississippi Flyway migratory path. This 44 acre city park contains many native plants and assorted habitats (open grasslands, a pond, and forested edges). Over the past eight years, fall bird surveys have been conducted by Conservation Biology classes at Delta State University and 4-H members when birds are migrating. Fifteen bird species were documented during the Fall 2016 survey, however 59 species have been recorded over the span of eight years during these brief surveys. Bird groups observed include: perching birds (50%), ducks/geese (21%), wading birds (15%), raptors (8%), gulls (4%), and upland/ground birds (2%). Species of birds worth noting are Picoides pubescens L. (downy woodpecker), Branta canadensis L. (Canada Goose), and Dryocopus pileatus L. (pileated woodpecker). Bird behavior detected included nesting, flying, foraging, and bathing. City parks like Bear Pen serve as important resting sites along the Mississippi Flyway and help to alleviate the decline of bird populations that have been noted in recent years.

P4.11

PREY REMAINS FOUND IN 24 OWL PELLETS FROM CAROLINA BIOLOGICAL SCIENCE

Alexis Patterson, Heather Brewer, Karoline Lambert, Madison Zoeller, Roxy Kimes, Eric Blackwell, Nina Baghai-Riding
Delta State University, Cleveland, Mississippi, USA

Owl pellets represent regurgitated and undigested diet remains and often consist of dirt, grass, bones, feathers, and fur. Their contents have been used to address broad ecological issues such as diet, prey distribution and abundance, food webs, and conservation. Twenty-four owl pellets from Carolina Biological were dissected by Biology and Human Concerns (BIO 110) students as a means of learning about terrestrial food webs. These students separated the bone elements from other regurgitated matter and placed the bones into plastic Ziploc bags. The Conservation Biology (BIO 459) class reanalyzed the contents to determine biodiversity and prey abundance in this food web. Eight hundred thirteen elements from five different vertebrates (mouse, rat, mole, shrew, and birds) were documented including skulls, jaws, vertebrae, ribs, scapulae, and more. Bird elements were the least numerous (2%) whereas mice were most common (43%). Shrews comprised 22.18% of the assemblage, rats made up 17.7% and voles 15.5%. Although it is unknown where these owl pellets were collected, we assume that they were obtained from the southeastern United States because of the large numbers of mice, rats, shrews, and voles. The absence or low frequency of some may be explained by the low abundance of these species at night (birds) or because of distasteful secretions (amphibians). Future work will be used to compare owl pellets from Bolivar County, Mississippi with those from Carolina Biological Science as well as to identify various bone elements to species in order to get a more accurate assessment of owl prey items.

Friday, February 24, 2017

MORNING
Room Union D
9:00-11:35

ECOLOGY AND ENVOLUTIONARY BIOLOGY AND ZOOLOGY AND ENTOMOLOGY

SYMPOSIA ON ECOLOGICAL DIVERSITY AND THE ENVIRONEMNT

Organizers: AHM Ali Reza and Marta Piva
Delta State University and Alcorn State University,

SEED NUTRITION: GENETICS AND ENVIRONMENT INTERACTIONS

Nacer Bellaloui PhD, Research Plant Physiologist with the Crop Genetics Research Unit, USDA-ARS,
Stoneville, MS.

BIODIVERSITY OF NATIVE BEES IN THE SOUTHEASTERN US

Katherine Parys, Ph.D., Research Entomologist with the Southern Insect Management Research Unit, USDA-ARS Stoneville, MS

PREDATORS MEDIATE THE INDIRECT EFFECTS OF FIRE ON UNBURNED AREAS

Marcus Lashley, Ph.D., Assistant Professor, Department of Wildlife, Fisheries, and Aquaculture, College of Forest Resources, Mississippi State University

INSECTICIDE RESISTANCE MANAGEMENT STRATEGIES

Clint Allen, Ph.D., Research Entomologist with the Southern Insect Management Research Unit, USDA-ARS Stoneville, MS

Friday, February 24, 2017
AFTERNOON

12:00-1:00	Plenary Speaker
1:00-3:00	Millsaps HHMI Undergraduate Symposium

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 23, 2017

MORNING
Room Union A

10:00 WELCOME/INTRODUCTION

O5.01

10:15 GEOMORPHIC ADJUSTMENTS ALONG BAYOU PIERRE, MISSISSIPPI (2004-2016)

Franklin Heitmuller, John Ables, George Raber
The University of Southern Mississippi, Hattiesburg, MS, USA

Bayou Pierre is a knickpoint-affected stream channel in southwestern Mississippi that has experienced considerable erosion during the 20th Century to present. The channel was classified by Ross et al. (2001) into five zones ranging from unaffected to actively deepening and widening downstream of the erosional knickpoint. This study serves to update those results through a combination of field surveys and planform assessments of channel stability using aerial imagery (including high-resolution drone-derived imagery rectified with GPS ground-control points) from the period 2004 to 2016. Results indicate: (i) continued upstream migration of the erosional knickpoint along the main-stem channel at a rate of 0.09 miles/year, (ii) downstream adjustments to establish a channel-floodplain system in quasi-equilibrium, and (iii) the prospect to facilitate fluvial processes to rehabilitate reaches affected by channel

bed and bank erosion. While the results of this study reveal that the Mississippi Highway 28 bridge could be compromised by 2028 and property owners will continue to lose land to the channel downstream of the knickpoint, the channel recovery further downstream offers a possibility of re-locating the threatened Bayou darter (*Etheostoma rubrum*) from increasingly isolated upstream habitats to appropriate riffle habitats along the lower reaches of Bayou Pierre.

O5.02

10:30 DEFORMATION OF THE LOWER OCEANIC CRUST FORMED AT A SLOW SPREADING RIDGE

Jeremy Deans
University of Southern Mississippi, Hattiesburg, MS, USA

Results from three deep-sea wells with bearing on the formation of the lower oceanic crust will be presented. Oceanic crust is formed at spreading centers, or mid-ocean ridges, and can be split into two categories: fast-spreading and slow-spreading. Fast-spreading ridges are defined by ridges that have full spreading rates of >20 mm/yr and are exemplified by the East Pacific Rise. Slow-spreading ridges are defined by ridges that have full spreading rates <20 mm/yr and are exemplified by the Mid-Atlantic Ridge and the Southwest Indian Ridge. Even though less crust is made at slow-spreading ridges compared to fast-spreading ridges, slow-spreading ridges comprise a larger proportion of ridges worldwide. Slow-spreading ridges form two primary types of crust: 1) similar to fast-spreading crust and, 2) oceanic core complexes. Oceanic core complexes are characterized by a domal structure formed by the exhumation of the lower crust along a high temperature detachment fault. An example of an oceanic core complex is Atlantis Bank, which formed 15 million years ago on the Antarctic plate along the slow-spreading Southwest Indian Ridge in the Indian Ocean. Three different holes at different distances to the spreading-ridge have been drilled over four expeditions by the continuation of the Ocean Drilling Program. Each well has distinct magmatic units and a distinct pattern of deformation with depth. Samples from these three holes demonstrate that the lower oceanic crust in the footwall of oceanic core complexes is formed through competing processes of magmatic intrusion and deformation.

O5.03

10:45 SHALLOW SEISMIC REFLECTION INVESTIGATION OF THE BIG RIDGE ESCARPMENT, JACKSON COUNTY, MISSISSIPPI

Jared Bullock, James Harris, Brooks Rosandich
Millsaps College, Jackson, MS, USA

The Big Ridge Escarpment (BRE) is a 20-km-long, east-west oriented, linear topographic feature on the Mississippi Gulf Coast. The change in elevation (down-to-the-south) across the BRE ranges from approximately 4.5 to 6.0 m. Two theories have attempted to explain the origin of the escarpment. The first theory suggests that it was caused by wave erosion. The second theory maintains that the BRE formed as a result of normal faulting. This origin is supported by the escarpment's linear trend and abrupt elevation change. Active growth faults (east-west oriented and down-to-the-south) have been imaged by seismic methods at sites to the west of the BRE; in the Lower Pearl River Valley, and in the Baton Rouge area. We collected a ~250-m-long shear-wave (S-wave) seismic reflection profile across the BRE (along McCann Road in St. Martin, Mississippi) using a 24-channel landstreamer acquisition system and a 1.8-kg sledgehammer seismic source to provide a high-resolution image of the near-surface structure. The processed reflection profile exhibits strong reflection energy to depths of greater than 50 m. Abrupt changes in reflection amplitude and coherency, and offsets in reflections, suggest the presence of high-angle down-to-the-south faults. Back-tilted (northward dipping) shallow reflections are also consistent with the near-surface structure of growth faults.

O5.04

11:00 HIGH-RESOLUTION GEOPHYSICAL IMAGING OF THE "NEW MADRID" FAULT, SOUTHEAST MISSOURI

Brooks Rosandich[1], James Harris[1], Jared Bullock[1], Edward Woolery[2], Rachel Harris[3]
[1]Millsaps College, Jackson, MS, USA, [2]University of Kentucky, Lexington, KY, USA, [3]Centre College, Danville, KY, USA

The New Madrid seismic zone is the most active earthquake zone in the central and eastern United States. Determining the relationship between the seismogenic faults (in crystalline basement rocks) and deformation at the Earth's surface and in the shallow subsurface has remained an active research topic for decades. An integrated geophysical data set, including compressional (P-) wave seismic reflection, shear (S-) wave seismic reflection, and ground penetrating radar (GPR) profiles, was collected in New Madrid, Missouri, across the previously identified "New Madrid" segment of the Reelfoot fault, whose most significant rupture produced the *M*=8, February 7, 1812, New Madrid earthquake. The geophysical data were collected over a 215-m-long line centered on the updip projection of the New Madrid fault. The seismic reflection profiles were collected using 48-channel (P-wave) and 24-channel (S-wave) towable landsteamer acquisition equipment. Seismic energy was generated by five vertical impacts of a 1.8-kg sledgehammer on a small aluminum plate for the P-wave data and five horizontal impacts of the sledgehammer on a 10-kg steel I-beam for the S-wave data. The GPR data were collected in bi-static mode with 100 MHz antenna, 1.0 m antenna spacing, and 0.25 m step size. Preliminary interpretation of the profiles across the New Madrid fault shows a west-dipping reverse fault that propagates upward from Paleozoic sedimentary rocks (>500 m deep) to Quaternary surface sediments. The hanging wall of the fault is anticlinally folded, a structural setting almost identical to that imaged on the Kentucky Bend and Reelfoot faults to the south.

O5.05

11:15 SEDIMENT GEOCHEMISTRY OF CRANE RIDGE LAKE, LEFLEUR'S BLUFF STATE PARK, JACKSON, MISSISSIPPI

Calvin Shaw, Stan Galicki
Millsaps College, Jackson, Mississippi, USA

The lake is an abandoned oxbow situated in the Pearl River floodplain at Lefluer's Bluff State Park. The oxbow is 630 meters (m) long and varies between 40-70 m wide with water depth up to 1.8 m. A 1.06 m long, 10 centimeter (cm) diameter conventional core was extracted from the lake. The core stratigraphy reveals 18 cm of silty, organic-rich clay over clayey silty sand and sand towards the base. The upper 30 cm of the core were sampled on 1 cm intervals and submitted for INAA-ICP-OES analyses. The change in deposition from predominantly sand to clay took place approximately 182 years ago when the channel was abandoned by the main channel of the Pearl River. The temporal geochemical signature of 50 elements was investigated. Of primary interest will be As, Pb, and P which are known agricultural and industrial elements with well documented signatures in lacustrine sediment less than 200 years old.

O5.06

11:30 AGE DETERMINATION OF CRANE RIDGE LAKE, LEFLEUR"S BLUFF STATE PARK, JACKSON, MISSISSIPPI

Zack Burch, Stan Galicki
Millsaps College, Jackson, Mississippi, USA

Crane Ridge Lake is an abandoned oxbow situated in the Pearl River floodplain at Lefluer's Bluff State Park. The oxbow is 630 meters (m) long and varies between 40-70 m wide. Water depth

ranges up to 1.8 m. A 1.06-meter-long, 10 centimeters (cm) in diameter conventional core was extracted from the lake. The core features 0.2 m of organic rich clay over 0.86 m of very fine to medium grained sand. Organic carbon averages 11 percent in the clay interval and 3 percent in the sand. Two samples were selected for radiocarbon (^{14}C) accelerator mass spectrometry dating; clay at 18 cm and wood encountered at the base of the core at 106 cm. The clay dates at 116±7 calibrated years before the present (cal yr B.P.) and the wood at 210±8 cal yr B.P. The rate of sediment accumulation since clay deposition started is 0.1 cm y^{-1}. Abandonment of the channel that formed the lake is interpreted to be represented by the change in lithology from sand to clay approximately 182 years ago. The wood dated at 210 cal yr B.P. is interpreted to be a remnant of a previous wetland surface that was covered by channel fill during a Pearl River channel migration approximately 276 years ago.

11:45-1:00 General Sessions

O5.07

1:00 APPLICATION OF SfM-MVS PHOTOGRAMMETRY IN GEOLOGY VIRTUAL FIELD TRIPS

Youngwoo Cho, Renee Clary
Mississippi State University, Mississippi State, MS, USA

We researched a procedure for building 3D models of geologic outcrops for Virtual Field Trips (VFTs) with Structure from Motion (SfM) and Multi-View Stereo (MVS) Photogrammetry technology. Using SfM-MVS from a collection of images taken in three geologic outcrops in northern Mississippi, we have reconstructed 3D models of the sites. In this application of SfM-MVS as a tool for VFTs, it is very important and challenging to maintain the image resolution of the models in high enough quality for them to be used in VFTs. Our method utilized DSLR (Digital Single-Lens Reflex) camera images of outcrops and samples of rocks and fossils in raw format. We can adjust various settings of the images in raw format during the post-production, so that the images that will be stitched into 3D models can be best viewed in the final result. Other photographic techniques such as lighting and managing depth of field will also be discussed. One of the other challenges encountered in making 3D models for VFTs is to have a better sharpness in the final result. The depth of the images presents some limitations in keeping the sharpness of the images as high as possible. We will also discuss how this can be accomplished by using a large aperture of a lens, or by using focus stacking or focus selecting techniques.

O5.08

1:15 ANALYSIS OF PROPOSED RESERVOIR IN GEORGE COUNTY, MISSISSIPPI, THROUGH FILL TIME

Lauren Parker, Courtney Killian, Darrel Schmitz
Mississippi State University, Mississippi State, MS, USA

This study is to determine the feasibility of a reservoir in George County, Mississippi. As the project moves into the Environmental Impact Statement (EIS) phase, saturation rates of both the Big Cedar Creek and the Little Cedar Creek basins will be studied. A reservoir in this area would benefit continuous movement of the lower Pascagoula River and provide George County with public recreation. The primary intent of this study is to evaluate the rates of reservoir fill and levels of saturation in strata surrounding the reservoir. In earlier studies, it was found that a clay layer is superimposed by porous sand. Additional studies will be conducted to establish if saturation of the reservoir would initiate ground water movement to adjacent basins. In order to determine fill rate and possible transfer of water to a nearby basin through the groundwater system, a numerical model will be the prime method. The model would allow for simulation of an aquifer composed of high permeability sand that was underlain by low permeability clay. The locations of the proposed reservoirs sit above an unconfined aquifer. Water levels from piezometers placed in the unconfined aquifer between the two drainage basins are utilized to determine water table fluctuations in the unconfined aquifer.

O5.09

1:30 PETROLEUM SYSTEMS INTERPRETATION AND PROSPECT ANALYSES OF THE FINNMARK CARBONATE PLATFORM

Patrick Jordan, Christopher Kyler
Mississippi State University, Mississippi State, MS, USA

Potential hydrocarbon drilling prospects in the Finnmark carbonate platform of the Norwegian Barents Basin were identified from 3D seismic surveys, well data, and geochemical analyses. Prospects are interpreted as prograding wedges and carbonate buildups, and were deposited on a carbonate platform during sea level highstands and lowstands. Prospects are associated with four-way closure, which were interpreted from inline and crossline transects, and 3D two-way-time structure maps. The source of hydrocarbons is postulated to originate from the thermally mature, organic rich shales and coals of the Lower Carboniferous Soldogg Formation. These fluvio-deltaic source facies have high TOC (81.55%wt) and Tmax values (461), with kerogen types one through three present. Reservoir rocks consist of highly porous, spiculite-limestones of the Upper Permian Roye Formation. These coarse-grained carbonates contain up to 19% porosity, and potentially 21 meters of hydrocarbon saturation in the pay column observed from well data. Trapping of potential hydrocarbons occur where the Roye Formation unconformably pinches-out down-dip, and is associated with negative seismic reflection terminations. Unconformably resting above the Roye Formation lie the tight shales of the Lower Triassic Havert Formation that serve as a laterally-extensive hydrocarbon seal. The massive-bedded Havert Shale provides the capacity to seal up at least 21 meters of hydrocarbons based upon well log interpretation, and is up to 61 meters in size. Exploration wells are recommended to be drilled, while testing Triassic and Jurassic sands en route to the primary targets.

O5.10

1:45 WHAT GOES INTO A ROADSIDE GEOLOGY BOOK

Darrel Schmitz[1], Stan Galicki[2]
[1]Mississippi State University, Mississippi State, MS, USA, [2]Millsaps College, Jackson, Mississippi, USA

To produce and publish a state roadside geology book, several tasks are necessary. First, roads and regions of interest must be identified and selected for study. In selecting the roads, all Interstate, U.S. Highways, and federal park roads, such as the Natchez Trace parkway are included. Additionally, major, state highways connecting larger cities, designated scenic highways, and highways traversing important geological sites are selected for study. The state is then broken into regions that correspond to major differences in the geology. Once the roads and regions have been selected, the roads are travelled in order to develop road logs and obtain photographs of geologic exposures and other geological attractions. Existing publications are utilized to note the location of geologic deposits over which the roads travel as well as obtain some sketches and diagrams. Next, a draft manuscript is compiled, consisting of an introductory section describing the geologic setting of the state followed by sections on each of the selected regions of the state. Then, the publisher and authors go through multiple rounds of changes and edits. The publisher then provides a proof copy of the text from which final edits are made. Once the final edits have been completed the book goes to press.

O5.11

2:00 VARIABLE PATHWAYS AND GEOCHEMICAL HISTORY OF SEEPAGE UNDER THE MISSISSIPPI RIVER LEVEE

Kaitlin Voll, Gregg Davidson

University of Mississippi, University, MS, USA

To better understand the geochemical evolution of water along variable flow paths on the Mississippi River, water samples were collected over a 55 km section north of Vicksburg, MS. Samples consist of river water and groundwater from actively flowing relief wells and sand boils during peak flood events from 2015 to 2016. Seepage beneath levees during flood stage is a concern, with shallow flow pathways creating the greater risk. The geochemically stratified nature of the Mississippi River valley alluvial aquifer (MRVA) is making it possible to differentiate deep and shallow flow pathways, with discharge from sand boils in 2011 and 2016 showing distinct geochemical and isotopic patterns. Deeper flow paths match the relief well chemistry and occur when the levee sits on top of low-permeability channel-fill deposits. Samples with high concentrations of dissolved Fe, As, and Ba provide strong indications that the source is from the deeper, anoxic portions of the aquifer. Relief wells and some sand boils have high Fe and As concentrations, which is consistent with water from deeper flow paths. Sand boils indicating shallow pathways flow through sandbar deposits, with Fe and As concentrations similar to river water. Preliminary Fe and Sr isotope signatures also show promise for understanding the evolution of groundwater along the different flow paths.

2:15 DIVISION BUSINESS MEETING

Thursday, February 23, 2017

EVENING

Ballroom

3:30 Dodgen Lecture and Awards Ceromony

General Poster Session

Immediately Following Dodgen Lecture

Friday, February 24, 2017
Room Union A
MORNING

9:00 INTRODUCTION

O5.12

9:15 SPECIAL SESSION:

PLATE TECTONICS AND EVOLUTION: THE VALUE OF THE PROVINCIALITY OF MESOZOIC OSTRACODES

Mark Puckett

University of Southern Mississippi, Hattiesburg, MS, USA

O5.13

9:30 GEOLOGY IN MISSISSIPPI AT THE TIME OF STATEHOOD

Michael B. E. Bograd
Mississippi Department of Environmental Quality - Office of Geology, Jackson, MS, USA

In 1817 when Mississippi became a state, a naturalist could have interpreted geological observations within one of two competing world views: Huttonian or Wernerian, Plutonist or Neptunist. Hutton's *Theory of the Earth* had been published in 1795, and Playfair's readable explanation of uniformitarianism in 1802. But in 1809 William Maclure published the first geologic map of the United States, including Mississippi, following Werner's classification of Primitive, Transition, Secondary, and Alluvial rocks. Southern and western Mississippi were mapped as Alluvial Rocks, and correspond to the unconsolidated Tertiary and Quaternary sediments of modern maps. Northeastern Mississippi was mapped as Secondary, corresponding to our gently dipping Cretaceous sediments but extending to a point farther to the southwest. Maclure's map was revised and republished in 1811 and 1817, and would have been available to geologists in Mississippi. Other publications included descriptions of geography, topography, soils, and resources, plus limited geological observations, by Hutchins (1784), Pendergrast's dissertation in medical topography (1803), Volney (1803), Ellicott (1803), and Natchez scientist William Dunbar (1804 and 1806). Winthrop Sargent, first governor of the Mississippi Territory, published in 1814 an account of his observations near Natchez of the effects of the New Madrid earthquakes of 1811-1812. The first sketch geologic map of the State of Mississippi was published by Oscar Lieber in 1854, and the first book on the geology of the state was published by B. L. C. Wailes (age 20 in 1817) that same year.

O5.14

9:45 THE OLIGOCENCE-MIOCENCE BOUNDARY IN RELATION TO FOSSIL SITES IN SOUTHERN MISSISSIPPI

James Starnes

Mississippi Department of Environmental Quality - Office of Geology, Jackson, MS, USA

The age of much of the Catahoula Formation was thought to be Miocene. Previous mapping in Jones and Covington counties, which includes the Collins, Williamsburg, Hot Coffee, Seminary, and Hebron 7.5-minute quadrangles, identified the *Heterostegina* Limestone in the subsurface. Mapping of the *Heterostegina* zone has established the upper limit of the Oligocene in Mississippi, the top of which is at least above the lower two-thirds of the Catahoula Formation. These geologic maps have been used to support the age of two important fossil sites in Mississippi. One is the Jones Branch Local Fauna, an Early Arikareean vertebrate Catahoula assemblage in Wayne County. Publication of this vertebrate assemblage continues with papers by this office, palaeontologists from University of North Florida, University of Louisiana Monroe, the Mississippi Museum of Natural Science, and others working the site. Secondly, a Middle Miocene age designation is given to the overlying Hattiesburg Formation, based on marine equivalents offshore and a *Teleoceras medicornutum* tibia found as float in association with a fossil llama proximal phalanx at a Hattiesburg outcrop on the Middle Fork Homochitto River near Meadville in Franklin County. University of South Alabama and University of Southern Mississippi paleobotanists are working with this office on a diverse fossil flora assemblage in the Upper Hattiesburg of Forrest County. Mapping of the *Heterostegina* Limestone in the subsurface below the site along with vertebrates in Stone County from the overlying Late Miocene Pascagoula Formation have helped to bracket the age of this important fossil local flora.

O5.15

10:00 A NEW ILLUSTRATED GUIDE TO THE LATE EOCENE MOLLUSKS OF MISSISSIPPI

David T. Dockery III
Mississippi Department of Environmental Quality - Office of Geology, Jackson, MS, USA

The molluscan fauna of the Moodys Branch Formation in Mississippi, and especially the Town Creek locality in Jackson, is the best preserved and most diverse for this period of time in the Western Hemisphere and rivals the Late Eocene Auversian molluscan faunas of the Paris Basin in France. The Town Creek site was visited by Charles Lyell in 1846, who placed the molluscan fauna in his Eocene Epoch, and was illustrated by B. L. C. Wailes in 1854 with new species named by Timothy Conrad; descriptions by Conrad followed in an 1855 publication. Monographs on the fauna were published by Gilbert Harris and Katherine Palmer both in 1946

and 1947 and Dockery in 1977. A new monograph on the Moodys Branch molluscan fauna is in progress, the pages of which will be filled with digitally-photographed images of molluscan species in high resolution and in multiple views. Images for the classes Bivalvia, Cephalopoda, Gastropoda, and Scaphopoda will be arranged systematically according to the systematics given in the *Molluscan Database* website. Dockery (2003) recorded 346 molluscan species in the Moodys Branch Formation in its extent from the Texas-Louisiana border to Alabama. At present time, figure-ready images of some 70 bivalve species, two cephalopod species, and 185 gastropod species have been completed. Many species are represented by both adult and juvenile specimens, the latter showing details of the protoconch.

O5.16

10:15 COMPARING FIELD AND LABORATORY MEASUREMENTS OF HYDRAULIC CONDUCTIVITY IN THE MISSISSIPPI DELTA

Taylor Moore, Luke Jenkins, Andrew O'Reilly
University of Mississippi, University, MS, USA

The Mississippi River Valley alluvial aquifer (MRVAA) supports an agriculture industry in the Mississippi Delta that produces more than $1.5 billion in annual commodities, but continual decreases in aquifer water levels over the past few decades suggest that this usage of groundwater is not sustainable. Soil sampling, field measurements of saturated hydraulic conductivity, and laboratory analyses of soil textural characteristics and saturated hydraulic conductivity are being performed to develop a greater understanding of recharge to the MRVAA. The soil samples were collected at various depths from two boreholes near Sky Lake in Belzoni, Mississippi. While the entirety of the research has not been completed, preliminary results from data collected at the two locations can be interpreted. Sieve analyses of the first borehole soil cores showed fines ranging from 7.21% to 63.4%, with a sharp decrease after ~2.8 m. The saturated hydraulic conductivity values ranged from $7x10^{-7}$ m/s at ~0.6 m to $2x10^{-4}$ m/s at ~3.0 m. Sieve analysis of the second borehole soil cores showed fines ranging from 40.9% to 70.5%, with a steady increase after ~1 m. A few laboratory measured saturated hydraulic conductivities have been obtained and can be compared to the field saturated hydraulic conductivity measurements. The ~0.6 m soil core had a saturated hydraulic conductivity of $2x10^{-8}$ m/s and the ~3.0 m soil core had a saturated hydraulic conductivity of $3x10^{-5}$ m/s, both of which are significantly lower than the field measurements at the same depths.

10:30 BREAK

O5.17

10:45 QUANTIFYING RECHARGE TO THE MISSISSIPPI RIVER VALLEY ALLUVIAL AQUIFER FROM OXBOW-LAKE-WETLAND SYSTEMS

Michael Gratzer, Gregg Davidson, Andrew O'Reilly
University of Mississippi, University, MS, USA

Groundwater withdrawals for irrigation are contributing to decreasing water levels in the Mississippi River Valley Alluvial Aquifer (MRVAA). To sustainably manage this resource, sources of recharge need to be quantified. This study focuses on recharge through oxbow lakes, ubiquitous in the Mississippi Delta. Previous investigations indicate that Sky Lake, an ancient Mississippi River oxbow with a riparian wetland near Belzoni, Mississippi, may contribute recharge to the MRVAA. The current study employs multiple methods to identify and quantify recharge from this oxbow lake-wetland system. Two soil cores within the wetland have been collected to analyze stratigraphy to a depth of approximately 7 m. Piezometers in the wetland and monitoring wells in Sky Lake's vicinity are being used to monitor MRVAA water level and temperature. With this data, the potentiometric surface upgradient, beneath, and downgradient of the lake-wetland system will be mapped to see if it shows groundwater mounding beneath the lake which would evidence vertical recharge. Lake water level and temperature are also being monitored. Soil temperature sensors have been installed 30 and 60 cm belowground at ten points near one of the wetland piezometers. Soil temperatures will be monitored over time and compared with surface-water temperatures to estimate vertical water flux at each point. Soil temperatures among the ten points will be compared to check for locally increased recharge flux through preferential pathways in the wetland sediments that may be created by abundant decaying root systems and fallen limbs in the heavily forested oxbow lake-wetland system.

O5.18

11:00 ASSESSMENT OF VADOSE-ZONE WELLS FOR ENHANCING GROUNDWATER RECHARGE IN THE MISSISSIPPI DELTA

Luke Jenkins, Taylor More, Andrew O'Reilly
University of Mississippi, University, MS, USA

The Mississippi River Valley alluvial aquifer (MRVAA) supports an agriculture industry in the Mississippi Delta that produces more than $1.5 billion in annual commodities, but continual decreases in aquifer water levels over the past few decades suggest that this usage of groundwater is not sustainable. Soil sampling, field and laboratory measurements of saturated hydraulic conductivity, and model simulations are being conducted to develop a better understanding of recharge to the MRVAA. The soil samples were collected at various depths from two boreholes near Sky Lake in Belzoni, Mississippi. The purpose of this portion of the research is to assess the feasibility of the implementation of vadose-zone wells to enhance groundwater recharge to the MRVAA. Hydraulic conductivity values have been measured in the laboratory for two cores taken in the field. The two cores are from depths of 1 ft and 10 ft. The hydraulic conductivities are $5.9x10^{-3}$ ft/d and 7.6 ft/d, respectively. Based on an assumed vadose-zone well depth of 8 ft and radius of 1 ft, a simple borehole infiltration equation was used to calculate well infiltration flow rates of 1.34 ft^3/d and 1720 ft^3/d, respectively. These rates are consistent with soil texture, because the top foot of soil is mostly silt and clay and the soil at 10 ft is predominately fine sand. Once hydraulic conductivity values have been measured for all the cores from both boreholes, the feasibility and design of the vadose-zone wells will be determined.

O5.19

11:15 INFLUENCE OF HYDROLOGIC REGIME AND CLIMATIC VARIABLES ON BALD CYPRESS SAP FLOW

Chayan Lahiri, Gregg Davidson
University of Mississippi, University, MS, USA

Xylem sap flow of bald cypress, a wetland species abundant throughout the American Southeast, have in the past shown response to changing hydrologic regime and salt water intrusion. The research conducted at Sky Lake (Mississippi) studied trees fitted with thermal dissipation probes measuring xylem sap flow during a two-year period (2013-2014) with distinctly different hydro-periods. Relative humidity and temperature were also measured during the same time period. The trees that were monitored at Sky Lake show no response to the changing hydrologic conditions at the site, a small temperature effect, and no response to relative humidity. Dendrometer bands attached to the same trees showed linear growth rates during the two growing seasons studied. The present scenario is unique and requires further investigation to determine the reason for such an occurrence.

O5.20

11:30 GEOLOGIC CROSS SECTION B-B' OF THE MIDDLE CLAIBORNE GROUP THROUGH SOUTHERN MISSISSIPPI

R. Tyler Berry
Mississippi Department of Environmental Quality - Office of Geology, Jackson, Mississippi, USA

Geologic cross section B-B' is the first in a series of cross sections to be constructed by the Mississippi Office of Geology's Surface Geology Division to document and improve understanding of the geologic framework and depositional systems of middle Claiborne Group sediments. For purposes of this cross section, the middle Claiborne Group interval investigated extends from the top of the marine Winona Formation to the base of the Cook Mountain Formation (i.e. Cook Mountain Limestone). Between these two easily identifiable datums are the regressive sands and clays of the prodelta/shelf Zilpha Formation and the overlying fluvial/deltaic Kosciusko Formation (i.e. Sparta aquifer). This west to east cross section spans approximately 191 miles, just north of the 31st parallel, from drill hole No. 1 in Wilkinson County, Mississippi to drill hole No. 29 in Greene County, Mississippi. Deltaic sands are thickest in the west and shale out to the east. The thickness of this middle Claiborne interval ranges from approximately 850 feet at drill hole No. 1 to nearly 120 feet at drill hole No. 29. This trend shows subsidence along the axis of the Mississippi Embayment with stable shelf conditions along the eastern margin, a trend that continues today with the course of the Mississippi River and delta.

11:45 AWARDS CEREMONY

12:00 CLOSING STATEMENTS

12:00-1:00 Plenary Speaker

1:00-3:00 Millsaps HHMI Undergraduate Symposium

HEALTH SCIENCES

Chair : George Moll
University of Mississippi Medical Center
Co-Chair: Olga McDaniel
University of Mississippi Medical Center
Co-Chair Jana Bagwell
University of Mississippi Medical Center
Vice-Chair: Ray Grill
University of Mississippi Medical Center
Vice-Chair : Jennifer Harpole
University of Mississippi Medical Center

Thursday, February 23, 2017
MORNING
Room TC Ballroom II/III

8:00 – Noon Population Health Symposium I

Special Abstract Presentations

Moderators: Jennifer Harpole, PhD., George Moll, MD. University of Mississippi Medical Center

O6.01

8:10 VACCINES IN POPULATION HEALTH: JUST A LITTLE PINPRICK

Larry McDaniel
University of Mississippi Medical Center, Jackson, MS, USA

Vaccines have had a profound effect on human health, and it has been suggested that no other medical intervention has had such an impact on the morbidity and mortality associated with infectious diseases. It has been estimated that more than 106 million cases of contagious diseases have been prevented by vaccine use in the United States. Still there remains considerable controversy surrounding the development and use of vaccines. Cost considerations have negatively impacted the development of some vaccines. Also, the availability of some vaccines in developing countries, which often need them the most, has been limited in some cases because of cost. The original approach of "isolate, inactivate, and inject", has been replaced with a more logical approach for vaccine development. However, there remains a lot that is not fully understood. The idea of "one size fits all" for vaccine dosing is coming under heavy pressure to change. Immunity is multifaceted and immune responses are dynamic. Given the developments in personalized medicine, the challenge is to develop new and more effective vaccines for individuals. Recent advances are resulting in the development of novel vaccines and therapeutics. Also, the range of vaccine targets has greatly expanded. Regulation and political pressure have led to increases in approval time for vaccines and needs to be refined. Ultimately, understanding the host response to vaccine antigens coupled with a systems biology approach has the potential to further revolutionize medical intervention through vaccination.

O6.02

8:25 SUSTAINING MISSISSIPPI'S TRAUMA CARE SYSTEM: IMPLICATIONS FOR POPULATION HEALTH

Amy Radican-Wald
Center for Mississippi Health Policy, Jackson, MS, USA

Background: In 2008, the Mississippi Legislature enacted HB 1405, which provided a steady funding stream to support the state's trauma system. The provisions implemented were documented by researchers as a successful model for other states. In 2016, legislation was enacted to alter the funding stream designated to support the system. Objective: Examine the impact of the policy changes to the trauma system on health outcomes statewide.

Methods: Quantitative analyses of traffic, vital records, and administrative data from 2008-2016.

Results: Unintentional injuries comprise the majority of Mississippi's injury deaths (67%). Motor vehicle crashes were the leading cause of these deaths. From 2008 to 2014, crash death rates were higher in Mississippi than the United States, but death rates declined significantly ($p<.01$) faster in Mississippi compared to the nation.

Trauma system funding levels did not reach the $40 million authorized per year from 2009-2016 (range: $22.3-$26.9 million). When the amounts collected were adjusted to account for medical inflation, the funding levels were even lower. By redirecting the fees and assessments in 2016 which are related to moving traffic and other driving violations into the State General Fund rather than funds designated for trauma care, there is projected to be ~$9 million less annual revenue to support the state's trauma system. Conclusions: Motor vehicle crash death rates slowed since enactment of policies supporting the trauma system. Recent statutory changes have the potential of seriously reducing the revenue designated to support the state's model trauma care system, which could impact injury outcomes state-wide.

O6.03

8:40 PERSONALIZING MEDICINE IN OBESITY USING TOPOLOGICAL DATA ANALYSIS

John Clemmer, W. Andrew Pruett, Kenneth Butler and Robert Hester
University of Mississippi Medical Center, Jackson, MS, USA

Methodologies that could identify subgroups of patients that may or may not respond to a given treatment could be a revolutionary tool in personalized medicine, a new concept for treating a specific patient based on their particular health or physiology. The association between obesity and diabetes is well known, and the basic science of the mechanisms of insulin resistance are well understood, however, it is unclear how to translate this knowledge to the clinic to give actionable information about a patient's optimal treatment. Based on 36 physiological variables, we analyzed a cohort of 2700 patients from the Genetic Epidemiology of Network of

Arteriopathy (GENOA) Study using topological data analysis (TDA), a new clustering algorithm tool. Variables used for the analysis included blood pressure, BMI, age, renal function, and metabolic markers. TDA clustered and separated out 6 distinct subgroups of obese patients that significantly differed in renal disease, prevalence of stroke, and serum inflammatory biomarkers including CCR5 (or RANTES, a protein thought to play a role in insulin resistance) and C-reactive protein. Interestingly, an obese patient cluster had similarly low levels of these inflammatory markers as compared to lean patients, but still had increased insulin resistance and a greater prevalence of diabetes. This suggests that the association between hyperglycemia and inflammation is not always clear and that new potential anti-inflammatory treatment regimens may not be appropriate for all diabetic patients. These methodologies could potentially be used to discover patterns in a patient's physiology and advance personalized medicine.

O6.04

8:55 THE SCIENCE OF GEOSPATIAL ASTHMA HEALTH IN MISSISSIPPI

Swatantra Kethireddy

Mississippi Valley State University, Itta Bena, MS, USA

Building upon the previous work, in a sense that health of a population is dependent on the health of geographical environment where they live and work. Applying the spatial analytics on population health data and exploring the regional environmental characteristics is important in this research, and is vital to understand the impact on asthma health. Spatial and statistical tools were applied to exploit the health data, Mississippi coast, Delta, and urban Jackson regions are varied with respect to the environmental settings, populations, and businesses. From the existing data between 2009 and 2011, significant health anomalies were observed among those regions, and the disease prevalence increased geographically over the coast along with population growth. Further investigation is under process to understand the urban and rural differences in disease spread, and its association with urban and rural specific variables. From policy to action, health and environmental policies should heavily reflect upon the research and act to protect the health of Mississippians.

O6.05

9:10 COUNTERING THE EPIDEMIC OF PRESCRIPTION OPIOID ABUSE WITH ABUSE-DETERRENT FORMULATIONS

Kevin B. Freeman

University of Mississippi Medical Center, Jackson, MS, USA

Mu opioid agonists (e.g., oxycodone, morphine) are the most effective class of drugs for treating pain, but overdose deaths from prescription opioid abuse have risen sharply in recent years. This trend is a major public health concern because prescription opioids, by virtue of their high clinical utility in the management of pain, will continue to be made available to and used by a large demographic of the population for years to come. Thus, there is a critical need to increase the effectiveness of existing approaches for curtailing the abuse of these medications. Several strategies have been developed to modify the formulation of prescription opioids in ways that either reduce their appeal or prevent them from being altered for intravenous or intranasal abuse. These abuse-deterrent formulations (ADFs) have had a positive impact on abuse rates. However, each strategy also bears unique limitations. The current presentation will review a range of ADF strategies, including one under development at the University of Mississippi Medical Center. The relative strengths and limitations of each approach will be reviewed, as well as the potential of combining some strategies. Research at UMMC supported by R01-DA039167

O6.06

9:25 VISUALIZING HEALTH IN MISSISSIPPI: THERE'S AN APP FOR THAT!

Denise D. Krause

University of Mississippi Medical Center, Jackson, MS, USA

Introduction**.** An interactive, web-based application using geographic information systems (GIS) has been developed to visualize health providers, services, statistics, and outcomes in Mississippi. This application is an easy-to-use and handy tool for effective workforce planning, recruitment, and health services and population health research. This tool was developed to assist in improving access to health care and health outcomes for all Mississippians. Methods**.** Data including active health professionals practicing in the state were collected from health professional licensure boards. These datasets, combined with other proprietary and public datasets, were prepared, processed, catalogued, and stored in our Healthy Mississippi Data Lake. An ArcGIS 10 server application was developed in JavaScript, which can run on most platforms, including mobile devices, to query and visualize the geographic distribution of the health workforce; health statistics, such as the number of primary care physicians per population in a specified county; and health outcomes, such as infant mortality rates. The application is scalable and has built-in security features. Key findings. The application allows users to identify and query geographic locations of health professions filtering by selected criteria, to perform drive-time or buffer analyses, and to explore health-related and socio-demographic population data by geographic area of choice. The application is particularly useful to medical and dental students and residents, the Rural Physician and Dentist Scholarship Programs, the Office of Mississippi Physician Workforce, the Mississippi State Department of Health, and many other state and private organizations. Implications. This application visually represents health in Mississippi and provides access to much needed information for state-wide health workforce planning, health services, and population health research. It is an expandable tool that enables Mississippi to become more proactive in addressing the needs for health care providers, services, and interventions to improve health throughout the state.

Future Directions.

- We continue to obtain, process, and add data and layers of interest to the application.
- We will measure use statistics over time and administer satisfaction and usability surveys to user groups.

Funding sources. Partial funding for this project has been provided by the Office of Mississippi Physician Workforce and the University of Mississippi School of Dentistry.

9:40 – 9:55 Break

Population Health Posters on Display

P6.01

RACIALLY-DIVERSE POPULATION WITH RACE-SPECIFIC BIOMARKERS FOR COLORECTAL CANCER

Eldrin Bhanat Bhanat[1], Ingrid Espinoza[2], Amit Reddy[2], Xu Zhang[2], Logan Fair[2], Joy King[2], Elizabeth Tarsi[2], Tara Craft[2], Roy Duhe[2], Charulochana Subramony[2], Christopher Lahr[2], Xinchun Zhou[2], and Christian Gomez[2]

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

Colorectal cancer (CRC) diagnosis is based on tumor-node-metastasis staging. Biological markers detect early cancers and aid in therapies. Stemness molecules identify aggressive cancers in patients. Here, Zinc finger E-box binding homeobox 1 (ZEB1), Trefoil factor 3 (TFF3), Hepatoma Up-Regulate Protein (HURP), Mucin 2 (MUC2), and Cystic fibrosis transmembrane regulator (CFTR) are assessed as potential prognostic biomarkers in CRC. Total (N=56) cases assessed by a pathologist were included. Thirty two were African Americans (AA) and twenty four Caucasian

Americans (CA). The median follow-up for 42 surviving patients was 4.5 years. Tissue tumor microarray (TMA) with tumor stage-matched CRC from AA and CA was stained with each biomarker using immunohistochemistry. The association for expression of all the biomarkers with disease-free survival (DFS) was evaluated separately in AA and CA. In CA, high ZEB1 expression was associated with poor DFS (p= 0.015) whereas ZEB1 expression in AA was not found to be a significant predictor of DFS, suggesting that expression of ZEB1 may represent a marker for CRC prognosis, particularly in CA. High nuclear TFF3 expression in AA was found to be associated with poor DFS with marginal significance (p=0.089). The cytoplasmic and nuclear expression of HURP, MUC2, and CFTR among the AA and CA did not significantly correlate with DFS. Here, two stemness molecules, ZEB1 and TFF3, have potential as markers for aggressive CRC. ZEB1 can predict the prognosis of CRC in CA, and TFF3 will be a prognostic marker for AA who are usually known to have worse CRC outcomes.

P6.02

DRY NEEDLING AND NECK PAIN CONTROL: A SYSTEMATIC REVIEW

Felix Adah,, Z Weber, C Borland, H Davis, Hutchins D, and Maier J
University of Mississippi Medical Center, Jackson, MS, USA

Patients presenting pain is commonly seen in physical therapy clinic and they attract varying therapeutic interventions. There are conflicting reports in the literature that DN of myofascial trigger points (MTrPs) or trigger points (TrPs) is efficacious in reducing spinal pain and pain of musculoskeletal origins. The mechanism by which DN mediates pain modulation is not fully elucidated. Therefore, the purpose of this systematic review is to evaluate the effect of DN treatment in patients with neck pain and speculate the mode of actions in pain reduction. Methods**:** The PubMed database was accessed through January 27, 2016 using dry needling for patients with neck or back pain. Inclusion criteria included spine and/or neck regions, pain measurements, and local needling. Exclusion criteria included injections as primary interventions. Study quality was evaluated using PEDro criteria. The PEDro is a 10-point scale for assessing internal validity (higher scores indicating higher quality). Results**:** The described search strategy identified seven studies meeting all requirements. The mean PEDro score of the studies was 6.57 with a range of 5 to 8. The CEBM frequency included three level II studies and four level III studies. Conclusion**:** The study demonstrated that DN treatment resulted in significant pain reduction and decreased sensitivity of pain in six of seven studies with the non-significant study also trending towards pain reduction. Six studies that measured ROM for an outcome measure demonstrated increased ROM of the cervical region after DN.

P6.03

IMPLEMENTATION AND DEVELOPMENT OF AN EVIDENCE-BASED COMMUNITY HEALTH WORKER PROGRAM TO REDUCE RURAL HEALTH DISPARITIES

Hayes, S. C. and Hawkins, J.
J. Owens Health and Wellness Center, Tougaloo, MS, USA

Introduction**:** The changing landscape of the U. S. population, coupled with other challenges, necessitate the need to support and more effectively reach underserved communities. Tougaloo College has developed a core competency community health worker training program to increase capacity to deliver health care in rural settings. Methods**:** The core curriculum is composed of a minimum of 160 hours of instruction and training and at least 20 clock hours in eight core competencies: 1) Communication skills; 2) Interpersonal skills; 3) Service Coordination skills; 4) Capacity-building skills; 5) Advocacy skills; 6) Teaching skills; 7) Organizational skills; 8) Specific health issues. Results**:** From July 2014-August 2016, 159 CHWs were trained for various agencies across several health and social service domains/settings. The following challenges were identified: Competition for training among agencies conducting CHW training and their lack of willingness to share resources, train other training instructors, and work collaboratively to build capacity to address health disparities.

- Perception among other allied health professions that CHWs will take "their" jobs.
- Time investments needed to educate the community about the role of CHWs.
- Legislation has been introduced to defeat bills aimed at banning CHWs from MS workforce.
- Lack of living wage jobs for CHW workforce.

Public Health Implementations: The use of community health workers can assist in reducing rural health disparities by complementing services delivered through a more formal health care network.

P6.04

CARDIOMYOCYTES CAN BE USED TO STUDY THE SAFETY OF ANTIDIABETICS AND ANTIDEPRESSANTS

Shana Nelson[1], Michelle Tucci[1], Joseph Cameron[2], Hamed Benghuzzi[1]
[1]University of MS Medical Center, Jackson, MS, USA, [2]Jackson State University, Jackson, MS, USA

Selective serotonin reuptake inhibitors (SSRIs) are antidepressants used for the treatment of mood and anxiety disorders and are associated with an increased risk for diabetes. The objective of our study was to compare the cellular effects of selective serotonin reuptake inhibitors in combination with Metformin on cardiomyocytes. Cardiomyocytes were grown in a tissue culture environment containing high glucose and challenged with therapeutic concentrations of SSRIs alone or in combination with this antidiabetic drug. Over time in culture there were significant changes in intracellular glutathione concentration. In addition, cytological changes such as disruption of the myotubules were evident after combination treatments in the high glucose media. Hydropic swelling was evident which indicates ER stress response. Analysis of the nuclear area and cytoplasmic changes are sensitive enough to use a cell-based model for determination of adverse effects associated with co-administration of drugs.

P6.05

HUMAN GENOME EDITING AND POPULATION ETHICAL CONCERNS

D. Olga McDaniel
University of Mississippi Medical Center, Jackson, MS, USA

Genome editing of human cells may no longer be the researcher's imagination. It has proven to provide a useful tool which may help to repair a mutation that otherwise could cause a deadly disease. Such corrective revisions to the mutation carrying cells would last the life time of the cells and the progeny. Such editing of a mutation would provide curative treatment for patients. It is more likely that it may take several years before gene editing can be developed into human therapeutics, however, investigators have experienced some preliminary positive outcomes with diseases such as sickle cell anemia, HIV, cystic fibrosis which involves a single mutation, single gene and single cell type. This presentation reviews the mechanisms of different genome editing strategies and the progress that have been made in cell therapy. Clearly there are great concerns regarding the ethical and safety measures involving use of genome editing at the level of germline and human embryos. Most common concerns are about the current technology that could have unpredictable outcomes on the future of the human population health. There is a general consensus and thoughts that "Scientist should agree not to modify the DNA of human reproductive cells in which the consequences of genetic modification to an embryo may be impossible to know before the birth". In summary, a public

awareness is necessary making in clear distinction between genome editing technology to not diminish the significance of the clinical approaches to possible cure of disease.

10:00 – 12:00 Invited Keynote Speakers

Moderators: D. Olga McDaniel, PhD., and Denise Krause, PhD. University of Mississippi Medical Center

Daniel Jones, MD. Department of Physiology & Biophysics and Medicine, UMMC
"OBESITY AND CHRONIC DISEASES"

Carol Connell, PhD. Department of Nutrition & Food Systems, USM
"FOOD INSECURITY AND POPULATION HEALTH IMPACT"

Therese Hanna, MHS. Executive Director, Center for Mississippi Health Policy, Jackson MS

"HEALTH POLICY AND IMPACT ON POPULATION HEALTH"

Joshua Mann, MD. Chair, Department of Preventive Medicine, UMMC

"MISSION, STRUCTURE, AND DIRECTION OF THE J.D. BOWER SCHOOL OF POPULATION HEALTH AT THE UNIVERSITY OF MISSISSIPPI MEDICAL CENTER"

Thursday, February 23, 2017
AFTERNOON
Room TC Ballroom II/III

1:05 – 3:00 pm Population Health Symposium II

Invited Speakers

Moderators: Jana Bagwell, MLS (ASCP)CM MB, and Larry McDaniel, PhD University of Mississippi Medical Center

"UPDATES ON MOSQUITO-BORNE DISEASES IN MISSISSIPPI AND ELSEWHERE"

Paul Byers, MD. State Epidemiologist, Mississippi State Department of Health

"MOSQUITO ECOLOGY AND CONTROL"
Jerome Goddard, PhD. Medical & Veterinary Entomologist, Departments of Biochemistry & Molecular Biology, Entomology & Plant Pathology, MSU

"IMPACT OF PESTICIDES USE IN AGRICULTURE, ENVIRONMENT AND HEALTH"
Nacer Bellaloui, PhD. Crop Genetics Research Unit, USDA-ARDS

Thursday, February 23, 2017

EVENING

Ballroom II/III

3:30 Dodgen Lecture and Awards Ceromony

General Poster Session

Immediately Following Dodgen Lecture

P6.06

LONG-LASTING BRAIN IMPAIRMENTS IN ADULT RATS FOLLOWING INTRAUTERINE GROWTH RESTRICTION

Emily C. Turbeville[1], Norma Ojeda[1], Jonathan W. Lee[1], Silu Lu[1], Colin B. Muncie[2], Tembra K. Jones[3], Donisha D. Lard[4], Yi Pang[1], Abhay J. Bhatt[1], Renate D. Savich[1], and Lir-Wan Fan[1]

[1]Department of Pediatrics, Division of Newborn Medicine, University of Mississippi Medical Center, Jackson, MS, USA, [2]Department of Pediatrics, Division of Surgery, University of Mississippi Medical Center, Jackson, MS, USA, [3]Howard Hughes Medical Institute Scholars Program, Tougaloo College, Tougaloo, MS, USA, [4]Base Pair Program, University of Mississippi Medical Center/ Murrah High School, Jackson, MS, USA

Epidemiological and experimental studies suggest that intrauterine growth restriction (IUGR) can cause neurodevelopmental impairments. Our previous studies demonstrated that IUGR alters brain size and behavioral performances in both neonatal and juvenile rats. To further examine whether IUGR has persisting effects in adult rats, brain impairments were determined in 6-month-old rats following reduced uterine perfusion (RUP) during late gestation (E14~E22). Our results show that offspring from dams exposed to RUP showed significantly lower birth weight compared to offspring from control dams. IUGR resulted in motor deficits in the open field test of 6-month-old rats. IUGR-induced brain size alteration, as indicated by the reduction of total brain, cortical, and hippocampal volume, along with the dilation of ventricles, persisted in 6-month-old rats. IUGR also caused the impairments of dendrites (MAP2+) and myelin (RIP+). In addition, IUGR induced brain inflammation, as indicated by increases in microglia and astrocytes in the rat brain. The current study suggests that IUGR causes long-lasting behavioral disturbances and persistent brain impairments, which may be associated with brain inflammation. This model may be useful for studying mechanisms involved in the development of IUGR brain impairments and for developing future potential therapeutic strategies.

P6.07

CELECOXIB AMELIORATES NEONATAL LIPOPOLYSACCHARIDE-INDUCED LONG-LASTING DOPAMINERGIC NEURONAL INJURY IN ADULT RATS

Jonathan W. Lee[1], Silu Lu[1], Lu-Tai Tien[2], Asuka M. Kaizaki[3], Yi Pang[1], James P. Shaffery[4], Norma Ojeda[1], Abhay J. Bhatt[1], Renate D. Savich[1], and Lir-Wan Fan[1]

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Our previous study showed that neonatal lipopolysaccharide (LPS) exposure resulted in chronic neuroinflammation and persistent injury to the dopaminergic system of the postnatal day 70 (P70) rat brain. Cyclooxygenase-2 (COX-2) is induced in inflammatory cells in response to cytokines and pro-inflammatory molecules, suggesting that COX-2 plays a role in the inflammatory processes. The objective of the current study was to determine the protective effect of celecoxib, a selective COX-2 inhibitor, in LPS-induced dopaminergic neuronal injury and neurological dysfunction of rats later in life. Intraperitoneal (i.p.) injection of LPS (2 mg/kg) or saline was administered to P5 Sprague-Dawley male rat pups, followed by i.p. injections of either celecoxib (20 mg/kg) or vehicle 5 min after LPS or saline injection. Neurobehavioral tests were carried out from P7 to P70 and brain injury was examined on P70. Our results showed that neonatal administration of celecoxib

provided protection against LPS-induced motor behavioral impairments in the later life of rats. Celecoxib treatment also significantly attenuated LPS-induced injury to the dopaminergic system through its association with the reduction of activated microglia in the substantia nigra of P70 rat brain. Our data show that celecoxib provided long-lasting neuroprotection against systemic LPS exposure, suggesting a critical involvement of COX-2 in LPS-induced chronic neuroinflammation and brain injury.

P6.08

STRESS ENHANCED MOTIVATION FOR INGESTIBLE REWARDS AND ITS MECHANISM IN SATIATED RATS

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Overeating beyond individuals' energy homeostatic needs leads to obesity. Exposure to stressful life events is proposed to be a contributing factor for overeating. However, the neurobehavioral mechanisms of excessive food intake under stress are not fully understood. The present study examined effects of stress challenge on motivation for procuring ingestible rewards. Male Sprague-Dawley rats with free access to standard laboratory chow and water in their home cages were trained to press a lever under a progressive-ratio schedule for deliveries of either high-fat food pellets or sweetened water. These rats, even though satiated, emitted substantial levels of responses, indicating their motivation for earning these rewards. A pharmacological stressor yohimbine administered 30 min prior to the test sessions significantly increased lever responses, indicating an enhanced motivation for procuring these rewards. In subsequent tests, administration (20 min prior to yohimbine) of a corticotropin-releasing factor receptor (CRF_1) antagonist NBI but not a glucocorticoid receptor antagonist mifepristone effectively bloacked the behavior motivational effect of yohimbine challenge. These findings demonstrate that the stress-enhanced motivation is directed to not only the caloric value but also the palatability of rewards, suggesting that "comfort eating" of the tasty and high-caloric fast foods in resoponse to stressful life events may lead to overeating. The findings that antagonism of CRF_1 but not glucocorticoid receptors prevented the yohimbine-enhanced motivation for these rewards suggest a role of the extrahypothalamic CRF system in overeating behavior under stress. These results would shed a light on our understanding of the behavioral and biological mechanisms of overeating/obesity.

P6.09

ACTIVITY OF PLANT-DERIVED ANTIMICROBIAL COMPOUNDS AGAINST ANTIBIOTIC RESISTANT PATHOGENS

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Each year in the United States over 2 million people become ill, and 23,000 people die as a result of infections caused by antibiotic-resistant pathogens. These infections are a major health concern because bacteria constantly evolve new mechanisms to resist antibiotics, thus making the number of effective drugs rapidly decline. Hence, there is a need for novel therapeutic measures against antibiotic-resistant bacteria. Plant-derived antimicrobial compounds have emerged as a promising alternative to medical antibiotics but detailed knowledge about their mode of action against antibiotic-resistant pathogens is lacking. In this study, we screened plant-derived antimicrobials vanillin, carvacrol, and thymol, as well as butyl paraben, chlorobenzaldehyde, and methoxybenzaldehyde for the ability to antagonize different strains of Staphylococcus, Burkholderia, Escherichia, Mycobacterium, and Pseudomonas. We used an overlay assay to determine the activity of individual compounds and broth microdilution method to define their Minimal Inhibitory Concentration (MIC). Our results revealed that each compound inhibited at least six pathogens, and the MIC assay showed that carvacrol and vanillin were the most active compounds, as they inhibited 100% of all tested pathogens at low concentrations. We are currently working on determining the synergistic effect of different compounds to increase their efficacy. We also plan to incorporate the most active compounds into polymer nano-particles to improve their stability and sustained delivery.

P6.10

INVESTIGATING THE ASSOCIATION BETWEEN SEXUAL EDUCATION SEXUAL BEHAVIOR AMONG COLLEGE STUDENTS IN MISSISSIPPI

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More than 9,500 Mississippians are living with HIV, while young people age 13-19 make up 18% of this population. Mississippi is also number two in the nation for chlamydia and gonorrhoea. Sexual education is needed in order to inform teens of the risks of contracting HIV and STDs. The aim of this study was to determine if there was a significant correlation between college students who attended a sexual education course in high school and their current sexual behavior, knowledge and awareness. Secondary data was collected from the CDC's website and primary data was collected from quantitative surveys disseminated to college students in central Mississippi. Results show a narrow association between lack of sexual education and risky sexual behavior. Findings showed that 58% of students did not have any sexual education. Approximately 60% of students stated they engaged in sexual intercourse before the end of their senior year. Among those 44% admitted to not using a condom the last time they had sexual intercourse. Sexual education is important for teens to understand their reproductive health. By participating in a sexual education class, students will have the confidence to make responsible decisions when engaging in sexual intercourse. With an increase in sexual education, we could start to see a decrease in HIV and STD rates among college students. It is also important for students not only to be taught about abstinence but also incorporate birth control and reproductive health into their curriculum.

P6.11

ASSOCIATIONS BETWEEN MASCULINE PERCEPTION AND SEXUALITY WITH RISKY SEXUAL BEHAVIORS AMONG AAMSM

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African-American men who have sex with men (BMSM) have been the main group of people most affected by HIV since the 1990s. BMSM often deal with the struggles and adversity, identifying both as black and gay bring. As a result, the way people perceive this community tend to shape and influence certain sexual behaviors, which put these individuals at risk for HIV transmission. For this project, we focus on identifying if perception and masculinity have an effect on sexual behaviors. This cross-sectional analysis included data from HIV infected and uninfected BMSM enrolled in The MARI Study. Participants completed surveys via audio computer-assisted self-interview technology and underwent rapid HIV testing, if applicable, to confirm HIV serostatus. We analyzed the data using descriptive statistics and t-tests to determine any associations. We saw that there significant correlations between: openness with parents & siblings about sexual orientation and condom usage with main partners, as well as alcohol usage before or during sex. This coincides with the CDC making the statement that negative attitudes towards BMSM, and those who can't cope with it, are three time more likely to engage in risky sex. We see that

people's perception of both masculinity and homesxuality, does have an influence on sexual behavior. Public health departments, should work on developing spaces: that counsel BMSM on developing techniques on disclosing their sexuality (especially to families and loved ones), as well as continue to educate BMSM about the risks of condomless anal sex.

P6.12

THE IMPORTANCE OF THE LANGUAGE ACCESS PLAN

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The purpose of my project is to develop and finalize a Language Access Plan for the Mississippi State Department of Health (MSDH). English is the predominant language in U.S., but there are millions of residents who are not fluent in English and often struggle when interacting with others. Title VI of the Civil Rights Act of 1964 prohibited discrimination among recipients of federal funds based on race, gender, etc., and Executive Order 13166 expanded on this to include persons with limited English proficiency (LEP) by providing interpreters and translated educational and informational materials. Individuals categorized as LEP may show limited ability in reading, speaking, writing, and understanding English. These individuals will be accommodated for by the Language Access Plan, since it will be designed to provide interpreting service access to LEP patients. Therefore, the goal of the Language Access Plan is to ensure that the MSDH is effectively communicating with LEP individuals by providing proper resources, and this will help reduce the language barrier between the patient and the provider. Before placing the plan into action an assessment will be developed to help the MSDH determine the current status of access to LEP patient services. As a result of the plan and the assessment, patients with LEP will be informed about the interpreting services provided by the MSDH, and the employees of the MSDH will be trained on how to assist patients with LEP.

P6.13

DOES THE SOUTH GIVE AFRICAN AMERICAN MSM A HIGHER RISK FOR CONTRACTING HIV/AIDS?

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According to the Duke Center for Health Policy and Inequalities Research, the South (Texas, Georgia, Mississippi and Louisiana) have been leading the nation with the most cases of HIV/AIDS for the past ten years (Reif). Eight of the ten states with the highest rates of new HIV infections were located in the South. By group, African American MSM have the highest percentage of HIV/AIDS cases. In 2010, among black MSM reported an estimated 72% (10,600), new infections and 36% (29,800) new HIV infection. In black women an estimated 29% (6,100) new HIV infection (CDC, 2014). The purpose of our research is to find out if the South gives African American MSM a higher risk of contracting HIV/AIDS. There are many methods available within the United States to prevent this life threatening dilemma particularly the treatment for HIV/AIDS. However, all of those methods have not been applied to its full extinct in the Southern region of the United States. Reviewing the literature of scientifically and statistically conducted reports, we have observed that the South, in fact, has not provided the African American MSM the proper care when it comes to HIV/AIDS. The funding for various programs including sex education classes which educates African American MSM population, protecting themselves against the disease, has been minimized or cut in southern region of the United States. We concluded that many steps must be taken in the future in order to decrease the number of African American MSM who are at risk for contracting HIV/AIDS.

P6.14

CHILDHOOD SEXUAL ABUSE AMONG BLACK MEN WHO HAVE SEX WITH MEN

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Scant research has documented a link between childhood sexual abuse and indicators of quality of life among Black MSM. The purpose of the present study was to investigate the prevalence of childhood sexual abuse and examine the cross-sectional associations between CSA and indicators of quality of life (namely history of homelessness, history of incarceration, and subjective social status) among Black MSM in the Deep South. (2013-2014), 465 BMSM who reported engaging in anal and/or oral sex with another man in the past 6 months were recruited from two Southern U.S. metropolitan areas (Jackson, MS and Atlanta, GA). Participants completed an electronic survey containing questions regarding various socio-cultural factors. CSA was assessed by asking participants 10 questions about sexual experiences before the age of 18. Correlations were computed between CSA, subjective social status, history of incarceration, and history of homeliness. Study analyses included complete data from 372 participants with a mean age of 30.4 years. The majority of participants self-identified as gay/homosexual (54.4%). The majority of participants reported at least one form of CSA. Results revealed that CSA was associated with history of homelessness and history of incarceration, but not subjective social status. Our findings suggest that CSA is associated with quality of life among Black MSM. In studies examining CSA among women, CSA has been shown to be associated with negative affect, poor decision making, impulsivity, and physical health problems. Research examining the associations of CSA among BMSM is warranted. In addition, structural interventions are needed to address this major societal problem.

P6.15

ASSOCIATIONS BETWEEN CHILDHOOD SEXUAL ABUSE, DEPRESSION AND SOCIAL SUPPORT AMONG BLACK MSM

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Early life childhood sexual abuse (CSA) has been linked to being a stressor during adolescent and post-adolescent life. CSA has been associated with psychological and physiological effects. CSA has been shown to be linked to depression, the host immunological deprivation, and high risk for infectious diseases including HIV. However, there has been no link found between CSA, depression and social support in Black MSM (BMSM). This study was conducted to investigate if there is any association between CSA, depression and social support in BMSM in the Jackson and Atlanta area. There were 356 BMSM participated for this study. These participants were from the Atlanta and Jackson area. The participants were surveyed with two scales; first, to determine their current depression state and second to investigate if they had experienced CSA. Both of these scales asked questions that ranged from very frequent, minimal or none at all. Of the 356 participants who took part in this study 67% of them identified as gay/ homosexual. In the Jackson area participants who were surveyed 52% have had experienced CSA. There was a significant difference (16%) in those participants who knew that they were diagnosed with HIV and they have had experienced CSA as compared with those who did not experience CSA. In conclusion, in this study there was no significant difference in the status of social support in BMSM with CSA vs. those without CSA. Thus, it appears that the BMSM are directly affected by CSA in regards to depression rates and HIV infection.

P6.16

THE EFFECTIVENESS OF HIV/STI PREVENTION INTERVENTION(S) FOR AFRICAN-AMERICAN TEEN GIRLS

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We studied human Immunodeficiency Virus (HIV), primarily in African American women. African American women receive more AIDS diagnoses and experience more HIV-related deaths than any other racial or ethnic group in the U.S. In 2003, black teens (ages 13-19) compromised of 66% of AIDS cases, while white teens counted for 11% of AIDS cases. We used data from Sisters Informing, Healing, Living, and Empowring (SiHLE) to determine if the intervention is an effective method of reducing risky sexual behaviors among African-American teenage girls. Participants were given a Pre and Post assessment which asked questions concerning 1) risky sexual behaviors and 2) perceptions regarding condom usage. Descriptive statistics were conducted for analysis of the database. Our study show an increase in condom usage among teens between themselves and their partners. In addition, there was a decrease in the number of females who believed condom usage builds trust among them and their partners. In contrast, there was an increase among the women who believe that the notion of sex not feeling good with a condom. Thus, such interventions can be useful if an adequate resources and helpful methods are provided. By practicing the SiHLE information, participation of the teen girls will be increased drastically, and there will be an increase of the awareness among girls whom having safe sex. In conclusion, as long there is a ground for a common understanding between teens and their partners, safe sex can be useful in preventing the trend of unprotected sex and associated diseases.

P6.17

CONDOMOLOGY: CONDOMS USE AMONG HIV POSITIVE AND NON-HIV POSITIVE MSM MAIN AND CAUSAL PARTNERS

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The main source of HIV transmission is among men who have sex with men (MSM) in through unprotected anal intercourse (UAI). Condoms are a method that reduces the risk of transmitting HIV to partners. The aim of this study is to analyze the association between the usage of condoms during anal sex among HIV positive and Non-HIV MSM with main and casual partners. Descriptive and association testing were used to conduct this study, and participants were recruited from the MARI study. The Minority Aids Research Initiative (MARI) was developed to examine the sexual behavior and the prevalence of HIV/STI in AAMSM in the Southeastern US. Overall, the project is an ecological study that aims to gain a better understanding of the complex interaction between individual-level factors and environmental contexts, as well as their association with high-risk sexual behaviors among AAMSM. The research study is being conducted by MBK at two sites located in the Southeastern region of the US - Jackson, MS & Atlanta, GA. The results show that 52% of HIV positive men reported not always using condoms with a main partner over a one year period; 38% of HIV positive men reported not always using condoms with a casual partner over a one year period. These results suggest that there are factors that influence why MSM choose not to use condoms during intercourse such as they may not fit - too large or too small - they may be allergic, or simply do not like the way they feel.

P6.18

DEFINING THE BECOMING A HEALTHIER U PROGRAM AT OPEN ARMS HEALTHCARE CENTER

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The Jackson Metro area has some of the highest rates of sexually transmitted diseases in the state of Mississippi. The most prevalent diseases include syphilis, chlamydia, gonorrhea, and the Human Immunodeficiency Virus. At Open Arms Healthcare Center, programs have been implemented to reduce the prevalence of sexually transmitted diseases in the Metro area. Specifically, becoming a Healthier U program, which is a free program designed to provide patients with access to preventive health screenings as well as a variety of preventive mental and sexual health counseling. Some services included in the BHU are: health risk assessments, screening for STDS and high risk sexual behaviors etc. The BHU program is vital because it brings awareness to one's overall health. When most people think of being healthy the first thing that comes to mind is diet and exercise. In addition to diet and exercise which are the major components of the human health; the individual's healthy sexual conduct is as greatly important and serious protective actions needs to be take. In conclusion, with STD rates on such an alarming rise, the BHU program has been effective by providing diagnostic services and informing the patients regarding to their sexual health status and prevention measures in order to maintain an healthy life style and healthy atmosphere.

P6.19

HIV AND MENTAL HEALTH

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Research has shown that the human immunodeficiency virus (HIV) has become an endemic in the most southern region of the United States. An endemic by definition is a disease or condition regularly found among particular people or in a certain area. In the US, HIV is most commonly found among MSM, or men who sleep with men, in major southern metropolitan areas such as Jackson, MS, Miami, FL, and Atlanta, GA. Research across the country has confirmatively shown that a majority of people who are living with HIV/AIDS (PLWA) are also living with at least one other sexually transmitted disease. Furthermore, many of the PLWA's struggling with other chronic diseases/conditions such as diabetes, hepatitis, obesity, alcohol and drug abuse. In addition, one of the most common and overlooked issues among the PLWA group is the status of their mental health status. Thus, the purpose of this investigation is to study how HIV affects the human mental health. The two main focuses are an HIV diagnosis for a person who was previously battling with mental health disorder and how actually the diagnosis may lead to a more thoughtless, reckless lifestyle, risky behaviors, and alcohol and/or drug abuse. In conclusion, evidence indicated that mental health status works in concert with human chronic and infectious diseases, when a person struggles with a cluster of diseases that may magnify their mental health status and disorder.

P6.20

THE PREVALENCE OF OBESITY IN THE DELTA

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Obesity has been a persistent issue that has been steadily impacting America over the last couple of decades. Specifically,

Mississippi currently has a higher prevalence of obesity than the rest of the country, with an adult obesity rate of 35.5%, making it the third most obese state in the nation. The age group that has the highest percent of obesity, 41.5%, are people that range from 26-44 years old and African Americans suffer from the largest obesity prevalence, 43.0%. In addition, Mississippi has the highest childhood obesity rate in the nation, with the children ranging from ages 10-17. Obesity can also lead to other chronic illnesses such as diabetes, hypertension, heart disease, arthritis, and sometimes even cancer. To aim at a more specific area in Mississippi, the Delta has the highest rate of obesity throughout the entire state. This study aims to describe the prevalence of obesity throughout the state of Mississippi and its respective regions as well as identify the factors that may contribute to obesity and its co-related morbidities, such as the food environment index, the amount of physical activity, access to exercise opportunities, and the number of primary care physicians.

P6.21

SOCIOCULTURAL FACTORS ASSOCIATED WITH HIV TESTING FEAR AND ANXIETY AMONG AAMSM IN JACKSON, MS

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According to the CDC, nearly 1.2 million Americans are living with HIV. However, one in eight of them don't know it. Young people are significantly affected with youth ages 13 to 24 accounting for one in five HIV diagnoses in 2014 of which 80% of those were gay and bisexual males. In Jackson, MS, 4 out of 10 gay and bisexual males are reported as living with HIV- the highest incident rate of its kind in the nation. Although CDC recommends that everyone between the ages of 13 and 64 get tested at least once in their lives, data suggests that due to HIV testing accessibility hindered by lack of adequate transportation, low-to-no access to evidence-based reproductive health or HIV/AIDS knowledge in schools, and clinical hours that do not support student schedules, many youth do not receive HIV or STI tests. The aim of this study is to determine the socialcultural factors associated with HIV testing fear and anxiety among AAMSM in the Jackson, MS metropolitan statistical area which includes Hinds, Rankin, Madison, Copiah and Simpson Counties. At the conclusion of this study, it was determined that core barriers to testing may be less about fear and anxiety and more about the lack of perceived necessity to test and testing service access. Although fear and anxiety play parts in a person decision to receive an HIV test, inadequate transportation and insufficient knowledge regarding HIV/AIDS may be a more prominent basis for testing barriers in the Jackson, MS MSA.

P6.22

INEQUITY AND HEALTH DISPARITIES: INEVITABLE CORRELATION DUE TO CAUSES

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Health disparities are the inequalities that occur in the provision of health care and access to healthcare across different racial, ethnic and socio-economic groups. Access to quality healthcare, does not always equate good health outcomes. However, socioeconomic status, geographic location and cultural barriers, both presently and in the past, all contribute to an individual's ability to achieve good health. Data was pulled from the 2013 Community Health Needs Assessment sponsored by MBK. to examine the correlation between inequalities and health disparities in three regions within the state. Descriptive statistics were run from the variables related to health inequalities and secondary data analysis was also used to better understand health inequalities in Mississippi. The data pulled from the 2013 Community Health Needs Assessment shows that the Coastal region of Mississippi is the least healthiest region followed by the Central region and lastly the Mississippi Delta. This study helps to prove that socioeconomic status, cultural barriers and geographic location all contribute to an individual's health. In 2008, approximately 33%, of people surveyed identified themselves as belonging to a racial or ethnic minority population. Also in 2008, approximately 12% or 36 million people not living in nursing homes or residential care facilities had disability. The goal is to ultimately reduce various health disparities throughout the country and improve the health of all socioeconomic groups. To do this, one has to focus primarily on the various health disparities at risk to various minorities and socioeconomic groups and health care services available to them.

P6.23

CANCER: THE EFFECTS OF HIV AND ANTIRETROVIRAL THERAPY

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People with HIV have a significantly higher risk of getting certain types of cancer compared to uninfected individuals. Some of these types of cancers would be known as "AIDS-defining malignancies": Kaposi Sarcoma and non-Hodgkin Lymphoma. People who are infected with HIV have an increased risk of these cancers due to their immune system being weakened and having an inability to fight off the toxicities that lead to cancer. Antiretroviral therapy is the mixture of antiretroviral medicines that help slow down the rate in which HIV duplicates itself in the body. The combination of three antiretroviral medicines is more efficient than using only one medicine to treat HIV. With antiretroviral therapy and one of these therapies called HARRT it has decreased sarcoma and non-Hodgkin's lymphoma among infected individuals because it lowers the amount of HIV circulating in the bloodstream allowing the immune system to restore. The risk of specific side effects varies from drug to drug, from drug class to drug class, and from patient to patient. In this study I also look at the interactions of AID malignancies on different populations such as long term survivors not on antiretroviral therapy and individuals who are on types of antiretroviral therapies and how these effects portray different outcomes. Overall antiretroviral drugs lower the risk of Kaposi sarcoma and non-Hodgkin lymphoma and increases overall survival.

P6.24

RELATIONSHIP BETWEEN LIFESTYLE BEHAVIORS AND STD RATES AMONG YOUNG ADULTS IN MISSISSIPPI

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The Center for Disease Control and Prevention estimates that there are approximately 20 Million new STD infections each year- almost half of them among young people ages 15- 24. Because many cases of STDs go undiagnosed the reported cases of Chlamydia, gonorrhoea, and syphilis represent only a fraction of the true burden of STDs in the United States. Compared with older adults, sexually active adolescents aged 15-19 years old and young adults aged 20-24 are at a higher risk for acquiring STDs for a combination of behavioral, biological, and cultural reasons. In Mississippi, 2013, it was reported about 12,930 Chlamydia cases and 3,337 cases of gonorrhoea. Data from Healthy People 2020 suggest that several factors contribute to the spread of STDs. We hypothesize that social, economic, and behavior factors that affect the spread of STDs include racial/ ethnic disparities, poverty, access to health care, and substance abuse. The aim of this study is to determine the lifestyle behaviors among young adults as it relates to the STD rates in the state of Mississippi. At the conclusion of this study, it was determined that the leading cause of sexual transmitted diseases

maybe less of nonchalant attitudes and more of life style behaviors. Unprotected sex, engaging with multiple partners, use of drugs and alcohol, and trading sex for money can all increase the STD rates among the young adults in Mississippi. Promoting healthy sexual behaviors, strengthening community capacity, and increasing access to quality services can prevent STDs and their complications.

P6.25

IL1-RA REDUCES LIPOPOLYSACCHARIDE-INDUCED BRAIN INJURY AND IMPROVES NEUROBEHAVIORAL PERFORMANCE IN NEONATAL RATS

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Inflammation plays an important role in brain injury in neonatal human and animal models. Our previous study indicated that neonatal lipopolysaccharide (LPS) exposure resulted in brain inflammation, as indicated by sustained activation of microglia and elevation of interleukin-1beta levels in the brain. The objective of our current study was to examine whether the IL-1 receptor antagonist (IL-1ra) reduces systemic LPS-induced brain inflammation, brain damage, and neurological dysfunction. Intraperitoneal (i.p.) injection of LPS (2 mg/kg) was performed in P5 Sprague-Dawley rat pups and IL-1ra (100 mg/kg) or vehicle was administered (i.p.) 5 min after LPS injection. The control rats were injected (i.p.) with sterile saline. Neurobehavioral tests were performed and brain injury was examined on P6. Our results showed that IL-1ra protected against LPS-induced neurobehavioral impairments, including reduction of mean latency times in wire hanging maneuver and hind-limb suspension. IL-1ra treatment also provided protection against LPS-induced brain damage, which is indicated by the loss of oligodendrocytes. IL-1ra also significantly attenuated LPS-induced increment in the number of activated microglia and concentration of IL-1beta in the neonatal rat brain and serum. In summary, our data suggests that due to its potent anti-inflammatory property, IL-1ra may protect the developing brain against systemic LPS exposure-induced brain injury and neurobehavioral disturbances.

P6.26

SELECTIVE INVOLVEMENT OF a5GABA$_A$ RECEPTORS IN THE REINFORCING EFFECTS OF ALCOHOL

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Approximately 7-8% of the population is diagnosed with an alcohol use disorder (AUD). Pharmacotherapies for AUD currently exist, but these treatments are not uniformly effective. Previous studies have shown $GABA_A$ receptors expressing the a5 subunit (i.e., $\alpha5GABA_A$ receptors) to be involved in alcohol's behavioral effects. For example, agonists selective for these receptors enhance the relapse-inducing effects of alcohol; whereas inverse agonists targeting these receptors decrease relapse-like drinking in rats. It is not clear, though, whether these receptors are involved in active alcohol self-administration in rats. Our study examined the extent to which drugs selective for this receptor modulate self-administration of alcohol solution. For comparison, we also evaluated the effects of the same drugs on self-administration of a sucrose-only solution. Two groups of adult male Sprague Dawley rats were trained to self-administer solutions in operant chambers under a fixed-ratio schedule using a standard sucrose fading procedure such that every 2 lever presses (FR2) resulted in delivery of 0.1 ml of solution and flashing of stimulus lights. $a5GABA_A$-selective drugs were administered for 5 days per dose. We found that the inverse agonists L-655-708 and RY-023 dose-dependently reduced alcohol, but not sucrose self-administration. These drugs were as effective as the FDA-approved pharmacotherapy naltrexone. In contrast, the agonist QH-ii-066 increased alcohol self-administration without altering sucrose self-administration. These results implicate $\alpha5GABA_A$ receptors as key selective modulators of the reinforcing effects of alcohol and further suggest that they may serve as a potential novel molecular target for the treatment of AUDs. Support: AA016179.

P6.27

EXPOSURE OF PREPARED SILVER-NANOPARTICLES TO A549 CELLS IN CULTURE

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The field of nanotechnology has grown rapidly over the past years, and silver nanoparticles (AgNPs) have garnered significant interest in potential physical and clinical applications. With the use of AgNPs in many clinical conditions, potential toxicity remains a concern. Hypersensitivity reactions have been reported in a small proportion of burn patients who received ionic silver treatment, and a limited number of cell culture studies have also shown some evidence of nanoparticles being harmful, appearing to be inversely related to particle size. The goal of this study was to determine how the concentrations of AgNPs affects the A549 cell line's functions and morphology over time. Silver nanoparticles were prepared and ranged in size from 1-10 nm. The AgNPs were diluted to a stock concentration of 0.1 mg/mL in culture media. A549 cells were grown in 24-well plates and on coverslips and treated with three concentrations of AgNPs for 24, 48, and 72 hours. The cells were harvested at each time point, and cell numbers, protein, nitric oxide, and glutathione concentrations were determined. Cells grown on coverslips were stained and evaluated for morphological changes. All results were compared with cells in media alone. The results show no differences in cellular protein concentrations for the duration of the study. Overall, the AgNPs were endocytosed and highly aggregated inside vesicular structures with increased changes in both cellular nitric oxide and hydropic swelling within the first 24 hours. However, additional time points show a cellular recovery and lack of cytotoxicity at the concentrations tested.

P6.28

CONCUSSIVE TBI PRODUCES BLOOD BRAIN BARRIER AND PERINEURONAL NET DEFICITS IN RATS

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Concussive traumatic brain injury (cTBI) can produce long-term deficits that result in life-long impairments in cognitive functions. Most human TBIs consist of mild, closed head,frontal impacts in which the brain undergoes both lateral and rotational acceleration; conditions that are represented in a novel rat model of TBI ("Maryland model", Kilbourne et al. 2009). Here, we further characterize this model by investigating the effects of a single concussion on aspects of normal brain integrity; the blood brain barrier (BBB), key regulator of the blood-born access of materials into the CNS, and perineuronalnets (PNNs), extracellular matrix molecules that shape the development of synapses and regulate the plasticity of neural pathways. Adult male Sprague Dawley rats were anesthetized and received a frontal, closed-head cTBI. Controls received no cTBI. Brains were collected 1, 7 and 28 days post injury. cTBI-induced BBB breakdown was measured by quantitative assessment of the influx of albumin, a serum protein normally excluded by the BBB within rostro-caudal sections of brain. Integrity

of the PNN was assessed by measuring binding/distribution of wisteria floribunda lectin in brain sections. Preliminary analysis suggests cTBI increases the amount of albumin labeling at 24 hours, but not 7 days post injury. Similarly, cTBI also produced a decrease in cortical PNN distribution at 1, but not 7 days. Together these data show that this model of cTBI is associated with BBB permeability and reduced PNN integrity. The Maryland model represents a novel tool with which to better understand the pathophysiology of concussive TBI.

P6.29

THE TQ EFFECT ON THE INDUCTION OF A POTENTIAL ANTIOXIDANT SCAVENGER

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Thymoquinone (TQ) is an antioxidant that has possible anti-cancer effects. Studies have shown that TQ can exhibit inhibitory effects on the cell proliferation of many cancer cell lines. These results indicate that TQ inhibits tumor angiogenesis, tumor growth, and could be used as a potential drug candidate for cancer therapy. Cancer cells are constantly exposed to oxidative stress which can be detected by glutathione levels. The glutathione assay measures glutathione peroxidase which protects the organism from oxidative damage. This study investigates the glutathione levels after the conventional and sustained delivery of TQ to the ovarian cell line Caov-3. One-hundred thousand cells were plated according to standard lab protocols and subdivided into 2 groups of 6 wells each. Group 1 served as control and group 2 was treated with TQ (16 μM). Glutathione biomarker evaluations were performed following standard lab techniques. The results of the study revealed: (1) for conventional delivery, glutathione levels were not statistically different ($p<0.05$) following the administration of TQ at all time periods and (2) for sustained delivery, glutathione levels were statistically different ($p<0.05$) following the administration of TQ at 72 hours. Overall conclusion: TQ only affected glutathione levels when administered by a sustained delivery system.

P6.30

DISSEMENTATION OF *EHRLICHIA CHAFFEENSIS* USING AN ARTIFICIAL FEEDING SYSTEM

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Background: *Amblyomma americanum* ticks are competent vector of *Ehrlichia chaff*eensis, the causative agent of Human Monocyte Ehrlichiosis. In tick-transmitted infections, the pathogens induce the gene expression of their host to ensure survival, replication, and transmission into the vertebrate host. In this study, an artificial membrane feeding system was used to generate *E. chaffeensis* infected *A. americanum* ticks to assess the infection, and dissemination of *E. chaffeensis*. Methods: An artificial membrane feeding system was constructed of a silicone covered, reinforced membrane attached to an acrylic chamber. Adult and nymph ticks were fed on blood collected from an abattoir. *A. americanum* infected, via the "dipped" method, with *E. chaffeensis* were fed in the chambers, and blood was collected from each well during the infection transmission study. RNA isolated from male and female tissues was subjected to qRT-PCR for verification of the presence of *E. chaffeensis.* Results: The gene expression from the artificial membrane feeding system is compared by weight and by feeding intervals to *in vivo* fed ticks. The expression for both approaches is similar with few significant changes (11% of the samples tested). PCR of collected tick exposed blood showed the transmission of *E. chaffeensis* within the first 48 hours of feeding in an artificial membrane feeding system. Conclusion: This study shows that the *E. chaffeensis* infected *A. americanum* ticks can be generated to investigate the life cycle of this pathogen in the tick vector and assess the pathogen induced "sialome switch" as demonstrated with metalloproteases.

P6.31

THE INCIDENCE OF PREECLAMPSIA IN PREGNANT WOMEN WITH HUMAN IMMUNODEFICIENCY VIRUS

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PreE is a disease of pregnancy which is characterized by new onset of hypertension and proteinuria at 20 weeks of gestation or greater. Women with PreE have increased levels of CD4+ immune cells however; HIV is characterized in part by a decrease in CD4+ immune cells. The objective of the current study was to evaluate the incidence of PreE in women with HIV. Under an IRB approved protocol at the University of Mississippi Medical Center (UMMC) retrospective data was abstracted from medical records from women with a diagnosis code equivalent to HIV in pregnancy (January 2009 – December 2014). Maternal demographics, HIV viral loads, CD4 counts, ante/intra/post-partum history and neonatal birthweight and outcome were recorded. A total of 109 charts of women have been reviewed however 65 were excluded due to not delivering at UMMC. Four women developed PE but had nonsignificant increase in CD4 counts (542+155.9) compared to HIV women without PreE (442.2+51.37; $p=0.556$). HIV with PreE had been diagnosed earlier than HIV women who did not develop PreE ($p=0.04$). Women with HIV+PreE were more at risk for developing chorioamniotis ($p<0.0001$) and were also more likely to have low birth weight babies ($p<0.0001$) or intrauterine fetal death ($p<0.0001$) compared to women with just HIV. Despite the small sample size these data suggest that the length of HIV diagnosis and increased CD4 count may contribute the development of PreE. Future directions include increasing the sample size to allow us to make more definitive conclusions.

P6.32

FRACTURE TOUGHNESS AND UNBIASED FRACTAL DIMENSIONAL INCREMENT IN FRACTURE SURFACES

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The purpose of this study was to determine the regression model relating fracture toughness (K_{IC}) to the fractal dimensional increment (D*) of the fracture surface calculated using a new and unbiased technique and a standard reference material (Si_3N_4). Additionally, our accuracy in using the surface crack in flexure (SCF) method to calculate the K_{IC} of Si_3N_4 was tested. The fracture toughness (K_{IC}) of rectangular beams of NIST standardized Si_3N_4 (n=10) was evaluated by the SCF method according to the ASTM C1421 with a Knoop indentation load of 49 N. Fracture surfaces were analyzed using fractography and fractal analysis. The critical flaw sizes were measured using a scanning electron microscope. Epoxy replicas of the mirror region of the fracture surfaces were prepared and scanned using the atomic force microscopy as follows: 5 μm x 5 μm scanning area with 512 lines at a rate of 0.592 Hz. The height data from the surfaces were imported into a custom MathCAD script, and FRACTALS software was used to determine D* by the Minkowski cover technique. The calculated K_{IC} value for Si_3N_4 (4.62±0.14) was similar to the value found in the Standard Reference literature (4.57±0.12) for the same material (Student's t-test, $p=0.57$). Fracture toughness was linearly correlated to square-root of D*. A regression equation was found ($K_{IC} = 12.86 \cdot D^{*½}$).The calculated K_{IC} for Si_3N_4 agrees closely with the standard reference value, and the regression model relating K_{IC} and D* was determined. Supported by NIH Grant 1R01 DE024333

P6.33

FINITE ELEMENT ANALYSIS OF A THREE-UNIT FIXED DENTAL PROSTHESIS

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Objectives**:** To create three-dimensional numerical models of a multilayered three-unit all-ceramic fixed dental prosthesis (FDP) and to investigate the effects of various combinations of veneer and framework materials on the stress distribution in the prosthesis using finite element analysis (FEA) method. Methods**:** 3D models were created in Mimics based on Micro-CT images. The following materials from the IPS e.max system (Ivoclar Vivadent) were defined using elastic constants found in the literature: Ceram, CAD, and ZirCAD. Three different framework/veneer material combinations were simulated as follows: (1) CAD/Ceram; (2) ZirCAD/Ceram; (3) ZirCAD/CAD. The ZirCAD/CAD model was created with a fusion glass-ceramic layer between veneer and framework to simulate the e.max CAD-on technique. Models were then exported into FEA software (ABAQUS) for stress analysis. Results**:** All models had stress concentrations on the occlusal surface surrounding the loading area and at the gingival embrasure of connector in the veneer layer. The ZirCAD/Ceram model had the lowest stress value at the gingival embrasure area of connector in the veneer layer among three models. The CAD/Ceram model had the lowest maximum stress in the framework at the gingival embrasures of the connectors. The ZirCAD/CAD model had the lowest maximum stress in the luting agent layer at the cervical margin area of the premolar abutment. Conclusions**:** Stress distributions were significantly influenced by different combinations of veneer and framework materials for a three-unit FDP. All three all-ceramic systems were resistant to fracture at the given physiological occlusal loading level. Acknowledgement**:** Supported by NIH grant 1R01 DE024333.

P6.34

LIGAND BIAS IN OPRM1 RECEPTORS

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Opioids are commonly used as analgesics, but they are highly addictive. Mu opioid receptors, a subgroup of G-protein coupled receptors (GPCRs), bind natural peptides, including beta-endorphin, and opiate drugs, including morphine and fentanyl, with high affinity. Ligand binding to GPCRs triggers downstream signaling pathways and these pathways can be differentially activated by diverse ligands, a phenomena called ligand biased signaling. However, ligand biased signaling is still under study. These understandings may contribute to improving the analgesic efficacy and reduction of side effects including abuse liability. The main goal of this study is to delineate the effects of Mu opioid agonists across secondary signaling pathways. We have stably transfected the human origin mu receptor into a Chinese hamster ovary (CHO) cell line. We then tested the downstream signaling using GPCR 10 pathway Reporter Arrays (QIAGEN). In these arrays, a firefly luciferase reporter downstream of a transcriptional response element for each pathway of interest is introduced into the cell line along with renilla luciferase gene acting as a transfection/transduction control. Each array were divided into four groups: CHO-saline, CHO-ligand, CHO:OPRM1-saline and CHO:OPRM1-ligand. Four different ligands (DAMGO, beta-endorphin, morphine and fentanyl) at different high concentrations (from 0.1umol to 100umol) were tested. Firefly and renilla intensity was measured, and the ratio was used to compare differences among groups. Complete dose response curves can then be generated to compare EC50 and bias across signaling pathways.

P6.35

MORAL PSYCHOLOGY AND SELF-CONFLICT IN US OBESITY POLICY

Anna Schwartz and Patrick Hopkins
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Since their conception, government food assistance programs like SNAP have successfully reduced the food deprivation that once defined their beneficiaries. In the last few decades, however, new health problems have arisen that assistance programs fail to address and, in fact, are unable to address because of incompatible values and goals within the managing governmental organizations themselves. This poster will delineate four important problems--snap refuses to define healthy or unhealthy foods yet promotes healthy eating, refuses to define measurable health outcome goals, refuses to support health-promoting restrictions on food purchases, and has shifted from conceptualizing those who receive food assistance as recipients to customers and clients. All of this is largely due to a fear of stigmatizing the poor and obese. There is such a strong desire to avoid anything resembling moral judgment that it is unclear if SNAP is addressing health, or obesity, at all.

P6.36

EOTAXIN IN RESPONSE TO DIETARY FISH OIL IN A549 CELL CULTURE

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The A549 human adenocarcinoma cell line is theorized to produce chemokines in response to inflammatory cytokines. Eotaxin, a CC chemokine, may play a role in recruitment and activation of eosinophils to the site of inflammation in obstructive lung diseases such as asthma. The objective of this study was to evaluate the influence of omega-3 fatty acid on A549 cells after exposure to a proinflammatory cytokine interleukin 1β (IL-1β) in culture. The aim of this *in vitro* study is to assess the levels of eotaxin (CCL11), when combined with menhaden fish oil, a rich source of omega-3 fatty acid. To establish an environment of an inflammatory response, confluent A549 cells were stimulated with IL1-β in concentration variation ranging from (10.0, 1.0, 0.1, 0.0 ng/mL) in a 96-well plate. The cells were treated independently and allowed to incubate for 24 and 48 hours. To monitor overall cellular health, cell viability was assessed by reduction of alamarBlue®, cellular membrane integrity by lactate dehydrogenase (LDH), and oxidative stress was measured by glutathione level. Eotaxin levels were determined by immunoassay. ANOVA was utilized for statistical analysis with a post hoc Tukey's test when appropriate. The results from this study indicate that eotaxin levels are not significantly influenced by dietary fish oil in cellular model as hypothesized. In contrast, fish oil delivery at standard recommended dosage did have an increased influence on eotaxin levels and not a reduction, but the increase was not shown to be statistically significant ($p>0.05$).

P6.37

THE EFFECTS OF ACUTE AND CHRONIC FLUOXETINE ADMINISTRATION ON ADULT RAT TESTES

Gerri A. Wilson, Michelle A. Tucci and Hamed A. Benghuzzi
University of Mississippi Medical Center, Jackson, MS, USA

The effects of acute and chronic ingestion of the SSRI fluoxetine on testicular cells were investigated in Sprague Dawley adult male rats. The animals were exposed to either 10 or 20 mg/kg fluoxetine administered via cookie dough for two or 16 weeks. Fluoxetine administration of either dose did not result in changes in body weight over time. The wet weights of the reproductive organs were normalized to body weight and then compared to their respective controls. Differences between the groups were apparent as early as two weeks in the epididymis of the high dose groups when compared with the low dose group and control. The epididymal weights in the high group were larger than control and statistically greater than low dose treatment. By 16 weeks there were no differences in the normalized epididymal weights between the groups. Normalized testicular weights were statistically higher in the high dose group

after four months when compared to both the low and control animals. Histomorphometric analysis of the testicular cell population showed decreases in the number of both primary and secondary spermatocytes and spermatid for both doses when compared to control at two and 16 weeks. Overall, long-term ingestion of either dose for 16 weeks causes a significant decrease in spermatogenesis in seminiferous tubules of the testes, which can impact fertility. Assessment of the reproductive hormones testosterone, FSH, and LH are being investigated to determine the role of the SSRI on the hypothalamic-pituitary-gonadal axis.

P6.38

DIFFERENTIAL CELLULAR GLYCOLYSIS: SURVIVAL OF LUNG FIBROBLAST AND LUNG CARCINOMA CELL LINES

Ibrahim Farah

Jackson State University, Jackson, MS,USA

The role of energetic modulations and use of glycolytic inhibitors on cancer/normal cell survival is not clearly established in the literature. The purpose of this study was to evaluate six potential glycolytic modulators namely, Pyruvic acid, oxalic acid, Zn acetate, sodium citrate, fructose diphosphate (FDP) and sodium bicarbonate at µM concentrations on growing A549 (lung cancer) and MRC-5 cell lines. Exposed and non-exposed cells were tested with phase-contrast micro-scanning, survival/death and metabolic activity trends through MTT-assays, as well as death end-point determinations by testing re-growth on complete media and T4 cellometer counts. Results showed that oxalic acid and Zn acetate both influenced the pH of the medium and resulted in differential massive cell debris within the exposure period. Pyruvic acid, sodium citrate, sodium bicarbonate and FDP did not cause pH changes; however, they caused detectable cell disfigurement and loss of metabolic activity, viability and survival/ death end points with the resultant death of the A549 cell line. The MRC-5 cell line was differentially unaffected by exposure to pyruvic acid, sodium citrate, sodium bicarbonate, FDP and Zn acetate, underwent complete recovery and remained both attached and healthy for 6 weeks upon subculture when transferred to a new complete medium. Oxalic acid did not show differential modulation with the consequent loss of survival and death of the MRC-5 cell line. Phase contrast, metabolic activity, cell counts as well as death end-point findings confirmed our hypothesis. These studies show the potential possibly for exploiting cellular metabolic differences in cancer control.

P6.39

POSTNATAL LIPOPOLYSACCHARIDE LEADS TO EXCESSIVE NEUROGENESIS AND IMPAIRED COMMUNICATIVE FUNCTIONS IN RATS

Yi Pang, Xuemei Dai, Anna Roller, Kathleen Carter, Ian Paul, Abhay Bhatt, Rick Lin, and Lir-Wan Fan

University of Mississippi Medical Center, Jackson, MS, USA

Perinatal infection is a well-identified risk factor for a number of neurodevelopmental disorders with neurobehavioral impairments, including the white matter injury (WMI) and Autism Spectrum Disorders (ASD). The underlying mechanisms by which early life inflammatory events cause aberrant neural, cytoarchitectural, and network organization, reflecting neurobehavioral dysfunction, remain elusive. This study is aimed to investigate how systemic lipopolysaccharide (LPS)-induced neuroinflammation affects microglia phenotypes and early neural developmental events in rats. We show here that LPS exposure at early postnatal age leads to a robust microglia activation which is characterized with mixed microglial proinflammatory (M1) and anti-inflammatory (M2)-like phenotypes. More specifically, we found that microglial M1 markers iNOS and MHC-II were induced at relatively low levels in a regionally restrict manner, whereas M2 markers CD206 and TGFβ were upregulated in a sub-set of activated microglia in multiple white and gray matter structures. This M2-biased microglia polarization was associated with a markedly decrease in natural occurring apoptosis, but increase in cell proliferation in the subventricular zone (SVZ) and the dentate gyrus (DG) of hippocampus. LPS exposure also leads to a significant increase in oligodendrocyte lineage population without causing discernible hypermyelination. Moreover, LPS-exposed rats exhibited significant impairment in communicative and cognitive functions. These findings suggest a possible role of a M2-like microglial activation in abnormal neural development underlying ASD-like behavioral impairments in the current animal model.

P6.40

EXOSOMAL MICRORNAS FROM STRESSED STEM CELLS REGULATE GENE EXPRESSION IN METASTATIC BREAST CANCER CELLS.

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Background: Exosomes (30-120nm in diameter), are membrane vesicles, constituted of a double membrane of phospholipids that contain miRNA, mRNA, proteins and lipids. It has been shown that exosomes secreted by cells affect a recipient cell by modifying protein translation, thus, inducing a cascade of signaling events. Previous studies in our lab characterized the exosomes cargo from serum deprived human mesenchymal stem cells (SD-HMSCs), and their role in tumor supportive properties. Our goal of this study was to investigate the role of exosome transferred miRNA in gene regulation of metastatic breast cancer cells. Methods: We isolated the total RNA from the tumors that were developed in mice from MDA-MB-231 cells with or without exosome treatment. Expression levels were determined by quantitative-PCR. Protein levels were determined by Western blotting. Results: Real-time PCR showed the differential expression of miRNAs 205 and 31. Furthermore, over expression of miRNAs 205 and 31 showed down regulation of ubiquitin-conjugating enzyme-13 (Ubc13), a metastatic protein in Western blotting. Conclusion: these findings suggest that exosomes transfer miRNAs from human mesenchymal stems cells (HMSCs) may inhibit breast cancer from metastasis, as well as may provide a role for miRNAs 205 or miRNA 31 in the pathogenesis of human cancer. Further studies to identify the responsible factors are required.

P6.41

THE EFFECTS OF LPS ON A549 CELL FUNCTION AND VIABILITY

Esther Iyanobor, Dominque Thompson, Kayla Rice, Victoria Williams, Gerri Wilson, Austin Puckett, Michelle Tucci, and Hamed Benghuzzi

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The cell line A549 is a continuously cultured line derived from a human pulmonary adenocarcinoma that has morphologic and biochemical features of the pulmonary alveolar type II cell. The type II cells secrete surfactants and modulate lung immunity. The goal of the experiment was to challenge A549 type II cells with low (2 ng/mL), medium (5 ng/mL), or high (10 ng/mL) LPS and to determine the effects on cell function and survival over 24, 48, and 72 hours. Cell protein and cell numbers were decreased at 48 and 72 hours in the medium and high LPS treated groups when compared to non-treated control cells. No noticeable differences were observed in the glutathione or nitric oxide measurements after 24 hours, but there was an increase in nitric oxide following the challenge with LPS after 48 hours. Cellular morphology showed evidence of hydropic swelling after 24 hours and was still evident after 72 hours in LPS treated cells. The cells did not show increased evidence of karyohexis and karyolysis after 48 and 72 hours. After 72 hours there

was an increase in the number of anucleated cells in the medium and high dose LPS treatments when compared to control.

P6.42

BIOSENSING AND THERAPY OF LNCAP PROSTATE CANCER CELLS USING GRAPHENE OXIDE NANOMATERIAL

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Prostate Cancer is the most common malignancy among US men and the second leading cause of cancer fatalities. Mississippi has one of the highest incidence rate and mortality rate for Prostate Cancer. Currently available treatments are mostly ineffective in advanced stage cancers and cause drastic side effects. As a result, new approaches to treat cancers that do not rely on traditional therapeutic regimes, is essential for public health. Recently, nanomaterials of different sizes and shapes with optical properties tunable in the near-infrared (NIR) region have been exploited for the targeted sensing and hyperthermal or photodynamic destruction of cancer cells, potentially used as drugs in photothermal nanotherapy. Furthermore, novel hybrid graphene oxide have been used for biosensing, detailed imaging and therapy of cancer cells. We synthesize Graphene oxide from graphene sheet and synthesize popcorn shaped gold nanoparticle embedded graphene oxide. We functionalize hybrid graphene oxide and attach nanomaterial modified graphene oxide to LNCaP prostate cancer cells for detection and imaging of graphene oxide attached prostate cancer cells. We perform photothermal therapy on the graphene oxide attached prostate cancer cells. The results show the successful attachment of modified graphene oxide to the cancer cells and destruction of prostate cancer cells with photothermaltherapy. 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

Friday, February 24, 2017
MORNING
RoomTC 226

Oral Presentation I: Microbiology and Genomics

Moderator: Dr. Larry McDaniel, PhD

University of Mississippi Medical Center

O6.07

8:00 OLIGOPEPTIDE BINDING PROTEINS ALIC AND ALID INTENSIFY VIRULENCE OF NONENCAPSULATED *STREPTOCOCCUS PNEUMONIAE*

Jessica Bradshaw[1], Haley Pipkins[1], Lance Keller[2], James Pendarvis[3], Larry McDaniel[1]
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Nonencapsulated *Streptococcus pneumoniae* (NESp) is an emerging human pathogen that colonizes the nasopharynx and is associated with noninvasive disease such as otitis media (OM), conjunctivitis, and nonbacteremic pneumonia. Surprisingly, surveillance of invasive pneumococcal isolates has linked NESp expressing oligopeptide binding proteins AliC and AliD with invasive disease. Our study investigates the impact of AliC and AliD on virulence of emerging NESp. Isogenic *aliC* and *aliD* deletion mutants were constructed in NESp strains MNZ41 and MNZ85. In vitro assays examining biofilm formation and pneumolysin protein expression were performed. Pneumococcal colonization was assessed in a mouse model, and virulence during a chinchilla OM infection was also investigated. Pneumococcal survival in whole blood and deposition of complement factor C3b on the pneumococcal surface was also measured. Lastly, the proteomes of double mutant and wild-type NESp were analyzed by mass spectrometry. In deletion mutants, biofilm formation increased, but pneumolysin protein expression significantly decreased. A deletion of *aliC* and *aliD* decreased colonization of the murine nasopharynx, abrogated OM in the chinchilla, reduced pneumococcal survival in whole blood, and increased the deposition of C3b on the pneumococcal surface. Proteome analysis revealed a pneumococcal surface protein C (PspC) variant and stress response proteins are downregulated in the double mutant relative to wild-type levels. This study reveals that NESp expressing AliC and AliD have intensified virulence compared to isogenic mutants, and AliC and AliD are essential for mucosal colonization and infection. Also, the substrates of AliC and AliD alter protein expression and are critical for NESp metabolism.

O6.08

8:15 ACTIVITY OF PLANT-DERIVED ANTIMICROBIAL COMPOUNDS AGAINST ANTIBIOTIC RESISTANT PATHOGENS

Dana Jones, Yetunde Adewunmi, Dahlia Amato, Doug Amato, Olga Mavrodi and Dimitri Mavrodi
University of Southern Mississippi, Hattiesburg, MS, USA

Each year in the United States over 2 million people become ill, and 23,000 people die as a result of infections caused by antibiotic-resistant pathogens. These infections are a major health concern because bacteria constantly evolve new mechanisms to resist antibiotics, thus making the number of effective drugs rapidly decline. Hence, there is a need for novel therapeutic measures against antibiotic-resistant bacteria. Plant-derived antimicrobial compounds have emerged as a promising alternative to medical antibiotics but detailed knowledge about their mode of action against antibiotic-resistant pathogens is lacking. In this study, we screened plant-derived antimicrobials vanillin, carvacrol, and thymol, as well as butyl paraben, chlorobenzaldehyde, and methoxybenzaldehyde for the ability to antagonize different strains of Staphylococcus, Burkholderia, Escherichia, Mycobacterium, and Pseudomonas. We used an overlay assay to determine the activity of individual compounds and broth microdilution method to define their Minimal Inhibitory Concentration (MIC). Our results revealed that each compound inhibited at least six pathogens, and the MIC assay showed that carvacrol and vanillin were the most active compounds, as they inhibited 100% of all tested pathogens at low concentrations. We are currently working on determining the synergistic effect of different compounds to increase their efficacy. We also plan to incorporate the most active compounds into polymer nano-particles to improve their stability and sustained delivery.

O6.09

8:30 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]University of Southern Mississippi, Hattiesburg, USA, [2]Tougaloo College, Tougaloo, USA, [3]Mississippi State University, Starkville, MS, 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 each fatty acid, cultures were grown to midlog in the presence of varying concentrations of the fatty acid stearic acid or palmitic acid aerobically and then exposed to 5% bile. Preliminary results suggested that under aerobic conditions, both fatty acids conferred "protection" to all three strains of *L. monocytogenes*.

O6.10

8:45 NEW INHIBITORS FOR TARGETING HIV-1 INTEGRASE

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

The treatment of AIDS patients with highly effective anti-retroviral therapies has transformed the prognosis of an HIV-1 infection from a once deadly illness to a chronic manageable disease. However, the rapid development of HIV-1 resistance to almost all currently used antiviral agents is a major clinical problem. In the absence of an effective vaccine there is an urgent need to continually improve available drugs and develop new strategies against unexploited viral targets. The HIV-1 Integrase (IN) is a viral enzyme that is essential for the replication of HIV-1. Our recent studies have highlighted the vulnerability of IN to a new class of inhibitors (the ALLINIs) capable of triggering aberrant IN multimerization during the virus life cycle. We have demonstrated that these compounds are able to disable viral infectivity by interfering with normal HIV-1 particle maturation. This effect results in the production of crippled virions that are no longer infectious. While the pharmaceutical industry has shown great interest in these molecules, how they function is not fully understood. Our research aims to better understand the molecular and mechanistic mode of action of these ALLINIs by examining how these compounds are able to bind to their target and modulate both protein-protein and protein-nucleic acid interactions within HIV-1 virions. Our studies combine several methodologies such as protein biochemistry, medicinal chemistry and virology. Our ultimate goal is to design and propose new therapeutic strategies able to block HIV-1 viral replication.

O6.11

9:00 THE EFFECTS OF ANTIOXIDANTS ON HUMAN LYMPHOBLASTOID CELLS EXPOSED TO SIMULATED MICROGRAVITY AND RADIATION

Abednego Nii Adom Commey[1], Timera Brown[1], Alexandria Thompson[1], Bidisha Sengupta[1], Laura E. Blackmon[2], Chunli Claus Yang[2], Jinghe Mao[1]
[1]Tougaloo College, Jackson, Mississippi, USA, [2]University of Mississippi Medical Center, Jackson, Mississippi, USA

Space discoveries are essential for the advancement of life on Earth. However, the health of these brave astronauts is in immediate danger. In space, astronauts are at risk due to two major factors: weightlessness and space radiation. Prior research conducted in our laboratory indicates that the space environment decreases cell survivability in human lymphoblastoid TK6 cells due to oxidative stress. Lymphoblastoids are immature cells, and they further differentiate to form lymphocytes such as T cells and B cells which are instrumental in attacking invaders and foreign particles. Hence, the reduction of lymphoblastoid cells in astronauts will lead to compromised immune function. This study aims to investigate whether simulated microgravity increases radiation-induced apoptosis in human lymphoblastoid TK6 cells. Additionally, it aims to investigate the effect of antioxidant treatment on the synergistic effect of simulated microgravity and radiation on human lymphoblastoid TK6 cells. The methods employed in this study are as follows: 1) TK6 cells are exposed to X-ray irradiation at 1Gy or 2Gy dosage; 2) cells are allowed to grow under simulated microgravity using a HARV vessel; and 3) apoptosis is determined by flow cytometry analysis. We confirmed that the synergistic effect of simulated microgravity and radiation decreased cell survival and induced apoptosis in TK6 cells. In our study, we also discovered that induced apoptosis could potentially be reversed by the antioxidants morin and N-acetyl cysteine (NAC). In conclusion, the antioxidants morin and NAC, particularly morin, could be considered potential candidates for maintaining astronauts' and space travelers' health. Acknowledgements: This work was supported by grants from the Howard Hughes Medical Institute (HHMI) Scholarship Program at Tougaloo College, UGRAD 52007562, and Mississippi EPSCOR: Research Infrastructure Development Program Grant #: NNX13AB31AANASA

O6.12

9:15 PSPK INCREASES VIRULENCE OF ENCAPSULATED *STREPTOCOCCUS PNEUMONIAE*

Haley Pipkins[1], Jessica Bradshaw[1], Lance Keller[2], Larry McDaniel[1]
[1]University of Mississippi Medical Center, Jackson, MS, USA,
[2]University of Groningen, Groningen, The Netherlands

Most *Streptococcus pneumoniae* infections are associated with encapsulated pneumococci, making the capsule the target of licensed vaccines. Selective pressure is causing increased distribution of non-vaccine serotypes, including nonencapsulated *S. pneumoniae* (NESp). As NESp become more prevalent, encapsulated strains could acquire NESp virulence genes, thus generating novel strains and potentially increasing pneumococcal disease. Therefore, the purpose of our study was to assess expression of the NESp virulence factor pneumococcal surface protein K (PspK) in encapsulated pneumococci. Encapsulated strain EF3030 was transformed with pABG5::*pspk*, to produce LEK14. The EF3030 Δ*cpsA* mutant LEK12 was also transformed with pABG5::*pspk* to generate LEK15. Adhesion and invasion of human pharyngeal or lung epithelial cells were examined. A mouse model of nasopharyngeal colonization and pneumonia, as well as a chinchilla model of otitis media were used. PspK expression increased adhesion and invasion of lung cells but not pharyngeal cells. PspK expression increased murine colonization by LEK15 but did not alter murine colonization by EF3030. PspK expression increased EF3030 persistence in murine lungs. During coinfections, LEK14 outcompeted EF3030 in both the lungs and nasopharynx. Higher CFU were recovered from chinchillas infected with LEK14 in comparison to EF3030. We conclude PspK expression does not increase EF3030 colonization, but PspK does in part compensate for loss of colonization in the absence of capsule. PspK also increases persistence of encapsulated pneumococci in the lungs and the middle ear. Additionally, PspK gives a selective advantage in a competitive environment. Therefore, NESp virulence factor PspK may have a condition-dependent impact on pneumococcal virulence.

Friday, February 24, 2017
MORNING
RoomTC 227

Oral Presentation II: Immuno-regulation and Biomaterials

Moderator: Jana Bagwell, MLS(ASCP)^{cm}MB University of Mississippi Medical Center

O6.13

8:00 TNFalpha DIFFERENTIALLY REGULATES microRNA-181a AND NOTCH2 IN ALVEOLAR EPITHELIAL CELLS

Maricica Pacurari
Jackson State University, Jackson, MS, USA

PURPOSE: MicroRNAs (miR) are short strands of RNAs that regulate gene expression thus mediating pathogenesis of human diseases including inflammation-associated lung diseases. Using bioinformatics tools, we identified a potential miR-181a target, Notch2. Notch2 is a member of the evolutionary conserved Notch family receptors involved in determining cell fate and differentiation. HYPOTHESIS: In the present study, using alveolar epithelial A549 cells, we investigated whether TNFalpha regulates miR-181a and its potential target gene Notch2.

MATERIALS AND METHODS: Using A549, we analyzed the regulation of miR-181a and Notch2 by TNFalpha using qPCR, western blot, and immunohistochemistry. RESULTS: Low concentration of TNFalpha (1 ng) and short exposure time (6h) slightly decreased miR-181a (0.86- vs 1.0-fold change control). High concentration of TNFalpha (10 ng) and short exposure time increased miR-181a (1.86- vs 1.0-fold change control). After 24h, low concentration of TNFalpha inhibited miR-181a (0.27- vs 1.0-fold change) whereas high concentration of TNFalpha had no effect. TNFalpha significantly increased Notch2 mRNA. Western blot analysis showed a 30% increase in Notch2 protein level. Immunohistochemistry a showed a strong immunodetection of Notch 2 at cell periphery and intracellularly. After 24h, TNFalpha induced Notch2 immunodection in the nucleus. Ectopic treatment of cells with miR-181a mimic profoundly affected cell morphology including cell elongation and less cell-cell contact. CONCLUSION: These results suggest that TNFalpha temporally regulated miR-181a and increased Notch2 expression and cellular localization. Ectopic miR-181a affected alveolar epithelial cells morphology. These data salso uggest that TNFalpha independently regulates miR-181a and Notch2, both of which might differentially modulate inflammation-mediated lung diseases.

O6.14

8:15 IL1-RA REDUCES LIPOPOLYSACCHARIDE-INDUCED BRAIN INJURY AND IMPROVES NEUROBEHAVIORAL PERFORMANCE IN NEONATAL RATS

Tembra Jones[1], Donisha Lard[3], Emily Turbeville[2], Jonathan Lee[2], Silu Lu[2], Yi Pang[2], Abhay Bhatt[2], Renate Savich[2], Jinghe Mao[1], Lir-Wan Fan[2]

[1]Tougaloo College, Tougaloo, MS, USA, [2]Department of Pediatrics, Division of Newborn Medicine, University of Mississippi Medical Center, Jackson, MS, USA, [3]Base Pair Program, University of Mississippi Medical Center/ Murrah High School, Jackson, MS, USA

Inflammation plays an important role in brain injury in neonatal human and animal models. Our previous study indicated that neonatal lipopolysaccharide (LPS) exposure resulted in brain inflammation, as indicated by sustained activation of microglia and elevation of interleukin-1beta levels in the brain. The objective of our current study was to examine whether the IL-1 receptor antagonist (IL-1ra) reduces systemic LPS-induced brain inflammation, brain damage, and neurological dysfunction. Intraperitoneal (i.p.) injection of LPS (2 mg/kg) was performed in P5 Sprague-Dawley rat pups and IL-1ra (100 mg/kg) or vehicle was administered (i.p.) 5 min after LPS injection. The control rats were injected (i.p.) with sterile saline. Neurobehavioral tests were performed and brain injury was examined on P6. Our results showed that IL-1ra protected against LPS-induced neurobehavioral impairments, including reduction of mean latency times in wire hanging maneuver and hind-limb suspension. IL-1ra treatment also provided protection against LPS-induced brain damage, which is indicated by the loss of oligodendrocytes. IL-1ra also significantly attenuated LPS-induced increment in the number of activated microglia and concentration of IL-1beta in the neonatal rat brain and serum. In summary, our data suggests that due to its potent anti-inflammatory property, IL-1ra may protect the developing brain against systemic LPS exposure-induced brain injury and neurobehavioral disturbances.

O6.15

8:30 F RACTAL ANALYSIS OF CERAMIC FIXED DENTAL PROSTHESES - A NEW UNBIASED METHOD

Kartikeya S Jodha, Bo Key, Susana M Salazar Marocho, Yuanyuan Duan, John J Mecholsky Jr and Jason A Griggs

University of Mississippi Medical Center, Jackson, MS, USA

The fracture surfaces of ceramic prostheses can be characterized using fractal geometry to provide information about the material properties and the conditions present at the time of failure. This useful tool is not widely employed because the current methods of fractal analysis are labor intensive, technique sensitive, and statistically biased. We have developed an automated, unbiased method of precisely measuring the fractal dimensional increment (D*) of fracture surfaces. This proposal aims to validate this technique in (1) determination of the failure origin in multilayered structures and (2) determination of material fracture toughness; even when the failure origin has been lost or damaged. In addition, when the failure origin is visible on the fracture surface, the stress at failure can be estimated, which will be useful in diagnosing parafunction and/or the presence of an atypical residual stress. We tested the accuracy of this technique by comparing our results on two benchmark materials (silica glass and NIST standardized Si_3N_4) with the existing data from the literature. We will test the utility of fractal analysis by verifying our ability to detect which of three commercially available dental ceramics is the failure origin in bilayered specimens (glass-ceramic veneered with porcelain, zirconia veneered with porcelain, and zirconia veneered with glass-ceramic). The resulting protocol may also be applicable to ceramic components used in orthopedic surgery and the automotive, aerospace, and energy industries.

O6.16

8:45 MACROLIDES SUPPRESS LPS INDUCED INFLAMMATORY *IN VITRO* BRAIN INJURY MEDIATED BY MICROGLIA

Sumana Ramarao, Yi Pang, Kathleen Carter and Abhay Bhatt

University of Mississippi Medical Center, Jackson, MS, USA

Objective**:** There is a critical lack of knowledge in the prevention and treatment of inflammation induced brain injury in very low birth weight (VLBW) infants. Oligodendrocyte progenitor cell (OPC) is the major cellular target of brain damage in VLBW infants. Our previous studies have shown that Microglia mediate lipopolysaccharide (LPS)-induced damage to OPCs. Macrolides inhibit inflammatory response from systemic immune cells, whether they also inhibit inflammatory response from microglia is unknown. Our objective is to investigate whether Azithromycin inhibits inflammatory cytokines release and OPC death by LPS activated microglia. Methods**:** We used Microglia and OPCs of P1 rat brain. Microglia activated by LPS treatment. There were four groups- 1: Control; 2: LPS; 3: AZ only; 4: AZ + LPS. Performed ELISA to measure IL-1β and IL-6 in cell culture medium. Collected Microglia-conditioned medium (MDM) from all groups. OPC cultures divided into same four groups as above and treated similarly as microglia culture except the treatment with microglia-conditioned medium (MDM) with or without LPS and AZ exposure. Cell survival measured using XTT assay. Results**:** AZ suppressed IL-1β at 24 h and IL-6 at 24 and 48 h by LPS activated microglia (Two-way ANOVA, $P<0.05$, post hoc Holm-Sidak test, n= 4- 5). MDM following LPS treatment reduced the OPC survival as measured by XTT assay at 24 and 30 h compared to OPC survival following treatment with MDM from the control and AZ+LPS groups. Conclusion**:** Our findings suggest that AZ inhibits proinflammatory cytokines release and OPC death by LPS activated microglia.

O6.17

9:00 REDUCING THE TISSUE-IMPLANT RESPONSE USING AMINO ACID COATED UHMW-PE IN SOFT TISSUE

Kenneth Butler, Hamed Benghuzzi and Michelle Tucci
University of Mississippi Medical Center, Jackson, MS, USA

Polyethylene materials used in orthopedic applications are biocompatible and non-immunogenic with host tissues. The purpose of this investigation was to determine the relationship of fibrous tissue capsule components following implantation of ultra-high molecular weight polyethylene (UHMW-PE) rinsed with saline (control) or coated with arginine-glycine-aspartic acid (RGD) or arginine-glycine-glutamic acid (RGE) into the abdominal cavity of 12 adult male rats. Implants and surrounding tissue were harvested at 90 days post-implantation. The animals were euthanized, and the UHMW-PE implants and the fibrous tissue capsules surrounding them were harvested. Microscopic examination of routinely stained sections (5 microns, Hematoxylin & Eosin) of the fibrous tissue capsules revealed macrophage, fibrocytes, and vascularity counts were highest in the saline treated group. There was a scant number of neutrophils in the saline and RGD coated groups. There were statistically significant differences (ANOVA, $p < 0.05$) of all three experimental groups compared to control with respect to macrophages, fibrocytes, and vascularity. These findings indicate that coating UHMW-PE implants with RGD and RGE limits the tissue-implant response in soft tissue (peritoneal cavity) applications. These results provide further evidence that the intensity of the chronic inflammatory reaction to UHMW-PE can be manipulated to some extent by simple amino acid coatings that may enhance biocompatibility.

Friday, February 24, 2017
MORNING
RoomTC Ballroom I (A)

Oral Presentation III: Genome and Medicine

Moderator: Dr. George Moll, MD, PhD, FAAP, FACE University of Mississippi Medical Center

O6.18

8:00 HUMAN GENOME EDITING AND POPULATION ETHICAL CONCERNS

D. Olga McDaniel
University of Mississippi Medical Center, Jackson, MS, USA

Genome editing of human cells may no longer be the researcher's imagination. It has proven to provide a useful tool which may help to repair a mutation that otherwise could cause a deadly disease. Such corrective revisions to the mutation carrying cells would last the life time of the cells and the progeny. Such editing of a mutation would provide curative treatment for patients. It is more likely that it may take several years before gene editing can be developed into human therapeutics, however, investigators have experienced some preliminary positive outcomes with diseases such as sickle cell anemia, HIV, cystic fibrosis which involves a single mutation, single gene and single cell type. This presentation reviews the mechanisms of different genome editing strategies and the progress that have been made in cell therapy. Clearly there are great concerns regarding the ethical and safety measures involving use of genome editing at the level of germline and human embryos. Most common concerns are about the current technology that could have unpredictable outcomes on the future of the human population health. There is a general consensus and thoughts that "Scientist should agree not to modify the DNA of human reproductive cells in which the consequences of genetic modification to an embryo may be impossible to know before the birth". In summary, a public awareness is necessary making in clear distinction between genome editing technology to not diminish the significance of the clinical approaches to possible cure of disease.

O6.19

8:15 UNDERSTANDING THE BIOLOGY OF PUBERTY THROUGH STUDY OF HYPOGONADOTROPIC HYPOGONADISM

A. Kemal Topaloglu
University of Mississippi Medical Center, Jackson, MS, USA

Hypogonadotropic hypogonadism (HH) often manifests as pubertal delay in males and females with premature ovarian failure in females. A considerable proportion of cases of HH are due to genetic mutations that can lead to identification of puberty control signaling pathways. Clinical diagnosis of HH is often delayed until 14 years of age or older. Recognizing mutated genes and associated phenotypes for HH should improve our diagnostic capabilities and support for optimal puberty progression and adolescent self-esteem. Gonadotropin Releasing Hormone Receptor (GNRHR) and TACR3 (Tachykinin Receptor 3 encoding neurokinin B associated NKR3) would be the first genes to screen in a clinical setting for equivocal cases such as constitutional delay in puberty destined to progress normally though delayed in onset to mature adult height versus idiopathic HH requiring assessment for available age dependent therapy to achieve adult height. In Kallmann syndrome (KS), according to presence of accompanying clinical features, genetic screening may be prioritized: synkinesia (KAL1), dental agenesis (FGF8/FGFR1), bony anomalies (FGF8/FGFR1), and hearing loss (CHD7, SOX10) along with a growing list of KS associated genes (e.g., FEZF1). Discovery of KISS1/KISS1R and TAC3/TACR3 gene mutations in kisspeptin and neurokinin B signaling, respectively, has provided major advancements in our understanding of the biology of pubertal progression driven by the gonadotropin-releasing hormone pulse generator. Identification of causative mutations accounting for the HH phenotype is now more feasible with improved accessibility of whole exome sequencing. Such knowledge should provide deeper insight into the hypothalamic-pituitary-gonadal axis to assist attainment of individual optimal puberty progression.

O6.20

8:30 LEARNING BY EXAMPLE, NFL BMI AS GUIDELINES FOR PUBLIC HIGH SCHOOL FOOTBALL

Kenji Maeda and George Moll
University of Mississippi Medical Center, Jackson, MS, USA

Background**:** Obesity is a National Healthcare concern with nearly 30% of children meeting Body Mass Index (BMI) obesity criteria. A subset of interest is adolescent boys participating in Public High School (PHS) Football aspiring to play in the NFL. PHS participants lacking NFL physical training are at risk for injuries (about 12.2 fatalities per year among PHS and College players) including Exertional Heat Stroke (EHS) linked with obesity. We hypothesize football sets player BMI limits that can be used to identify PHS boys who should not participate but be directed to alternative weight control programs. Methods/Design: Vital statistics from PHS and NFL rosters were available for free public internet access. Individual BMI's were calculated for leanest State (LS), fattest State (FS), and NFL players with mean +/- SD compared overall and for identifiable football player positions (Quarterback (Q), Backfield (B), Lineman (L), excluding all kickers). Results/Findings: LS, FS, NFL BMI mean differences were significant ($p<0.01$) for Q or B vs L (LS 29.9 +/- 4.7 and FS 31.6 +/- 5.7). We noted no significant mean BMI differences for corresponding Q, B, L positions among LS, FS, NFL team players. Football injury literature revealed 42 High School EHS fatalities between 7/1990-6/2010 with non-fatal EHS events 11 times greater in football vs all other sports players combined. Highest EHS attack rates occurred with BMI greater than 30.

Conclusions: Our data and literature review support setting an individual BMI limit no greater than 30 for healthy physical approval to participate in PHS football.

O6.21

8:45 FACTORS ASSOCIATED WITH BREASTFEEDING IN HIGH RISK PREGNANCIES

Mobolaji Famuyide[1], Sannie Snell[3], Sarah Harris[2], Wison Helmit[2], John Green[2]
[1]University of Mississippi Medical Center, Jackson, MS, USA, [2]University of Mississippi, Oxford, MS, USA, [3]Right From the Start Program, Hernando, MS, USA

Many factors might influence a mother's decision to breastfeed, ranging from personal preferences to cultural climate, socioeconomic conditions, and access to resources. The importance of contextual and structural issues are likely to be the most pronounced for mothers facing high risk pregnancies and those with preterm deliveries and low birth-weight. We set out to develop a better understanding of contextual and structural issues impacting breastfeeding among families in the most vulnerable situations. 32 detailed face-to-face interviews were conducted with mothers who breastfed and those who did not at high risk newborn follow up and high risk obstetric clinics at the University of Mississippi Medical Center in Jackson, Mississippi. About 66% of pregnant mothers were willing or committed to breastfeeding, 50% had initiated any breastfeeding with their youngest child with a median duration of 12 weeks. Twelve of the mothers had a baby who had been in the Neonatal Intensive Care Unit (NICU) and were more likely to discontinue breastfeeding at discharge (75% of NICU mothers vs. 61% of non-NICU mothers). Myriad of stressors were reported as affecting pregnancy. Transportation problems and depression hindered NICU visitation. Majority of these mothers with a high risk pregnancy considered breastfeeding prior to delivery. NICU mothers were more likely to initiate breastfeeding, but for a shorter duration than non-NICU mothers. Transportation and depression were factors that negatively impacted NICU visitation and breastfeeding.

O6.22

9:00 COCAINE-INDUCED VASCULITIS

Leonard Addae
Morehouse School of medicine, Atlanta, GA, USA

Cocaine -Induced vasculitis is a syndrome characterized by necrotizing skin lesions associated with the use of levamisole-adulterated cocaine. Levamisole was first marketed as an anthelmintic agent and later used as cancer therapy. It was withdrawn from the US market due to its toxic side effects. Studies suggest approximately 70% of cocaine in the United States is now contaminated with levamisole. In this report, I will discuss the clinical presentation and hospital course of a patient with cocaine-induced vasculitis. This case discusses a 31- year old female with history of crack cocaine use who presented to the hospital with painful ulcerations on her extremities and bilateral auricles. She reported subjective fever and chills. Physical examination revealed multiple ulcerated and crusting lesions in her extremities and face. There was also violaceous crusting plaques on her bilateral ear auricles. No surrounding erythema, warmth or foul discharge. Urine drug screen was positive for cocaine. Laboratory work revealed microcytic anemia without leukopenia. Hepatitis panel, HIV and syphilis test negative.

Of note, patient has positive perinuclear anti-neutrophil cytoplasmic antibodies, double-stranded DNA antibodies, anti-histone and anti-nuclear antibodies. C3 complement normal; C4 complement low. Anti-smith and serum cryoglobulin test negative. Patient was assessed by dermatology however skin biopsy was deferred since her clinical presentation was consistent with levamisole- induced vasculitis. Patient was started on oral prednisone and mupirocin ointment with improvement of her lesions. She was counseled on cocaine cessation and provided with list of substance abuse treatment programs.

O6.24

9:15 INTERACTION OF HCMV pUL3 AND pUL30 WITH COILIN DURING INFECTION

Mohammad H. Hasan[1], Andrew K. Asante[3], Leslie E. Davis[1], Michael D. Hebert[2], Ritesh Tandon[1]

[1]Department of Microbiology and Immunology, and [2]Department of Biochemistry.

University of Mississippi Medical Center, Jackson, MS 39216, USA
[3]Alabama State University, Montgomery, AL, USA

Coilin is the marker protein for Cajal bodies, a host subnuclear domain that is involved in ribonucleoprotein biogenesis. In human cytomegalovirus (HCMV), there is evidence that several subnuclear structures are involved in viral-host interaction which may play a role in viral replication but the mechanisms are not clear yet. Thus, the goal of this study was to investigate such interactions. During this study, we have used glutathione S-transferase (GST)-pulldown assay to identify the interactions of coilin with HCMV proteins such as pUL3 and pUL30. We have generated stop frame-shift (nonsense) mutations in pUL30 using bacterial artificial chromosome (BAC)-based homologous recombination in Towne as well as TB40/E strains of HCMV to characterize these mutant phenotypes. A significant decrease in the number of Cajal bodies was observed in the human cytomegalovirus (HCMV) infected host cell nuclei compared to the mock-infected control in immunofluorescence assays. Also, coilin was partially displaced from the nucleus to the cytoplasm during infection. Furthermore, GST-coilin pulldown assays showed a direct interaction of coilin with HCMV proteins pUL3 and pUL30. The presence of indigenous RNA in this assay abolished pUL30 – coilin interaction but not the interaction of pUL3 – coilin. pUL3 is known to be dispensable for HCMV growth; however, pUL30 mutations result in severe growth defects. The functions of these two proteins during HCMV infection are unknown. For future studies, coilin-knockout mouse embryonic cells have been acquired to study the impact of coilin depletion on cytomegalovirus infection. In conclusion, a detailed understanding of this putative host-viral interaction may reveal how certain viral proteins directly manipulate the host cell processes for the benefit of virus replication.

Friday, February 24, 2017
MORNING
RoomTC 229

Oral Presentation IV: Molecular Modeling And Disease

Moderator: Dr. Raymond Grill, PhD

University of Mississippi Medical Center

O6.25

8:00 NOVEL MODEL OF HYPOXIC-ISCHEMIC BRAIN DAMAGE IN IUGR NEWBORN RATS

Radhika Narang, Kathleen Carter, Colin Muncie, Yi Pang, Lir-wan Fan, Yangzheng Feng, Norma Ojeda, Abhay Bhatt
University of Mississippi Medical Center, Jackson, MS, USA

There is a critical lack of knowledge of factors that might prevent adequate response to moderate hypothermia after HI brain injury. We aim to characterize a reproducible, rat model of neonatal HI with intrauterine growth restriction (IUGR) to evaluate IUGR as one such likely factor. Rodent model of IUGR induced by placental insufficiency in dams at 14 days of gestation was used. HI was induced at postnatal day (P) 10 by permanent right carotid artery ligation followed by 90 min of hypoxia. Both IUGR and HI increased caspase-3 activity in right cortex at 24h after room air and

hypoxic exposure respectively (P= <0.05, n= 3-5 pups). Prior IUGR augmented HI induced right cortex caspase-3 activity (p=<0.05, n=3-5). HI in control and IUGR groups decreased the success rate of the contralateral vibrissa-elicited forelimb test, increased the time to initiate movement during movement initiation test and increased the time to finish elevated beam walk test at P40 and P60 (p<.05, n=8-12). Prior IUGR augmented HI induced abnormality in vibrissa-elicited forelimb test at P40 but showed higher success rate when compared to HI only group at P60 (p<.05, n=8-12). Time to explore novel object did not vary significantly amongst the 4 groups. Mild to moderate HI in P10 rats showed evidence of early brain injury and abnormalities in motor and behavior outcomes at adolescent and adult ages. As previously reported, prior IUGR increased HI induced early brain injury. However, prior IUGR showed variable effects on HI induced long-term behavior and motor abnormalities.

O6.26

8:15 COMPLETE MOLECULAR MODELING OF THE ENDOCRINE-DISRUPTING ACTIVITY OF POLY-PERFLUROALKYL SUBSTANCES

Supratik Kar[1], Maria Sepúlveda[2], Kunal Roy[3], Jerzy Leszczynski[1]
[1]Interdisciplinary Center for Nanotoxicity, Department of Chemistry and Biochemistry, Jackson, MS, USA, [2]Department of Forestry and Natural Resources, Purdue University, West Lafayette, IN, USA, [3]Department of Pharmaceutical Technology, Jadavpur University, Kolkata, USA

Exposure to poly- and perfluoroalkyl substances (PFASs), an emerging class of endocrine disrupting halogenated pollutants, has been linked to thyroid toxicity in human populations across the globe. The PFASs can compete with thyroxine (T4) for binding to the human thyroid hormone transport protein transthyretin (TTR) which may lead to reduce thyroid hormone levels leading to endocrine disrupting activity. Distress about their environmental fate and endocrine-disrupting activity has initiated several research projects, but the amount of experimental data available for these pollutants is limited. In this background, twenty-four PFASs, together with 6 structurally similar natural fatty acids binding capacity in a radioligand-binding assay values were modeled with classification- and regression-based quantitative structure-toxicity relationship (QSTR) tools using simple molecular descriptors obtained from chemical structures of the compounds to identify the responsible structural features and fragments of these diverse class of PFASs. Additionally, docking study performed employing the crystal structure complex of TTR with bound 2,´6´-difluorobiphenyl-4-carboxylic acid (PDB: 2F7I) to constitute the receptor model for human TTR provided corroborating evidence for these binding interactions and indicated multiple high-affinity modes of binding. The developed in silico models therefore provide an understanding of important structural attributes of these chemicals and may provide important information for the design of chemicals for future synthesis of molecules as well as may serve as an efficient query tool for screening of large databases with diminished systemic toxicity profile.

O6.27

8:30 SILICA-COATING STRATEGIES ON Y-TZP: ROUGHNESS AND FRACTAL GEOMETRY

Susana Maria Salazar Marocho[1], Diego Santos Manarão[2], Paulo Francisco Cesar[2], Jason A. Griggs[1]
[1]University of Mississippi Medical Center, Jackson, USA, [2]University of Sao Paulo, Sao Paulo, Brazil

The aim of this study was to determine the surface roughness (Ra) and calculate the fractal dimensional increment (D*) of Y-TZP structures after different silica-coating (SC) strategies.

Y-TZP bar-shaped specimens were divided according to the SC strategy. The control group (a) did not receive any surface treatment. Groups b) to e) received SC with silica-modified alumina particles with different sizes either before or after final sintering, as follows (particle size/SC protocol): b) 30µm/before sintering, c) 110µm/before sintering, d) 30µm/after sintering, and e) 110µm/after sintering. Atomic force microscopy (AFM) was used to examine the surface roughness (Ra). The height data from the treated surfaces were imported into a custom MathCAD script, and FRACTALS software was used to determine D* by the Minkowski cover technique. Silica-coating before sintering always resulted in rougher surface compared to silica coating after sintering, and this difference was statistically significant for both 30 µm and 100 µm particles. Silica coating after sintering always resulted in greater D* compared to silica coating before sintering, but this difference was significant only when 30 µm particles were used. In addition, a relationship between surface roughness and fractal dimension was found. The highest roughness values were obtained when SC was performed before final sintering. Interestingly, only surfaces that were silica-coated with 30 µm particles after final sintering resulted in a higher tortuosity. Supported by FAPESP 2012/13727-3, CNPq 150296/2013-4, NIH Grant 1 R01 DE024333.

O6.28

8:45 LNCAP PROSTATE CANCER CELL DETECTION AND PHOTOTHERMAL THERAPY USING GOLD NANOMATERIAL SERS

Santanu Banerjee
Tougaloo College, Tougaloo, MS, USA

Prostate cancer is the most common malignancy among US men. The Southern states, including MS has one of the highest prevalence and fatality rates due to prostate cancer in the nation. Currently available treatments of radiation, surgery, and chemotherapy have severe side effects and are mostly ineffective in advanced stages. Recent advances in Nanotechnology have provided new approaches to treat this disease. We use the Surface Enhanced Raman Spectroscopy (SERS) for detection and monitoring of photothermal destruction of prostate cancer cells. Raman signal is normally quiet weak but can be enhanced over 10 orders of magnitude in gold nanoparticles and adsorbed molecules on such nanoparticles, thus making it a highly sensitive probe to measure the presence of cancer cells. We attach Rh6g attached RNA Aptamers followed by attaching anti PSMA antibodies corresponding to proteins overexpressed in the LNCaP prostate cancer cells, to bind to popcorn shaped gold nanoparticles. These multifunctional gold nanomaterials selectively aggregate on LNCaP prostate cancer cells. We monitor the SERS signal of the Rh6g dye. In presence of LNCap cells we clearly see a strong SERS signal detectable to less than 100 cancer cells per ml. The SERS signal diminishes as we perform photothermal therapy with 785 nm continuous Near Infrared Laser until all the prostate cancer cells are destroyed. 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.

O6.29

9:00 SPINAL CORD INJURY PRODUCES AN EARLY AND SUSTAINED STATE OF CHEMOTHERAPEUTIC RESISTANCE

Raymond J. Grill
University of Mississippi Medical Center, Jackson, MS, USA

Spinal cord injury (SCI) damages spinal tissues producing a range of functional deficits to sensory and motor systems. As there currently are no effective therapeutic strategies that will either preserve or restore function following SCI, individuals face a lifetime of deficits that reduce overall quality of life. My laboratory has addressed this issue of a lack of therapeutic treatment options for SCI from the perspective that spinal trauma may produce conditions similar to that found in many forms of cancer; i.e., an active resistance of tissue to therapeutic treatments due to the upregulation of ATP-dependent transporter proteins that sequester systemically-applied drugs and prevent their availability to tumor tissues. Using a clinically-relevant model of rat SCI, we found that the ATP-driven

pump, P-glycoprotein (Pgp) (also known as the multidrug-resistance protein-1) was dramatically upregulated early within the tissues of the lesioned spinal cord. Following the SCI-dependent induction of Pgp, we found that bioavailability of a recently identified Pgp substrate, riluzole, was reduced within traumatized spinal tissues compared to uninjured controls. Riluzole is an FDA-approved neuroprotective drug that was under clinical assessment for treating spinal cord injury. We subsequently demonstrated that a novel anti-inflammatory drug, licofelone, suppressed inflammation, prevented induction of Pgp and enhanced the bioavailability of systemically-administered riluzole. These results suggest that SCI elicits chemotherapeutic resistance, reducing the therapeutic efficacy of at least one FDA-approved neuroprotective drug. However, pharmacological inhibition of Pgp may prevent onset of chemotherapeutic resistance and enhance bioavailability and efficacy of neuroprotective drugs that are also Pgp substrates.

9:30 – 10:15 High School Poster Session II

P6.43

MINOCYCLINE REDUCES SYSTEMIC LIPOPOLYSACCHARIDE-INDUCED HYPERALGESIA AND SPINAL CORD INFLAMMATION IN NEONATAL RATS

Donisha Lard, Viviek Patel and Tembra Jones
University of Mississippi Medical Center, Jackson, MS, USA

Our previous studies have shown that systemic administration of endotoxin lipopolysaccharide (LPS) induces hyperalgesia (an increased sensitivity to painful stimuli) and spinal cord inflammation in neonatal rats, which is associated with the production of pro-inflammatory cytokines by activated microglia. The objective of the current study was to determine whether minocycline, a putative suppressor of microglial activation, reduces LPS-induced spinal cord inflammation and hyperalgesia in the neonatal rats. Intraperitoneal (i.p.) injections of LPS (2 mg/kg) or sterile saline were performed in P5 rat pups and minocycline (45 mg/kg) or vehicle was administered (i.p.) 5 min after LPS injection. The tail-flick test was performed and spinal cord inflammation was examined on P6. Our results indicated that neonatal systemic LPS exposure results in reduction of pain response latency in the tail-flick test of P6 rats and an increase in the levels of microglia activation-related pro-inflammatory cytokines including interleukin-1β (IL-1β), and prostaglandin E2 (PGE2) in the P6 spinal cord. Minocycline treatment significantly ameliorated LPS-induced hyperalgesia and the increase of spinal cord pro-inflammatory cytokine levels. These results suggest that minocycline provides protection against systemic LPS exposure-induced hyperalgesia and that the protective effects may be associated with its ability to attenuate LPS-induced microglia activation-related pro-inflammatory cytokines. (Supported by NIH grant NH/NINDS R01NS080844, Base Pair Program, and Newborn Medicine Funds from the Department of Pediatrics, University of Mississippi Medical Center)

P6.44

SEX DIFFERENCES IN CAROTID VESSEL LARGE CONDUCTANCE POTASSIUM CHANNEL FUNCTION

Andria Miller[1], Mallikarjuna Pabbidi[2], Tanya Pareek[2]
[1]Murrah High School, Jackson, MS, USA, [2]University of Mississippi Medical Center, Jackson, MS, USA

Cerebrovascular disease rates are higher in adult men than in adult women, but the underlying mechanisms are not clear. Constriction and dilation of blood vessels are likely to be consequential of K^+ channel function. The mechanisms responsible for sex differences in cerebrovascular function and the role of large conductance potassium channel (BK channel) are still not clear. The use of traditional pharmacological inhibitors has been invaluable for the understanding of the functional importance of BK channels. Our main objective is to identify the sex differences the BK channel function located in carotid arteries. Our hypothesis is that "carotid arteries isolated from normal adult female (Sprague Dawley) rats may have exaggerated vasodilation in response to BK channel activators compared to adult male SD rats. The carotid rings will be pre-constricted using a receptor-independent vasoconstrictor such as 70mM KCL or receptor-dependent vasoconstrictor such as phenylephrine in order to constrict maximally and to measure BK channel-mediated dilation. NS1619 and either 17β estradiol or tamoxifen will be used to activate BKα and BKβ1-subunits respectively. BK channel inhibitor such as paxilline or iberiotoxin will be used to measure BK channel role. We anticipate that activation of BKα or β1-subunit may induce exaggerated vasodilation in carotid vessels isolated from adult female rats compared to adult males.

P6.45

GENE EXPRESSION PROFILING IN THE WNV EXPOSED MOUSE BRAIN TISSUE SLICE CULTURES

Kira Gaddis[1], Deyin Lu[2], Amber Paul[3], Fengwei Bai[3], Art Leis[4], Dobrivoje Stokic[4], and Parminder J.S. Vig[2]

[1]Murrah High School, Base Pair Program, Jackson, MS, USA; [2]Department of Neurology, University of Mississippi Medical Center, Jackson, MS, USA; [3]Department of Biological Sciences, University of Southern Mississippi, Hattiesburg, MS, USA; [4]Methodist Rehabilitation Center, Jackson, MS, USA

Toll like receptors (TLRs) are intracellular pattern recognition receptors and play an essential role in detection and initiation of strong antiviral response against flaviviruses, including West Nile virus (WNV) infection. Since TLRs are expressed in multiple brain cells, we determined if WNV infection in distinct brain regions (in vitro) would show variable induction of TLR and related genes. Our lab utilized gene expression profiling using mouse Affymetrix gene array technology. Assays were performed at the Molecular and Genomics Core, UMMC. Briefly, the cerebellar and spinal cord slice cultures were prepared from young mouse pups. The cultured slices were sent to USM where they were infected with WNV. After completion of the experiments, the pooled slices were processed for total RNA extraction. Three samples/group were used for analysis. We found several fold increase in the expression of TLR3, IFR7 and viperin in the WNV treated cerebellar slices as compared to mock. In contrast, fold changes in the spinal cord slices were less remarkable. Interestingly, TLRs 1, 2, 3, and 9 were upregulated in the WNV treated cerebellar slices, whereas TLRs 2, 5, and 7 were upregulated in the spinal cord slices. This distinctive response in the cerebellar slices to WNV infection could be due to the presence of specific cell types like Purkinje cells and Bergmann glia, which express TLR3 and do not localize to the spinal cord slices. Further protein expression and morphometric analysis using primary cell cultures will help understand the complex role of TLRs in WNV infection.

P6.46

IMPACT OF AUTOREGULATION OF RBF ON PROTEINURIA ASSOCIATED WITH PPO

Kiara Smith[1], Jan Williams[2], Kasi McPherson[2], Lateia Taylor[2]
[1]Murrah High School, Base Pair Program, Jackson, MS, USA, [2]Department of Pharmacology, University of Mississippi Medical Center, Jackson, MS, USA

Background and Significance: Prepubertal childhood obesity (PPO) has emerged as an epidemic and major health problem in the United States. Recent studies suggest that that PPO is associated with increased risk of renal injury in children. Approximately 37% of obese children develop microalbuminuria (proteinuria). The early stages of renal disease associated with obesity include increased RBF and GFR (hyperfiltration), which may be due to impaired autoregulation of renal blood flow. However, the influence of renal hyperfiltration on proteinuria and renal injury associated with PPO has never been examined. Objective: The present study examined

the impact of autoregulation of renal blood flow during the development of proteinuria associated with PPO in SS rats. Methods: Experiments were performed on 4 week-old Dahl salt-sensitive (SS) rats that either lack autoregulation (SSAR- strain) or exhibit restored/improved autoregulation (SSAR+ strain) fed a high fat (HF) diet. Protein excretion was measured every 2 weeks until the animals reach 10 weeks of age. Results: Body weight and protein excretion was similar between both strains at baseline (4 weeks of age). At the end of the study, the SSAR+ strain experienced significantly lower body weight than the SSAR- strain regardless of diet. We also did not observe any differences in protein excretion in the SSAR- and SSAR+ strains when fed a HF diet throughout the study. Conclusion: These data suggest that the lack of autoregulation does not play a significant role in the development of proteinuria during PPO.

P6.47

LIVER ISCHEMIA-REPERFUSION INJURY RESPONSES IN OBESE MELANOCORTIN-4 RECEPTOR-DEFICIENT MALE RATS

Ryan Nichols and Frank Spradley
University of Mississippi Medical Center, Jackson, MS, USA

Nonalcoholic fatty liver disease (NAFLD) is progressive, dangerous, and prevalent. Morbidity and mortality from NAFLD-mediated chronic liver disease, injury, and cirrhosis is rising a result of the obesity pandemic, and cardiovascular disease is a major contributor to this. Although fat accumulation and steatosis increases the risk for liver injury, a full understanding of these mechanisms is unknown. We tested the hypothesis that steatosis increases the injury response to ischemia-reperfusion (IR) in obese melanocortin-4 receptor homozygous-deficient (MC4R-/-) compared to MC4R+/+ male rats. Rats, at ~ 20 weeks old, from each strain were subjected to 45" of 70% warm liver ischemia with plasma and liver tissue harvested at 24 hours of reperfusion.. Body weights were not altered by IR or Sham, respectively, in MC4R-/- (649±17g, n=5 vs 653±17g, n=6) or MC4R+/+ (436±9g, n=8 vs 425±27g, n=4), they were greater ($P<0.05$) in the MC4R-/- strain overall. Similarly, EchoMRI revealed that % total body fat (MC4R-/-: 34±1 vs 33±3 and MC4R+/+: 11±1 vs 12±2) and % total liver fat (MC4R-/-: 5.8±0.6 vs 6.1±1.4 and MC4R+/+: 2.5±0.8 vs 0.3±0.3) were not altered by IR or Sham, respectively, but were both greater ($P<0.05$) in the MC4R-/- strain. In contrast, IR increased ($P<0.05$) total liver wet weight in both MC4R-/- (4.3±0.1 vs 3.6±0.1) and MC4R+/+ (3.5±0.1 vs 3.2±0.1). The latter were numerically greater in obese MC4R-/- following IR. In conclusion, this experimental model will be utilized to examine the mechanisms whereby NAFLD increases the risk for chronic liver disease with the goal of identifying novel treatment strategies.

P6.48

COMPARATIVE ANALYSIS OF ONE AND FOUR HOUR ACCLAMATION PERIOD FOR USV MEASUREMENTS

Jose Navas, Micaiah Tillman, Amanda Blackwell, Sorsha Morris, Alana Knowles, Sharron Cabral, James Shaffery
University of Mississippi Medical Program, Jackson, MS, USA

Ultrasonic Vocalizations (USVs) have been measured in rats for behavioral research for at least forty years. In this experiment, the objective is determining whether different-length acclamation periods influence the amount and quality of USVs during recording, as well as determining whether time of day influences quality of USV recording. This information will be used to decide which acclamation period should be used. Six Sprague Dawley male rats were divided into two groups of three. Each group was recorded in four sessions; two sessions during the rats' day-cycle consisting of a one- and four-hour acclamation period, and two session during the rat's night-cycle consisting of a one- and four- hour acclamation period. Tests have been recorded and the data is currently being analyzed. We attempted to validate the four-hour paradigm by comparing data to an experiment that similarly used the four- hour acclamation period during the rat's day-cycle. The best acclamation length and time should be used in experiments that record USVs for behavioral research.

P6.49

A ROLE FOR EARLY LIFE REMS DEPRIVATION IN REGULATING HIPPOCAMPAL DEVELOPMENT

Micaiah Tillman, Sorsha Morris, Amanda Blackwell, Alana Knowles, Jose Navas, Sharon Cabral, James Shaffery
University of Mississippi Medical Center, Jackson MS, USA

In the young, rapid eye movement sleep (REMS) is initially more highly represented in daily sleep/wake cycles than later in life. This large amount of REMS early in life is thought to facilitate brain maturation. Early life REMS disturbances (i.e., ERD) have relatively long-lasting, negative effects on hippocampal synaptic plasticity mechanisms such as reductions in expression of several glutamate signaling proteins and long- term potentiation (LTP) stability. Data from this experiment would further establish a role for REMS in regulating hippocampal development, and it would demonstrate that ERD preprograms functional, cognitive deficits in the young adult. Our *in vitro*, hippocampal LTP results led us to hypothesize that ERD preprograms learning and memory deficits later in life. We tested ERD and control rats in the novel object recognition (NOR) test as young adults (postnatal day 51), which consists of introducing an animal to two objects, and replacing one of the objects with an unfamiliar object on the re-test. The NOR test is not thought to be hippocampal dependent. Given the differences in LTP that were observed in the hippocampus during our past experiments, we predicted that ERD rats would exhibit learning-deficits on the hippocampal-dependent tests compared to the control rats. We found a significant difference between the performance of ERD and control rats (t-test, $t= 2.499$, $df=17$, $p < 0.05$). The data showed that ERD animals spent less time investigating the novel object compared to control rats. Accordingly, we propose that the effects of ERD are more generalized than originally hypothesized.

P6.50

FROM ENVIRONMENTAL WASTE TO VALUE-ADDED PRODUCT

Nancy Zhang,

Starkville High School, Starkville, MS, USA

Carbon dioxide (CO_2) is the number one greenhouse gas emitted from human activities through the combustion of fossil fuels from transportation vehicles and industry factories. Recent increase in CO_2 levels, causing rapid climate change and dangerous acidity levels in oceans, has become a primary concern worldwide. The purpose of this project is to develop a procedure to use an efficient and cost-effective way to turn this harmful excess of carbon dioxide gases into value-added products such as methanol. The procedure involved developing a simple process to produce carbon encapsulated copper-core nanoparticles (CECNs) using biomass waste and thermal treatment, and then applying the CECNs as a catalyst for the conversion of carbon dioxide and hydrogen gas into methanol. The data collected shows that the CECNs demonstrated remarkable activity and stability as a catalyst for the conversion, yielding an over 10% CO_2 conversion and over 50% methanol selectivity. The value-added product that resulted from this catalytic conversion, methanol, is commonly used as a primary feedstock for chemical manufacturing.

P6.51

DEVELOPING A NUMERICAL BOX MODEL TO COMPUTE ALGAE CONCENTRATION AS CHLOROPHYLL

Sichen Shawn Chao

Oxford High School, Oxford, MS, USA

The purpose of my research is to develop a numerical box model that can be used to calculate the concentration of algae (as chlorophyll) in a well-mixed, closed water body system. This method calculated the algae concentration based on the its growth rate and

death rate which are temperature-dependent terms. Knowing the initial concentration provided from field measurement and the net growth rate, the concentration of algae at certain time intervals can be obtained. Three primary growth factors: light intensity, water temperature, and nutrients concentrations were taken into account in the model. The effects of sediment concentration and water depth on the algae growth were also considered. This model was calibrated and validated using measured data in Lake Vechten, Netherlands and Beasley Lake in the Mississippi Delta. Acceptable accuracy was generally obtained using the developed model. Some scenario studies were conducted using this model to analyze the effects of global warming (increase in temperature) and the influx of nutrients on the algae concentration. It was shown that global warming decreased the concentration of algae while an influx of nutrients increased the concentration. An online interface has been developed using Flask, a Python web micro framework, and SQ-Lite, a lightweight database, to apply this model. This web-based model provides a user-friendly interface for model implementation and allows more users to access it.

P6.52

AN ELECTRODYNAMIC APPROACH TO THE COLLIGATIVE PROPERTIES OF SOLUTIONS

Andrew Neely

St. Andrew's Episcopal School, Ridgeland, MS USA

The colligative properties of solutions, including the boiling point elevation, are said to be dependent only on the concentration of particles dissolved, not the identity of the particles. Departures from this model are evident in experimental data and can be attributed to non-ideal behavior in solutions of moderate to high concentrations. The boiling point elevation, which is dependent on the magnitude of solute-solvent interactions, can be more accurately modeled in moderate and high concentration ranges through the consideration of various aspects of solute nature. Further improvements to the mathematical model have been made, most notably through the consideration of solvent polarization, London dispersion interactions, and various quantum effects. Through the proposed methodology, a means of calculating boiling point elevation, starting with the quantum numbers of the electrons in the electron cloud of the solvated ions has been established, yielding a model of the boiling point elevation, that exceeds the accuracy of the accepted colligative property model of boiling point elevation by a notable degree, likely owing its reflection of experimental trends to its thorough consideration of the ion-solvent system. Statistical analysis for solutions of sodium chloride shows a close fit, reflected in a 67.9 percentage point reduction in mean absolute error

10:15 Break

Friday, February 24, 2017

MORNING

Room Ballroom I (A)

10:30 -12:00 Interactive Workshop,

Sponsored by the 23and ME, Inc.©

Modernizing Genetics in the Classroom

Speaker: Dr. Thao Do

Join us for an interactive and collaborative workshop highlighting 23andMe's educational resources for teaching genetics. Following the workshop, participants will be able to:

- Explain the scientific process behind how 23andMe provides insights on ancestry and traits through the analysis of genomic data
- Describe how genotype data, along with self-reported survey information, is used to make new discoveries about how genome variations affect certain traits
- Describe how the 23andMe lactose intolerance wellness report can be used to teach basic NGSS concepts in inheritance and variation of traits
- Design a classroom activity that uses 23andMe genetic profiles to teach key concepts in genetics
- List two useful teaching resources available on the 23andMe Education website

Friday, February 24, 2017

AFTERNOON

12:00-1:00- Plenary Speaker

1:00-3:00- Millsaps HHMI Undergraduate

HISTORY AND PHILOSOPHY OF SCIENCE

Chair: Paula Smithka

University of Southern University

Chair: Lauren Williamson

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 23, 2017

MORNING
Room TC 226

O7.01

8:10 AGAINST SPECIES PLURALISM: BIOLOGICAL SPECIES AS A HOMEOSTATIC PROPERTY CLUSTER KIND

Paula Smithka and Kenneth Curry

University of Southern Mississippi, Hattiesburg, MS, USA

The debate regarding the ontological status of species has included the argument that a single concept of 'species' (species taxon) is incompatible with the various roles species play in biological inquiry, as units of classification, in generalization, and as dynamic entities (Reydon 2005, "On the Nature of the Species Problem and the Four Meanings of 'Species'"). Reydon claims 'species' is a homonymic term and suggests four distinct species ontologies. Previously, Kitcher (1984, "Species"), Ereshefsky (1992, "Eliminative Pluralism"; 1998, "Species Pluralism and Anti-Realism"), and Dupré (1999, "On the Impossibility of a Monistic Account of Species") defended 'species pluralism' because the investigative questions various biologists ask require carving taxa in different and often incompatible ways. These approaches seem to portray taxonomists and evolutionary biologists, in particular, at odds with one another or at least "isolated" from each other's concerns. We suggest that this dichotomy is exaggerated and argue that, if species taxa are considered to be homeostatic property cluster kinds (HPCKs) (Boyd 1999, "Homeostasis, Higher Taxa, and Monophyly"; Wilson, Barker, and Brigandt, 2007, "When Traditional Essentialism Fails: Biological Natural Kinds"), this single conception of 'species' captures the goals of biological inquiry, classification, generalization,

and dynamic systems.

O7.02

8:40 BIOLOGICAL SPECIES AS HOMEOSTATIC PROPERTY CLUSTERS: ROLE OF NATURAL SELECTION AND SELF-ORGANIZATION

Kenneth Curry and Paula Smithka

University of Southern Mississippi, Hattiesburg, MS, USA

Biological species were described in terms of homeostatic systems in the 1970s and in terms of homeostatic property clusters in the 1980s. The idea of species as homeostatic property clusters captures a sense of biological populations characterized by (1) natural variation among individual organisms and (2) cohesion across the group that is flexibly robust against external and internal perturbations. Here we consider the nature of species homeostasis in terms of complex systems dynamics with respect to the role of self-organization in natural systems and the role of natural selection. A self-organizing system is described as "a process in which pattern at the global level of a system emerges solely from interactions among lower level components of the system" (Camazine et al. 2001 Self-Organization in Biological Systems). Stuart Kauffman (1993 Origins of Order) has modeled biological self-organization as complex systems described in the language of phase space in which various components of the system come to settle in regions of phase space called attractors where their organization tends to resist external and internal perturbations. Attractors, for Kauffman, are the ultimate source of homeostasis. Kauffman focuses on a particular set of attractors found with computer simulations in the ordered regime just on the edge of chaos. These attractors offer exactly the conditions of emerging variation and flexibility to shift among attractors that maximize the effect of natural selection on the system. Batten et al. (2008 Biological Theory 3:17–29) remark of such a system "self-organization proposes what natural selection disposes."

O7.03

9:10 HOW DID PLATO DEFINE THE NUMBER ONE IN HIS BOOK, "THE REPUBLIC"?

Andrew W. Harrell

Independent Scholar, Vicksburg, MS, USA

In his book, "Plato's Republic a Dialogue in 16 Chapters", Dr. Alain Badiou, a current French philosopher, proposes a new way of defining the "Number One". This way uses a mapping from "Being" to "Event". In it, he claims that "The Republic" is actually Plato's playbook for a Communist society, using this definition as its base. But, was this really what Plato said or wanted to say? This would mean Plato believes that the philosophy of mathematics is a part of science and its philosophy. It would mean that then questions of what "Justice", "Truth", "Goodness" is in political science can be related to what "Oneness" is? Dr. Badiou says in his books "Being and Event" and "Number and Numbers" that he does not subscribe to a Normative Theory of Truth. His arguments are based on his complicated mathematical set theory and ontology of what is "real". They are based on a mathematics and a nature in which the Number One is actually, not a set, but a process. The present day concept of a mapping or function is something Plato clearly wasn't able to understand in his time. I will relate this topic to several earlier talks on "How Do We Define the Number One" that I gave at previous annual conventions of the MS Academy.

9:40 Break

Thursday, February 23, 2017
MORNING
Room Ballroom II/III

Population Health Symposium I-
Invited Keynote Speakers 10:00-12:00

Co-Sponsor with Health Sciences and Psychology

Daniel Jones, MD. Department of Physiology & Biophysics and Medicine, UMMC
"OBESITY AND CHRONIC DISEASES"

Carol Connell, PhD. Department of Nutrition & Food Systems, USM
"FOOD INSECURITY AND POPULATION HEALTH IMPACT"

Therese Hanna, MHS. Executive Director, Center for Mississippi Health Policy, Jackson MS
"HEALTH POLICY AND IMPACT ON POPULATION HEALTH"

Joshua Mann, MD. Chair, Department of Preventive Medicine, UMMC
"MISSION, STRUCTURE, AND DIRECTION OF THE J.D. BOWER SCHOOL OF POPULATION HEALTH AT THE UNIVERSITY OF MISSISSIPPI MEDICAL CENTER"

12:00-1:00 General Symposia

Thursday, February 23, 2017

AFTERNOON

O7.04

1:00 THE SHIP OF THESEUS: PATIENT SELF-IDENTITY IN ILLNESS AND HEALTHCARE

Nick Gilbert

University of Mississippi Medical Center, Jackson, MS, USA

Identity is intimately associated with situation, surrounding, and perception. This is uniquely applicable to the patient in the course of illness and healthcare. Current medical practice increasingly emphasizes care of the whole person, however, understanding both the static and dynamic aspects of patient identity presents a daunting challenge to the clinician. Failure to realize the importance patient self-identity can pose a substantial barrier to effective patient care and achieving optimal outcomes. This review examines the foundation of self-identity in the context of illness and healthcare. By applying classic thought experiments to common clinical scenarios, the static and dynamic constituents of patient self-identity are explored, including physical, psychological, and social identity. Specific situations to be discussed include defining patient identity, chronic conditions, disability, traumatic brain injury and identity after illness, and others. With an increased awareness and understanding of patient self-identity, the clinician can better anticipate patient behaviors and concerns, adapt their approach to patient-provider interactions, and better realize the goal of treating the whole person.

O7.05

1:30 THE ASYLUM HILL CEMETERY PROJECT: ADMINISTRATIVE NEED, BIOMEDICAL SCIENCE, AND THE HUMANITIES

Joseph Maxwell and Ralph Didlake

University of Mississippi Medical Center, Jackson, MS, USA

In 1848, the Mississippi state legislature established the Mississippi State Lunatic Asylum on land located just outside the city of Jackson. This facility, later renamed the Mississippi State Insane Hospital, operated until 1935 when the Mississippi State Hospital was built at Whitfield. During its 87-year existence, the asylum maintained a cemetery on its grounds in which as many as 7000 deceased patients were interred. This site, left unattended in the decades following closure of the institution, is now the last undeveloped space on the main campus of the University of the Mississippi Medical Center, which now occupies the grounds of the former asylum. A proposal to exhume these remains and place them in a respectful memorial that will also serve as a bio-archeological resource for long-term research and education has been brought forward and is under evaluation. The technical, ethical, and logistic challenges of this proposal include descendant community acceptance, preservation of the deceased individuals' legacy and history, appropriate public history programming, and maximum utilization of remains and artifacts for education and research. To meet these challenges, The Asylum Hill Research Consortium, a diverse group of scholars representing the fields of history, archeology, anthropology, and the biomedical sciences, was created to meet the challenges of this project. This presentation outlines the long-term vision of this Consortium for the Asylum Hill project.

O7.06

2:00 DENTITION IN EARLY 20th CENTURY MISSISSIPPI STATE INSANE ASYLUM BURIALS: INITIAL OBSERVATIONS

Katie Alford and Ralph Didlake

University of Mississippi Medical Center, Jackson, MS, USA

In 1855 the Mississippi State Insane Asylum began operations in a then "state of the art" facility on the outskirts of Jackson. The Asylum maintained a large cemetery on this site which is now the last undeveloped space on the present-day campus of the University of Mississippi Medical Center. During recent construction 66 burial sites from this cemetery were exhumed and the remains made available for dental examination. Radiographs were collected using a handheld, Nomad Pro 2 radiograph machine and MediaDent software. Images were taken from bucco-lingual and medio-distal perspectives in order to capture the total pulpal anatomy and ensure comprehensive examination. The radiographs and direct physical examination were used to document any abnormalities in the dentition as well as the mandibles and hard palates. Of the current 66 bodies that were exhumed, 5 had dentition with 2 showing complete or portions of the mandible. Only 1 burial had a hard palate present and a full set of adult dentition. Carious lesions were present upon gross and radiographic examination and alveolar bone loss was noted in the burial with a hard palate. A generalized lack of teeth per burial was also observed. These initial observations indicate that the Nomad Pro 2 is a useful modality for examining archeological remains when teeth are present, but the low yield of oral cavity structures per burial site will require examination of large numbers of specimens in order to make conclusions about oral health in this population.

2:30 Business Meeting

Thursday, February 23, 2017
EVENING
Ballroom

3:30 Dodgen Lecture and Awards Ceromony
General Poster Session
Immediately Following Dodgen Lecture

Friday, February 24, 2017
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- Millsaps HHMI Undergraduate Symposium

MARINE AND ATMOSPHERIC

Chair: Dr. Duanjun Lu,
Jackson State University
Vice-Chair: Dr. Remata Reddy,
Jackson State University

Thursday, February 23, 2017
MORNING
Room 227

O8.01

9:00 STUDYIES IN GLOBAL WARMING AND CLIMATE CHANGE USING AN EMPERICAL MODEL

Remata Reddy, Francis Tuluri, Daunjun Lu, Mehri Fadavi

Jackson State University, Jackson, MS, USA

Global warming and climate change refer to an increase in average global temperatures. Natural events and human activities are believed to be contributing to an increase in global temperatures. This is caused primarily by increases in "greenhouse" gases such as Carbon Dioxide (CO2). It is clear that human activities have caused most of the century's warming by releasing heat trapping gases called greenhouse gases into the atmosphere. In the present study, an attempt has been made to develop an empirical model and study the empirical aspects of the global climate change by applying the mass energy concept to the earth atmosphere system, assuming that the atmosphere is in hydrostatic balance. Further, we assumed that the earth atmosphere system behaves as a black body. The presence of the gas in the atmosphere keeps some of the radiant energy received by the earth from being returned to space, thus producing the so-called greenhouse effect. The results of the study pointed out that the global temperature changes due to mass increase as a whole of the earth atmosphere system for the period 1900-2050. These changes in global warming are due to temperature increases from 0.053C to 0.84C. The predicted changes are in good agreement with the observed global warming (IPCC, 1990). The temperature changes due to doubling of CO2 are only 0.02C by 2050. The global warming due to temperature changes may be attributed to increase in mass as a whole including greenhouse gases (CO2, water vapor, and other CFC's) and human activity and feedbacks.

O8.02

9:15 MODELING EMISSION SOURCES FOR OZONE CONCENGTRATION OVER EL PASO, TX

Duanjun Lu[1], Rosa Fitzgerald[2], William Stockwel[3]

[1]*Jackson State University, Jackson, MS, USA,* [2]*University of Texas at El Paso, El Paso, TX, USA,* [3]*Howard University, Washington D.C, USA*

The development of an ozone attainment strategy involves many simulations with the photochemical grid model to determine which source regions, source categories, and emission types (i.e., VOC and

NOx) must be controlled to reduce ozone most effectively. In this study, a regional photochemical modeling experiment was set up to simulate a high ozone episode of August 30, 2015 in order to evaluate the impact of various emissions sources on ozone concentrations over El Paso, TX region. The base case simulation showed reasonable model performance by capturing the peaks and the diurnal variability of observed ozone concentrations in the El Paso area. A comprehensive impact assessment of emissions sources to the ozone concentration has been evaluated within the study domain. Through a source apportionment analysis of emissions influencing the hourly ozone concentrations, NOx and VOC limited areas were identified.

O8.03

9:30 THE CORRELATIONS OF EL NINO AND THE RED RIVER FLOODING

Mariama Feaster[1], Julianna Glinskas[2], Davyon Hill[3], Jason Hansford[3]

[1]*Jackson State University, Jackson, MS, USA,* [2]*LeTourneau, United States,* [3]*National Weather Sevice, USA*

Flooding along the Red River is rare especially across the middle and lower portions of the Red River Basin of Southern Oklahoma, Northeast Texas, Southwest Arkansas, and Northwest Louisiana. However, several periods of heavy rainfall fell across the basin between May 2015 and May 2016, resulting in multiple flood crests along numerous points between Lake Texoma along the Texas-Oklahoma border to Alexandria, Louisiana. This accounted for five separate flood crests in Shreveport, Louisiana, including the largest crest since April 1945, and the first flood since May 1990. These series of crests occurred during one of the strongest El Niño events on record, with several other flood and near flood crests noted in Shreveport's history during past El Niño events since 1950. This study will compare synoptic patterns and rainfall distributions during past El Niño events when flooding occurred along the Red River in Shreveport. The synoptic patterns associated with El Niño will also be compared with the 1950-2015 means for that time period. In addition, past flood event analysis and impacts will be addressed to determine any correlations between the effects of El Niño, as well as other potential atmospheric, geologic, and manmade factors that may have contributed to the increased instances of flooding along the Red River in Shreveport.

O8.04

9:45 ENVIRONMENTAL INFLUENCES ON QUANTUM USE EFFICIENCY IN A VIRGINIA SALT MARSH

Geselle Coleman[1], Jesus Ruiz-Plancarte[2], Jose Fuentes[2], Raymond Najjar[2]

[1]*Jackson State University, Jackson, MS, USA,* [2]*Pennsylvania State University, University Park, PA, USA*

Tidal wetlands perform a number of important ecosystem services, such as carbon sequestration, water quality improvement, and nutrient control. However, quantitative relationships between tidal wetland productivity and environmental factors are lacking. In this study, data from a flux tower in a Virginia salt marsh are used to assess the gross primary productivity (GPP), defined as the total amount of carbon dioxide assimilated by vegetation, and investigate the effect of air temperature, inundation level, and photosynthetically active radiation (PAR) on the quantum use efficiency (GPP/PAR) from June to November of 2015. The quantum use efficiency was lowest during the middle of the day, presumably due to temperature and light stress. Quantum use efficiency also declined from summer to fall, with temperature the likely driver of the decline because inundation did not change and PAR decreased. The findings should be helpful in the development of process-based and remote-sensing models of tidal wetland productivity.

O8.05

10:00 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, created a data set of several parameters—atmospheric air temperature (AirTemp), atmospheric temperature anomaly (ATA), atmospheric carbon dioxide (CO2), sea surface temperature (SST), tropical cyclone heat potential (TCHP), mid-layer wind shear (WindShear),convective available heat potential (CAPE), vertical motions (VerticalMotion), precipitable 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 an OAI given conditional probabilities. The BNN network rejected ATA and WindShear. Results showed probabilities acceptable within expert interpretations of parameter interactions to predict favorable OAI conditions.

10:15 – 10:30: Coffee Break

O8.06

10:30 DIURNAL CYCLE OF RAINFALL OVER THE PACIFIC BASIN ASSOCIATED WITH EL NIÑO

Tony Hurt,

Jackson State University, Jackson, MS, United States

Accurately reproducing the diurnal cycle of rainfall for atmospheric modeling represents a potential challenge for improving the reliability of weather and climate forecasting. Scientific advances such as the Tropical Rainfall Measuring Mission and Global Precipitation Measurement have provided invaluable rainfall data for detailed research. Moreover, large-scale decadal to multi-decadal climate variations such as El Niño create significant deviations in atmospheric conditions and rainfall, particularly within the tropics. El Niño and its counterpart La Niña represent the respective warm and cool phase of the global-scale phenomenon known as El Niño – Southern Oscillation (ENSO), and distinct variations in the diurnal cycle of rainfall are associated with each phase. This research focuses on the December through February (DJF) period of each ENSO phase, when it has historically been strongest. Daily mean rainfall, diurnal amplitude and phase values from 1998-2016 were compared to observations during individual and averaged El Niño and La Niña events. Probability distributions were calculated for statistical analysis of diurnal amplitude and phase, and results indicated a statistically significant relationship between ENSO phase and the diurnal cycle. Diurnal amplitude was enhanced and suppressed, respectively, during El Niño and La Niña events. Diurnal phase during El Niño closely mirrored climatology,

with maximum phase probability during the mid-morning hours, along with an additional maximum in phase probability during the afternoon. Phase maximum and minimum probability during La Niña occurred during the mid-morning and mid-afternoon hours, respectively.

O8.07

10:45 THE CONSORTIUM FOR OIL SPILL EXPOSURE PATHWAYS IN COASTAL RIVER-DOMINATED ECOSYSTEMS (CONCORDE)

Pat Fitzpatrick[1], Jessie Kastler[2], Frank Hernandez[2], Carla Culpepper[2], Candace Bright[2]

[1]Mississippi State University, Starkville, MS, United States, [2]University of Southern Mississippi, Hattiesburg, MS, United States

CONCORDE is the CONsortium for oil spill exposure pathways in COastal River-Dominated Ecosystems (CONCORDE). It is one of 12 research consortia funded by the Gulf of Mexico Research Initiative (GoMRI) to conduct scientific studies of the impacts of oil, dispersed oil and dispersant on the Gulf's ecosystem and public health. CONCORDE is led by the University of Southern Mississippi with seven research partners: Mississippi State University, Rutgers University, Oregon State University, Dauphin Island Sea Lab, Old Dominion University, and the U.S. Naval Research Laboratory. The primary CONCORDE emphasis is on near-shore waters in the northern Gulf of Mexico and how rivers influence the transport, fate and toxicity of oil as it interacts with coastal waters and biology. Deepwater Horizon revealed transport uncertainties regarding river plumes and impacts to plankton. CONCORDE will address how coastal waters dominated by pulsed-river plumes control the exposure, impacts, and ecosystem recovery from offshore spills like the Deepwater Horizon. Several field campaigns have completed utilizing the research vessels Pelican, Point Sur, and smaller "day" boats to examine low river, high river, Bonnet Carret spillway, and HAB events. The seminar will summarize CONCORDE findings on river plume morphology, plankton distributions, and island pass salinity gradients. CONCORDE also includes an Education and Outreach component. Teachers interacted with scientists for classes and field programs. The commercial fishing community have participated in a citizen scientist program, with hand-on work to collect data for CONCORDE scientists. Many are first-generation Vietnamese. Participants will provide feedback on their involvements.

O8.08

11:00: HABITAT AND SEASONAL EFFECTS ON PARASITE COMMUNITIES IN PINFIN (LAGODON RHOMBOIDES)

Andrew Claxton, Robin Overstreet

Gulf Coast Research Laboratory, University of Southern Mississippi, Ocean Springs MS, USA

The presence of parasites transmitted by the consumption of infected prey items can serve as indicators of previous feeding by infected hosts. Shifts in those infections over time and among habitats can be used to assess changes in host feeding. In this 2016 study, parasite assemblages infected the pinfish (*Lagodon rhomboides*) from the Back Bay of Biloxi, Mississippi, in the fall when the eelgrass (*Vallisneria americana*) occurred in relatively low salinity (e.g., approximately 6 ppt); from another fall Mississippi location at Weeks Bayou, which had no submerged aquatic vegetation and a higher salinity (e.g., approximately 13 ppt); and in Pensacola, Florida, during the spring, summer, and fall when the seagrasses *Thalassia testudinum* and *Halodule wrightii* occurred in salinity ranging from 18 to 31 ppt. Highest levels of species richness and mean abundances of several parasites occurred in pinfish from Pensacola, mostly in summer, where the 163 total Florida fish exhibited adult trematodes, larval and adult nematodes, and larval cestodes likely acquired from feeding on at least polychaetes, ctenophores, small fishes, and copepods. The adult acanthocephalan *Dollfusentis chandleri*, restricted to the pinfish collection from Back Bay of Biloxi and acquired from amphipod prey, infected 96% of that sample. Rarely encountered larval and adult trematodes also infected Mississippi stocks. The different individual parasites and parasite assemblages in the 3 locations appear to indicate the different salinities, the different corresponding diets in those pinfish stocks, and the seasonal importance of infections at those locations.

11:15 Business Meeting

12:00 pm – 1:00 pm: General Symposia

Thursday, February 23, 2017

EVENING

Ballroom

3:30 Dodgen Lecture and Awards Ceromony

General Poster Session

Immediately Following Dodgen Lecture

P8.01

MARCH 2016 FLOODING: SYNOPTIC ANALYSIS OF RAINFALL OVER CADDO AND BOSSIER PARISHES

Robert Garrett, Felecia Bowser, Matt Hemingway

Jackson State University, Jackson, MS, USA

A strong upper level low pressure system that settled over Northern Mexico became stationary over the ArkLaTex region from March 8 - March 12, 2016. This system alone produced over 500% more than average monthly rainfall in the state of Louisiana. The strong El Nino contributed to a stronger than normal Aleutian Low, (subpolar area of low pressure located in the Gulf of Alaska). A cutoff low funneled flooding precipitation into the Lower Mississippi Valley. Rainfall amounts of over 20 inches were recorded in some locations. Many locations in northern Louisiana experienced extreme flooding; from this, many historical records were broken. Most lakes and rivers matched or exceeded record crest marks. This analysis goal is to provide an overview of the synoptic aspects of the storm, and provide more insight into the consequential effects of the flood event.

P8.02

TROPICAL CYCLONE/HURRICANE STUDIES: BASICS, UNDERSTANDING AND PREDICTION USING BUOYS AND SATELLITE DATA

Aditya Remata[1], Nathan Massey[1], Remata Reddy[2]

[1]Clinton High School, Clinton, MS, USA, [2]Jackson State University, Jackson, MS, USA

A hurricane is the most severe category of the meteorological phenomenon known as the "Tropical Cyclone. When the winds exceed 74 mph, the storm is considered a hurricane. Hurricanes are about 300 miles wide though they can vary in size. The eye at the hurricane's center is calm and approximately 20 to 40 miles across. The eye wall is composed of dense clouds that contain the highest winds in the storm. The hurricanes form over warm ocean temperatures, upper level winds with low wind shear. Anatomy of a Hurricane includes, Eye and Eyewall, Spiral Rain bands, and hurricanes which are storms with violent winds and cause mass destruction. Storm surge is an abnormal rise of water generated by a storm, over and above the predicted astronomical tide. Storm surge is caused primarily by the strong winds by a hurricane. Three ways to measure storm surge are tide stations, high water marks, and pressure sensors. It's the change in the water level that is due to the presence of the storm. All locations along the U.S East and Gulf Coasts are

vulnerable to storm surge. GOES satellites track the movement of hurricanes. We have selected two Atlantic hurricanes, Katrina and Isaac and associated storm surge to investigate basics, understanding and prediction using satellite data. Katrina happened in 2005 and was a category 5 hurricane and Isaac happened 2012 and was a category 1 hurricane. Fatalities and billion dollar property damages occurred due to these two hurricanes over the Mississippi Gulf Coast.

P8.03

VIBRIO VULNIFICUS AND THE MISSISSIPPI GULF COAST

Madison Pullens, Shuo Shen, Jay Grimes

University of Southern Mississippi Gulf Coast Research Laboratory, MS,USA.

Much of the Mississippi Gulf Coast is dependent on a thriving seafood industry for the maintenance of their local economy. The biological quality of the marine waters, particularly that of the Mississippi Sound, directly impacts the quality of seafood that can be harvested in addition to its effect on drawing tourists to the local beaches. *Vibrio vulnificus* is virulent, rod-shaped, gram-negative halophile naturally found in coastal marine waters, but shows seasonal increases during the warmer months of May-October. This coincides with the flourishing of local oysters and increasing rates of tourism. *V. vulnificus* has two serological biotypes that determine pathogenicity: an ecological strain, Serovar A, and a clinical strain, Serovar B. The clinical strain, often considered "Flesh Eating Bacteria" can lead to infection and necrosis with exposure to an open wound. This has a 25% mortality rate and typically results in amputation. More importantly, *V. vulnificus* , when ingested via raw or undercooked shellfish, can cause gastrointestinal infection that, if untreated, results in septicemia. Septicemia is the deadliest food-borne disease, accounting for 95% of seafood related deaths and has a 50% mortality rate. In this study, marine water samples were collected from Gulfport, Biloxi, and Ocean Springs. Water temperatures ranged from 27.8-32°C. Samples were plated and grown on Vvx media at 32.2°C for 24-48 hours. Colonies were collected and stored for quantitative determination using PCR primers specific to determining the two serological biotypes.

P8.04

AEROSOL TRANSPORTATION AND ITS EFFECTS ON CLIMATE AND HEALTH

Lenetta Mallory, Remata S. Reddy, Mehri Fadavi

Jackson State University, Jackson, MS, USA

This study further investigates the transportation of aerosol, ozone, and their effects on climate and health. Therefore, the study has been undertaken for the NOAA Center for Atmospheric Sciences (NCAS) Project at Jackson State University (JSU) to investigate the interactions of PM 2.5 μm and ozone over coastal stations of Puerto Rico, Gulf of Mexico and Caribbean Sea using EPA's Air Quality System (AQS). Due to the effects of ozone and PM2.5 on health and climate, regularly monitoring aerosol levels is needed to ensure the health. By looking at data collected over the past 5-10 years by MODIS (Moderate Resolution Imaging Spectroradiometer) and other instruments. The study analyzed the collection of Saharan Dust from the African coast and the air particles over the sea area. The Hybrid Single-Particle Lagrangian Integrated Trajectory (HYSPLIT) model calculated the forward and backward trajectories during the outbreak of dust over the sea. The HYSPLIT models averaged between 10 and 20 meters above the ground level. The reduction of ozone concentration may be due to the decrease of solar radiation under the fine dusty condition. The reduced solar radiation suppresses the photochemical reactions and can result in low ozone concentration.

P8.05

INVESTIGATING THE CAUSES OF NOISE IN PRECIPITATION GAUGE

Keon Gibson[1], Scott Landolt[2], Brian Bevirt[2], Eileen Carpenter[2], Justin Lentz[2]

[1]Jackson State University, Jackson, MS, USA, [2]UCAR/NCAR, Boulder, CO, USA

This study investigates noise in the data output from three vibrating wires that measure the mass of precipitation recorded by the Geonor T-200B Precipitation Gauge. It has been observed that some frequency data output by this instrument is unusually noisy. This study aims to isolate the source of the noise in the vibrating wires' frequency data by canceling out variables that are suspected of causing the noisy data. In this study, three vibrating wires in a weatherproof enclosure were tested to test performance with a static load in isolation. The test lasted six weeks to see how the wires responded to temperature changes over a long period of time. The results ndicate sensor that depends on the wires is less stable at higher temperatures. The result reveals electrical inputs to the device may be contributing to the inaccuracy of the data they produce.

P8.06

CHANGES IN CO_2 CONCENTRATION AND FLUX OVER AN INLAND WATER BODY

Justin Bonds[1], Duanjun Lu[1], Sussela Reddy[1], Raleigh Grysko[2], Huiping Liu[2]

[1]Jackson State University, Jackson, MS, USA, [2]Washington State University, Pullman, Washington, USA

Inland lakes and reservoirs are major contributors to the global carbon cycle. It is important to understand how much carbon they emit as well as any significant changes in carbon emissions. Eddy covariance flux tower located in the Ross Barnett Reservoir (RBR) in Ridgeland, MS was used to measure carbon dioxide (CO 2) concentrations, CO2 fluxes, and components of the surface inland lakes and reservoirs are major contributors to the global carbon cycle. It is important to understand how much carbon they emit as well as any significant changes in carbon emissions. Eddy covariance flux tower located in the Ross Barnett Reservoir (RBR) in Ridgeland, MS was used to measure carbon dioxide (CO 2) concentrations, CO2 fluxes, and components of the surface energy budget.

P8.07

ENVIRONMENTAL QUALITY AND HEALTH STUDIES IN SELECTIVE LOCATIONS IN JACKSON AREA

Briana Jefferson[1], Brandon McGrew[1], Kyla Love[2], Shaloam Dasari[3], Shareena Dasari[3], Joel Maddirala[3], Francis Tuluri[4], and Remata Reddy[4]

[1]Murrah High, Jackson, MS, USA, [2]Yazoo City High, Jackson, MS, USA, [3]Jackson State University, Jackson, MS, USA, [4]College of Science, Engineering and Technology, Jackson State University, MS, USA

The environmental quality (water quality, and air quality) and health data is studied in selective locations of Jackson of Mississippi state for association with health related issues in the region. pH values and bacteria are examined in these samples and found that water samples in certain areas is not clean and may be detrimental to health. The pH values ranged from 2 to 9. It was observed that most of the samples were weak bases and weak acids, one of the seven samples was neutral, and one sample was a strong acid. In another set of local water samples collected, bacteria grow was observed. It is observed that the samples collected from water fountains contained large amount of bacteria growth. The student participants are also advised to collect secondary data on air quality and health impacts. Using data from the Mississippi Behavioral Risk Factor Surveillance Surveys from 2010 through 2013, it was found that people who had a low income or low education level had the highest percentage of asthma incidents. Based on their study, it is observed that the air quality and asthma relationship is prevalent among low income families.

P8.08

WEATHER OBSERVATION CONSISTENCY BETWEEN MOBILE PLATFORM AND FIXED STATIONS

Jaylond Harvey, Loren White

Jackson State University, Jackson, MS, USA

The purpose of this study was to investigate and compare weather measurements taken by a mobile platform and fixed stations. The two particular categories of fixed stations are the Official NWS/FAA sites and the Mesonet stations operated by other agencies. The weather measurement observed and compared is temperature, relative humidity, and dew point. During observation there are important factors to consider which is the distance from the fixed station and the time difference from the fixed station observation. Also, the differences due to prevailing weather such as rainy and cloudy factors is important during observation. The end result will explain the exploration of how the potential for consistency between the mobile platform and fixed stations could be used together.

P8.09

THE TAIL OF THE THREE SUPERCELLS

Janae Elkins[1], Tom Salem[2]

[1]Jackson State University, Jackson, MS, USA, Memphis National Weather Service, Memphis, TN, USA

On December 23, 2015, three supercells tracked across the Mid-South and resulted in vastly different outcomes. One supercell produced two long-track tornadoes, and EF3 and EF4 that caused numerous casualties, another produced an EF1 tornado and a third produced nothing according to the Memphis Forecast Office service area. To help explain differences, an investigation of the environmental data and radar signatures. Analyzing the radar data every volume scan to determine the rotational velocity, as well as any unique reflectivity and dual-pol signatures that could be clues to different outcome. The goal was to recognize or determine what caused the third supercell to produce nothing and find any new data that wasn't previously recorded.

P8.10

TEMPORAL DYNAMICS AND SPATIAL PATTERNS OF JUNCUS ROMERIANUS DOMINATED WETLAND VEGETATION CHARACTERISTICS AND CARBON STORAGE ABILITY OF GRAND BAY NATIONAL ESTUARINE RESEARCH RESERVE, MISSISSIPPI, USA

Taimei Harris, Ranjani Kulawardhana, Eric Gulledge, Fengixang Han, Paul Tchounwou

Jackson State University, Jackson, MS, USA

Wetlands serve as important carbon sinks for atmospheric carbon, and play a vital role in the terrestrial carbon cycle. However, their role in the terrestrial carbon cycle has been under-estimated, mainly due to the lack of timely and reliable estimates on their carbon stocks. Within this background, this study was implemented with the goal of evaluating carbon storage ability of the Grand Bay National Estuarine Research Reserve (GBNERR) of Mississippi, USA. The specific objectives of this study were to: 1) study spatial patterns and temporal dynamics; and 2) to evaluate factors affecting spatial variability of vegetation characteristics and carbon stocks of Juncus roemerianus (Black needlerush) dominated wetland habitats of GBNERR. Extensive field sampling was conducted over the summer of 2015 to collect vegetation measurements and their spatial patterns were evaluated using geospatial analytical techniques. J. roemerianus of our study area are characterized by relatively taller plants (mean plant height of 131 ± 21 cm), which is characteristic of the low marsh vegetation of this region, while the mean live shoot density is relatively low (mean of 354 per m2). Marsh vegetation of our study area is characterized by high productivity with a mean plant biomass density of 767 g per m2, while the dead biomass accumulations over the marsh surface accounts for 60% of the total biomass indicating contributions from the previous season's growth. These vegetation characteristics revealed noticeable variations in their spatial and temporal distributions over the marsh extent characterized by localized patches of low and high biomass accumulations.

P8.11

SYNOPTIC ANALYSIS OF TWO CASE STUDIES DURING THE FIRST 2013 AEROSE CAMPAIGN

Chastity Curry[1], Vernon Morris[2], Ebony Roper[2]

[1]Jackson State University, Jackson, MS, USA, [2]Howard University, Washington, DC, USA

The purpose of this project was to develop a synoptic analysis for the causes of the SAL dust particulate that was injected into the atmosphere and transported long distances during the AEROSE campaigns. The HYSPLIT model was employed to assist with identifying potential surface sources of the desert dust and source regions of relevant air masses. The NOGAPS model was employed for comparisons of observed and predicted dust and smoke concentration over the Atlantic Ocean.

P8.12

MAPPING SEAGRASS BEDS OF PASCAGOULA RIVER BASIN IN MISSISSIPPI USING REMOTE SENSING

Jennifer Blanks, Ranjani Kulawardhana

Jackson State University, Jackson, MS, USA

Seagrass beds contribute to the health and productivity of wetland and estuary ecosystems in numerous ways. First, seagrasses support aquatic organisms. Secondly, seagrass beds trap sediment through their process of photosynthesis. This is an important ecological function because carbon abundance in the atmosphere is steadily increasing. Lastly, seagrass beds contribute to the overall health and development of wetland growth and productivity. As seagrasses grow, wetlands will flourish in return. Despite their ecological importance, seagrasses are fragile ecosystems and physical disturbances can uproot them. It is important for coastal land managers to routinely map changes of seagrasses to better understand their responses to environmental change. Seagrass beds in the Mississippi Gulf Sound have been studied by multiple researchers but minimal work has been done along the Pascagoula River Basin. The goal is to focus on improving mapping techniques for the month of April using remote sensing and ERDAS Imagine software. The image was improved with radiometric corrections and classifying the data sets image. The accuracy assessment will be supported by the collected field data, measuring the depth of the seagrass of the study site. The corrections applied to the image improved the quality of the image. By focusing the corrections on only the water area, the image accuracy improved. The long term goal for the future is to be able to analyze land cover change of the Basin overtime.

Friday, February 24, 2017
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	Millsaps HHMI Undergraduate Symposium

MATHEMATICS, COMPUTER SCIENCE AND STATISTICS

Chair: Jamil Ibrahim
University of Mississippi Medical Center
Vice-Chair: Ping Zhang
Alcorn State University

Thursday, February 23, 2017
MORNING
ROOM TC Board Room 231

O9.01

10:00 FUTURE OF MATHEMATICS, COMPUTER SCIENCE AND STATISTICS FIELDS IN MISSISSIPPI

Jamil Ibrahim

The University of Mississippi Medical Center, Jackson MS, USA

The disciplines of Mathematics, Computer science and statistics are key components of the STEM fields. There is no doubt that occupations in these related careers are some of the fastest growing and best paid of the 21st century, and they often have the greatest potential for job growth. It is important to ignite Mississippi student interest at an early age in STEM fields. It is also important that schools have inspiring and competent teachers who also have many professional development resources at their disposal. Higher Education Teacher-preparation programs have not provided most school teachers with the depth of mathematical sciences background needed to effectively teach for understanding. These fields are changing rapidly and Mississippi Higher education institutions have to meet these challenges by preparing competent and efficient professionals. Systemic curricular review and revitalization require time, energy and commitment from the state's policy makers.

O9.02

10:15 FRUIT BRUISE DETECTION BASED ON IMAGING PROCESSING AND PATTERN RECOGNITION

Ping Zhang, Zilong Hu, Jinshan Tang, Babu Patlolla
Alcorn State University, Lorman, MS, USA

Bruise detection on fruits plays a critical role in determining the grade of fruits. The use of human resource for sorting of fruits has various disadvantages. Thus, how to detect bruises and remove the damaged products can help maintaining the quality of the entire lot and is therefore essential to the fruit economy. In this paper we propose an efficient method for displaying bruised fruits using 2-D and 3-D imaging technologies. The proposed system consists of 2-D image acquisition, 2-D imaging processing and 2-D bruise segmentation. This bruise detection in apples using 3-D imaging is also studied in this paper. Bruise detection based on 3-D imaging overcomes many limitations of bruise detection based on 2-D imaging, such as low accuracy, sensitive to light condition, and so on. In this paper, apple bruise detection is divided into two parts: feature extraction and classification. For feature extraction, we use a framework that can directly extract local binary patterns from mesh data. For classification, we studies support vector machine. Bruise detection using 3-D imaging is compared with bruise detection using 2-D imaging. 10-fold cross validation is used to evaluate the performance of the two systems. Experimental results show that bruise detection using 3-D imaging can achieve better classification accuracy than bruise detection based on 2-D imaging.

O9.03

10:30 A NEWLY CENTRALIZED COMPUTER LAB SCHEME

Shreyas Thyagaraja[1], Felton Square[2], Ping Zhang[1], Babu Patlolla[3]

[1]Department of Mathematics and Computer Science, [2]Center for Information Technology Services, [3]Department of Biological Sciences, Alcorn State University, MS, USA

In this paper, we propose a new computer lab scheme implemented in the Department of Mathematics and Computer Science. The scheme consists of a computer server and multiple computer terminals or work stations. This scheme is mainly brought in by focusing to eradicate space occupancy, energy consumption and to improve the performance of the computers. In the lab implementation, one computer server is installed in the data center and is connected to work stations through network cables. We install a portable N computing devices to initialize connections with the server and the work stations. As we did this changes for our two computer labs and tested with its performance, the effectiveness is perfect and the connectivity of work stations (terminals) performs well. Based on the implementation, more efficient and effective ways of setting new computers will be discussed in the paper.

O9.04

10:45 HOW DO WE IMPLEMENT INFORMATION SECURITY POLICY

Yong Wang
Alcorn State University, Lorman, MS, USA

In this talk, we review current security policy implementations. Specifically, we review top-down approach and bottom-up approaches. In the end, we recommend better security policy approach. Different from traditional software development cycles, we develop new software development life cycle for security system.

O9.05

11:00 DESIGN OPTIMIZATION OF DENTAL IMPLANTS BY ARTIFICIAL NEURAL NETWORK

Jason Griggs[1], Hakan Yaserer[2], Matthew Loeb[1], Yuanyuan Duan[1], Yacoub Najjar[2]
[1]*University of Mississippi Medical Center, Jackson, MS, USA,*
[2]*University of Mississippi, Oxford, MS, USA*

Objective: The objective was to train an artificial neural network (ANN) to predict the fatigue limits of dental implants. Methods: Four commercially available reduced-diameter implant systems (RDIS) were investigated: Straumann Narrow Neck, Biomet 3i Osseotite MicroMiniplant, Nobel Biocare NobelReplace, and Biomet 3i Osseotite Certain. Step-stress accelerated lifetime testing was performed on the RDIS to determine the fatigue limit for each design. MicroCT images (Skyscan1172, Microphotonics) of the four RDIS were analyzed. Twenty-four design parameters were identified, and measurements were made using Mimics interactive image processing software (Materialise, 9μm resolution). Linear stepwise regression was used to identify the seven most significant design parameters, and these were used as the input vector to predict the fatigue limit in a feedforward error-backpropagation ANN having one hidden node. The learning ratio was decreased from 1 to 0 over 1,500 iterations. Results: The ANN achieved a notable prediction accuracy (R^2=0.99995). The effects of implant body inner diameter, abutment screw thread height, and abutment screw head diameter were non-linear and could account for most of the variation in fatigue limit between implant systems. Conclusion: The ANN was successfully trained on the commercially available implant systems and may be a useful tool in predicting the implant design that corresponds to maximum possible fatigue limit. However, some of the design parameters are confounded in the current commercially available systems, so future studies should train an ANN on the fatigue lifetime predictions from finite element models of

hypothetical implants systems in which the factors are not confounded.

O9.06

11:15 FUNDAMENTALS OF LOAD TRANSFER MECHANISMS IN BIOSTRUCTURES: A COMPLEX NETWORK APPROACH

Reena Patel[1], Guillermo Riveros[1], David Thompson[2]
[1]US Army Engineer Research and Development Center, Vicksburg, MS, USA, [2]Mississippi State University, Starkville, MS, USA

Biostructures are unique owing to the multiple functions they are designed to accomplish coupled with the complex hierarchical geometrical arrangement that makes them strong, tough, lightweight, and energy dissipative. This work presents an integrated, interdisciplinary approach that utilizes computational and experimental mechanics with complex network strategy to obtain fundamental insights into failure mechanisms of high performance, light weight, structured composites by investigating structural and material properties of the rostrum. Although computational mechanics experiments give an overall distribution of stresses in the structural systems, due to the large numbers of degrees of freedom the underlying kinematics which plays a vital role in load transfer mechanisms and the formation of the strong and weak links in the network is unknown. Towards this end, the rostrum will be formulated as a network flow problem. The nodes and edges of the rostrum's network will be extracted from the numerical model used in the computational mechanics experiments. The flow network will be weighted based on the parameter of interest, which may be stresses, energy dissipation etc. The changing kinematics of the system is input to the mathematical algorithm that will compute the maximum flow of the stresses at uniform cost. This research investigates the load transfer mechanisms for the rostrum of the paddlefish by conducting computational mechanics experiments; identify the formation of the force chains in the rostrum by employing maximum flow /minimum cut mathematical algorithm and demonstrate preliminary results of the advantages of the flow network to solve this type of engineering problems.

O9.07

11:30 IMPORTANCE OF EFFECT SIZE AND SIGNIFICANCE TESTING FOR ANALYZING AND COMMUNICATING RESEARCH STUDIES

Jamil Ibrahim[1], S Ibrahim[2]
[1]University of Mississippi Medical Center, Jackson, MS, USA, [2]Arab American University, Jenin, Palestine

In research practice, the most common requests to statisticians from investigators are sample size calculations or sample size justifications. Determining sample size is one of the most important steps in designing a study. In order to have reliable and valid results, it is important to determine the right sample in combination with high quality data collection efforts. Sometimes, researchers have different opinions as to how sample size should be calculated. Statisticians usually choose from many available formulas that can be applied for different types of data and study designs. The aim of this workshop is to clarify this issue and to provide examples on how to calculate sample size. The components of sample size calculations will be discussed and what factors to consider in choosing the sample size. Other concepts related to this issue such as power analysis, confidence intervals, variability, type I error, type II error, and minimum effect size of interest will also be discussed.

11:45 Divisional Business Meeting

12:00 General Symposium

Thursday, February 23, 2017
AFTERNOON
1:30-3:00 PM Divisional Poster Session

P9.01

THE IMPACT OF STEM OUTREACH IN LOW INCOME SCHOOLS AND COMMUNITIES

Tayla Frizell[1], Joselyn Hathaway[2], Jennah Seaver[3], Darryl Monteau[3], Linda Hayden[2]
[1]Mississippi Valley State University, Itta Bena, MS, USA, [2]Elizabeth City State University, Elizabeth City, NC, USA, [3]The University of Kansas, Lawrence, Kansas, USA

The Center for Remote Sensing of Ice Sheets (CReSIS) at the University of Kansas is a National Science Foundation (NSF) Science and Technology Center (STC) CReSIS' K-12 Educational Outreach Program with a curriculum designed to introduce students to the dynamics of polar ice sheets and their effects on sea level rise. The Ice, Ice Baby (IIB) curriculum is a series of inquiry-based lessons developed by CReSIS K-12 Educational Outreach Staff and currently has 7 units with 31 lesson plans. Data (pre- and post-surveys from students and teachers) from the IIB program have been collected and assessed annually. This research study focuses on the impact the IIB curriculum has made on student participants in the program, their level of interests in STEM, and will examine data assessed from the student and teacher surveys from 2009 to 2015. Science, Technology, Engineering, and Mathematics (STEM) outreach programs target K-12 students and enhance student learning, comprehension skills, and helps students understand various principles related to STEM [10]. These programs are coordinated by various organizations, colleges, or universities that are staffed with STEM professionals and facilitators [4]. A major issue that schools face today is the low involvement of minority students in STEM education and careers. Research suggests ways to get students involved includes: developing discussions, hands-on activities, and incorporating STEM into lesson plans [6]. The research presented will support the effectiveness of STEM outreach programs, explain how they are essential to student learning, and the importance of encouraging students to participate in STEM.

P9.02

EFFECT OF CALCULATOR USE ON STUDENTS' PERFORMANCE IN MATH

Johnny Gary[1], Abraham Ayebo[2]
[1]Mississippi Valley State University, Itta Bena, MS, USA, [2]North Dakota State University, Fargo, ND, USA

In this study, we investigate the effect of calculators on students' attitude and performance on mathematics tasks in K-12. Of the 168 articles chosen for the study, only 17 met the criteria used for data analysis. The findings of these 17 research studies were integrated through meta-analysis to determine the effects of calculators on student achievement and attitude levels. Effect sizes were generated through Glassian techniques of meta-analysis. Results revealed that students generally performed better on mathematics tasks and had positive attitudes towards mathematics when calculators were used. However, the effect sizes were low. Further research is needed to replicate the empirical studies that were conducted within the last 20 years.

P9.03

A CORRESPONDING STUDY OF WATER QUALITY EVALUATION OF THE PASQUOTANK WATERSHED

Jamal Stevenson[1], Raveen McKenzie[1], Steffi Walthall[3], Ricky Dixon[1]
[1]Mississippi Valley State University, Itta Bena, MS, USA, [2]Elizabeth City State University, Elizabeth City, NC, USA, [3]Savannah College of Arts and Design, Savannah, GA, USA

The 2015 Research Experience for Undergraduates Pasquotank River Watershed Team completed various tests along the tributaries and the river itself, adding to the previously gathered data from 2011, 2013, and 2014. The points were derived during the 2011 Summer Watershed Team research project with four points added during the 2014 summer project. Results were compared with previous readings for analysis. Streams tested were the Newbegun Creek, Knobbs Creek, Areneuse Creek, Mill Dam Creek, and Sawyers Creek. In-house tests on this year's samples continued to include pH, salinity, total dissolved solids, and conductivity. Air/water temperature, dissolved oxygen, wind speed/direction, and turbidity/clarity measurements were taken in the field. The results were placed into an online database where they are correlated to the location of the sample using Google Maps®. Mill Dam Creek rose above the previous three scores of 48 (2011), 47 (2013), and 49 (2014) and achieved a medium water quality score of 57. Areneuse Creek improved in water quality with a medium water quality score of 60. Sawyers Creek became the lowest scoring waterway tested at 35. Knobbs Creek decreased from previous years with a water quality score of 42. For a fourth consecutive testing year, Newbegun Creek fell within the medium water quality range with a score of 65. Pasquotank River rose from the previous testing year but still remained within the bad water quality range with a score of 45. The Lower Pasquotank remained the highest scoring tributary for a second consecutive year with a score of 85.

P9.04

DETECTING THREATS BY AGGREGATING PRE-INCIDENT DATA FROM ONLINE SOCIAL MEDIA

April Tanner, F. Chevonne Thomas Dancer, Nicholas Whitfield, Quavanti Hart
Jackson State University, Jackson, Mississippi, USA

Social media data is a very valuable data source that can be used to assist in the rebuilding of communities through communication between public and private agencies and individuals. There are several studies that have been done focusing on social media data analysis after an incident has occurred, but virtually none of these studies focus on pre-incident detection or aggregating data from multiple online sources. Pre-incident detection has the potential to diminish the loss of human life and irreplaceable research as well as structural damage before a major threat occurs. In our paper, we evaluate pre- and post-incident frameworks to determine their usefulness in predicting threats. We propose the development of a pre-incident model that categorizes threats into categories/levels and the use of free social media and blog analysis tools to create a publicly available application that provides analyzed pre-incident data that assists in informing the community of potential disasters through utilizing social media. We will present our proposed model, discuss the development of application used to acquire pre-incident data, and discuss how this research could be useful to plan for emergencies prior to an incident and be used in safeguarding our national security.

Thursday, February 23, 2017

EVENING

Ballroom

3:30 Dodgen Lecture and Awards Ceromony

General Poster Session

Immediately Following Dodgen Lecture

Friday, February 24, 2017

MORNING

O9.08

10:00 STUDY ON THE GROWTH OF RING-LIKE VORTICAL STRUCTURES IN BOUNDARY LAYER

Yonghua Yan[1], Caixia Chen[2], Chaoqun Liu[3], Fan Yang[4]

[1]Alcorn State University, Lorman, MS, USA, [2]Jackson State University, Jackson, MS, USA, [3]The University of Texas at Arlington, Arlington, TX, USA, [4]Shanghai Key Laboratory of Multiphase Flow and Heat Transfer in Power Engineering, Shanghai, Shanghai, China

It is proved by both experiments and numerical simulations that the mechanisms of disturbance development predominant at late stages of boundary-layer transition are rather universal and the late boundary layer transition starts with the ring-like (hairpin or ?-shaped) vortex formation. These ring-like vortical structures are commonly found in almost every boundary layer vortex formation which also play a critical role in the boundary layer transition process. In this research, the mechanisms of the formation of the large ring-like vortices, the mutual interaction among ring-like vortical structures and the increase of boundary layer are studied by DNS (Direct Numerical Simulation). It is found that the ring-like vortical structures generated in different time and different packets interacts intensely. Once the vortical structures in the downstream packet caught the packet in the upstream, the ring-like vortical sturctures will interact with each other and be piled up and move towards a higher position. The interaction, especially the merging process, makes the ring-like vortical structures be stronger and the boundary layer thus becomes thicker.

O9.09

10:30 STUDY ON SWBLI IN MVG CONTROLLED RAMP FLOW WITH DIFFERENT INFLOW CONDITIONS

Yonghua Yan[1], Caixia Chen[2], Chaoqun Liu[3], Fan Yang[4]

[1]Alcorn State University, Lorman, MS, USA, [2]Jackson State University, Jackson, MS, USA, [3]The University of Texas at Arlington, Arlington, TX, USA, [4]Shanghai Key Laboratory of Multiphase Flow and Heat Transfer in Power Engineering, Shanghai, Shanghai, China

MVG(micro vortex generator) is a kind of low profile passive control device used to control the boundary layer flow. It is proved to be very efficient in reducing the separation zone induced by shock wave in the supersonic ramp flow. In this study, LES(large eddy simulation) is conducted on the MVG controlled supersonic ramp flow under the influence of different inflow conditions. Three different turbulent inflow conditions with different boundary layer thickness and turbulent intensities are generated in front of the MVG. The different inflow conditions do not influence on the mechanism of the generation of vortical structures in the downstream of MVG, but will have significant influences on the topology and intensity of the ring-like vortical structure generated by MVG. It is found, which is more important, the interaction between vortex ring and the shock wave at the ramp corner which controls the boundary layer separation is also influenced. With higher boundary layer, the ring-like vortices are distorted more intensively and become weaker when they propagate to the ramp shock wave. The weaker ring-like vortices thus have a lower capability to eliminate or distort the strong ramp shock wave. As a result, the induced separation zone is less reduced.

O9.10

10:45 ONLINE INTERACTIONS IN THE ERA OF SOCIAL MEDIA

Bilal Abu Bakr, Dylan Hogland
Texas A&M University-Commerce, Commerce, TX, USA

People act vastly different online than they do in person. Specifically, now that social media websites have become a trend and are integral in most people's daily life, relations and daily interactions have altered quite a bit. However, if a person says the wrong thing to the wrong person online, there's no guaranteeing the aggressor's personal safety. With malicious tactics such as online stalking via easily-obtained services to using the deep web to completely buy and steal someone's identity, hardly anyone could sleep easy at night knowing they're completely safe. Even inside of a virtual space in a video game, people are not safe. With such services as 'locator agents' being out for hire anyone can be found, even if they are trying to escape reality and relax. It is expressly shown that these kinds of negative interactions affect the people's lives not only in person, but also have adverse effects on their online personas. Facebook and Twitter profiles do not just go away if a person deletes a comment either. There is a stark difference between someone being anonymous online and someone being untraceable. What someone says online will stay online almost regardless of their actions. Often times what someone says online can affect their personal life forever. While not being totally censored in the things that are said, some people are choosing to watch what kinds of things they say publically to people online for fear of social out lashing from their peers.

O9.11

11:00 CONNECTIVITY CONSTRAINTS THAT GOVERN INTERNET MANAGEMENT

Bilal Abu Bakr, Usha Sree Nagapuri
Texas A&M University-Commerce, Commerce, TX, USA

An internet user when accessing internet whose bandwidth is Mbps provided by local Internet Service Provider (ISP). This internet connection is accessed by multiple users at home. The data is shared among various devices (laptop, phone, desktop etc.) When viewing a superior quality program, while recording, texting over the phone, the network becomes increasingly sluggish and affects speed. This problem can be resolved at the router by changing the Wi-Fi settings. Certain routers have Quality of Service settings (Load sharing) which prevent excess usage of bandwidth. Load sharing distributes traffic among multiple paths between a remote Autonomous system (AS) and local AS. This configuration uses Border Gateway Protocol (BGP) which chooses one best path among all those available. Other protocols include Routing Information Protocol (RIP) and Open Shortest Path First (OSPF) for selecting the best path which ensure high availability, reliability, flexibility, and efficiency by giving access to active devices. Limiting bandwidth can also be achieved by certain applications as they prioritize traffic flows to ensure consistent quality of service, enhance speed and efficiency. NetBalancer: It controls and prioritizes traffic flow to ensure consistent quality of service by setting bandwidth limit for each program. Bandwidth Management: It is an approach that is used to manage quality of service issues such as network response times and download speeds for specific groups and users. NetLimiter: It controls and monitors traffic over the network. Transfer rate limits can be applied for applications which also monitor their internet traffic.

11:15 Closing Remarks

Friday, February 24, 2017

AFTERNOON

12:00-1:00	Plenary Speaker
1:00-3:00	Millsaps HHMI Undergraduate Symposium

PHYSICS AND ENGINEERING

Chair: Cecille Labuda
University of Mississippi
Vice-Chairs: James Stephens
Southwest Mississippi Community College
Vice-Chairs: Shanti Bhushan
Mississippi State University

Thursday, February 23, 2017

MORNING

Room TC 228

Session I: 8:30 – 10:00 (Chair: Dr. Cecille Labuda)

Guest Speaker

8:30 OCEANIC INTERNAL WAVES AND THEIR EFFECT ON UNDERWATER SOUND PROPAGATION: NUMERICAL SIMULATIONS AND LABORATORY MEASUREMENTS

Likun Zhang

Department of Physics and Astronomy, and National Center for Physical Acoustics, University of Mississippi, University, MS, USA

Sound propagation through oceans is a unique method for underwater communication and imaging. The propagation is strongly affected by spatial-temporal fluctuations introduced by various ocean processes, particularly ocean gravity waves that oscillate within the ocean (internal waves). These oceanic waves are generated by tidal flow over bottom topography. The fluctuations impose a limit to underwater sound communication. We will present direct numerical simulations of internal wave generation by tidal flow over periodic and random topography, and laboratory measurements of sound propagation in a density-stratified fluid in the presence of internal waves. The results gain insight into the dynamics of oceanic internal waves and their effects on sound propagation in continuously stratified oceans.

O10.01

9:00 STUDY ON THE GROWTH OF RING-LIKE VORTICAL STRUCTURES IN BOUNDARY LAYER

Yonghua Yan[1], Caixia Chen[2], Chaoqun Liu[3], Fan Yang[4]
[1]Alcorn State University, Lorman, MS, USA, [2]Jackson State University, Jackson, MS, USA, [3]The University of Texas at Arlington, Arlington, TX, USA, [4]Shanghai Key Laboratory of Multiphase Flow and Heat Transfer in Power Engineering, Shanghai, Shanghai, China

It is proved by both experiments and numerical simulations that the mechanisms of disturbance development predominant at late stages of boundary-layer transition are rather universal and the late boundary layer transition starts with the ring-like (hairpin or Ω-shaped) vortex formation. These ring-like vortical structures are commonly found in almost every boundary layer vortex formation which also play a critical role in the boundary layer transition process. In this research, the mechanisms of the formation of the large ring-like vortices, the mutual interaction among ring-like vortical structures and the increase of boundary layer are studied by DNS (Direct Numerical Simulation). It is found that the ring-like vortical structures generated in different time and different packets interacts intensely. Once the vortical structures in the downstream packet caught the packet in the upstream, the ring-like vortical

structures will interact with each other and be piled up and move towards a higher position. The interaction, especially the merging process, makes the ring-like vortical structures be stronger and the boundary layer thus becomes thicker.

O10.02

9:20 STUDYING THE TEMPERATURE DEPENDENT BEHAVIOR OF SHEAR WAVES IN A MICELLAR FLUID

E.G. Sunethra Dayavansha, Cecille Labuda
University of Mississippi, Oxford, MS, USA

Wormlike micellar fluids are viscoelastic and can support shear waves. Phase transitions of the micellar aggregates are temperature dependent and can manifest as sharp changes in the shear wave speed as a function of temperature. In this work, the variation of shear speed with temperature of 200mM CTAB/NaSal micellar fluid in a 5:3 ratio was studied. Shear wave propagation through the fluid was observed as a time varying birefringence pattern by using a high speed camera and crossed polarizers and shear speed was calculated by edge tracking techniques. The behaviour of shear waves was studied in the temperature range 7– 40^0 C to investigate any phase transitions. The implications of the shear wave speed variation over a wide temperature range will be discussed.

O10.03

9:40 TEMPORALLY DEVELOPING DIRECT NUMERICAL SIMULATION OF BOUNDARY LAYER BYPASS TRANSITION

Satish Muthu, Shanti Bhushan
Mississippi State University, Starkville, MS, USA

Transition from laminar to turbulent conditions is important in many engineering applications, and significantly impacts important flow quantities, such as drag or heat transfer. Engineering applications often involve bypass transition, which entails strong nonlinear phenomena and therefore poses a significant challenge for numerical modeling techniques. The present study employs a temporally developing approach, as it is an inexpensive alternative to the commonly used spatial approach, and allows the use of numerically accurate pseudo-spectral methods with less numerical approximations. Initial results for temporally developing flat-plate boundary layer simulations show good agreement with the spatial-DNS results, and available experimental data when plotted versus Re_θ. In addition, the simulations performed using different domain sizes (or translation Re) show similar predictions. To compute Re_x from the solution times, the domain translation velocity (VD) is required. It has been estimated that the domain should move with the peak streamwise velocity fluctuations, thus VD= 1/2 $U_0+u'_{RMS,MAX}$. This above estimate of VD provides a reasonable prediction of the Re_θ vs Re_x growth. The results confirm that the boundary layer growth and freestream turbulence decay is consistent throughout the simulation. Overall, results demonstrate that temporally developing simulations are a viable approach for capturing the transition flow physics, as long as the domain length is longer than the expected streamwise extent of the largest turbulent (or fluctuating in the pre-transitional and transitional region) structures. In addition, the domain size should be short enough that the expected change in turbulent statistics over the size of the domain is small.

O10.04

10:00 STUDY ON SWBLI IN MVG CONTROLLED RAMP FLOW WITH DIFFERENT INFLOW CONDITIONS

Yonghua Yan[1], Caixia Chen[2], Chaoqun Liu[3], Fan Yang[4]
[1]Alcorn State University, Lorman, MS, USA, [2]Jackson State University, Jackson, MS, USA, [3]The University of Texas at Arlington, Arlington, TX, USA, [4]Shanghai Key Laboratory of Multiphase Flow and Heat Transfer in Power Engineering, Shanghai, Shanghai, China

MVG(micro vortex generator) is a kind of low profile passive control device used to control the boundary layer flow. It is proved to be very efficient in reducing the separation zone induced by shock wave in the supersonic ramp flow. In this study, LES (large eddy simulation) is conducted on the MVG controlled supersonic ramp flow under the influence of different inflow conditions. Three different turbulent inflow conditions with different boundary layer thickness and turbulent intensities are generated in front of the MVG. The different inflow conditions do not influence on the mechanism of the generation of vortical structures in the downstream of MVG, but will have significant influences on the topology and intensity of the ring-like vortical structure generated by MVG. It is found, which is more important, the interaction between vortex ring and the shock wave at the ramp corner, which controls the boundary layer separation, is also influenced. With higher boundary layer, the ring-like vortices are distorted more intensively, and become weaker when they propagate to the ramp shock wave. The weaker ring-like vortices thus have a lower capability to eliminate or distort the strong ramp shock wave. As a result, the induced separation zone is reduced.

10:20 – 10:40 Break

Session II: 10:45– 12:00 (Chair: Dr. P. Biswas)

O10.05

10:45 SIMULATION OF SMALL-ANGLE X-RAY SCATTERING IN HYDROGENATED AMORPHOUS SILICON: A FIRST-PRINCIPLES STUDY

Durga Paudel, Parthapratim Biswas
The University of Southern Mississippi, Hattiesburg, MS,, USA

We present a computational study of the intensity of small-angle X-ray scattering of hydrogenated amorphous silicon (a-Si:H) with an emphasis on the extended inhomogeneities, such as nanoscale voids with spherical, ellipsoidal and cylindrical geometries of varying sizes. The intensity of the SAXS for a number of a-Si:H models with a varying hydrogen concentration has been computed from the reduced radial distribution function and the atomic-scattering factors of Si and H. We address the effect of the shape, size and number density of the voids on the intensity spectrum and compare the results with the same from the experimental data. Our results appear to suggest that the intensity of the SAXS spectrum in the small wave-vector region depends on the shape, size and number density of the voids, which is consistent with the experimental data from SAXS measurements on a-Si:H. Acknowledgement: The work is partially supported by NSF under grant no. DMR 1507166

O10.06

11:00 DEFORMING THE FREDKIN SPIN CHAIN AWAY FROM ITS FRUSTRATION-FREE POINT

Khagendra Adhikari, Kevin Beach
Department of Physics and Astronomy, University of Mississippi, Oxford, MS, USA

Salberger and Korepin have recently introduced a model of an S=1/2 chain in which the interactions take the form of a singlet-pair projector that is correlated with the up or down character of the spin at a third, adjacent site. The model is frustration-free, and its exactly solvable ground state is an equal-weight superposition of spin states with a Dyck word structure. The state is highly entangled, and the excitation gap closes like inverse of the chain length cubed. We introduce a generalized model that interpolates between this so-called Fredkin spin chain and the conventional antiferromagnetic quantum Heisenberg model. We present numerical results that track the properties of the system as it is tuned between the two limits. The ground state is everywhere disordered, but the entanglement and gap scaling vary.

O10.07

11:15 PROPERTIES OF EPOXY NETWORKS MODIFIED BY PREREACTED POSS AND SILICA NANOPARTICLES

Amit Sharma, Jeffrey Wiggins
University of Southern Mississippi, Hattiesburg, MS, USA

Epoxy-amine networks were modified with well-defined inorganic building blocks- polyhedral oligomeric silsesquioxanes (POSS) and silica nanoparticles. The self-assembly behaviour between POSS and silica nanoparticles was studied through controlled experiments to observe its influence for generating nanostructured morphologies in epoxy networks cured by 4, 4'-diamino diphenyl methane (44DDM). POSS molecules were incorporated in the organic-inorganic networks as pendant chains within diglycidyl ether of bisphenol-A (DGEBA) monomer to determine their self-assembly behaviour with functional and non-functional silica nanoparticles surfaces. The POSS-POSS and POSS-silica interactions are the main factors controlling the network structure as these interactions mandate ultimate morphologies and the mechanical properties of the developed organic-inorganic networks. As a result, because of these interactions, the system becomes more homogenous and POSS and silica become better dispersed during network formation. The developed hybrid networks were characterized via SEM, TEM and DMA to study molecular and phase structure evolutions analysis and the mechanical properties were investigated in compression mode to determine bulk modulus and strain at the yield of these hybrid networks.

O10.08

11:30 HYBRID MONTE CARLO SIMULATIONS OF Fe AND Ni CLUSTERS

Dil Limbu, Parthapratim Biswas
The University of Southern Mississippi, Hattiesburg, MS, USA

We present Monte Carlo (MC) simulations of Iron (Fe) and Nickel (Ni) clusters for N=5-100 using Sutton-Chen and Finnis-Sinclair potentials, respectively. The total energy of the system is minimized using a smart Monte-Carlo method, which simultaneously uses both the stochastic nature of MC simulations and the gradient of a potential function to construct MC moves. The structural configurations of the clusters are analysed and the total energy and forces on the atoms are compared with the same from the Cambridge Cluster Database (CCD). Our results suggest that the structural configurations obtained from the hybrid MC approach are very close to that of the CCD configurations with a deviation of the total energy value of the order of 0.05% from the corresponding CCD value. The maximum force on each cluster is observed to be smaller than the value obtained from the minimum structural configurations in the CCD. Acknowledgement: The work is partially supported by the NSF under grant number DMR 1507166

11:30-12:00 Divisional Business Meeting

12:00-1:00 General Symposia

Thursday, February 23, 2017
AFTERNOON
Room TC 228

Session III: 1:00 – 3:00 (Chair: Dr. S. Bhushan)

O10.09

1:00 LASER SPECTROSCOPY AND IMAGING AND TOOTH DECAY

Shan Yang
Jackson State University, Jackson, MS, USA

Tooth decay remains the major problem in dental healthcare. Early detection of dental decay is highly desired as many decay related procedures such as bridge and crown can be eliminated. Laser related spectroscopy and imaging technologies attracted a great attention is this regard because their unique advantages such as non-invasive, real time analysis. In this presentation, we will report the current progress of research on tooth decay detection using various laser spectroscopy and imaging technologies. We will also report in detail of the research findings related to Raman spectroscopy and imaging and their application on tooth decay detection.

O10.10

1:20 MIMICKING BRAIN TISSUE

Somayeh Taghizadeh, Cecille Labuda
University of Mississippi, Oxford, MS, USA

The lack of real tissue for medical experiments is currently an issue due to short lifetime of body organs and increasing need for finding a treatment for severe diseases such as cancer. A solution to this problem is development of tissue-mimicking phantoms, alternative materials that have the same properties of real tissue for a given application. In this research, we are developing a tissue-mimicking phantom as an alternative for brain tissue for ultrasound research purposes using poly vinyl alcohol. The composition of the phantom is varied in order to match the acoustic properties of the phantom such as speed, attenuation and scattering. These properties are measured and compared to that of real brain tissue. Methods to improve the results are also discussed. In conclusion, the results that are obtained for some properties are in a good agreement with real brain so the phantom can later be used for further development of ultrasound medical techniques.

O10.11

1:40 ADVANCED ANALYTICAL TECHNIQUES: EXPLORING AQUATIC ANIMAL ECOLOGY THROUGH ISOTOPES AND BIOFLUID ANALYSIS

Bryan Robinson, Shanti Bhushan, Scott Rush
Mississippi State University, Mississippi State, MS, USA

Aquatic turtles can have an influence on their surrounding ecosystem function and corresponding food webs by selection of specific habitats. Based on resources available they can modify specific habitats and diet in order to optimize physiological and reproductive gains. The ongoing inter-disciplinary collaboration focuses on the understanding the relationships between turtles optimum foraging and habitat selection. The research questions investigated are:

- Does foraging efficiency towards fish, benthic materials and or vegetation vary among species and within species - across various sizes?
- Does habitat influence nutritional gains, reflected in lipid and nitrogen in the turtle's blood?

To achieve these objectives the proposed research will focus on (a) generating a database of relatively common turtle species: the slider, the river cooter (*Pseudemys concinna*) and the spiny softshell turtle

(*Apalone spinifera*), and (b) use numerical simulations to understand the movement of the turtle species, and understand their trophic interactions. For this research, turtles are captured using passive methods, photographed and measured. Then 2D and 3D CAD models were generated for the small, medium and large turtles for each of the three different species, i.e., in total of 9 cases. Numerical grids were generated for the models, and laminar and turbulent flow simulations were performed using commercial solver Ansys/FLUENT, including grid verification study to identify appropriate grid for the simulations. The analysis of results focus on the drag resistance and flow pattern around the turtles. It is expected that the turtle drags are related to the foraging and habitat selection.

O10.12

2:00 MEASUREMENTS OF SOUND RADIATION ENHANCEMENT BY ACOUSTIC META-STRUCTURES

Maryam Landi[1], Jiajun Zhao[2], Ying Wu[2], Likun Zhang[1]
[1]Department of Physics and Astronomy, and National Center for Physical Acoustics University of Mississippi, University, MS, USA, [2]King Abdullah University of Science and Technology (KAUST), Thuwal, Saudi Arabia

It was theoretically and numerically proposed that the inefficient radiation from sound sources at low frequency can be overcome by using a coiled-up structure with a sub-wavelength dimension [Zhao, Zhang, and Wu, 2016 *in preparation*]. We experimentally build the structure by using 3D printing with ABS (*Acrylonitrile Butadiene Styrene*) and use a balanced-armature speaker as a monopole source. The sound intensity radiated from the source enclosed by the structure is measured at both near and far field for source frequency scanned over a wide range. We compare the measured results with that measured with the same source but without the structure to characterize the amount of enhancement. The comparisons validate the capability of the structure on enhancing radiation for sound whose frequencies are near resonant frequencies of the structure.

O10.13

2:20 ELECTRIC DIPOLE RADIATION IN BETWEEN PARRALEL MIRRORS

Zhangjin Xu, Henk Arnoldus
Mississippi State University, Mississippi State, MS, USA

Electromagnetic energy emitted by an oscillating electric dipole in free space travels in straight lines from the site of the dipole to infinity. We consider such a dipole located in the space between two parallel mirrors. The emitted light interferes with the light reflected off each of the two mirrors, and interference leads to intricate energy flow patterns. The reflected light is identical to the light emitted by an infinite array of image dipoles, lying on a line perpendicular to the mirrors. We shall show graphically that, depending on the mirror separation, the location of the dipole and the angle of oscillation with respect to the plane of the mirrors, numerous vortices and singularities appear. It is found that the location of vortices is determined by the vanishing of the magnetic field at the centre of the vortex. In certain cases, the light travels to, say, the right, then turns around, swings by the dipole for a second time, and leaves the system on the left. Interference patterns containing singularities repeat on the scale of a wavelength, and persist to infinity along the waveguide structure. We shall also show that in the very vicinity of the dipole the light is emitted in a four-vortex structure, contrary to the expectation that the radiation field should be dominated by the emitted light by the dipole itself, and travel initially along a straight line (as in free space).

O10.14

2:40 PEROVSKITE SOLAR CELLS TOWARD OUTDOOR APPLICAITONS

Qilin Dai
Jackson State University, Jackson MS, USA

It is reported that perovskite solar cells (PSC) efficiency has been boosted to over 20% recently, which is believed to have big potential solve energy crisis issue. However, there are still some major issues, such as stability, flexible devices, and large-area devices. In this work, we developed a promising technique to fabricate PSCs with high stability, large area and flexibility toward outdoor applications. Planar heterojunction PSCs are prepared based on radio frequency magnetron sputtering (RFMS) method and evaporation & immersion (E & I) approach. RFMS is used to prepare high quality uniform compact TiO_2 thin films for electron collection in devices. E & I technique is utilized to synthesize perovskite $CH_3NH_3PbI_3$ films, where PbI_2 films prepared by thermal evaporation technique were immersed in CH3NH3I solution to form perovskite films for charge generation in devices. The devices prepared by our technique show a power conversion efficiency (PCE) of 12.1%. 77% if its initial PCE can be observed after 1440 h aging in ambient atmosphere, indicating the good PCE and stability. Flexible devices are also fabricated and investigated in this work. A PCE of 8.9% was obtained on flexible substrates.

3:00– 3:30 Break

Thursday, February 23, 2017

EVENING

Ballroom

3:30 Dodgen Lecture and Awards Ceromony

General Poster Session

Immediately Following Dodgen Lecture

P10.01

UNDERSTANDING TRAUMATIC BRAIN INJURY

Timothy Pace[1], Lakiesha Williams[2], Haden Johnson[2], Courtney White[2]
[1]University of Southern Mississippi, Hattiesburg, MS, USA, [2]Mississippi State University, Starkville, MS, USA

1Mississippi INBRE Research Scholar, the University of Southern Mississippi
2Department of Agricultural and Biological Engineering, Mississippi State University

According to the Centre for Disease Control, more than 5.3 million people are currently living with a disability caused by traumatic brain injury (TBI). By studying the response of brain tissue at varying strain rates, the severity of TBI can be evaluated by analysing the mechanics and microstructure of the tissue. A better understanding of the tissue deformation at different strain rates will allow for more ways to help prevent and treat future TBI cases. Porcine models were obtained from a local abattoir and the samples were extracted within the first hour of acquisition. Testing was performed at both quasi-static and dynamic strain rates using the Mach-1 Micromechanical System and the Split-Hopkinson Pressure bar method utilizing a polymeric bar. Quasi-static tests were conducted at rates of 0.00625, 0.025, and 0.1 s-1, while the dynamic tests were conducted at 280, 330, and 390 s-1. Quasi-static testing is still in progress; however, sufficient data has been acquired from dynamic testing in order to compare the two. The dynamic data shows that the increased strain rates cause the brain to undergo an extreme hardening effect due to its viscoelastic properties. "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."

P10.02

USING iOS DEVICES AS AN INTERACTIVE LAB ENVIRONMENT

Francis Tuluri, Lattrice Evans, Terrance Eubanks, Aaron James, LaDamion Harness, Traeshaun Hiley
Jackson State University, Jackson, MS, USA

Interactive laboratory sessions in undergraduate science and engineering disciplines, help improve the understanding of principles and theory. Using smart devices, such as smart phones and tablets for data collection and visualization facilitates performing many interactive lab activities, which are otherwise tedious and laborious for the students. Here, we describe a novel method of data collection and visualization on iOS devices by interfacing external sensor with a view to perform interactive and inquiry-based lab activities. The iOS devices (smart phone and tablets), microcontroller, WiFi module, and external sensors are interfaced to collect real time data, visualize the data trends, and publish for analysis and behavior of a subject of interest. A proto model of weather environment physical system consisting of temperature, humidity, and light sensor is designed to study real time monitoring of the environment. For example, over a period of one hour the corresponding variables are observed for the changes of a surrounding environment in a location and a certain time, and found to be 62 F to 64 F, 86% to 86.5%, and 45 to 52 (arbitrary units). The measured data are within an accuracy of 1% and the results are found to agree with the traditional data of corresponding variables. The proposed model displays the data as a dashboard in different graphical formats such as 2D plots, gauge meters among others. The study and analysis of data is simple and interesting to the students to further their learning of physical principles of dynamic systems.

P10.03

SERS PROBE FOR SELECTIVE DETECTION OF CD (II) FROM DRINKING WATER

Derrick Dunn, Afua A Antwi-Boasiako, Yolanda K Jones, Anant K Singh
Alcorn State University, Lorman, MS , USA

Alizarin functionalized on plasmonic gold nanoparticle displays strong surface enhanced Raman scattering from the various Raman modes of Alizarin, which can be exploited in multiple ways for heavy metal sensing purposes. This work demonstrates a surface enhanced Raman spectroscopy (SERS) probe for trace level Cadmium in water samples. Alizarin, a highly Raman active dye was functionalized on plasmonic gold surface as a Raman reporter, and then 3-mercapto-propionic acid**,** 2,6-Pyridinedicarboxylic acid at pH 8.5 was immobilized on the surface of the nanoparticle for the selective coordination of the Cd (II). Upon addition of Cadmium, gold nanoparticle, provide an excellent hotspot for Alizarin dye and Raman signal enhancement. This plasmonic SERS assay provided an excellent sensitivity for Cadmium detection from the drinking water samples. We achieved as low as 10 ppt sensitivity from various drinking water sources against other Alkali and heavy metal ions. The developed SERS probe is quite simple and rapid with excellent repeatability and has great potential for prototype scale up for field application. "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."

P10.04

QUANTUM BAYESIAN GAMES

Neal Solmeyer[2], Radhakrishnan Balu[2], Ricky Dixon[1]
[1]Mississippi Valley State University, Itta Bena, MS, USA, [2]Army Research Laboratory, Adelphi, MD, USA

Game theory is the study of the mathematics behind rational decision making; mainly used in economics, political science, and psychology. This research began with studying classical two player games. The games used were the Prisoner's Dilemma and DA Brother's game. Using the Mathematica software, a code was created to run simulations of these games to find the Nash equilibria (NE). Next, these games were quantized. Using the program that was written, we were able to study the payoff and NE as a function of the entanglement. From the data, it was seen that the Prisoner's Dilemma game the NE disappeared at a relatively low amount of entanglement whereas with the DA Brother's game there was still a NE at maximal entanglement. Once the analysis of these games were completed, a Bayesian game was created where Player A was a general player, Player B1 was a Prisoner's Dilemma type player, and Player B2 was a DA Brother's type player. In the Bayesian game Player A has a possibility, P, of playing with player B1 and possibility (1-P) of playing with player B2. In order to analyze this game three-dimensional gaps were created in order to see the NE as a function of not only entanglement but also as a function of P. From these graphs, it was observed that although the payoffs at the NE varied in response to P, the curves were similar to those seen in the initial two player games.

P10.05

APPLY CRITICAL ASSET RISK MANAGEMENTTECHNIQUES AT JSU E-CENTER

Pao-Chiang Yuan, Michael Stevenson, Jeremiah Burns
Jackson State University, Jackson, MS USA

These techniques are used to assist local emergency responders and stakeholders in identifying the jurisdictional critical infrastructural sectors that may be at risk and developing mitigation strategies that can lessen the jurisdictional impacts. Local relevant threats and hazards are used to gauge a jurisdiction's capability to prevent, prepare for, mitigate, respond to, and recover from significant events. This study will help university administrators to prioritize their mitigation efforts and allocate resources to where they are need most. Mississippi E-Center is one of campuses of Jackson State University (JSU). The center is a public facility, which incorporates student classes, and offices. Currently, it mainly house the School of Communication, the Ph.D. Executive Program, Information Technology Department, Human Resource Department, Small Business Program, several private businesses, the Mississippi State Department of Public Safety, and the Office of Home Security. There are vulnerabilities, which can be pre-mitigation and also post-mitigation. The first element of this approach is to establish a common definition and process for analysis of basic risk for critical infrastructure protection. In the context of Homeland Security, the National Infrastructure Protection Plan framework assesses risks as a function of consequences, vulnerabilities, and threats. This paper selects possible nature disasters, which are more frequent in Mississippi (e.g. Tornados), and Incidents caused by human (e.g. Active Shooter) for the study.

P10.06

EFFECT OF MORPHOLOGY ON ELECTRICAL PROPERTIES OF CONDUCTIVE NANOCOMPOSITES

Matthew Hartline, Brian Greenhoe, Jeffery Wiggins
The University of Southern Mississippi, Hattiesburg, MS, USA

Multiwall carbon nanotubes (MWCNTs) possess a high electrical conductivity. However, the electrical performance in thermoset nanocomposites has been limited thus far due to the formation of agglomerates. The strong Van der Waals interactions between tubes increases the difficulty of effectively dispersing the nanotubes into a polymeric matrix, and keeping them dispersed through the cure. In this work, a novel continuous reactor was utilized to de-bundle and disperse primary agglomerates of MWCNTs into an epoxy matrix while increasing conversion of the pre-polymer. Employing two different cure profiles, the materials were analysed for dispersion and its effects on conductivity using optical microscopy (OM), transmission electron microscopy (TEM), and dielectric spectroscopy. Applying a single-step high temperature cure profile,

the reduction in matrix viscosity is accompanied by a secondary re-agglomeration of the MWCNTs and a nanowire type network was formed. Conversely, when a slow, low temperature cure prescription is used, the as processed dispersion state of the MWCNTs was static. While the well dispersed morphology was achieved, it was found to reduce the bulk electrical conductivity by orders of magnitude.

P10.07

AN APPLICATION OF FORCE SENSITIVE RESISTOR, FSR, AND SUBMERGING CAR'S SOS

Bemnet A Tirfagegnehu[1], Nardos Tadele[1], Md. Moin Uddin Khan[2], Gordon Skelton[1], M. Ashraf Khan[1]
[1]Jackson State University, Jackson, MS, USA, [2]Election Commission Secretariat, Dhaka, Bangladesh

Flash flood may cause drowning of a car, giving almost no time for the driver to contact the emergency team, or even cell phone may not be accessible at that moment; a car may crash into water. An automatic generation of SOS signal in this situation may help the people save their lives. The modern cars and the cars to come in the markets could have the feature of sending signals to rescue team for urgent help when needed. However, the cars now in use, which are going to be old and can be assumed to be in use for the next 10-15 years, do not have such feature. We propose to add a feature to the car that automatically sends SOS signals to the emergency responder even when the driver fails to do so. The idea is that when water enters into a car and reaches to a specific level, an emergency signal is sent to emergency team with the information of the location of the car in danger. In our design, an electronic circuit produces a signal with the application of force sensitive resistor, FSR that can be coupled to GPS. Initially, we characterized the properties of the FSR. Then, we utilized the properties to sense the pressure change for the water. To generate the signal, Op-Amps are used. The application of the final circuit is expected to help people in drowning cars save their lives.

P10.08

AN INVESTIGATION OF SIT TO STAND RATIOS FOR COMPUTERIZED WORK

Cassidy Hardy, Kari Babski-Reeves, Alex Calhoun, John Debusk
Human Systems Engineering Lab, Mississippi State University, Starkville, MS, USA

Work related musculoskeletal disorders, obesity, and a variety of cardio-metabolic conditions and other risk factors are widespread among employees with jobs that require prolonged bouts of sedentary work (Robertson et al., 2013; Choi et al., 2010). Employees sit at work for 77% of the time;51% of that time, it is for periods longer than 30 minutes (Evans et al., 2012). Sit-stand workstations have been developed to help alleviate monotonous positions for these employees. Though they maintain efficiency while decreasing discomfort, the optimum ratio of sitting to standing is still unknown (Karakolis et al., 2014). Therefore, the purpose of this research is to quantify muscle activity and subjective discomfort while engaging in different sit-to-stand ratios when using a computer with a height adjustable desk. Additionally, the impact of using wrist supports will be quantified. Two sit-to-stand time ratios will be tested: 1) 20 minutes of sitting to 10 minutes of standing (2:1), and 2) 15 minutes of sitting to 5 minutes of standing (3:1). Eighteen participants completed two 2-hour testing sessions involving a variety of computer entry tasks. Surface electromyography (EMG) of the shoulder, neck, and upper back were measured along with subjective perceptions of discomfort. Muscle activity for the posterior deltoid was significantly higher when standing (μ = 32.21%) than when sitting (μ = 16.92%). Muscle activity for the 2:1 ratio without a wrist rest is significantly higher (20.15%) than the 3:1 ratio without a wrist rest (5.77%) for the sternocleidomastoid. Overall, discomfort showed no significance.

P10.09

REVITALIZING A COMMUNITY COLLEGE OBSERVATORY

Brittany McGuire, James Stephens
Southwest Mississippi Community College, Summit, MS, USA

Southwest Mississippi Community College possesses a campus observatory donated in 1997 by Dr. Aubrey Nichols. The facility has 7" f/9 Astro-Physics Starfire telescope. The telescope is mounted on an Astro-Physics 800 series equatorial mount, which has an appreciable amount of damage. The observatory has had a few recent improvements including installation of a new weather skirt to the observatory dome and reconditioning the stairs leading to the observatory platform. The goal of this study is to assess the state of the observatory, including its environmental conditions, and to determine whether the type of repairs and modification (or possible replacement) required for the telescope mount, with an eye towards installing an electronic pointing system. This improvement will make the telescope more usable and will enable students to learn to operate it. This project has been set in motion for the benefit of the students and community as well as the future of Southwest Mississippi Community College.

P10.10

APPLICATIONS OF INERTIAL MICRO-ELECTRO-MECHANICAL SYSTEMS ON AMERICAN FOOTBALL PLAYERS AND EQUIPMENT

Derius J. Galvez

Aerospace Engineering Department, Mississippi State University, Mississippi. State, MS, USA

North American football players often hurt themselves because of incorrect football positions. The idea of using orientation sensing to help younger football players with football position development was studied in this research. This paper discusses how an orientation sensor can be created to help younger football players develop a better tackling position. After reviewing three inertial measurement devices, the raspberry pi coupled with a lis331 accelerometer was chosen. The MATLAB program reads the x, y, and z gravity components of the accelerometer and inputs them into the Euler angle equations. Once these angles were found, they were inserted into a flight path equation which was formulated into an orientation matrix. This allowed the sensor to measure the orientation of the football players. However, variance in the resolution of the sensor most likely occurred due to a mismatch of the input excitation voltage in the power surge which was 12 volts and the sensor's threshold voltage which was 3.3 volts. Further work must be done to enhance the signal output or sensitivity of the sensor.

Friday, February 24, 2017
MORNING
Room TC 228

Session IV: 8:20– 10:00 (Chair: Dr. A. Singh)

O10.15

8:20 LABEL FREE IDENTIFICATION SKBR3 CTC CELLS

Anant Singh[1], P.C. Ray[2], Afua A. Antwi-Boasiako[1]
[1]Alcorn State University, Lorman, MS, 39056, USA, [2]Jackson State University, Jackson, MS, USA

It is well demonstrated that GO with high surface area to volume ratio and are similar in size to biological macromolecule are promising candidate for the development of bio-sensing and imaging devices. Raman spectroscopy was proved particularly useful nondestructive tool for characterization of carbon-based materials because of the ability to monitor the structure of sp^2 networks, doping, defects, and chemical modifications. Raman spectrum of GO consists of prominent G peak near 1580 cm^{-1} due to the bond

stretching of all pairs of sp^2 atoms and intense D band near 1360 cm^{-1} associated with breathing modes of sp^2 atoms in rings. Herein we inspect the interaction between micrometer sized graphene oxide and the SKBR3 cell utilizing the properties of D and G Raman bands of GO. A major finding is that, these defect bands from graphene diminish and finally disappear depending on the time of incubation due to direct cellular penetration. This observation is based on the non-penetration properties of 532 nm light which was used to record the SERS spectra of GO-SKBR3 incubated samples. We observed that micron sized GO can penetrate the SKBR3 cells within 10 hours of incubation and consequently can detect at ~80 cells/mL SKBR3 cell line selectively. "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."

O10.16

8:40 AN UPDATED β-DECAY STUDY OF NEUTRON-RICH 77ZN USING PURIFIED BEAM OF 77CU

D. Siwakoti[1], S.V. Ilyushkin[2], J.A. Winger[1], C.J. Gross[3], K.P. Rykaczewski[3], J.C. Batchelder[4], L. Cartegni[5], I.G. Darby[6], C. Goodin[7], R. Grzywacz[5], J.H. Hamilton[7], A. Korgul[8], W. Krolas[10], S.N. Liddick[5], C. Mazzocchhi[11], S. Padgett[5], A. Piechaczek[12], M.M. Rajabali[5], D. Shapira[3], E.F. Zganjar[12]
[1]Mississippi State University, Starkville, MS, USA, [2]Colorado School of Mines, Golden, CO, USA, [3]Oak Ridge National Lab, Oak Ridge, TN, USA, [4]Oak Ridge Associated Universities, Oak Ridge, TN, USA, [5]University of Tennessee, Knoxville, TN, USA, [6]Katholieke Universiteit Leuven, Leuven, Belgium, [7]Vanderbilt University, Nashville, TN, USA, [8]Warsaw University, Warszawa, Poland, [9]Joint Institute for Heavy-Ions Reactions, Oak Ridge, TN, USA, [10]Polish Academy of Sciences, Krakow, Poland, [11]Universita degil Studi di Milano and INFN, Sez. Milano, Italy, [12]Louisiana State University, Baton Rouge, LA, USA

Study of the β-decay of 77Zn into 77Ga is presented with an update on the decay scheme and structure of 77Ga. The present study utilized a more efficient detector setup along with high purity of the 77Cu beam in comparison to previous studies. The purity of beam used prevented any member of the decay chain from being dominant and allowed for comparisons of branching rations between the decays. The greater efficiency of the HPGe detector array means more low energy γ-ray detection from the decays. The γ-γ and β-γ coincidence data obtained from the experiment were used to develop a revised decay scheme using an objective method. In this method, the standard Gaussian function was used to fit each peak in the γ-γ spectra to determine the peak area on both a peak gate and an adjacent background gate. This enabled us to identify the statistically significant γ-γ coincidence peaks to be used in developing the decay scheme.

O10.17

9:00 DETAIL β-DECAY STUDY OF NEUTRON RICH ^{75}GA ISOTOPE

U. Silwal[1], S. V. Ilyushkin[1], J. A. Winger[1], K. P. Rykaczewski[2], C. J. Gross[2], J. C. Batchelder[3], L. Cartegni[4], I. G. Darby[5], R. Grzywacz[4], J. H. Hamilton[6], A. Korgul[7], W. Krolas[7], S. N. Liddick[10], C. Mazzocchi[7], T. Mendez[2], S. Padgett[4], M. M. Rajabali[4], D. Shapira[2], D. W. Stracener[2], E. F. Zganjar[12]
[1]Dept. of Physics and Astronomy, Mississippi State University, Starkville, Mississippi 39759, USA, [2]Physics Division, Oak Ridge National Laboratory, Oak Ridge, Tennessee 37831, USA, [3]UNIRIB, Oar Ridge Associated Universities, Oak Ridge, Tennessee 37831, USA, [4]Dept. of Physics and Astronomy, University of Tennessee, Knoxville, Tennessee 37996, USA, [5]Instituut voor Kern-en Stralingsfysica, Katholieke Univrsiteit Leuven, Leuven, B-3001, Belgium, [6]Dept. of Physics and Astronomy, Vanderbilt University, Nashville, Tennessee 37235, USA, [7]Faculty of Physics, University of Warsaw, Warsaw PL 00-681, Poland, [8]Joint Institute for Heavy-Ion Reactions, Oak Ridge, Tennessee 37831, USA, [9]Institute for Nuclear Physics, Polish Academy of Sciences, Krakow PL 31-342, Poland, [10]National Superconducting Cyclotron Laboratory, Michigan State University, East Lansing, Michigan 48824, USA, [11]Universita degli Studi di Milano and INFN, Sez. Milano, Milan I-20133, Italy, [12]Dept. of Physics ans Astronomy, Louisiana State University, Baton Rouge, Louisiana 70803, USA

Pure ^{75}Cu beam was developed at the Holifield Radioactive Ion Beam facility (HRIBF) of Oak Ridge National Lab (ORNL) and b decay of the A=75 decay chain was studied using 4 High Purity Germanium detector (HPGe) clover detectors in the Low energy Radioactive Ion Beam Spectroscopy Station (LeRIBSS) set up. In our measurement, data on γ-ray emission following β decay, including βγ and γγ coincidences were obtained. Gated γγ spectra were analyzed to identify the statistically significant coincidences, and decay schemes have been developed for all daughter nuclei within the decay chain. Presented here is the case for ^{75}Ga b decay. We have been able to significantly increase the number of both energy levels and transitions. In our purposed decay scheme, a total of 36 energy level were established with the placement of 66 g rays. Out of the purposed 36 energy levels, we have been able to confirm 12 levels, which were identified in a previous b-decay study, as well as 8 levels which were observed in other types of measurements as indicated in the National Nuclear Data Center (NNDC) database. The remaining 16 levels are the totally new. In addition, we have removed 3 erroneous levels, modified the placement of a few g rays, identified several new g rays associated with the decay, and established many higher-lying energy levels.

O10.18

9:20 NEGATIVE REFRACTION AND SUPERRESOLUTION BY A STEEL-METHANOL PHONONIC CRYSTAL

Ukesh Koju[1], Joel Mobley[2]
[1]University of Mississippi, University, Mississippi, USA, [2]National Center for Physical Acoustics, University, Mississippi, MS, USA

Negative refraction and the associated lens effect in a two-dimensional (2D) phononic crystal (PC) were studied by numerical simulation using Finite Element Analysis (FEA). The phononic crystal consists of a hexagonal array of steel cylinders (r=0.4 mm) in a methanol matrix with a lattice constant of 0.5 mm, all surrounded by water. Transmission simulations of the pressure field show negative refraction of plane waves through a prism shaped crystal. Using a flat PC the super resolution lens effect was demonstrated by imaging a point source where the focal spot was smaller than the Rayleigh diffraction limit.

O10.19

9:40 THE RKKY INTERACTION FOR LINK VARIABLES ON THE SQUARE LATTICE

Huu Do, Kevin SD Beach
University of Mississippi, Oxford, MS, USA

A system of Ising spins living on the links of a square lattice in a background of tight-binding electrons is investigated for two cases: (i) zero field and (ii) applied magnetic field B != 0 such that a π flux flows through each square plaquette. In our model, the Ising spins modify the electronic hopping across each link—mimicking the Kane-Mele interaction. Integrating out the electrons gives rise to an effective Ruderman-Kittel-Kasuya-Yosida (RKKY) interaction between the Ising spins. For B = 0, this effective interaction is mediated by conventional band electrons occupying a Fermi surface, and for B != 0 by linearly dispersing Dirac fermions at a Fermi point. We report analytical and numerical results that highlight the differences between the two cases

O10.20

10:00 EFFECT OF TEMPERATURE ON THE STRUCTURE OF PROTEIN SEGMENT (hHV1) BY CG-MODEL

Ras Pandey[1], Sunita Subedi Paudel[1], Panisak Boonamnaj[2], Pornthep Sompornpisut[2], Warin Jetsadawisut[2], Sunan Kitjaruwankul[3]
[1]The University of Southern Mississippi, Hattiesburg,MS, USA, [2]Chulalongkorn University, Bangkok, Thailand, [3]Kasetsart University Sriracha Campus, Bangkok, Thailand

A coarse-grained (CG) computer simulation model as a function of temperature studies conformational response of a segment of a membrane protein (hHv1). Specificity of a residue is critical in understanding the prolific yet unique structures of a protein. Although the structural detail of a residue is ignored in our coarse-grained description, its specificity is captured by its unique interaction. Competition between the residue interaction and thermal agitation controls the complex structures of the protein. Using coarse-grained Monte Carlo computer simulations, we address how the residues of the protein hHv1 assembles or disperse as the temperature varies. Variations of the radius of gyration of the protein, mobility profiles, and contact maps of residues with the temperature will be presented.

10:20– 10:40 Break

Friday, February 24, 2017
MORNING
Room TC 228

Session V: 10:40 – 12:00 (Chair: Dr. J. Stephens)

O10.21

10:40 EMERGENCY PREPAREDNESS INTERACTIVE GAMES

HuiRu Shih, Ebony Davis, Michael Stevenson, Kawandrea Spann, Jarrett McElroy, Darius Miller
Jackson State University, Jackson, MS, USA

Emergencies often occur with little or no warning. No one is ever ready for an emergency but people can be prepared. Emergency management is the discipline of dealing with and avoiding both manmade and natural disasters. Jackson State University has established an "Emergency Management Technology" (EMT) program. The goal of EMT program is to train the future emergency management professionals to have the skills needed to manage a crisis, to help prevent the worst, and to improve outcomes in all types of disasters. Scratch is a graphically rich visual programming tool that makes it easy to create interactive stories, games, and animations. It is drag and drop which does not require writing code. Scratch can provide a great introduction to programming. Scratch can also provide an introduction to the kind of creative problem solving that programmers do all the time. This study exposed EMT major students to interactive media, an area that is unfamiliar to them. Students with no prior programming experience created interactive games. The interactive media created in this project needs to be used to help people prepare for emergencies and offer guidance in emergencies. This study investigated if people can reinforce the safety and preparedness messages by repeatedly playing those games. Computational thinking is a phrase that has received considerable attention over the past several years. The design-based learning activities enable students to create their own interactive media. This study investigated if designing interactive media with Scratch can support the development of computational thinking in students.

O10.22

11:00 DEVELOPMENT OF A TILT-FREE SEISMOMETER

Mohammad Afrough[1], Camillo Cocchieri[2], Veronica Leccese[2], Katherine Dooley[1]
[1]The University of Mississippi, Oxford, MS, USA, [2]University of Pisa, Pisa, Italy

Seismic noise is one of the major sources of noise at Laser Interferometer Gravitational-wave Observatory (LIGO). Isolating the system (e.g. interferometer mirrors) from ground motion reduces the seismic noise. Different sensors such as inertial sensors are used to monitor these disturbances and take part in a feedback or feedforward control system. The tilt-horizontal coupling in inertial sensors is one of the major problems for seismic isolation in low frequencies. The signal of inertial sensors is dominated by tilt motion at low frequencies and, the goal is to attenuate tilt motion. A solution could be using inertial rotation sensors and subtracting the tilt component from the signal of horizontal inertial sensors. But this solution is restricted by the noise level of rotational sensors. Another solution is to mechanically filter the transmitted tilt to the sensor. This method can produce a lower noise measurement. In this method, an inertial sensor is suspended and isolated from ground tilt. We designed and built a suspended seismometer. We applied a tilt motion to the system and measured the transfer function of tilt to the displacement of the suspended sensor.

O10.23

11:20 AN ELECTRONIC CIRCUIT DESIGN FOR CHILD SAFETY IN CARS AT HOT WEATHER

Michael C Ngahane, Aaliyah Sibley, Brian Buford, Lidya Worede, Lashay Williamson, Lufat Rahman, M. Ashraf Khan

Jackson State University, Jackson, MS, USA

Child safety in cars is an important issue in current times since there are child deaths reported in recent times due to an increased temperature in cars. Any warning system installed in the car can help save a child in danger. The cars coming into market can incorporate the feature that helps rescue children in such case. However, current car, which are going to be old ones and can be assumed to be in use for the next 10-15 years, do not have such feature. For the feature, we design an electronic circuit that will signal the driver to notify about the child in the car and, if it fails to do so, it also notifies the people outside the car that a child is in danger in the car. The proposition is that whenever the driver turns off a car, which has a child in the child car seat, some LED lights will starts flashing, after few seconds, it starts making buzzing sound as a primary response, and then it stops. The secondary response of the car child seat is to sense temperature inside the car. If the temperature is beyond the safe limit, it will start flashing and make buzzing sound to let the people nearby know that a child is in danger. In our design, we used diode as a sensor. To generate signals, Op-AMPs are used for an amplifier, comparator and oscillator. The final circuit is expected to help rescue children in hot cars.

O10.24

11:40 PREDICTING THE SCATTERING PATTERN BASED ON THE TIP-VOLUME OF THE PARTICLE

Jehan Seneviratne[1], Matthew Berg[2]
[1]Mississippi State University, Mississippi State, MS, USA, [2]Kansas State University, Manhattan, KS, USA

In this work, the effect of particle's internal field on its scattering pattern is explained using phasors. The scattering by wavelength-scale axially symmetric particles of different size, shape, and orientation are studied. The results show that the envelope of the power-law pattern can be produced using the tip-volume of the particle for the weakly refractive axially symmetric particles.

Friday, February 24, 2017

AFTERNOON

12:00-1:00 Plenary Speaker

1:00-3:00 Millsaps HHMI Undergraduate

PSYCHOLOGY AND SOCIAL SCIENCES

Chair: Gary Chong
Tougaloo Collge
Co-Chair: Mehrun Laiju
Tougaloo Collge

Thursday, February 23, 2017

MORNING
Room 229

O11.01

9:00 FORTIFICATIONS, MOBILITY, AND UNDERSTANDING PREHISPANIC WARFARE IN THE COLCA VALLEY, PERU

Lauren Kohut
Tougaloo College, Jackson, MS, USA

This paper examines the use of fortifications in monitoring access through strategic corridors during periods of warfare. Mobility is frequently examined in terms of interaction, confluence, and circulation. During periods of warfare, however, roads and paths can become arenas for the negotiation and control of people, lands, and resources, and thus bring into sharp relief the often tense politics of mobility. This paper draws on regional survey of Late Intermediate Period (A.D. 1100-1450) hilltop fortifications in the Colca Valley to examine the use of fortification to monitor and control mobility during a period of warfare. Methodologically, this paper uses a circuit-based approach to identify areas where regional travel would have been significantly more likely, and those where it would have been less likely- as a measure of landscape permeability. This spatial modeling of regional connectivity is used to examine the relationship between fortification placement and probable movement corridors at a regional scale. The results show how the topography of the high-altitude mountainous environment of the Colca Valley canalized possibilities for movement into several key corridors. It is clear that local groups strategically used fortifications to monitor and regulate access to the region, suggesting that control over mobility was a key component in the local defensive strategy. Using these results, I argue that evidence for surveillance and control of access to the valley indicates a coordinated defensive response to external threat in this region during the Late Intermediate Period.

O11.02

9:20 THE IMPACT OF STEREOTYPE THREAT IN TWO EDUCATION ENVIRONMENTS

Gabrielle Smith
Tougaloo College, Tougaloo, MS, USA

Research has shown stereotype threat to be an effective barrier to the educational pursuits of African American scholars. This dissertation examined the impact of stereotype threat on the academic performance of Black students attending two large public institutions in Alabama (one HBCU and the other PWI).Additionally, this research explored stereotype threat with special consideration to the possibility of potential moderators. The results suggest that stereotype threat not only impacts performance on items from GRE tests, but does so differentially for students depending on the type of institution they attend. Also, this research implies that GPA, aspects of racial identity and stigma consciousness serve as moderators of the relationship between stereotype threat and performance. Further research is needed to understand the mechanism(s) underlying stereotype threat as well as the individual differences or other mechanism(s) that buffer against or amplify the phenomenon.

O11.03

9:40 GRANDPARENTAL ACCEPTANCE AND ADJUSTMENT OF AFRICAN AMERICAN COLLEGE STUDENTS IN PARENT HOUSEHOLDS

Shaila Khan, Tougaloo College, Tougaloo, MS, USA

Relationships between perceptions of grandparental acceptance/rejection and psychological adjustment of 127 African American college students in Mississippi were investigated. A comparison between students who grew up in single-parent (N=74) and those in dual-parent (N=53) households was done. The majority perceived their grandmothers to be "Very Important" (91%) compared to grandfathers (62%). Grandmothers were more accepting compared to grandfathers ($t=2.96$, $p<.01$) for dual-parent household, while no difference was found in single-parent households. Results of simple bivariate correlations suggested that psychological adjustment was associated with perceptions of acceptance by grandmother ($r=.560$, $p<.01$) and grandfather ($r=.327$, $p<.05$) for dual-parent households, and only for grandmother ($r=.333$, $p<.01$) but not for grandfather ($r=.185$, $p=.143$) for single-parent households. Simple multiple linear regression analysis found that only acceptance by grandmother ($\beta=.518$, $t=4.22$, $p<.001$ for dual-parent, $\beta=.260$, $t=2.01$, $p=.04$ for single-parent) but not by grandfather contributed significantly to psychological adjustment. Even when effects of parental acceptance were removed, only acceptance by grandmother was found to contribute significantly to psychological adjustment. No statistical difference in regression relations was found between single parent and dual parent households. It may be concluded that while perceived acceptance/rejection by grandmother significantly impacts psychological adjustments of African American students for both dual and single parent households, perceived acceptance/rejection by grandfather does not. Perhaps the unique nature of the growing up family structure and closeness to grandmothers play a role in such relationship.

10:00-11:00 POPULATION HEALTH SYMPOSIUM II

Room-Ballroom II/III

Invited Keynote Speakers

Daniel Jones, MD. Department of Physiology & Biophysics and Medicine, UMMC

"OBESITY AND CHRONIC DISEASES"

Carol Connell, PhD. Department of Nutrition & Food Systems, USM

"FOOD INSECURITY AND POPULATION HEALTH IMPACT"

Therese Hanna, MHS. Executive Director, Center for Mississippi Health Policy, Jackson MS

"HEALTH POLICY AND IMPACT ON POPULATION HEALTH"

Joshua Mann, MD. Chair, Department of Preventive Medicine, UMMC

"MISSION, STRUCTURE, AND DIRECTION OF THE J.D. BOWER SCHOOL OF POPULATION HEALTH AT THE UNIVERSITY OF MISSISSIPPI MEDICAL CENTER"

Room TC 229

O11.04

11:00 BODY MASS INDEX, PERCEPTIONS AND HOME ENVIRONMENT: PARENT-CHILD COHORT IN HEAD START

Martha Ravola, Victor Njiti, Priscilla Houston
Alcorn State University, Lorman, MS, USA

The soaring rate of childhood obesity has become a national concern. Children from low income families are found to be more at risk for obesity than those from average income families. Almost one-third of children in preschool are either at risk or already obese. Even though multidisciplinary research teams are already addressing this issue, due to the enormity of the problem, the efforts have not significantly lowered the rate of childhood obesity. This is evident as the proportion of children at risk of obesity continues to remain high. The need therefore, is for more stringent preventive and educational programs that would sensitize families about the gravity of the problem and inculcate healthful behaviors that would prevent obesity. The current paper will focus on the efforts of one such study that was conducted in rural southwest Mississippi in selected Head start programs. The paper will focus on three main obesity-related aspects which are: (1) to assess the Body Mass Index of parents and children to determine the status of their body weight, (2) to elucidate their perceptions on childhood obesity and (3) to assess the home environment to identity risk and protective factors for obesity. The sample comprised fifty parents and child cohorts from three head start centers. The parent-child cohorts were assessed on anthropometric measures, perceptions on obesity and family environment for obesity related factors. The results obtained from the study will be examined to design sustainable interventions, design effective strategies to strengthen policy and reduce future childhood obesity rates.

O11.05

11:20 POST-PARTUM RATS WITH (HELLP) SYNDROME HAVE HEPATIC INFLAMMATION AND HYPERTENSION

Wisdom Randle[1], Cynthia Bean[2], Shauna Kay Spencer[2], Teylor Bowles[2], Kedra Wallace[2]
[1]Tougaloo College, Tougaloo, MS, USA and [2]University of Mississippi Medical Clinic, Jackson, MS, USA

Women with HELLP syndrome during pregnancy are to be at an increased risk of developing cardiovascular and immune related diseases compared to women with normal pregnancies. Therefore this study was to determine if rats with HELLP syndrome had increased immune activation and hypertension in the early post-partum period. On gestational day 12, mini-osmotic pumps infusing sFlt-1 and sEng are placed into rats to induce HELLP syndrome and were removed 12-24hrs post-delivery. Mean arterial pressure (MAP) was measured during postpartum days 33-40 and blood and tissue were collected to measure inflammatory cytokines via enzyme linked immunoassay and immune cells via flow cytometry. Rats with a history of HELLP syndrome had significantly increased MAP compared to NP rats. There were no statistically significant differences in circulating levels of sFlt-1 or sEng or in circulating levels of IL-6, TNFα or IL-1β between NP and HELLP rats. Local levels of the anti-angiogenic factor sFlt-1 in the liver were significantly increased in HELLP rats compared to NP rats. sEng levels were increased in HELLP rats compared to NP rats but did not meet statistical significance. Liver levels of the inflammatory cytokines IL-6 and IL-1β were significantly increased in HELLP rats compared to NP rats. Whereas, TNFα levels were not different between the groups. CD4 and CD8 immune cells were collected for flow cytometric analysis and results are pending. These data suggest that rats with a history of HELLP syndrome are hypertensive in the early post-partum period of time and have increased hepatic inflammation.

11:40am WORKSHOP: APPLYING TO GRADUATE SCHOOL IN PSYCHOLOGY
Gary Chong, Tougaloo College, Tougaloo, MS USA

12:00 -1:00pm General Sessions

Thursday, February 23, 2017
AFTERNOON
Room TC229

O11.06

1:40 PARENTAL ACCEPTANCE, ADJUSTMENT, RELATIONSHIP, ANXIETY, AND INTIMACY IN AFRICAN AMERICAN STUDENTS

Cynthia Lindsey[1], Shaila Khan[2]
[1]Northwestern State University, Natchitoches, LA, USA, [2]Tougaloo College, Tougaloo, MS, USA

Relationships among perceptions of parental acceptance/rejection, psychological adjustment, relationship anxiety, and fear of intimacy in African American college students in Louisiana and Mississippi were investigated. Questionnaires of adult versions of Parental Acceptance-Rejection (PARQ-Short Form) and Personality Assessment (PAQ), the Personal Information Form (PIF) (Rohner, 2005), Interpersonal Relationship Anxiety Questionnaire (Rohner Research Publications, 2011), and Fear of Intimacy (Descutner & Thelen, 1991) were administered to 268 college students (160 from Louisiana and 108 from Mississippi; 62 males and 206 females) who ranged in age from 18 through 58 years (mean=22.77, SD=5.76 years). Results of simple bivariate correlations suggested that fear of intimacy of African American students was associated with their perceptions of rejection by mother (r=.320, p<.001), father (r=.287, p<.001), psychological adjustment (r=.454, p<.001) and anxiety (r=.373, p<.001). Linear regression analysis found that rejection by mother (b=.229, t=3.28, p=.001), and father (b=.190, t=2.72, p=.007) contributed significantly to fear of intimacy. Rejection by mother (b=.271, t=4.06, p<.001), and father (b=.247, t=3.70, p<.001) were found to contribute significantly to psychological adjustment. Only rejection by mother (b=.390, t=5.97, p<.001), but not by father (b=.121, t=1.85, p=.066) contributed significantly to anxiety. However, when considered together, only psychological adjustment (b=.362, t=5.27, p<.001) but none of the perceived parental rejections contributed significantly to fear of intimacy. Also, maternal rejection (b=.279, t=4.52, p<.001) and psychological adjustment (b=.465, t=7.70, p<.001) but not paternal rejection was found to contribute significantly to anxiety. The conclusion is: a perception of parental acceptance determines fear of intimacy and anxiety in African American college students.

2:00 PANEL DISCUSSION: MODERN DAY SLAVERY/HUMAN TRAFFICKING

Gary Chong (moderator), Frederick Hunter, Shaila Khan, Meherun Laiju, Gabrielle Smith

Tougaloo College

2:30 Business Meeting

Thursday, February 23, 2017

EVENING

Ballroom II/III

3:30 Dodgen Lecture and Awards Ceromony
General Poster Session
Immediately Following Dodgen Lectuer

P11.01

EARLY LIFE REM SLEEP DEPRIVATION AFFECTS LEARNING ABILITIES IN YOUNG RATS

Alana Knowles[1], James Shaffery[2], Sorsha Morris[2], Amanda Blackwell[3]
[1]Mississippi INBRE, Decatur, MS, USA, [2]The University of Mississippi Medical Center, Jackson, MS, USA, [3]Summer Undergraduate Research Experience, Jackson, MS, USA

Rapid Eye Movement (REM) sleep is imperative to all human life as many neurochemicals and hormones follow a circadian release. In a previous electrophysiological study conducted by Dr. James P. Shaffery, changes were discovered in the hippocampus of rats that had been sleep deprived in early developmental years. We are furthering our research showing that REM sleep deprivation on young rats can affect brain maturation and development as they age, specifically in the hippocampus that regulates learning and behavior. To test this hypothesis, we ran sleep deprivation on immature rats 4 hours a day for four days straight. We compared the rats against controls with several tests: play behavior, novel object recognition, open field tests, adult ultrasonic vocalizations, novel place recognition, and novel object response. We will use the results to gauge how their behavior, memory, and learning abilities were impacted by the REM sleep deprivation (REMSD). We predict that the experimental rats will display abnormal memory and behavioral changes in comparison to non-REMSD rats. If this hypothesis is supported by pending results, it would suggest that sleep deprivation on children and young adults can be detrimental to their learning behavior.

P11.02

GEOSOCIAL NETWORKING AND RISKY SEX AMONG MEN WHO HAVE SEX WITH MEN

Curtis Hooks, Elicia Lair, Alan Gross
University of Mississippi, Oxford, Mississippi, USA

Men who have sex with men (MSM) often use smartphone geosocial networking applications (GSN apps) to meet sex partners. Research suggests that use of GSN apps may contribute to sexual-risk taking, as they establish a great availability of MSM (via location-based technology) and facilitate relatively easy sexual partnering (via instant notifications). Sexual sensation seeking (SSS) has also been identified as sexual-risk factors among MSM. SSS is the propensity to seek out varied and novel sexual experiences to enhance sexual sensations, despite risk or negative consequences. The aim of this study was to investigate the moderating effect of GSN app use on relationships between SSS and several risky sexual behaviors. Four-hundred and twenty three MSM completed measures through various social networking websites (e.g., Reddit, Facebook, etc) assessing demographics, app use, SSS, and several risky sexual behaviors. Data revealed that app use was predictive of reported recent male sexual partners. SSS was found to predict recent and lifetime male sex partners, as well as receptive unprotected anal intercourse. However, app use did not moderate relationships between SSS and any of the sexual-risk behaviors. The results suggest that GSN app use and SSS may influence sexual-risk taking among MSM. However, more research is needed to understand associations between GSN app and other sexual-risk factors.

P11.03

EXAMINING THE RELATIONSHIP BETWEEN PREJUDICIAL ATTITUDES AND PROSOCIAL BEHAVIORS AT AN HBCU

Nuha Fara, Theresa Kearns-Cooper
Jackson State University, Jackson, MS, USA

This study aimed to examine the relationship between prejudicial attitudes and prosocial behaviors with an African American population. The intent of the study was to see whether prejudicial attitudes had a significant effect on bystander intervention during times of need. It was hypothesized that people who endorse prejudicial attitudes would be less likely to help stigmatized individuals during times of need, that people who victim blame or devalue the victim would be more likely to diffuse the responsibility onto others, and that they would be more likely to intervene if the rewards outweighed the costs. A sample of 87 African American college students an Historically Black University (HBCU) participants will be analyzed using a Person's Product-Moment Correlation Coefficient (Pearson's r) to test the link between prejudicial attitudes and prosocial behaviors.

P11.04

THE IMPLICATIONS OF RACE AND ETHNICITY IN THE SITUATIONAL LEADERSHIP MODEL

Frederick Hunter
Tougaloo College, Tougaloo, MS, USA

Leadership management has been an integral part of society as formal organizations prepare to deal with challenges and their ability to meet maximum productivity within the workspace. The Hershey-Blanchard Situational Leadership Theory (SLT) is one model that has been used within a number of workplace environments to meet efficiency and productively in the leader-worker model. SLT model is a proposed perspective of leaders (superiors) quickly assessing workers (subordinates) maturity and ability levels to provide the correct and appropriate supportive and directive leadership technique in the workplace. On its surface, this model serves as an effective tool to quickly assess the leadership technique necessary to motivate workers. However, there has been conflicting reviews on the utility of this model with some researchers critiquing the model as ineffective because it places too much emphasis on the leader and little emphasis on the worker. On the other hand, researchers have found the model to be especially effective within educational settings, yet have neglected to understand the implications of how racial and ethnic differences between leaders and followers influence the application of the various approaches. This research argues that this model dismisses the role that race and ethnicity plays in accessing ability and maturity of the worker. Using the educational setting as a site for studying the implications of racial differences this research intends to illustrate how the difference in the race and ethnicity of managers and workers may contribute to the ineffective application of the SLT model on the part of leaders.

P11.05

FACTORS ASSOCIATED WITH SEXUAL INTERCOURSE ACTIVITIES AMONG TEENAGERS: AN EXPLORATORY STUDY

Janesia Smoots, Frederick Hunter
Tougaloo College, Tougaloo, MS, USA

Teenage sexual intercourse continues to rise as we observe younger and younger children engaging in these practices. This is of grave concern as we think about the implications of sexual intercourse on young people and the potential harm faced by engaging in sexual activities-teenage pregnancy and exposure to STIs and STDs. This study aims to examine the relationship between teenagers sexual practices and factors (e.g., the media, peers, and parental and sibling influences) which may encourage or discourage early sexual experimentation. The study surveys 80 participants, all

freshmen, from a small private liberal arts college. The data will be analyzed using chi-square statistical analysis.

P11.06

PARENTAL MOTIVATION FOR CHILDREN'S PARTICIPATION IN ORGANIZED SPORTS: AN EXPLORATORY STUDY

Valencia Bonds, Frederick Hunter
Tougaloo College, Tougaloo, MS, USA

The participation of children in organized sports has been noted to serve a positive function in the development of children's self-esteem and growth. Most notably, research has pointed to the reduction in childhood obesity, juvenile delinquency rates and an increase in a child's social development. However, little research has aimed to consider the influence that parental perceptions of the characteristics that children develop in organized sports contribute to the decision to encourage sports participation among young children. This study aims to investigate how adult's perceptions of potential characteristics from organized sports participation influences parent's decision to encourage sports among children. The study surveys 80 participations, faculty and staff, at a small private liberal arts college in the South. The data will be analyzed using chi-square statistical analysis.

P11.07

MINDFULNESS AND SPIRITUALITY AS PREDICTORS OF RISKY SEXUAL BEHAVIOR

Brandon Nash, Taunjah Bell
Jackson State University, Jackson, MS, USA

The purpose of this study was to examine whether mindfulness and spiritual beliefs influence the risky behavior of African American college students. The participants were 52 predominantly African American students between the ages of 18 and 40 from a historically Black university. Each participant completed the Expressions of Spirituality Inventory (ESI), the Mindful Attention Awareness Scale (MAAS), and the Sexual Risk Scale (SRS). The ESI measured the participants' personal beliefs about the existence and relevance of spirituality. The MAAS assessed the participants' tendency to think and behave mindfully in their daily life. The SRS evaluated the participants' beliefs regarding risky sexual behavior. I predicted that higher spirituality and mindfulness scores would be correlated with lower risky sexual behavior scores while lower spirituality and mindfulness scores would be correlated with higher risky sexual behavior scores. The data were analyzed using a linear multiple regression analysis. The results from this study did not support the original hypothesis that mindfulness and spirituality would predict the likelihood of participating in risky sexual behavior (R^2=. 05). The findings suggest that individuals who score high on instruments that measure the more reflective and meaning-producing aspects of spirituality are more likely to participate in risky sexual behavior. Also, this study revealed a moderately strong positive correlation between spiritual beliefs and mindfulness (r=. 33; 95%CI).

P11.08

HOW DOES VIOLENCE IMPACT THE EMOTIONAL STATE OF AFRICAN AMERICAN COLLEGE STUDENTS?

Jazmine Hopson, Gabrielle Smith
Tougaloo College, Tougaloo, USA

This research seeks to better understand the affective impact of viewing violent actions on mood and aggression. Participants were exposed to two different scenes from the popular television show Empire. The interaction was either a violent altercation between Jamal and Hakeem or a touching interpersonal interaction between the brothers'. Within the violent altercation the brothers engage in a physical brawl prompted by a misunderstanding between the two. In the touching video the brothers are expressing love and support for each other. The videos were then followed with two questionnaires measuring mood and level of aggression "The Aggression Questionnaire and "The Positive and Negative Affect Schedule (PANAS)".The data was collected from a sample of volunteer student participants from a Historically Black College or University (HBCU) in the Jackson area. The results of this study will be analyzed through ANOVA using version 17 of SPSS. It is hypothesized that viewing the violent videos will induce more negative affect and a report of more aggressive tendencies.

P11.09

PROBLEMS OF CONSTRUCT VALIDITY AND MEASUREMENT BIAS IN STUDIES OF INTERPERSONAL TRUST

Gracey Belote
Millsaps College, Jackson, MS, USA

Although trust is a concept that is quite common and very familiar, there has not been extensive research about how trust works, how it impacts our lives, or what its neural correlates are. There also seems to be no standard definition of what trust is. Differing definitions can be found across fields such as psychology, sociology, economics, philosophy, and systems theory. Although there are a variety of definitions for trust, the operational measurements of trust remain almost entirely limited to self-reported attitudinal surveys and economic exchange/prediction games (with the exception of only one study that used a design relating to the protection of personal information). This poster will lay out the importance of researching trust, explain the three types of study designs that are exclusively used in studying trust, critique the methods and operational definitions used in those studies, and begin creating a foundation for new and more scientifically accurate ways to measure trust in future research. After a critical analysis of studies using each of the methods previously mentioned, it was found that the methods of these studies seem to possess issues with construct validity, specifically related to both the mono-method bias and "ease-of-measurement" bias.

P11.10

ENHANCING EXPOSURE THERAPY WITH ARACHNIDS

Andrew Thaw, Kayla Pavlick
Millsaps College, Jackson, MS, USA

Fear and phobias are treatable. However, some treatments are better than others. Exposure therapy is commonly employed to gradually bring people into closer and closer contact with their fear as a way to overcome it. The way in which the fearful stimuli is introduced may be an important part of the therapy. In this study we explored the effects of exposure therapy in treating participants who expressed a fear of arachnids. Specifically, a live tarantula and a large scorpion were used as stimuli. Participants were randomly placed into one of two groups. Each participant underwent a modified form of exposure therapy in which they attended fourteen sessions of increasing exposure levels to the arachnids. Even numbered sessions were tarantula-related, while odd numbered sessions were scorpion-related. Participants were divided into Group 1, which was not given any additional information during exposure, or Group 2, who were given answers to all of their questions pertaining to the animals during the exposure session. Heartrates were measured before the stimulus and after the exposure session as a measure of general sympathetic nervous system activity. Results reveal significant reductions in Heart Rate following the exposure session for the group that asked questions ($t=7.57$ $p<0.01$). There were no significant differences in heart rate between the two groups prior to the session starting. We conclude that during exposure therapy a critical factor in reducing fear may be the collection of information on the fearful stimuli.

P11.11

INVESTIGATION INTO GRIT AND ACADEMIC HABITS

James Kelley Gunn, Melissa A. Lea
Millsaps College, Millsaps College, USA

GRIT can be described as a characteristic that describes the mental stamina of an individual. GRIT has been shown to be correlated with academic performance, athletic toughness, and persistence to goal. Using an online survey, the current study predicted a positive relationship with GRIT and study habits in college students. That is, students that with GRIT have study habits that have been proven to get good grades. In addition, we hypothesized that those with a higher GRIT score would have a higher GPA. Our survey results confirm our hypothesis. Previous studies have shown that you can train GRIT, so our plan is to train students in their freshmen year with the proposed outcome of higher GPA and better study habits over their four years in college. Discussion of theoretical models and future research will be provided.

P11.12

LAMOTRIGINE INDUCED QTC PROLONGATION: A CASE REPORT AND LITERATURE REVIEW

Chasity Torrence, Jon Jackson
University of Mississippi Medical Center, Jackson, MS, USA

QTc is a rate-corrected QT interval measurement for cardiac repolarization. Many psychotropic medications are known to prolong this interval which can lead to torsade de pointes, a life-threatening polymorphic ventricular tachyarrhythmia. Known QTc prolonging agents include anti-psychotics (specifically ziprasidone and thioridazine), tricyclic anti-depressants (specifically maprotiline and desipramine), and selective serotonin and norepinephrine reuptake inhibitors such as venlafaxine. Like the above drugs' mechanisms contributing to prolongation of the QTc interval, lamotrigine and phenytoin inhibit the human cardiac delayed rectifier potassium current in vitro. According to a literature review, lamotrigine, when used as an anti-convulsant for epilepsy, a mood stabilizing agent for bipolar depression, or an adjunct treatment for major depression, has not been associated with cardiac abnormalities. In a study published in the British Journal of Clinical Pharmacology, the conclusion remained that therapeutic doses of lamotrigine were not associated with QTc prolongation in healthy subjects. The same study went a step further to suggest that lamotrigine does not seem to be associated with QTc prolongation in situations of overdose. However, this case report rebukes this conclusion that lamotrigine does not contribute to QTc prolongation in scenarios involving supratherapeutic doses. When such scenarios are combined with unhealthy subjects with risk factors including pre-existing cardiovascular disease, age over 65 years, bradycardia, female sex, electrolyte abnormalities, or simultaneous administration of other repolarization delaying drugs, the risk for QTc prolongation is even greater. This case report represents one of several incidents in the literature supporting a conclusion that supratherapeutic levels of lamotrigine adversely affect cardiac conduction.

P11.13

MILLENIAL MUSINGS: THE INFLUENCE OF RACIAL IDENTITY ON MUSIC CONSUMPTION BEHAVIORS AMONG MILLENIALS

Rasaan Turner
Tougaloo College, Detroit, Michigan, Usa

Contemporary racial/ethnic discourse, particularly those that consider post-raciality, are often limited by two factors that harbor a comprehensive understanding of the phenomenon. Firstly, Millennials are frequently referred to in the media as a monolithic entity that believes America has entered a "post-racial" state; this is a conflicting notion in that the voices of different groups within the Millennial Generation, particularly Black millennials, aren't being considered. Without gaining the perspectives of every race within America, who exactly gets to decide if America is "post-racial" or not? Secondly, "post-racial" discourse is often bound to a political scope and does not consider other cultural factors. The implications of living in a "post-racial" America don't just lie in legislation, but also how people mingle with different languages, organize by racial affiliation, and even how people spend their money. My research seeks to address the lack of empirical evidence of "post-racial" America with both of these concerns in mind. In my investigation, I study the position race holds in music consumption among members of the Millennial generation. Specifically, does race factor into the genre preferences, artist preferences, frequency of listening, and buying habits of music among Millennials; and if so, for what reasons? I contend that race holds a major significance for Millennials and that this significance can be exhibited by the music that they consume every day.

P11.14

BULLYING AND PERCEPTIONS OF SKIN TONE IN AFRICAN AMERICAN COLLEGE STUDENTS

Amanda Dortch[1], Karen Kellum[2], Emmie Hebert[2]
[1]Tougaloo College, Tougaloo, MS, USA, [2]University of Mississippi, Oxford, MS, USA

The purpose of this study was to focus percentage of college students who have been victims of bullying and how they perceive their own skin tone as well as the different shades of skin tones. A previous study revealed through the doll study conducted by Clark and Clark (1947), that children showed a preference for lighter skin. The participants recruited for the study will be African American college students. Participants will be asked to answer a questionnaire that will ask about whether or not they have had any prior experiences with bullying, how often they were bullied, what type of bullying they have experience, and why they were bullied. They will be questioned as to whether or not skin tone was a factor in the reason they were bullied. Following the questions about bullying, the participants will be asked how satisfied they are with their own skin tone and will then be asked to identify their own skin tone. Once the questionnaire is completed they will be given a series of vignettes that concern bullying situations involving skin tone. The completion of the skin tone section of the questionnaire will reflect whether or not there is a skin tone preference among the participants. This study analyzes the amount of students who have and have not been bullied, and, how the students who have been bullied view their own skin tone.

P11.15

SOCIO-DEMOGRAPHIC CHARACTERISTICS AND NATURAL DISASTER PREPAREDNESS AMONG MISSISSIPPI RESIDENTS

Irenia Ball, Meherun Laiju
Tougaloo College, Tougaloo, MS, USA

This paper presents a survey report about Sociodemographic Characteristics and their association with Natural Disaster preparedness among Mississippi residences. Structural Functionalism was used as a theoretical framework. The hypotheses that were considered for the study were: 1.) Participants gender would have an association with preparedness of Natural Disaster, 2.) Ethnicity would have an association with preparedness of Natural Disaster, 3.) Participants family structure would have an association with preparedness. The data were collected by the survey method. The instrument used consisted of ten items that indicated natural disaster preparedness. Convenience sampling strategy was used to select participants. One hundred individuals who are residents of Mississippi participated in this study. The results are pending.

P11.16

TELEVISION REPRESENTATIONS AND PERCEPTIONS OF AFRICAN-AMERICANS

Keneisha Tucker, Frederick Hunter
Tougaloo College, Tougaloo, MS, USA

African Americans are often portrayed on television unfavorably. According to previous research, television often presents African

Americans in stereotypical roles. These unfavorable representations can have an influence on the perceptions of viewers. Research indicates that television viewers have used these images as indications of real portrayals of life and of others, causing viewers to rely on these stereotypical images in face-to-face interactions. Although prior studies have considered the impact that these images have had in the minds of people different from the images, little research has considered how images of African Americans have influenced the perceptions of African Americans. This proposed study was designed to focus on the portrayals of African Americans on television. This study focused on the positive and negative representations, and considered how these portrayals have influenced individuals' perceptions of African Americans. This study used Cultivation Theory and Theory of Hyper reality to provide a framework for understanding how to develop the questionnaire and a glimpse into what should be expected within my analysis. The dependent variable for this study was the attitudes towards the portrayal of African Americans on television. The independent variables were participants' classification level, gender, and how much the participants watch television. In order to test this study, a survey was conducted, which included a sample of 80 participants from a small private college. The questionnaire was used to examine the perceptions of these African American portrayals on television. Cross tabulation and Chi square were used for statistical analyses of the data.

P11.17

THE RELATION BETWEEN AGGRESSION AND CORPORAL PUNISHMENT AMONG AFRICAN AMERICAN STUDENTS

Kelslyn Williamson, Shaila Khan
Tougaloo College, Tougaloo, MS, USA

The purpose of the study was to measure aggression in relation to corporal punishment among African American college students. Corporal punishment is a common discipline technique in the African American community, and in certain cases corporal punishment has been said to be the reason for aggression in many adolescents. Corporal punishment used by African Americans parents are often combined with nurturance and support that includes firm behavioral expectations and monitoring. African American parents display a different style characterized by warmth, support, and high levels of control that are associated with physical restraint and corporal punishment. Research suggest that this type of parenting by African Americans is widely prevalent and seems to be related to positive child outcomes (Lansford,2010), however not enough research has been aimed to explore the outcomes of college students regarding corporal punishment and aggression. It was predicted that corporal punishment may not cause aggression, however extreme corporal punishment, such as kicking, punching, and slapping may cause aggression. I collected data by using a questionnaire designed by Buss, A. H. & Perry, M. P. The Aggression Questionnaire and a Corporal Punishment questionnaire powered by SurveyMonkey.com. A convenience sample of 80 students from a Historically Black College/University in the Jackson, Mississippi Metro area participated in this study. Results were analyzed using SPSS Statistics. This research is ongoing.

P11.18

AGE, GENDER, AND RISK OF SUBSTANCE ABUSE AMONG EMERGING ADULTS

Lyser Selmon, Gary Chong
Tougaloo College, Tougaloo, MS, USA

Substance Abuse among college student has become more popular in recent years. This epidemic has effected college students in varies ways. This purpose of this study was to examine any differences in risk of substance abuse that may have to do with age and gender. A convenience sample of 80 students (emerging adults) from the campus of two Historically Black College/Universities (HBCUs) and other local colleges and universities in the Jackson-Metro area. It was predicted that there would be significant differences in substance abuse risk when comparing between age groups and genders. The Core Alcohol and Drug Survey (CADS) will measure the risk of substance abuse among participants. An ANOVA will show any variation of risk among college student groups (age and gender). This research is on-going.

P11.19

PERCEPTION OF SEXUAL HARASSMENT IN THE WORKPLACE

Valerie Scott, Frederick Hunter
Tougaloo College, Tougaloo, MS, USA

Sexual harassment is an ethical issue, primarily, ignored in society today. Although federal laws were enacted to protect employees from sexual harassment, the problem is still prevalent in the workplace. Prior studies have revealed that sexual harassment is common in the workplace and often goes unnoticed. The aim of this study was to gain an understanding of how college students perceive sexual harassment in the workplace. Its purposes were: to analyze what students think constitutes sexual harassment in the workplace and to analyze sexual harassment awareness among college students. The results of this study may increase the understanding for some factors which contribute to either the lack of awareness or increased perceptions of sexual harassment in the workplace. In this study, the dependent variable was the perception of sexual harassment in the workplace. The independent variables were gender, college classification, and employment status. A convenient sample of 80 students from a small private college were surveyed. The questionnaire was given to students in the college's library. The data is being analyzed using cross tabulation and Chi-square to examine the association between the dependent variable and the independent variables. Results are pending.

P11.20

SOCIAL MEDIA SITES USAGE, RELATIONSHIP SATISFACTION, AND INTERNET DEPENDENCY

Shekita Weddington, Gary Chong
Tougaloo College, Tougaloo, MS, USA

This study focused on the relationship of social media site usage to relationship satisfaction and internet dependency among college students. Previous studies have revealed that social media usage does not have a significant association with relationship satisfaction and internet dependency. The purpose of this study was to examine any correlation between social media sites usage on internet dependency and interpersonal relationship satisfaction. It was hypothesized that individuals aged 18-30 who use social media sites, would show significant increase in relationship satisfaction and internet dependency. The independent variable was social media site usage and the dependent variables were relationship satisfaction and internet dependency. Each participant was given a four-item demographic form and two questionnaires. The first questionnaire contained 27 items from the Internet Addiction Test (IAT) dealing with the measures of addictive use of Internet. The second questionnaire was the Relationship Satisfaction Scale. The data was collected from a convenience random sample of 80 volunteer student participants from a Historically Black College/University (HBCU) in the Jackson, Mississippi area. Statistical analyses of the data are being conducted using the t-test and ANOVA.

P11.21

EFFECTS OF EXERCISE ON DEPRESSION AND ANXIETY LEVELS OF COLLEGE STUDENTS

Arnissayur G Robinson, Gary Chong
Tougaloo College, Tougaloo, MS, USA

This study examined exercise effects with depression and anxiety among college students. Depression and anxiety are among the most prevalent psychological disorders in the general population and among young adults. The seriousness of these disorders determines

whether people seek help or receive treatment. Experiences with depression and anxiety levels are not the same for all, which can account for why treatments may vary across individuals. Many researchers have studied exercise as something that may help alleviate the levels of these disorders or even prevent them from occurring. Exercise is something that is offered to college students all over the world by their institutions. Results of this study may contribute to the understanding and treatment of depression and anxiety among young adults. It is hypothesized that students who exercise will have significantly lower levels of depression and anxiety. The independent variable in this research is exercise, and the dependent variables are depression and anxiety levels. A convenient random sampling method will be used for this research. Two questionnaires will be used to survey 80 students that attend a HBCU in the Jackson, Mississippi metro area. One of the questionnaires is the Beck's Depression Inventory (BDI), which contains 21 questions. The other questionnaire is the State-Trait Anxiety Inventory (STAI), which contains 20 questions. Statistical analysis of the data will be conducted using the t-test.

P11.22

EXPOSURE TO VIOLENCE INCREASES LEVELS OF AGGRESSION AMONG COLLEGE STUDENTS

Danerika Holloway, Shaila Khan
Tougaloo College, Tougaloo, MS, USA

College students deal with aggression and violence on a daily basis. Violence can increase aggression of college students who display physical and verbal aggression in altercations with others. The increasing of violence among college campuses can escalate daily. The college campus crime rate is far lower than national crime rate (Yang & An, 2013). Previous studies have revealed that even though colleges are seen as an aggression free environment, colleges are not free of aggressive behavior and violence and the presence of campus violence still remains undeniable (Yang & An, 2013). Media, community and domestic violence are all types that college students face on a daily basis. The purpose of this study is focused on how levels of aggression is increased due to exposure of violence. It is hypothesized that once a student is exposed to a violent situation, whether community, media, or domestic, their levels in aggression increases. The independent variable for the study was violence and the dependent variable is aggression. Research participants for this study is conducted by a brief review of the recent and past violence that's happened over the years and followed by a 2-page questionnaire about Aggression and another 2-page questionnaire based on Violence. The Aggression Questionnaire (Buss & Perry 1992) and the Attitudes Toward Violence Scale (Benjamin, Wood, & Bonacci, 2006) was administered to a sample of 80 African American undergraduate males and females between the ages 18 to 26 and 40. Statistical analysis of the data will be conducted using correlation coefficient.

P11.23

DIFFERENCES IN POST-TRAUMATIC STRESS DISORDER ON WAR VETERANS AND NON-WAR VETERANS

Joi Harris, Shaila Khan
Tougaloo College, Tougaloo, MS, USA

Frequently, army individuals return home and have major breakdowns. Soldiers usually experience Post Traumatic Stress Disorder (PTSD) while deployed or conducting intense training. PTSD can be defined as a mental condition that is triggered by a/or terrifying event(s). These events could include flashbacks, bad dreams, and/or bad thoughts. There are five different types of PTSD such as are normal stress response, acute stress disorder, uncomplicated PTSD, comorbid PTSD, and complex PTSD. After a traumatic event, most people have painful memories. For many people, the effects of the event fade over time. But for others, the memories, thoughts and feelings do not go away - even months or years after the event is over. If stress reactions do not improve over time and they disrupt everyday life, it is important to seek help to determine if PTSD is present. The purpose of this study was to determine PTSD levels between War Veterans and non-War Veterans. Data were collected by using a questionnaire designed by Weathers, Litz, Palmieri, Marx, and Schnurr (National Center for PTSD) as a measure of the 20 *DSM-5* symptoms of PTSD. Eighty males and females within 18 up to 65 years of age who were army veterans and non-army veterans were administered the questionnaire. It was hypothesized that army veterans will experience higher levels of PTSD than other non-army veterans. The independent variable of the study is types of veterans and the dependent variable was the PTSD. A t-test will be used to test the hypothesis.

P11.24

CHILDHOOD TRAUMA AND EFFECTS ON PERSONALITY

Kwamequa Ezell, Shaila Khan
Tougaloo College, Tougaloo, MS, USA

The purpose of this study is to see if there is an effect on personality due to childhood trauma Researchers have found that people who have experienced childhood trauma are more likely to be diagnosed with personality disorders or borderline personality disorder. (Allen & Lauterbach 2007). Can that distinctive character be affected by traumatized events brought up as a child? Could this be the reason why a person's personality makes a 360 from them when they are a child to adulthood? Instead of studying both females and males, researchers have studied females because of the statistics shows that females are more at high risk to have gone through trauma than males. But females could be the ones to report their traumatic events to public knowledge. Men hardly report trauma unless it involves death or an accident. The first hypothesis for the study states that there is no difference between childhood trauma among gender. The second hypothesis states that people experiencing childhood trauma will vary in big five personality dimensions. The independent variable for the study was childhood trauma and gender and the dependent variable is the score in the Big-Five Personality Inventory. The questionnaires used were the Childhood Trauma Screening and The Big-Five Personality Inventory. The participants were one-hundred African American undergraduates of which fifty were males and fifty females 18 years of age and older. T tests and Pearson correlations will be used to test the two hypotheses.

P11.25

LEVELS OF EMOTIONAL INTELLIGENCE IN ADOLESCENCES WITH ATTENTION DEFICIT HYPERACTIVE DISORDER

Micah Gains, Shaila Khan
Tougaloo College, Tougaloo, MS, USA

Attention deficit hyperactive disorder (ADHD) is the most prevalent chronic medical condition affecting children and adolescents in the United States (CDC, 2016). More than 6.4 million children as of 2011 have been diagnosed with ADHD. It impacts how adolescents navigate their emotions, organize priorities, interpret the world around them and complete tasks. Research suggests that children/young adults with ADHD poorly identify and regulate their emotions when compared with children/young adults who do not have ADHD (Climie, 2012). The ability to regulate, understand one's emotions and the emotions of others has been referred to as Emotional Intelligence (EI) after the work of Salovely and Mayer (1990). There's paucity of information to assess if children/young adults with ADHD, truly have a lower level of Emotional Intelligence. The purpose of this study is to identifying the levels of EI in adolescents with ADHD. The IV is ADHD and no ADHD and the DV is the EI. It was hypothesized that adolescents with ADHD will have a lower level of EI significantly in the sub set areas of emotional regulation and self-awareness compared with adolescent without ADHD. Using both a modified Emotional Intelligence Questionnaire developed by the National Health System (NHS) and personal interviews, data was obtained. Participants ages

ranged from 12 to 25 years old consisting of both males and females residing in Mississippi who are medically diagnosed with ADHD. Using t test the difference level of EI between adolescents with and without ADHD will be analyzed. The study is in progress.

Friday, February 24, 2017
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-	Millsaps HHMI Undergraduate Symposium

SCIENCE EDUCATION

Chair: Christine McDaniel
Mississippi State University

Vice-Chair: Elizabeth Prewitt
Mississippi State University

Thursday, February 23, 2017

MORNING

TC 218A

O12.01

8:00 USING SCIENCE MODELS TO ENHANCE LEARNING IN THE CLASSROOM AND LABORATORY

Johnny Mattox, Elizabeth Prewitt

Blue Mountain College, Blue Mountain, MS, USA

"Scientists use models to represent their current understanding of a system (or parts of a system) under study, to aid in the development of questions and explanations, and to communicate ideas to others" (Framework for K-12 Science Education: Practices, Crosscutting Concepts, and Core Ideas). Use of models in teaching the natural sciences has long been a common practice. The effectiveness of use of models, representations of the real object or concept, has been well documented in the literature. Increased use of models in the biological sciences can result in increased learning and understanding of concepts as well as greater retention of materials that may pose more difficulty for some students to grasp. For example, models of anaerobic respiration, aerobic respiration, and photosynthesis can enhance student learning when used in conjunction with interactive lecture and discussion as pedagogical methods of instruction.

O12.02

8:15 GIVERNY SCIENCE STORYBOOKS: ENGAGING ELEMENTARY STUDENTS IN SCIENCE EXPLORATION AND CONCEPT IDENTIFICATION

Renee Clary

Mississippi State University, Mississippi State, MS, USA

Founded by the 15 Degree Laboratory in 1998, the Giverny is awarded annually to both the author and the illustrator of the best children's science story book. The award is named for Claude Monet's gardens at Giverny, through which Monet meticulously illustrated seasonal changes and the natural environment. The award-winning books, which target the youngest readers (ages 4-8), must contain characters and a plot, meritoriously integrate artworks within the story, and teach at least one important science concept. This research probed the appropriateness and effectiveness of Giverny-winning books (N = 18) in elementary science classrooms. In addition to an apparent science-literacy connection, several scientific concepts that are included in the winning books were identified. Many of these concepts are typically introduced in lower elementary grades, such as seed germination, plant life cycles, seasonal changes, biodiversity, camouflage, and human influences on our planet. This research demonstrated that Giverny books can be effective at all stages of the 5E cycle, by 1) engaging students with scientific concept identification; 2) promoting further exploration of introduced concepts; 3) providing supporting evidence in explanation; 4) extending classroom investigations; and 5) evaluating scientific concepts through student-generated products.

O12.03

8:30 POTENTIAL IMPACTS OF ONSITE WASTEWATER TREATMENT ON SENSITIVE MISSISSIPPI COASTAL WATERS

Bailey Rainey, Veera Gnaneswar Gude, James Martin, Dennis Truax

Mississippi State University, Mississippi State, MS, USA

Assessment of water and wastewater quality is crucial to safeguard public health and the environment. However, water quality data on fresh and marine waters in the Mississippi coastal region, especially in Jourdan watershed are still sparse and uncoordinated. Therefore, monitoring these parameters is important for safety assessment of the environment and human public health and the water bodies. This research concerns about the water quality of sensitive water bodies (tributaries) in Jourdan River watershed which could have a potential impact from the wastewater discharges of small communities. These tributaries were named "Priority Creeks" due to impairments. They are namely Orphan creek, Bayou Bacon, and Bayou La Terre. Five communities surrounding these water creeks were selected to evaluate any contributing parameters. Ten sampling locations were selected to evaluate the water quality parameters along the upstream and downstream points of these communities. An evaluation of communities receiving wastewater treatment through centralized communities was also performed to delineate or isolate the issues related to small community or on-site wastewater treatment systems. Based on TMDL reports for the watershed and common nutrient contaminants present in wastewater effluent, the sampling parameters for the study have been defined. Current wastewater treatment and management practices and their impacts on these receiving water bodies were assessed for these communities. This presentation will discuss the preliminary evaluation of the water quality parameters and a present perspective on the local water/wastewater quality issues of the watershed.

O12.04

8:45 HISTORY OF SCIENCE: PROVEN VALUE AND PROJECTED POTENTIAL IN SCIENCE CLASSROOMS

Renee Clary

Mississippi State University, Mississippi State, MS, USA

Many science classrooms present science as "final form" (Duschl 1990), or as a rhetoric of conclusions (Schwab 1962). Regular and systematic incorporation of the history and philosophy of science in science teaching (HPSST) can combat students' misconceptions of linear, predestined scientific processes, and result in greater student understanding of the nature of science (NOS). Additionally, HPSST piques student interest and reveals the human side of science. Through longitudinal and interdisciplinary investigations with HPSST, effective methods for its incorporation were researched and analyzed. We documented the effectiveness of historical vignettes, controversial case studies, and historical graphics in science classrooms. In spite of research results, the 2013 US Next Generation

Science Standards (NGSS) did not explicitly designate the history and nature of science as a content or process strand, although nature of science is discussed within an appendix in the National Research Council's (2012) framework. Fortunately, teachers on the 2017 Mississippi CCR Standards writing team affirmed the importance of HPSST and NOS, and the draft standards currently incorporate both history and nature of science. It is imperative that science education researchers continue to investigate HPSST via interdisciplinary approaches to ensure its inclusion within our classrooms for better student understanding of NOS.

O12.05

9:00 APPLICATION OF SfM-MVS PHOTOGRAMMETRY IN GEOLOGY VIRTUAL FIELD TRIPS

Youngwoo Cho, Renee Clary

Mississippi State University, Mississippi State, MS USA

We researched a procedure for building 3D models of geologic outcrops for Virtual Field Trips (VFTs) with Structure from Motion (SfM) and MultiView Stereo (MVS) Photogrammetry technology. Using SfMMVS from a collection of images taken in three geologic outcrops in the northern Mississippi, we have reconstructed 3D models of the sites. In this application of SfMMVS as a tool for VFTs, it is very important and challenging to maintain the image resolution of the models in high enough quality for them to be used in VFTs. Our method utilized DSLR camera images of outcrops and samples of rocks and fossils in RAW format. We can adjust various settings of the images in RAW format so that the images that will be stitched into 3D models can be best viewed in the final result. One of the other challenges encountered in making 3D models for VFTs is to have a better sharpness in the final result. The depth of the images presents some limitations in keeping the sharpness of the images as high as possible. We will also discuss the breakthrough of this proble

O12.06

9:15 MISSISSIPPI'S FOSSIL PARK: POTENTIAL TO ENGAGE INFORMAL LEARNERS FOR IMPROVED PUBLIC GEOLITERACY

Renee Clary
Mississippi State University, Mississippi State, MS, USA

Within the spectrum between highly protected federal National Park sites and informal fossil collecting sites, the fossil park allows visitors to collect and retain a small number of personal fossils while providing informal education through signage, brochures, and/or docents. Earlier research on the fossil park concept identified important variables for optimal visitor experiences, evaluated the effectiveness of fossil parks as outdoor learning laboratories, produced a fossil park model, and researched the opportunities of underdeveloped fossil park sites. Mississippi currently has one identified fossil park site within the state: the W.M. Browning Cretaceous Fossil Park near Frankstown. This investigation researched and evaluated the Browning Cretaceous Fossil Park through site visits and available resources, using the fossil park model's categories and the Earth Science Literacy Initiative's focus areas. While authenticity and relative ease of fossil collecting-albeit in water-could yield a pleasurable visitor experience, lack of onsite educational materials was problematic for the novice fossil collector. Web-based resources can be accessed, but are not centrally archived. This investigation identified several important earth science constructs that can be explicitly targeted at this site; Browning Cretaceous Fossil Park has potential to enhance visitors' educational experiences for improved public geoliteracy.

O12.07

9:30 AN ENHANCED PHYSICS CURRICULUM FOR LIFE SCIENCE MAJORS

Betsy Chesnutt
Itawamba Community College, Fulton, MS, USA

Physics courses are required for students in many life science and medical fields but traditionally, these courses have been designed primarily using examples that are not directly relevant to knowledge needed in the life sciences. An indirect result of this is a negative perception of physics by students when in reality, physics principles are essential to developing an understanding of the life sciences. Delivering an innovative curriculum designed to incorporate experiences that are realistic and relevant to undergraduate life science students is an integral part of providing the medical and biomedical research professionals needed to meet the future needs of the State of Mississippi. To address these issues, the introductory physics curriculum at Itawamba Community College was revised to focus on topics of particular relevance for life science students. In the revised course, students were required to solve realistic problems and decide for themselves which abstractions and simplifications might be applicable for a given problem. Reasoning skills, such as using scaling arguments, interpreting and creating graphs, and interpreting multiple representations of data were also emphasized in this course. Lab activities and problems specific to the life sciences were added to the course. In this presentation, specific laboratory and classroom activities that were developed as part of this curriculum revision project will be discussed. Student perceptions of the revised course will also be presented.

O12.08

9:45 PLANT BLINDESS IN THE FOSSIL RECORD: PALEOBOTANICAL REPRESENTATION IN MISSISSIPPI'S MUSEUM DISPLAYS

Renee Clary
Mississippi State University, Mississippi State, MS, USA

The theory of Plant Blindness documents how humans notice animals within a landscape, with plants typically fading into the background. This research examined the extent of paleontological Plant Blindness within museums' fossil displays. Using case study methodology, both the Dunn-Seiler Museum at Mississippi State (1000+ visitors annually) and the Mississippi Museum of Natural Sciences (100,000+ visitors annually) were photographically documented and analyzed for their paleobotanical inclusion. These Mississippi sites were compared with the Field Museum (1-million + visitors annually) and the Smithsonian Natural History museum (7-million+ visitors annually). With minimal signage, analysis of Mississippi museums proceeded via allocated space examination. The Dunn-Seiler relegated plant fossils to 4.89% of traditional evolutionary progression displays, but the newer timeline exhibit fared better, with 23.1 % plant fossils. MMNS analysis revealed 5.58% plant fossils in evolutionary displays. However, the Field Museum included 12.6% plant fossils within entrance displays, and systematic paleobotanical inclusion within 9 interpreted displays. The Smithsonian's dinosaur hall featured fossil plants as 25% of the floor display, and 20% of the mural. This research indicates that Mississippi museums can improve fossil plant interpretation. Plant Blindness also exists in fossil displays: plants' value is often described with respect to animals in ecosystems.

10:00 BREAK

O12.09

10:15 AN INTRODUCTION TO 4MAT INSTRUCTIONAL DESIGN

Cynthia Handley
University of Southern Mississippi, Hattiesburg, MS, USA

As a unique instructional approach, 4MAT revolves around four major learning styles and takes into account brain hemisphericity. The main learning concepts are: Meaning, Concepts, Skills and Adaptations and the questions associated with this concepts are Why?, What?, How? And What If? The learners associated with these concepts are Imaginative, Analytic, Common-sense and Dynamic. The 4MAT system has been used to broaden the experience of the learner in Medical Laboratory Science, specifically a medical terminology class, so that each type of learner can feel comfortable with the learning. Bernice McCarthy, author of the 4MAT system, sees learning as a cycle where you attach the learning to something personal in a student's life to give it meaning, then give typical lectures to convey concepts, then use a hands-on approach for tactile learners and finally see where you can take the learning through adaptations of the material to new levels. In a study done recently at the University of Southern Mississippi, this approach was not been found to give significantly different results on final grades than other instructional methods in this medical terminology course, however, the need for further research is strongly indicated (4MAT students studied n=37).

O12.10

10:30 USING VARK LEARNING MODALITIES TO INCREASE STUDENT LEARNING RETENTION IN ORGANIC CHEMISTRY

Kierstin Page, Sharon Hamilton
Delta State University, Clevleand, MS, USA

A study was conducted to determine if there was a correlation of VARK learning preferences amongst science majors at Delta State University. The VARK Survey assesses what modalities a person prefers when learning. According to the VARK Survey, one can communicate by visual (V), aural (A), reading/writing (R), or kinesthetic (K) modalities. In the 2015-2016 academic year, college students in several science classes were administered two surveys, the VARK Survey, as well as a survey to assess their educational backgrounds and general information. From the gathered data, it was evident that science majors at Delta State University preferred the kinesthetic learning modality. In Fall 2016, the surveys were administered to Organic Chemistry I students along with a pre-test to assess their prior knowledge of Organic Chemistry I material. The results showed that the kinesthetic learning modality was still preferred amongst the students. By implementing more kinesthetic teaching methods, we anticipate seeing better student test scores compared to previous years. The pre-test will be re-administered at the end of the semester to check for the retention of the material. For Spring 2017, the pre-test was administered in Organic Chemistry II which covered all sophomore organic chemistry material. At the end of the semester another post-test with Organic Chemistry I and II material will be given to check for long and short term retention. We hypothesize that students will better retain the information learned in Organic Chemistry I resulting in higher tests scores for Organic II as compared to previous years.

O12.11

10:45 INSTRUCTIONAL DESIGN COMPARISONS

Cynthia Handley
University of Southern Mississippi, Hattiesburg, MS/South Central, USA

This research asked the question, "Does the individual instructional design make a difference in the effectiveness of learning in the classroom as measured by the student's final grade?" Three instructional designs were used in a series of three medical terminology classes (a new design each semester): 4MAT, traditional and MedTutor. All other content was essentially the same. The 4MAT system looks at a student's learning style and brain hemisphericity. The author of this design delves into each of four learning styles but ultimately says that each class should be planned to provide learning for all four styles. 4MAT uses lecture, handouts, homework and audio/visual learning. The traditional design was basically a lecture environment using Powerpoint with homework for each unit. The MedTutor design was a traditional approach with the addition of a pdf textbook and website for practice tests and other study aids. After performing an ANOVA using the final grade as the variable, it was found that the difference between the final grades were not statistically significant ($p=0.11$) among the three designs. In the future, this study may be repeated due to low number of participants (4MAT n=37, Traditional n=25 and MedTutor n=21) and other parameters may be examined including individual exam scores and homework/quiz grades.

O12.12

11:00 MEETING THE DEMAND: ANALYSIS OF TRAINING OPPORTUNITIES TO ADDRESS THE NURSING SHORTAGE

Amanda Chriswell[1], Ryan Walker[2]
[1]*University of Mississippi Medical Center, Jackson, MS, USA,*
[2]*Mississippi State University, Mississippi State, MS, USA*

Evidence of the anticipated nursing shortage is now emerging as Mississippi reports a 10% registered nurse vacancy rate for 2016. Currently there are over 2700 vacant registered nursing positions in the state of Mississippi. With nursing programs running at maximum capacity, healthcare availability increasing, population requiring healthcare increasing, and an alarming number of nurses quickly approaching retirement age, a multi-dimensional situation that is estimated to increase in intensity over the next 4 years threatens the health and well-being of the state. The registered nurse profession has two entry points: Associate's Degree Nurse and Bachelor of Science nurse. Additionally, Mississippi utilizes a nursing support team: the Licensed Practical Nurse and the Certified Nurse's Aide. While registered nurses are a product of academic curriculum, the nursing support team is the product of a vocational curriculum with CNA certification now being offered within the high school curriculum. High School Certified Nurse Aide Mentorship Program (HSCNAMP) offers an employable trade for participants who complete the program while simultaneously satisfying their high school curriculum. A recent study examined the possibility of the HSCNAMP serving as a pipeline for future nurses. The study examined the 2013 and 2014 cohorts. Of the 260 successful completers, less than 10% entered healthcare studies strongly suggesting HSCNAMP will not be a viable source for nurses. This multi-dimensional situation offers many additional opportunities to impact the shortage. While this study suggests HSCNAMP is not the pipeline to correct the registered nursing shortage, there are many other dimensions to explore.

O12.13

11:15 BELIEVING IS SEEING: STUDENTS' ACCEPTANCE OF EVOLUTION IN TENNESSEE

Michael Kohut
Vanderbilt University, Nashville, TN, USA

The paper reports findings from a study with middle and high school students in two Tennessee school districts, examining how the students understand evolutionary theory, and how this understanding relates to their religious commitments. The findings speak to an ongoing debate in the evolution education literature on whether understanding evolution yields acceptance of evolution. While the results show a positive correlation between understanding and acceptance, additional facts contradict an interpretation that acceptance is driven by understanding. First, there is no evidence that students' beliefs about origins change following instruction. Second, students identifying as young-earth creationists, whose position includes a rejection of most of modern science, understand

evolutionary theory at a level equal to students identifying with naturalistic evolution, even as old-earth creationist students, whose position is more consistent with scientific estimates for the age of the earth, have among the worst understandings. The paper argues ultimately that these results are best understood when beliefs are recognized as statements of social commitment that motivate certain reactions to the evolution curriculum rather than internal mental objects acting like stumbling blocks for understanding.

O12.14

11:30 PERSPECTIVE ON VALUE OF SCIENCE INQUIRY AND SCIENCE FAIR IN SECONDARY CLASSROOMS

Christina McDaniel, Ryan Walker
Mississippi State University, Miss. State, MS, USA

Educators agree that the implementation of science inquiry in the classroom is essential to developing a deep understanding of the nature of science and the world around us. This qualitative study explores the concept of science inquiry through the frame of successful teachers who implement teaching strategies that highlight science inquiry, such as science and engineering fair projects. Using the modern expectancy-value model, three successful teachers, or teacher who mentored several International Science and Engineering Fair finalists, were interviewed. The results of the interviews indicate five emerging themes: there is intrinsic value in science inquiry and science fair; strategic engagement opportunities support STEM career choices; intrinsic value, motivation, and pathway increase academic aptitude; the benefits outweigh the costs; and a linkage exists between intrinsic and utility value.

O12.15

11:45 BRIDGING THE PUBLIC TRUST IN SCIENCE GAP THROUGH "SHARING SCIENCE"

Joyce Shaw[1], Tracy Englert[2], Jessica Kastler[3]
[1]Gulf Coast Research Laboratory, Gunter Library, Ocean Springs, MS, USA, [2]University Libraries, The University of Southern Mississippi, Hattiesburg, MS, USA, [3]Gulf Coast Research Laboratory, Gunter Library, Marine Education Center, Ocean Springs, MS, USA

In April 2016, The University of Southern Mississippi (USM) Libraries, the College of Science and Technology, and the USM Speaking Center sponsored a workshop and practicum called "Sharing Science." Funded by a grant, "Implementing the Sharing Science Workshop & Practicum" and created by the Museum of Science in Boston, the purpose of the program was to provide graduate students and early career scientists with training and practical experience in engaging with the public to communicate about scientific topics. Participants attended a three-hour workshop developed from the NISE Network and presented by three USM communication studies graduate students. Following the workshop, participants engaged in a two hour practicum experience with high school students at USM for the Mississippi Science Olympiad. "Sharing Science" is a component in outreach efforts by USM Libraries to help bridge the public trust in science gap and promote science literacy in the community by providing opportunities for graduate students and early career scientists to improve their speaking skills.

12:00 General Session

1:00-2:30 ADVANCED TEACHING METHODOLOGIES WORKSHOP

Organizers: Dr. Ryan Walker and Christina McDaniel

The workshop will focus on the improvement and evaluation of science instructional strategies. This includes areas of consideration for curriculum implantation such as: the planned, the delivered and the received curricula. During this time we will engage participants to explore exactly how these three components can be integrated into any scientific discipline. Furthermore we will describe how the evaluation of curricula should align to college or career readiness in Science, Technology, Mathematics and Engineering (STEM) fields. Seating is limited to 50 participants. Pre-registration guarantees admission and official certificate of training. On-site registration available until workshop is full.

2:30 Science Education Business Meeting

Thursday, February 23, 2017

EVENING

Ballroom

3:30 Dodgen Lecture and Awards Ceromony
General Poster Session
Immediately Following Dodgen Lecture

P12.01

SCIENCE & CULTURE: ENGAGING STUDENTS WITH A LOCAL ZOOLOGICAL PARK

Philip Carlson, Reid Bishop, Leslie Robinson, and David O'Gwynn
Belhaven University, Jackson, MS, USA

Attempting to bridge the gap between professional and citizen science and to connect general chemistry knowledge to problems of cultural and local interested have generated a renewed effort to form connections with local organizations. Teaching science through a civic engagement model (including that of the National Center for Science and Civic Engagement - ncsce.net) has inspired students to learn and practice information presented in the classroom environment in the field. Information about the partnership with the local zoological park and how the gathered data will help the park construct their master plan will be presented. Connecting students to problems of local and global importance via the SENCER-ISE (sencer-ise.net) initiative has proven to be beneficial to all parties involved. This will be highlighted and emphasis will be given to the big picture of connecting chemistry to society and culture. This focus on cultural context has helped many students engage in scientific learning in unconventional yet memorable ways where they can see the direct impact of chemistry in society.

P12.02

TOXICITY EVALUATION OF GRAPHENE OXIDE IN TWO DIFFERENT BIOLOGICAL SYSTEMS

Anita Patlolla[1], Jonathan Randolph[2], and Paul Tchounwou[1]
[1]Jackson State University, Jackson, MS, USA and[2] Jim Hill High School, Jackson, MS, USA

Recently, graphene and graphene-related materials have attracted much attention due their unique properties, such as their physical, chemical, and biocompatibility properties. However, the reports on the potential toxicity of graphene oxide (GO) in biological systems are very few. The aim of this study was to investigate the effect of graphene oxide in two biological systems. Growth patterns in Zea Maize plant and activity of certain liver enzymes [(Alanine (ALT/GPT), Aspartate (AST/GOT)] in serum of Sprague-Dawley rats were used as toxicity end-points. The two experiments were performed following standard protocol. Three doses 5, 10, 15 mg/L

of GO were used in both systems. Five plants/dose were given 1ml/day of GO for five days and data on growth was collected on the tenth day after the last treatment. Similarly, five male rats, each weighing approximately 100 + 2 g, were administered graphene oxide orally, once a day for five days. A control group was also made of five plants and five rats. Samples from rat were collected 24 hours after the last treatment following standard protocols. Graphene oxide exposure decreased shoot-length in Zea Maize compared to control. Root-length was not affected. The activity of alanine aminotransferases (ALT) in exposed groups increased compared to control. Aspartate aminotransferases (AST) activity showed no effect. Decrease in shoot-length and activity of ALT were found to be statistically significant compared to control. From this preliminary study we infer that GO might cause damage to any biological system.

Friday, February 24, 2017

MORNING
TC 218A

O12.16

8:15 THE RELATIONSHIP BETWEEN HIGH SCHOOL STEM EXPOSURE AND STEM COLLEGE OUTCOMES

Shana Lee, Ryan Walker, Renee Clary, Christina Hillesheim, Aressa Coley, Gabriel Posadas, Katie Huston, Christina McDaniel

Mississippi State University, Mississippi State, MS, USA

More inspiration and support are needed to inspire students to choose STEM careers and STEM degrees in higher education. Currently our education system places less focus on the value of an ideal planned curricula and more focus on that derived through standardized assessment, resulting in overlooked skills and content essential for STEM learning. This research incorporated the Mississippi state longitudinal data system (SLDS) to examine the relationship between high school STEM exposure and STEM college outcomes while controlling for student and school-level characteristics. Two academic year cohorts (2007-2008 and 2008-2009) consisting of individuals who enrolled in a Mississippi community college or Mississippi public university within one year of graduating from a Mississippi public high school were chosen because they contained students from both four years of high school data and six years of post-secondary graduation data. The analysis included 1) The number and percent of students who initially majored in a STEM subject upon post-secondary enrollment; and 2) Among these students the number and percent who, within six years of enrollment; graduated from a Mississippi public university or community college with a STEM degree or non-STEM degree or did not graduate at all. Among students initially enrolling in postsecondary STEM degrees the most common outcome was not graduating, then not graduating with a STEM degree. Certain high school STEM courses and demographics were also linked to STEM enrollment in post-secondary education programs.

O12.17

8:30 LINKING ATTRITION RATES AND GATE KEEPER COURSES WITHIN BIOLOGICAL SCIENCE MAJORS

Sarah Lanier, Ryan Walker, Gabriel Posadas
Mississippi State University, Mississippi State, Ms, USA

At Mississippi State University, the attrition rate for biological science majors is nearly 25% from the time students enter as freshmen to graduation. Previous research has shown that ACT scores and demographic factors play a role in retaining chemistry majors (Hillesheim: 2016). Researchers now attempt to identify whether students leaving the biological science major turned to another specific major, and to identify what factors might predict student performance within the curriculum itself, including ACT math scores, gender, and ethnicity. Using archived data from 2007-2015, researchers determined that many students leaving biological sciences became kinesiology majors. There was some predictability between ACT score and performance in biological classes. Additional analysis revealed the varying levels of rigor existed among courses, but no one course could be identified as a gate-keeper or barrier to student success. Additional results are discussed within this paper. Student success and motivation may play more of a role than previously considered within the biological science major. The results lead to more questions and imply more research should be done to see whether instructional methodology, class size, or college readiness have more of a predictive role in student success.

O12.18

8:45 COST-BENEFIT ANALYSIS OF POST-SECONDARY STEM DEGREE PATHWAYS

Ryan Walker, Renee Clary, Christina Hillesheim, Gabriel Posadas, Shana Lee, Katie Huston, Aressa Coley, Christina McDaniel
Mississippi State University, Mississippi State, MS, USA

Employment in our STEM based economy can be disaggregated into three levels: low, middle and high-skill careers. Low-skill employment requires little to no experience or training whereas middle-skill requires more than a high school diploma but less than a bachelor's degree. The middle-skill job market employment offers sustainable, livable wages and makes up a significant portion of our growing STEM-based economy nationally. Traditionally thought of as technicians, these individuals typically receive training consisting of stackable credentials. High-skill jobs require advanced training and specialization, typically offered as a bachelor's degree received from an institution of higher learning. Researchers compared earnings for STEM field graduates between their respective degree paths: 1) certification, 2) associate's degree, and 3) bachelor's degree. A cost-benefit (ROI) was calculated to compare earning potential of post-secondary STEM degrees. Five graduating cohorts were identified for academic years 2004-2005 through 2008-2009. Each cohort consisted of students who graduated from a Mississippi community college or public university with a STEM degree/certificate during the respective year. Recipients of a 4-year degree have higher average earnings ($37,865) then individuals within associate's degree ($29,155), certificates ($23,724) or high school diploma ($12,816). Researchers identified potential threats to the internal validity of the model to include individuals holding both certification and a bachelor's degree. Additional research is required to understand the number of individuals that reenter training after earning a degree. These data will allow researchers to evaluate the employability of specific STEM degrees and link specific degree characteristics to employment expectations.

O12.19

9:00 SECONDARY STEM EDUCATION AND THE INFLUENCE OF STANDARDIZED ASSESSMENTS

Katie Huston, Ryan Walker, Renee Clary, Christina Hillesheim, Aressa Coley, Gabriel Posadas, Shana Lee, Christina McDaniel
Mississippi State University, Mississippi State, MS, USA

There is a traditional sequence of coursework established in secondary math and science education in Mississippi's public schools. Students are required to take standardized exams, which are limited to this sequence. In mathematics, students tend to take Algebra I (N=163,593), followed by Geometry (N=141,215), Algebra II, Trigonometry, and Calculus, respectively. While in science, they take Biology I (N=160,355), followed distantly by Biology II (N=45,857), Chemistry I, Earth Science, Physics I, etc. In this study, five cohorts were tracked from Academic Years 2005-2006 through 2009-2010. An examination of the relationship between failing the exam multiple times and high school graduation was conducted. Data was analyzed using descriptive results and a multilevel binary logistic regression model on students who took these courses during their high school tenor to examine the effects on

graduation rates by the number of attempts to pass standardized exams. The results revealed that students who failed (at least once) the biology exam were 4.3% less likely to graduate; whereas, students who failed the math exam were 15.6% less likely to graduate. Because of the pressure to pass the exam, students in Mississippi are leaving secondary education without diversified science content. There is a negative correlation between earning a passing grade in biology and the ability to pass the graduation exam. Although failing the math exam has a greater negative impact on graduation rates, science courses, as a whole, are struggling to retain students from one science course to another.

O12.20

9:15 ANALYSIS OF POST-SECONDARY STEM-RELATED EDUCATIONAL PATHWAYS

Gabriel Posadas, Ryan Walker, Renee Clary, Christina Hillesheim, Aressa Coley, Katie Huston, Shana Lee, Christina McDaniel
Mississippi State University, Mississippi State, MS, USA

The current educational system is designed to instill required skills for achieving success. The definition of student success, however, is a variable measure overlapping between graduation, admittance into post-secondary degree programs, and entering into a career, which makes evaluating student success and the efficacy of educational pathways difficult. This study is set to analyze post-secondary, STEM-related outcomes for graduates of the Mississippi K-12 education system and investigate differences in success between the different pathways. This research incorporated the state longitudinal data system (SLDS) and examined the relationship between type of entry into STEM programs (direct enrollment vs. community college transfer) and university graduation outcome (completed STEM degree, completed non-STEM degree, or did not graduate). Four graduating cohorts were identified for Academic Years 2004-2005 through 2007-2008, and each consisted of individuals who received a diploma from a Mississippi public high school during their respective academic year. Researchers identified that despite high enrollment rate (48%), community colleges had low rates of enrollment in STEM fields (11.24%) and even lower rates of retention (7.97%). However, rates of enrollment in a STEM field at a university (27.83%) increased from initial enrollment (17.91%). Researchers also discovered that 62.2% of transfer students from community colleges to universities did not complete a STEM degree. This research further supports the need for increased efforts in raising retention and improving preparation of students for these fields. Researchers also propose additional supports are needed for STEM students who transfer from community colleges to universities.

9:30 Break

10:00 Innovations in STEM Education Symposium The Mississippi Perspective

Symposium Coordinator: Dr. Rob Rockhold, University of Mississippi Medical Center, Jackson, MS 29216

Awareness of the effectiveness of active learning techniques for the science, technology, engineering and mathematics (STEM) disciplines is growing in the secondary school environment. Active learning methods, such as problem-based learning (PBL), team-based learning (TBL) and flipped learning, develop skills and habits essential for success in the 21st century workplace, including promotion of student investment in their own learning, building characteristics essential for life-long learning, improving reasoning skills, increasing retention of knowledge, and fostering skills for working collaboratively in team environments. Of these methods, the flipped learning or flipped classroom technique is uniquely amenable to the high school learning ecology, recognizing and capitalizing on student expectations for presentation of high quality graphic media, ubiquity of use of mobile devices and 24/7 broad bandwidth access to cyberspace resources. Not all educators are fluent in the technologies for and best practices applications of successfully implementing flipped learning in the STEM classroom. "Innovations in STEM Education – The Mississippi Perspective" brings together Mississippi experts in STEM education, online learning platforms and flipped learning technologies to provide a state-of-the-art presentation of key elements and examples of flipped learning best practices. The symposium highlights university-based professional development for teachers in the underlying skills and showcases resources for flipped learning developed by Mississippi STEM educators.

Time	Title	Speaker
10:00	Welcome and Overview of Symposium	Rob Rockhold, Ph.D.
10:10	SEPA and NIH Support Mississippi PreK-K Science	Lori Staton, Ph.D.
10:30	The Pedagogy of Active Learning in STEM	Wendell Douglas
10:40	Flipping your Classroom as Active Learning	Terry Pollard
10:50	Video Techniques for Flipped Learning	Robert Anderson
11:00	**BREAK**	**BREAK**
11:10	Medical Case Studies for Flipped Learning	Susan Bender
11:20	*Wolbachia* Rodeos: Classroom Engagement	Kathy McKone
11:30	Trellis.com: A Novel Community Platform	Donna Sullivan, PhD.
11:40	The STEMI Project: New Kid on the Block	Denise Thibodeaux

This project was supported by the Office of The Director, National Institutes of Health under Award Number R25OD020215-01A1. The content is solely the responsibility of the authors and does not necessarily represent the official views of the National Institutes of Health.

Friday, February 24, 2017

AFTERNOON

12:00-1:00 Plenary Speaker

1:00-3:00 Millsaps HHMI Undergraduate

ZOOLOGY

Chair: Marta Piva
Alcorn State University
Vice-Chair: Julius Ikenga
Mississippi Valley State University

Thursday, February 23, 2017
MORNING
Room TC 226

O13.01

9:00 FREE MEDICAL MISSION AND HIV/AIDS SCREENING AT AWAKE, IMO STATE, NIGERIA.

Alexander Acholonu
Alcorn State University, Lorman, MS, USA

Free medical mission was conducted at Awaka in Owerri North Local Government area (LGA) in Imo state, Nigeria under the auspices of Willy-Esther Foundation and Alcorn state university. The purpose was to engage in an international healthcare disparity activity; to give hope to the hopeless; to assist the economically deprived people in a rural community whose healthcare facilities and treatment are below par. It was also to engage in HIV/AIDS prevention, control, and screening and improve the health disparity in the area. The free medical mission was a one day operation, conducted on May 21, 2015 in a rural area, Awake located in Owerri North LGA in Imo state Nigeria. About 300 people were given free primary and secondary healthcare treatment and provided with needed drugs. Eighty people who volunteered were screened for HIV/AIDS. The test conducted in addition to HIV/AIDS screening, included blood sugar, blood pressure, malaria and eye tests. Of the 80 people screened for HIV/AIDS, only one was positive (1.25%). Many had eye problems and were given reading glasses. This was an execution of Willy-Esther Foundation slogan DELTA (doing everything **locally** to stop AIDS). It was also, to tackle health disparities or inequalities in the locality and try to ameliorate it. It is interesting that HIV and AIDS prevalence in this community is minimal. There was a request for more free medical mission by the community. There is plan to hold another in 2018.

O13.02

9:15 UNDERSTANDING THE DYNAMICS OF PATHOGENIC, *Rickettsia parkeri* AND SYMBIONTS IN *Amblyomma maculatum*

Khemraj Budachetri, Shahid Karim

The University of Southern Mississippi, Hattiesburg, MS, USA

Amblyomma maculatum (Gulf Coast tick) possesses vectorial capacity to *Rickettsia parkeri*. The rickettsial replication inside the tick vector is prerequisite for vectorial capacity of tick. We hypothesized that *R. parkeri* dynamically interacts with tick symbionts and modulates tick host to achieve successful replication, proliferation and colonization inside tick tissues before transmission. The *R. parkeri* infected (Rp+) and non-infected (Rp-) *A. maculatum* tick colony was established for tick-*Rickettsia* interaction studies. The *R. parkeri* load (Rp) along with intracellular symbionts, *Francisella*-like endosymbionts (FLE) and *Candidatus* Midichloria mitochondrii (CMM) were quantified along with total bacterial load across the tick life stages by specific primers in qPCR assays. We showed the transovarial and transstadial transmission of three important bacterial species across the *A. maculatum* life cycle. Moreover, *R. parkeri* displaces FLE and co-proliferates with CMM upon *R. parkeri* infection. This study provided the new avenues of pathogenic bacterial colonization inside tick tissues with insights from pathogenic and non-pathogenic bacterial interactions. The further study in Rp and FLE in establishment of infections, success of replications and transmission of *R. parkeri* from tick would yield important discoveries.

O13.03

9:30 EFFECTS OF BIOFLAVONOIDS ON OVIPOSITION IN THE PINK-SPOTTED LADYBIRD BEETLE *Coleomegilla maculata*

Eric Riddick[1], Zhixin Wu[1], Fred Eller[2], Mark Berhow[2]
[1]USDA-ARS, Stoneville, MS, USA, [2]USDA-ARS, Peoria, IL, USA

One goal of our current research is to mass produce ladybird beetles for biological control of plant pests in greenhouses and other protective structures. Cost-effective mass production involves the use of alternative prey/foods or artificial diets (rather than natural prey, e.g., aphids). One challenge is stimulating females to oviposit their full potential of eggs in rearing systems devoid of natural prey. In this study, we test the hypothesis that bioflavonoids stimulate and boost oviposition in the pink-spotted ladybird beetle *Coleomegilla maculata* DeGeer (Coleoptera: Coccinellidae). Bioassays were setup in small plastic cages with screened tops in which individual females were exposed to bioflavonoids (1 mg, pure powder). These included taxifolin, quercetin, kaempferol, catechin hydrate, naringenin, and genistein placed inside a small Petri dish at the base of test cages. Over 12 consecutive days, we monitored the location of egg clutches, the number of egg clutches, and the number of eggs per clutch laid per female in test and control cages. We discovered that quercetin was most stimulatory; more than 90% of egg clutches were oviposited within 1-3 cm of quercetin. Kaempferol was least stimulatory; less than 20% of egg clutches were oviposited near this compound. When pooled over the 12-day bioassay period, the total number of egg clutches was approximately 1.5 fold greater in test cages than in control cages (lacking bioflavonoids), in two of the three replicate bioassays. In conclusion, quercetin is a strong stimulant with potential to boost oviposition in *C. maculata* in rearing operations.

O13.04

9:45 A PUSH-PULL IPM STRATEGY FOR INVASIVE AMBROSIA BEETLES IN ORNAMENTAL TREE NURSERIES

Christopher Werle[1], Christopher Ranger[2], Peter Shultz[3], Blair Sampson[1], John Adamczyk[1]
[1]Thad Cochran Southern Horticultural Laboratory, Poplarville, MS, USA, [2]USDA-ARS, Wooster, OH, USA, [3]Hampton Roads Agricultural Research and Extension Center, Virginia Polytechnic Institute and State University, Virginia Beach, VA

Exotic ambrosia beetles (Coleoptera: Curculionidae) are important pests of ornamental tree production. Adult females are highly attracted to ethanol-baited traps and can be intercepted therein during their distance-limited dispersals from peripheral forested areas into nurseries. The plant volatile verbenone has been reported to have a repellency effect on ambrosia beetles. For these reasons, we are testing numbers of ambrosia beetle galleries on baited trees that are either protected or not protected by an array of baited intercept traps (pull), as well as being provided or not provided verbenone emitters (push). Numbers of new beetle galleries on baited trees were counted weekly and circled to prevent recounting. Counts of galleries were then normalized as needed and subjected to repeated measures analysis of variance to determine treatment and treatment*time interactions. Presented here are the results after one year of this field trial in both Mississippi and Ohio.

O13.05

10:00 IMPACT OF SAND MINING ON NWORIE RIVER, NIGERIA

Peter Okorie[1], Alexander Acholonu[2]
[1]Imo State University, Owerri,IMO, Nigeria, [2]Alcorn State University, Lorman, MS, USA

Nworie River in Owerri in south-eastern Nigeria is typical of a lotic freshwater resource under pressure from intensive human activities. In 2007 a baseline study was conducted to establish the longitudinal variations in the hydrochemistry of the river. Since that study, the river has come even under more severe perturbation from poorly supervised dredging activities and sand mining. The present study was conducted to investigate the impact of this sand mining on the water quality of the river. As in the baseline study, the present study investigated eleven (11) water quality criteria, namely, dissolved oxygen, carbon dioxide concentration, pH, chlorine, Nitrate-N, Nitrate, Ammonia-N, Hardness, orthophosphate, sulphate and silica. This study showed that water quality conditions have significantly changed. The most pronounced changes were dissolved oxygen and silica levels. Dissolved oxygen concentrations in the five sampling stations from upstream to downstream showed a range of 0.8- 2.8 ppm, raising fears about the survival of most fish species. Similarly, silica levels in the stations had risen to a range of 3.5- 4.4 ppm. The paper is advising an immediate stop to the activities for proper evaluation and eventual articulation of remediation measures to prevent total siltation of the river.

O13.06

10:15 STUDIES ON MITOCHONDRIAL TRANSLATION, COMPLEX IV, AND GENOME INTEGRITY IN *Saccharomyces cerevisiae*

Ariel Walker, Marta Piva, J. Ignacio Moreno
Alcorn State University, Lorman, Mississippi, USA

Loss of mitochondrial genome integrity is a phenomenon that affects all species. In *Saccharomyces cerevisiae*, translation deficiency has been linked to loss of mitochondrial DNA. However, it is still unknown how low the level of translation products must be or how long the deficiency must last to cause irreversible loss of the genome. Cox2p and Cox3p, components of complex IV of the electron transport chain, are encoded by the mitochondrial genome and as such are transcribed and translated in the organelle. These proteins are closely associated to Cox4p which is nuclear-encoded and imported into mitochondria. We conducted a time-course experiment in which the levels of these mitochondrial translation products were progressively reduced by suppressing the expression of Ccm1p, a pentatricopeptide repeat protein that is essential to accumulate 15S rRNA, one of the components of the mitorribosome small subunit. After 48 hours, 15S rRNA levels were less than 2 % of the initial amount, all three proteins became practically undetectable by immunoblot analysis but showed vastly dissimilar decay kinetics. Growth on non-fermentable substrates was also abolished. These observations indicated a severe mitochondrial translation deficit. However, the genome remained intact and its levels did not decrease as determined by Southern blot analysis and qPCR, respectively. Transcription was not affected as indicated by the stable levels of the other mitochondrially-encoded rRNA. After two additional days, the defect was reversed and the cells fully recovered. Therefore, even severe translation impairment, as long as it is short-term, does not affect the mitochondrial genome.

Thursday, February 23, 2017
AFTERNOON
Room TC Ballroom II/III

1:05 – 3:00 pm Population Health Symposium

Invited Speakers

"UPDATES ON MOSQUITO-BORNE DISEASES IN MISSISSIPPI AND ELSEWHERE"

Paul Byers, MD. State Epidemiologist, Mississippi State Department of Health

"MOSQUITO ECOLOGY AND CONTROL"
Jerome Goddard, PhD. Medical & Veterinary Entomologist, Departments of Biochemistry & Molecular Biology, Entomology & Plant Pathology, MSU

"IMPACT OF PESTICIDES USE IN AGRICULTURE, ENVIRONMENT AND HEALTH"
Nacer Bellaloui, PhD. Crop Genetics Research Unit, USDA-ARDS

Thursday, February 23, 2017

EVENING

Ballroom

3:30 Dodgen Lecture and Awards Ceromony

General Poster Session

Immediately Following Dodgen Lecture

P13.01

A SURVEY OF MISSISSIPPI MOSQUITOES' BLOOD MEAL AND MALARIA PARASITES.

Jessica Aycock, Jerome Goddard, Diana Outlaw
Mississippi State University, Mississippi State, MS, USA

Haemosporidians, along with many other pathogens, are transmitted to vertebrate hosts through the salivary glands of various mosquito species. Research on these vectors has been sorely lacking in the past couple of decades, particularly in linking the relationship between the vertebrate host and the parasite. This survey will determine the vertebrate blood meal of various mosquito species throughout counties in Mississippi and will identify any haemosporidian parasites carried by the vector. Of ~27,000 mosquitoes collected in Mississippi in 2013 and 2014, 167 specimens are engorged with a viable blood meal. Each mosquito has been identified and processed for DNA extraction. Three polymerase chain reactions will be performed on each sample. The first will use the mitochondrial cyt *b* gene to determine the vertebrate from which the blood meal was taken, and each will be sequenced to species. The second assay will also use the mitochondrial cyt *b* gene to detect any malaria parasites; these will also be sequenced and identified to species. The last polymerase chain reaction will be used on select *Culex* spp. to confirm their identity utilizing 18S rDNA sequence. The species included are *Culex salinarius, Culex restuans*, and *Culex pipiens* complex. These data will help to form a more detailed picture about the relationships between these three organisms, particularly the mosquito and the vertebrate.

P13.02

DETERMINING THE FUNCTIONAL ROLE OF NOVEL TICK METALLOPROTEASES IN PAIN SUPPRESSION

Faizan Tahir, Shahid Karim
University of Southern Mississippi, MS, USA

Arthropod adaptation to blood-feeding resulted in the evolution of a complex cocktail of salivary components that help the tick overcome host defenses against blood loss (hemostasis) and

inflammatory proteins at the feeding site capable of disrupting blood flow or triggering host-defensive behavior by sensation of pain or itching. An intriguing function of the saliva is the ability to degrade proinflammatory peptides involved in pain response, rendering the host unaware of the tick because of an itch-free attachment. In this study, we identified two metalloprotease genes that were hypothesized to produce angiotensin-converting enzymes (ACEs) which degrade bradykinin, a peptide hormone that leads to inflammation and the sensation of pain. To test the hypothesis, the time-dependent relative expression was determined using qRT-PCR throughout blood-feeding on the host. To determine the functional role of identified ACEs in hematophagy (blood-feeding), an RNAi approach was utilized to deplete ACEs transcriptional gene expression. The transcriptional expression of target ACEs were confirmed in the knockdown salivary glands. The impact of ACEs gene depletion on the tick phenotype was drastic. A significant decrease in replete weight, and a marked increase in distress in the host provided evidence for the critical role of these ACEs during the feeding of gene silenced ticks. We will further investigate the biochemical degradation of bradykinin using saliva from gene knocked down ticks.

P13.03

ZIKA VIRUS: A MOSQUITO-BORNE VIRUS RAISES ALARM IN THE AMERICAS

M. S. Zaman, Robert Sizemore
Alcorn State University, Lorman, MS, USA

Zika virus, an arbovirus, is primarily transmitted via two mosquito species, *Aedes aegypti* and *Aedes albopictus*. A recent report has indicated that Zika is the first insect borne disease to also be transmitted sexually. Human cases of the disease are mostly reported in South and Latin America, although, travellers to or from these countries have brought the disease to the United States. Very recently, infections through local mosquito vectors have been reported in Florida. Only around one in five infected humans will show symptoms of the disease, and in most cases, infected humans will have a mild flu-like illness. However, some infected adults have developed Guillain-Barre' syndrome. Zika virus has emerged as a devastating disease particularly to a developing fetus. Those at the greatest risk, are newborn children of pregnant women infected with the virus where severe birth defects such as microcephaly have occurred. Recent data suggest that the effects of the virus on an infected fetus are even more serious than initially thought and it appears infected infants born without any observable defect could encounter problems as they age. Unfortunately, the costs for care and prevention of such infected infants appears to be very high and have exceeded previous estimations. Since the primary mosquito vectors for the virus are present in the southern part of the country, it continues to be a potential threat to the United States. At present, there is no vaccine to prevent Zika infection.

P13.04

LIVER ISCHEMIA-REPERFUSION INJURY RESPONSES IN OBESE MELANOCORTIN-4 RECEPTOR-DEFICIENT MALE RATS

Ryan Nichols, Frank Spradley
University of Mississippi Medical Center, Jackson, MS, USA

Nonalcoholic fatty liver disease (NAFLD) is progressive, dangerous, and prevalent. Morbidity and mortality from NAFLD-mediated chronic liver disease, injury, and cirrhosis is rising a result of the obesity pandemic, and cardiovascular disease is a major contributor to this. Although fat accumulation and steatosis increases the risk for liver injury, a full understanding of these mechanisms is unknown. We tested the hypothesis that steatosis increases the injury response to ischemia-reperfusion (IR) in obese melanocortin-4 receptor homozygous-deficient ($MC4R^{-/-}$) compared to $MC4R^{+/+}$ male rats. Rats, at ~ 20 weeks old, from each strain were subjected to 45" of 70% warm liver ischemia with plasma and liver tissue harvested at 24 hours of reperfusion.. Body weights were not altered by IR or Sham, respectively, in $MC4R^{-/-}$ (649±17g, n=5 vs 653±17g, n=6) or $MC4R^{+/+}$ (436±9g, n=8 vs 425±27g, n=4), they were greater ($P<0.05$) in the $MC4R^{-/-}$ strain overall. Similarly, EchoMRI revealed that % total body fat ($MC4R^{-/-}$: 34±1 vs 33±3 and $MC4R^{+/+}$: 11±1 vs 12±2) and % total liver fat ($MC4R^{-/-}$: 5.8±0.6 vs 6.1±1.4 and $MC4R^{+/+}$: 2.5±0.8 vs 0.3±0.3) were not altered by IR or Sham, respectively, but were both greater ($P<0.05$) in the $MC4R^{-/-}$ strain. In contrast, IR increased ($P<0.05$) total liver wet weight in both $MC4R^{-/-}$ (4.3±0.1 vs 3.6±0.1) and $MC4R^{+/+}$ (3.5±0.1 vs 3.2±0.1). The latter were numerically greater in obese $MC4R^{-/-}$ following IR. In conclusion, this experimental model will be utilized to examine the mechanisms whereby NAFLD increases the risk for chronic liver disease with the goal of identifying novel treatment strategies.

P13.05

EGG LAYING MALE HAS ANDROGYNOUS SONG SYSTEM AND PLUMAGE COLORATION

John Aaron Howell, Richard Buchholz, Lainy Day
University of Mississippi, Oxford, MS, USA

Zebra finch sexes differ in plumage, song nuclei, and behavior. The effects of chromosomes and hormones on sexual differentiation are not completely understood. A “chimera” in our aviary had male plumage, a male partner, and produced viable offspring. Previously, mate preference tests revealed lower preference for the chimera and its progeny than controls, suggesting differences making them unattractive to other birds. Chimeric lineage males had greater same-sex preferences than controls. All sampled chimeric tissues had ZW female chromosomes. For song system comparison of the chimera, volume, cell number, and cell size of sexually dimorphic song nuclei (RA, HVC, LMAN) were measured. Our chimera is consistently between the volumes of males and females. For instance, the published male:female ratio for RA is 5.53. Our male:chimera RA ratio is 1.12. We have also identified a putative X in our chimera and will use X protein markers for verification. These results suggest that although the chimera had a female genotype, it had a partially masculinized song system. Color spectra were analyzed to determine if the chimera or its progeny had plumage differences undetectable by the human eye. We found that the beak of the chimera and the breast of the female progeny had different spectra than controls. Video analysis of the chimera and its mate will be done to determine if the chimera sang and to observe nesting behaviors. Other studies showed chimeric birds either having fully female song systems or androgynous systems like our own, suggesting multiple pathways for shared phenotypic traits.

P13.06

DEPENDENCE OF HONEY PLANTS' FLOWERING ON ECOLOGICAL CONDITIONS

Marta Piva, Elena Kostyleva
Alcorn State University, Lorman, MS, USA

Ecological conditions have a decisive impact on the timing of honey plants' flowering. For proper organization of commercial honey gathering it is particularly important to know the timing of flowering of the main honey plants. Respectively, the aim of this work was identifying the time of the main honey plants' flowering in the state of Mississippi. The observations showed: 2 species (8% of the main honey plants) belong to early spring bloomers, 7 (28%) - spring, 6 (24%) - early summer, 6 (24%) - summer, 2 (8%) - late summer, and 2 (8%) - fall bloomers. The beginning of flowering for most species of the main honey plants directly depends on the latitude: in the northern part of the study area flowering begins (on average 14 days) later and ends (more than 15 days) later, than in the south. On the contrary, for 7 species that bloom in summer and late summer, in the north the flowering begins on average 21 days earlier and ends 24 days earlier that in the south, due to very high temperatures in subtropics this time of year that are unfavorable for nectar production. The observed dependence of the flowering timing on the latitude in the study region creates favorable conditions for beekeeping: honey flow from the same species of honey plants can

be extended with the use of migratory beekeeping that increases honey production of bee colonies.

P13.07

ENHANCING MITOCHONDRIAL FUNCTIONALITY IN *Saccharomyces cerevisiae*

Marta Piva, J. Ignacio Moreno
Alcorn State University, Lorman, MS, USA

Cells require a steady supply of energy to perform their functions. Aerobic respiration, the most efficient metabolic energy-producing process, takes place in mitochondria. Our research group has discovered that the protein Ccm1p is essential for mitochondrial functionality in Saccharomyces cerevisiae. Ccm1p is a dual-functioning protein that is required for maturation of pre-mRNAs and to support the mitochondrial translation machinery. Ccm1p is conserved among several yeast species including those that produce ethanol from xylose, a pentose that forms the backbone of hemicellulose, a major component of plant cell walls. A major challenge is to improve mitochondrial function in the presence of those fermentable substrates that tend to repress it, causing the loss of mitochondrial DNA (mtDNA). This genome is critical to yeast tolerance to ethanol toxicity, therefore any modification that enhances the cell ability to maintain it or to increase its levels, could hypothetically improve the fermentation yield. We genetically engineered yeast cells to overexpress Ccm1p and compared them to a wild-type strain that produced endogenous levels of Ccm1p. mtDNA copy number and mitochondrial function were measured by quantitative PCR and growth in non-fermentable medium over time, respectively. Recombinant cells produced approximately 500-times more CCM1 mRNA than their wild-type counterparts, but more importantly they had 2.3-times more mtDNA and grew 2.3-times faster in non-fermentable substrates. These results suggest that it is possible to improve mitochondrial function beyond the physiological limits and may represent a viable solution for the difficult problem of limited yields in ethanol production.

P13.08

DYNAMICS OF MITORIBOSOME ASSEMBLY IN *Saccharomyces cerevisiae*

Khaliah Anderson, J. Ignacio Moreno, Marta Piva
Alcorn State University, Lorman, MS, USA

The mitochondrial genome encodes for a few essential components of the electron transport chain. These proteins are synthesized in the mitoribosomes and assembled in complexes along with other imported polypeptides. The mitoribosome minor subunit is composed of 15S rRNA, which is transcribed in mitochondria. 15S rRNA accumulation requires a nuclear-encoded pentatricopeptide motif protein, Ccm1p. Our study is focused in complex IV, which from yeast to animals in the upper echelons of the zoological hierarchy contains three mitochondrially-encoded subunits: Cox1p, Cox2p, and Cox3p. We conducted a time-course study in which Ccm1p expression was turned off and then turned back on, using subcultures with an inoculum to medium ratio of 1 to 100. Protein levels were determined by immunoblotting followed by densitometry, while rRNA levels were assessed by reverse transcription-qPCR. All values were normalized against housekeeping molecules and referred to the amount before suppression. Twenty-four hours after switching Ccm1p production off, levels of this protein and 15S rRNA fell to less than 2 % of the initial amount. However, translation in mitochondria was still robust as assessed by Cox2p levels of almost 10 %. When the expression was switched back on, the opposite occurred. Even though the levels of 15S rRNA were at 40%, those of Ccm1p were at only 4 % and Cox2p was still undetectable. This study suggests that while efficient translation in mitochondria takes place with a very small amount of mitoribosomes, assembly of these complexes is a time-consuming task in which substantially larger amounts of Ccm1p are required.

Friday, February 24, 2017

MORNING
Room
9:00-11:35

ECOLOGY AND ENVOLUTIONARY BIOLOGY AND ZOOLOGY AND ENTOMOLOGY

SYMPOSIA ON ECOLOGICAL DIVERSITY AND THE ENVIRONEMNT

Organizers: AHM Ali Reza and Marta Piva
Delta State University and Alcorn State University,

SEED NUTRITION: GENETICS AND ENVIRONMENT INTERACTIONS

Nacer Bellaloui PhD, Research Plant Physiologist with the Crop Genetics Research Unit, USDA-ARS,

Stoneville, MS.

BIODIVERSITY OF NATIVE BEES IN THE SOUTHEASTERN US

Katherine Parys, Ph.D., Research Entomologist with the Southern Insect Management Research Unit, USDA-ARS Stoneville, MS

PREDATORS MEDIATE THE INDIRECT EFFECTS OF FIRE ON UNBURNED AREAS

Marcus Lashley, Ph.D., Assistant Professor, Department of Wildlife, Fisheries, and Aquaculture, College of Forest Resources, Mississippi State University

INSECTICIDE RESISTANCE MANAGEMENT STRATEGIES

Clint Allen, Ph.D., Research Entomologist with the Southern Insect Management Research Unit, USDA-ARS Stoneville, MS

Friday, February 24, 2017
AFTERNOON

12:00-1:00-	Plenary Speaker
1:00-3:00-	Millsaps HHMI Undergraduate Symposium

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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
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Newberry, Madison
Nguyen, Tiffany
Nichols, James
Nunes, Lydia
Nutter, Chris
Nywening, Ashley
Overhoerls, JC
Page, Kierstin
Pandey, Shanti
Parker, Phenique
Patterson, Michael
Paul, Amber
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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
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Shasthree, Taduri
Shearer, Glen
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Shearer, Jr Glenmore
Shivers, Michael
Si, Hong Park
Simpson, C. Lashan
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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
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Wallace, Kedra
Webb, Ian
Wildhaber, Jordan

Wilkening, Steven R.
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Williams, Victoria
Wilson, George
Wilson, Gerri
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Xu, Hao
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Yee, Kathleen
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CHEMISTRY AND CHEMICAL ENGINEERING

Alamgir, Saadman
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Allred, Anna
Amato, Dahlia
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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
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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
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Essue, Kalyani
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Fitzkee, Nick
Frazee, Andrew S.
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Ghag, Gaurav
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Gorb, Leonid
Gould, Ian
Griesbeck, Axel
Gude, Veera Gnaneswar
Guillory, Devin
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Guo, Song
Hamilton, Sharon K.
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Hamme II, Ashton
Hammond, Neil
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Harless, Tyler
Harrigill, Max
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Hood, John
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Isayev, Olexander
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Jackson, Jabari
Jackson, Matthew
James, Logan
Janisse, Andrew P.
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Jha, Sanjiv
Johnson, Brittany
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Kaminski, Amanda
Kar, Supratik
Karekezi, Leon
Kaur, Gurjit
Kelley, Ariel
Khansari, Maryam Emami
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Kolodziejczyk, Wojciech
Kramer, Wolfgang
Lee, Ken S.
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Liu, Yongjian
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Lusbcome, Christine
Mahone, William
Mao, Xinyu
Martin, William
Mavrodi, Dmitri
Mavrodi, Olga
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McFarland, Frederick
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Miller, Doug
Molitor, Sabrina
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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
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Pham, Amy
Pigza, Julie
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Quach, Co
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Salter, Scarlett
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Sengupta, Bidisha
Shao, Xiaohou
Sharma, Amit
Shukla, Manoj
Simon, Yoan
Singh, Anant
Sinha, Sudarson Sekhar
Sledge, Taylor
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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
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Weeks, William
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Wiggins, Jeffrey
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Williams, Dalvin
Williams, Spencer
Wilson, Amber
Winetrout, Jordan
Woldanski, Tyler
Xia, Younan
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Zhang, Huaisheng
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Zhang, Shizhe
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ECOLOGY AND EVOLUTIONARY BIOLOGY

Alford, Mac
Baghai-Riding, Nina
Beck, Christine
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Blackwell, Eric
Bodden, Haley
Brewer, Heather
Carey, Jarrica
Chambley, Brady
Coleman, Mitchel
Davis, Kimberly
Day, Lainy
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Felton, DeAndra
Frew, Christian
Galloway, Matthew
Gulledge, Eric
Hamblin, Peyton
Han, Fengxiang
Harris, Taimei
Harvey, Mary
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Kimes, Roxy
Kulawardhana, Ranjani
Lacy, Bianca
Lambert, Karoline
Long-Aragon, A. Nichole
McGregor, Matt
McKenzie, Raveen
Outlaw, Diana

Pagart, Corey	Reza, AHM Ali	Zoeller, Madison
Patterson, Alexis	Stevenson, Jamal	Alford, Mac
Perkins, Susan	Wahome, Joseph	Baghai-Riding, Nina
Price, Monique	Walker, Shannon	

GEOLOGY AND GEOGRAPHY

Ables, John	Gratzer, Michael	Parker, Lauren
Berry, Tyler	Harris, James	Puckett, Mark
Bograd, Michael B. E.	Heitmuller, Franklin	Raber, George
Bullock, Jared	Jenkins, Luke	Rosandich, Brooks
Burch, Zack	Jordan, Patrick	Schmitz, Darrel
Cho, Youngwoo	Killian, Courtney	Shaw, Calvin
Clary, Renee	Kyler, Christopher	Starnes, James
Davidson, Gregg	Lahiri, Chayan	Voll, Kaitlin
Deans, Jeremy	Moore, Taylor	Woolery, Edward
Dockery III, David T.	More, Taylor	
Galicki, Stan	O'Reilly, Andrew	

HEALTH SCIENCES

Abdul-Haqq, Deja	Bullard, Rebekah	Dawkins, Milton
Adah, Felix	Bush, Jordan	Diggs, KiOsha
Addae, Leonard	Bush III, James	Donahue, Matthew
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Allen, Paige	Cameron, Joseph	Duan, Yuanyuan
Amato, Dahlia	Carter, Kathleen	Duhe, Roy
Amato, Doug	Chandler, Cassie	Espinoza, Ingrid
Armstrong, Liam	Chavez-Yenter, Daniel	Everett, Michelle
Assante, Andrew	Chukwuemeka, Edna	Fair, Logan
Bagwell, Jana	Chao, Shawn	Famuyide, Mobolaji
Bai, Fengwei	Clark, Dominique	Fan, Lir-Wan
Banerjee, Santanu	Clark, Johnlyn	Farah, Ibrahim
Bellaloui, Nacer	Clayton, Ahsia	Feng, Yangzheng
Benghuzzi, Ham	Clemmer, John	Francisco, Cesar Paulo
Benghuzzi, Hamed	Commey, A.	Freeman, Kevin
Benghuzzi, Hamed A.	Coon, Lauren	Fuller, Henry
Bhanat, Eldrin	Cotton, Joshua	Funchess, Tanya
Bhatt, Abhay J.	Covacevich, Anthony	Gilmore, Robert
Bhatt, Abhay	Craft, Tara	Gomez, Christian
Blackmon, Laura E.	Curtis, Tamika	Gong, Yongzhen
Boone, Joshua	Dai, Xuemei	Green, John
Borland, C	Dasari, Shareena	Griggs, Jason A.
Bradshaw, Jessica	Davis, H.	Grill, Ray
Brown, Timera	Davis, Leslie L.	Harpole, Jennifer

Harris, Sarah
Hasan, Mohammad
Hawkins, J.
Hebert, Michael D.
Hayes, S.C.
Helmit, Wison
Henderson, Joseph
Hester, Robert
Hickson, DeMarc
Hinton, Shantele
Hopkins, Patrick
Humphery, Trianna
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Hutchison, Charley
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Jones, Tembra
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Karim, Shahid
Keller, Lance
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Lahr, Christopher
Langston, Brenkeevia
Lard, Donisha D.
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Lee, Jonathan W.
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Leis, Art
Leszczynski, Jerzy
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Liu, Xiu
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Mao, Jinghe
Marshall, Makaila
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Mavrodi, Olga
McDaniel, D. Olga
McDaniel, Larry
McNair, Obie
McPherson, Kasi
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Miller, Andria
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Ojeda, Norma
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Pacurari, Maricica
Pang, Yi
Pareek, Tanya
Parkman, Benjamin
Patel, Bijalben
Patel, Viviek
Paul, Amber
Paul, Ian
Paul, Oindrila
Pendarvis, James
Pham, Michael
Phillips, Krystal
Pipkins, Haley
Platt, Donna
Plenty, Nicole Lee
Pochampally, Radhika
Pope, Ashleigh
Pruett, W. Andrew
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Radican-Wald, Amy
Ramarao, Sumana
Reddy, Amit
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Reeves-Darby, Jaren
Rice, Kayla
Roller, Anna
Rousselle, Thomas
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Rucker, T'Juan
Saito, Tais
Salazar, Marocho Susana M
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Santos, Manarão Diego
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Schwartz, Anna
Sengupta, Bidish
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Short, Xandria
Smith, Kiara
Snell, Sannie
Stallion, Monisa
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Stokic, Dobrivoje
Subramony, Charulochana
Tandon, Ritesh
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Taylor, Lateia
Theilman, Evan
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Thompson, Dominque
Tien, Lu-Tai
Topaloglu, A. Kemal

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Vallabhaneni, Krishna C.
Vallender, Eric
Vig, Parminder
Vita, Sydney
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Williams, Jaclyn
Williams, Jan
Williams, Quinesha
Williams, Victoria
Wilson, Gerri A.
Wilson, Gerri
Wilson, Jessica
Wilson, Morgan
Yancey, Denise
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Yu, Hongtao
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Zhang, Xu
Zhou, Xinchun

HISTORY AND PHILOSOPHY OF SCIENCE

Alford, Katie
Curry, Kenneth J.
Curry, Kenneth
Didlake, Ralph
Gilbert, Nick
Harrell, Andrew W.
Maxwell, Joseph
Smithka, Paula
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MARINE AND ATMOSPHERIC SCIENCES

Abdullah, Warith
Andrew, Claxton
Bevirt, Brian
Blanks, Jennifer
Bonds, Justin
Bowser, Felecia
Bright, Candace
Butler, Cary
Carpenter, Eileen
Claxton, Andrew
Coleman, Geselle
Culpepper, Carla
Curry, Chastity
Dasari, Shaloam
Dasari, Shareena
Elkins, Janae
Fadavi, Mehri
Feaster, Mariama
Fitzgerald, Rosa
Fitzpatrick, Pat
Fuentes, Jose
Garrett, Robert
Gibson, Keon
Glinskas, Julianna
Grimes, Jay
Grysko, Raleigh
Gulledge, Eric
Han, Fengixang
Hansford, Jason
Harris, Taimei
Harvey, Jaylond
Hemingway, Matt
Hernandez, Frank
Hill, Davyon
Hurt, Tony
Jefferson, Briana
Kastler, Jessie
Kulawardhana, Ranjani
Landolt, Scott
Lentz, Justin
Liu, Huiping
Love, Kyla
Lu, Daunjun
Maddirala, Joel
Mallory, Lenetta
Massey, Nathan
McGrew,Brandon
Morris, Vernon
Najjar, Raymond
Overstreet, Robin
Pullens, Madison
Reddy, Remata S.
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Reddy, Sussela
Remata, Aditya
Robin, Overstreet
Roper, Ebony
Ruiz-Plancarte, Jesus
Salem, Tom
Shen, Shuo
Stockwel, William
Tchounwou, Paul
Tuluri, Francis
White, Loren

MATHEMATICS, COMPUTER SCIENCE AND STATISTICS

Abu, Bakr Bilal
Ayebo, Abraham
Dancer, F. Chevonne Thomas
Dixon, Ricky
Duan, Yuanyuan
Frizell, Tayla

Gary, Johnny
Griggs, Jason
Hart, Quavanti
Hathaway, Joselyn
Hayden, Linda
Hogland, Dylan
Hu, Zilong
Ibrahim, Jamil
Loeb, Matthew
McKenzie, Raveen
Monteau, Darryl
Nagapuri, Usha Sree
Najjar, Yacoub
Patel, Reena
Patlolla, Babu
Riveros, Guillermo
Seaver, Jennah
Square, Felton
Stevenson, Jamal
Tang, Jinshan
Tang, Jinshan
Tanner, April
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Thompson, David
Thyagaraja, Shreyas
Walthall, Steffi
Wang, Yong
Whitfield, Nicholas
Yaserer, Hakan
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PHYSICS AND ENGINEERING

Adhikari, Khagendra
Afrough, Mohammad
Antwi-Boasiako, Afua A.
Arnoldus, Henk
Babski-Reeves, Kari
Balu, Radhakrishnan
Batchelder, J. C.
Beach, Kevin
Beach, Kevin SD
Berg, Matthew
Bhushan, Shanti
Biswas, Parthapratim
Boonamnaj, Panisak
Buford, Brian
Burns, Jeremiah
Calhoun, Alex
Cartegni, L.
Chaoqun, Yang Fan
Chen, Caixia
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Cocchieri, Camillo
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Dayavansha, E.G. Sunethra
Debusk, John
Dixon, Ricky
Do, Huu
Dooley, Katherine
Dunn, Derrick
Eubanks, Terrance
Evans, Lattrice
Galvez, Derius
Goodin, C.
Greenhoe, Brian
Gross, C.J.
Grzywacz, R.
Hamilton, J.H.
Hardy, Cassidy
Harness, LaDamion
Hartline, Matthew
Hiley, Traeshaun
Ilyushkin, S.V.
James, Aaron
Jetsadawisut, Warin
Johnson, Haden
Jones, Yolanda K
Khan, M. Ashraf
Kitjaruwankul, Sunan
Koju, Ukesh
Korgul, A.
Krolas, W.
Labuda, Cecille
Landi, Maryam
Leccese, Veronica
Liddick, S.N.
Limbu, Dil
Liu, Chaoqun
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McElroy, Jarrett
McGuire, Brittany
Mendez, T.
Miller, Darius
Mobley, Joel
Muthu, Satish
Ngahane, Michael C
Pace, Timothy
Padgett, S.
Pandey, Ras
Paudel, Durga
Piechaczek, A.
Rahman, Lufat
Rajabali, M.M.
Ray, P.C.
Robinson, Bryan
Rush, Scott
Rykaczewski, K.P.
Seneviratne, Jehan
Shapira, D.
Sharma, Amit
Shih, HuiRu
Sibley, Aaliyah
Silwal, U.
Singh, Anant K
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Siwakoti, D.
Skelton, Gordon
Solmeyer, Neal
Sompornpisut, Pornthep

Spann, Kawandrea
Stephens, James
Stevenson, Michael
Stracener, D. W.
Subedi, Paudel Sunita
Tadele, Nardos
Taghizadeh, Somayeh
Tirfagegnehu, Bemnet A
Tuluri, Francis
Uddin, Khan Md. Moin
White, Courtney
Wiggins, Jeffery
Williams, Lakiesha
Williamson, Lashay
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Worede, Lidya
Wu, Ying
Xu, Zhangjin
Yan, Yonghua
Yang, Fan
Yang, Shan
Yuan, Pao-Chiang
Zganjar, E.F.
Zhang, Likun
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PSYCHOLOGY AND SOCIAL SCIENCES

Ball, Irenia
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Belote, Gracey
Bell, Taunjaj
Blackwell, Amanda
Bonds, Valencia
Bowles, Teylor
Cabral, Sharon
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Dortch, Amanda
Ezell, Kwamequa
Farah, Nuha
Gains, Micah
Grobinson, Arnissayur
Gross, Alan
Gunn, James Kelley
Harris, Joi
Hebert, Emmie
Holloway, Danerika
Hooks, Curtis
Hopson, Jazmine
Houston, Priscilla
Hunter, Frederick
Jackson, Jon
Kellum, Karen
Kerns-Cooper, Theresa
Khan, Shaila
Knowles, Alana
Kohut, Lauren
Laiju, Meherun
Lair, Elicia
Lea, Melissa A.
Lindsey, Cynthia
Morris, Sorsha
Nash, Brandon
Navas, Jose
Njiti, Victor
Pavlick, Kayla
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Ravola, Martha
Scott, Valerie
Selmon, Lyser
Shaffery, James
Smith, Gabrielle
Smoots, Janesia
Spencer, Shauna Kay
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Tillman, Micaiah
Torrence, Chasity
Tucker, Keneisha
Turner, Rasaan
Wallace, Kedra
Weddington, Shekita
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SCIENCE EDUCATION

Bishop, Reid
Carlson, Philip
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Clary, Renee
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Englert, Tracy
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Kohut, Michael
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Martin, James
Mattox, Johnny
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O'Gwynn, David
Page, Kierstin
Patlolla, Anita
Posadas, Gabriel
Prewitt, Elizabeth
Rainey, Bailey
Randolph, Jonathan
Robinson, Leslie
Shaw, Joyce
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Truax, Dennis
Walker, Ryan

ZOOLOGY AND ENTOMOLOGY

Acholonu, Alex
Acholonu, Alexander
Adamczyk, John
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Goddard, Jerome
Howell, John Aaron
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Nichols, Ryan
Okorie, Peter
Outlaw, Diana
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Ranger, Christopher
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Sampson, Blair
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Walker, Ariel
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Wu, Zhixin
Zaman, M. S.