MISSISSIPPI

ACADEMY OF SCIENCES

EIGHTIETH ANNUAL MEETING

February 18-19, 2016

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
Eightieth Annual Meeting
February 17-19, 2016

WEDNESDAY, FEBRUARY 17, 2016

TIME	EVENT	LOCATION
6:00 PM to 8:00 PM	Board of Directors Meeting/Dinner	Ballroom I

THURSDAY, FEBRUARY 18, 2015

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 3:15 PM	Divisional Programs	See program for rooms
10:00 AM to 12:00 PM	Health Science Symposium	Ballroom II/III
1:00 PM to 2:30 PM	Science Education Workshop	TC 214
1:00 PM to 2:00 PM	Mathmatetics, Statisitcs, and Computer	TC 210
1:00PM ro 2:30 PM	Science Workshop	TC 218A
1:30 PM to 2:45 PM	Populatiob Health Symposium	Ballroom II/III
3:30 PM to 5:30 PM	2016 Dodgen Lecture &	Ballroom II/III
	Presentation of Awards	Ballroom II/ III
5:30 PM to 7:30 PM	Reception and Poster Session	Ballroom I

FRIDAY, FEBRUARY 19, 2016

TIME	EVENT	LOCATION
7:15 AM to 8:15 AM	Past-Presidents' Breakfast	TBA
8:00 AM to 2:00 PM	Registration and Exhibits	Lobby
8:00 AM to 9:55 AM	STEM Workshop (Science Ed)	TC218
10:15 AM to 12:00 PM	Simulation Based Education in Mississippi	Ballroom II/III
8:00 AM to 5:00 PM	Divisional Programs	See program for rooms
10:00AM to 11:55AM	Hands on Workshop (Health Sciences)	TC 216
10:00 AM to 1:00 PM	Graduate Symposium, Sponsored by Mississippi INBRE	Ballroom II/ III
12:00 PM to 1:00 PM	Mississippi INBRE & HHMI Plenary Speaker (Boxed Lunch Provided)	Ballroom II/III
1:00 PM to 3:00 PM	HHMI Undergraduate Symposium	Ballroom II/III
4:00 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

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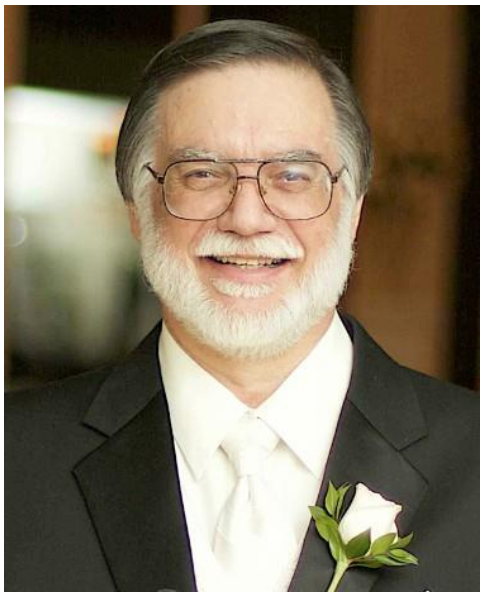


2016 Dodgen Lecture

Thursday, February 18, 2016
3:30 p.m.

Unleash Your Creativity

"Building your personal success toolbox"

by

Paul Frenger M.D.

A Working Hypothesis, Inc.
P.O. Box 820506, Houston, TX77282-
281-293-9484
pfrenger@alumni.rice.edu

Paul Frenger is a Senior Member of IEEE, Life Member of ACM and a practicing medical doctor in Texas who has been professionally involved with computers since 1976. He has worked as a computer consultant, published over 200 articles in the bioengineering and computer literature, served as editor for ACM SIGForth Newsletter (five years), as associate editor for ACM Sigplan Notices (thirteen years), and has three computer patents. He is active in artificial intelligence, robotics, prosthetics, bioengineering, space science and green technologies. Dr. Frenger was Course Director of the Combined Military Physician Assistant Program (USAF, Navy, Army National Guard) from 1975-1978; was Conference Chair for 1990 RMBS Symposium in Denver; assisted US Air Force Research Labs scientists developing testing systems for non-lethal weapons (2004-2005); Chair of the Houston Chapter of the IEEE Computational Intelligence Society (2007-2016) and served as General Chair of the AIAA / IEEE Workshop on Automation and Robotics - Innovation, NASA JSC - Houston (2008-2015).

Dr. Frenger is a former US Air Force Lt. Colonel; he has been a member of the Rocky Mountain Bioengineering Symposium (RMBS) since 1983; the Canadian Medical and Biological Engineering Society (CMBES) since 1997; the Association for Computing Machinery (ACM) since 1990; the Institute for Electrical and Electronic Engineers (IEEE) and the Engineering in Medicine and Biology Society (EMBS) since 1989; the International Society of Automation (ISA) since 2006; the Triple Nine Society since 2005 and MENSA since 1978. His biography is listed in: Who's Who in Medicine and Healthcare, Who's Who in Information Technology, Who's Who in Science and Engineering, Who's Who in the World, Who's Who in America, and others. He received the Air Force Commendation Medal (1978), service awards from ACM (1992, 1999), from IEEE (2008), and the RMBS President's Award (2004). His presentation, "Forth and Artificial Vision", received Best Paper at *EuroFORTH* 1997, Oxford University UK. He delivered a tutorial on "Biologically-Inspired Object Oriented Design and Programming for Robotics and Artificial Intelligence" at MIT (*IASTED International Conference on Robotics and Applications*) November 2010. His computer and automation consulting company, A Working Hypothesis, Inc, was chartered in 1982.

Plenary Speaker
Sponsored by HHMI and MS-INBRE

12:00 p.m.
Friday, February 19, 2016

Professionalism in Science

Given by

Ralph Didlake, MD,
Associate Vice Chancellor for Academic Affairs
University of Mississippi Medical Center

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

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

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

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

In his spare time, he enjoys restoring antique radios and has an interest in poetry criticism, especially 20th century Russian poets. He and his wife Millie are enjoying their first grandchild.

80th Annual Mississippi Academy of Sciences Meeting

February 18-19, 2016
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 for undergraduates and graduate students

1. 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

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 science education at all levels of education and is dedicated to increasing the number of people who pursue science-related careers and to broadening access to science for all. Student researchers who have shown outstanding achievement in science and engineering research may be selected by their division chairs to compete for these outstanding awards.

Criteria for Selection of recipients:

1. Each division chair(s) and vice chair(s) (13 divisions) selected the **top 20% undergraduate student posters** to represent their division and present in the Millsaps HHMI sponsored lunch award symposium, "Honoring Excellence in Science in Mississippi," on Friday February 19th from noon -2pm. Student's name must appear as first author in the abstract, as well as, the poster.
2. The nominated students agreed to present their posters (after presenting in their division) in the poster symposium over lunch on Friday from noon – 3 pm. Failure to physically present at the respected division, will disqualify the selected presenters to compete in the symposium (must be present to compete and co-author presentation will not be accepted).
3. The 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 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: Mrs. Jamie Lott | Outreach Director, Mississippi INBRE
The University of Southern Mississippi
Hattiesburg, MS

This symposium is intended to promote and recognize meritorious research conducted by graduate students. It is sponsored by the Mississippi IDeA Network of Biomedical Research Excellence (INBRE) which funded by the National Institutes of Health and housed at The University of Southern Mississippi. The Mississippi INBRE is a network of colleges and universities throughout Mississippi with the goal of enhancing biomedical research and training in the state. 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. The scientific foci of Mississippi INBRE are obesity, cancer and sexually transmitted diseases.

Criteria for Selection of recipients:

1. Each division chair(s) and vice chair(s) (13 divisions) selected the top **20% of graduate student** posters to represent their division and present their work in the Mississippi INBRE Graduate Scholars Symposium, a sponsored lunch award symposium, "Honoring Excellence in Science in Mississippi," on Friday, February 19th at 10:00 am -12:00 p.m. The student's name must appear as a first author in the abstract, as well as the poster.
2. The nominated students agreed to present their posters in both their divisional poster session an in the Mississippi INBRE Graduate Scholars Symposium held over lunch on Friday from 10:00 p.m. – 1:00 p.m. Failure to physically present at the respected division will disqualify the selected presenters from competing in the symposium (must be present to compete and co-author presentations will not be accepted).
3. The 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 a certificate of achievement.

80th 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 INBRE
Event Coordinator: Ms. Jamie Allen| Outreach Director
University of Southern Mississippi, MS

Symposium Program: All posters have to be assembled by Thursday 2/18/2016 no later than 12:00 PM and dismantled after after 3:00 PM on Friday 2/19/2016. All students must be present in both days and lack of adherence with this schedule will result in disqualification from the competition.

Thursday (PM)

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

Friday (AM)

10:00-10:30: Welcome and Introduction Remarks: Dr. Glen Shearer; Chair
10:30-10:40: President's Remarks, Dr. Hongtao Yu; MAS President
10:40-11:15: Poster competition (Visit to Posters)
11:15-11:55: Presentation of Awards: Drs. Shearer and Dr. H. Yu, MAS President
11:55-12:00: Closing Remarks: Dr. Glen Shearer; Chair of the Symposium
12:00-1:00: Plenary Speaker and Lunch (Provided for Participants by MS INBRE)

80th 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 2/18/2016 no later than 3:00 PM and dismantled after after 3:00 PM on Friday 2/19/2016. All students must be present in both days and lack of adherence with this schedule will result in disqualification from the competition.

Thursday

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

Friday

12:00-1:00 PM: Symposium Plenary Speaker and Lunch
1:00-1:20 PM : Opening and Introduction Remarks, Dr. Tim Ward; Symposium Chair
1:20-1:30 PM : President's Remarks, Dr. Hongtao Yu; MAS President
1:30-2:15 PM : Poster competition (Visit to Posters)
2:15-2:25 PM : Dr. Zelma Cason: MAS Past President
2:25-2:55 PM : Presentation of Awards: Drs. Ward and Dr. H. Yu; MAS President
2:55-3:00 PM : Closing Remarks: Dr. Tim Ward: Chair of the Symposium

DIVISIONAL SYMPOSIA AND WORKSHOPS
Thursday, February 17

HEALTH SCIENCES
10:30-11:30 AM
Room TC Ballroom II/III

Gift of life-Organ Transplantation

Organizers**:** Olga McDaniel, Jana Bagwell**,** Amy Radican-Wald, George Moll
University of Mississippi Medical Center and Center for Mississippi Health Policy

Christopher D. Anderson, MD, FACS, University of Mississippi Medical Center
Title: "Organ Transplantation"
Dr. Christopher Anderson will discuss Organ Transplantation: Historical perspective and current practice including immunosuppression and future possibilities.
Dr. Christopher D. Anderson, James D. Hardy Professor, Chair of Department of Surgery, Chief, Division of Transplant and Hepatobiliary Surgery, Medical Director, Abdominal Transplant Surgery, Surgical Director, Liver and Kidney Transplantation, Surgical Director, Mississippi Organ Recovery Agency.
Dr. Anderson, was born in Lucedale MS and earned his undergraduate degree at the University of Southern Mississippi in 1995. He earned his MD from Emory University in 1999, and a general surgery residency and a research fellowship in hepatobiliary surgery at Vanderbilt University Medical Center.

Dr. Anderson joined the faculty at UMMC in late 2011 and led a University Transplant team that has doubled the kidney transplant volume at UMMC. In addition, University Transplant has initiated pediatric kidney transplant, liver transplant and pancreas transplant under his leadership. As part of these efforts, University Transplant has established an HPB surgery program which is associated with the UMMC Cancer Institute and is Mississippi's only high volume liver and pancreas surgery program.
Following his subspecialty training, he joined University of Washington, St. Lois as an assistant professor. He focused on adult and pediatric liver and kidney transplant as well as complex hepatobiliary surgery. He began the laparoscopic donor nephrectomy program at Barnes Jewish Hospital and was a member of the Siteman Cancer Center and the Nutrition Obesity Research Center. Dr. Anderson is a fellow in the American College of Surgeons and a member of the American Society of Transplantation and the American Hepato-Pancreatico-Biliary Association. He serves in leadership positions within the Association for Academic Surgery and the American Society of Transplant Surgeons.

Kevin Stump, Chief Executive Officer at Mississippi Organ Recovery Agency (MORA)

Title: "Organ Donation and Recovery"
Kevin will discuss current practice in organ donation and recovery.

Kevin Stump is a native of Oklahoma. He graduated from Southern Nazarene University with a Bachelor of Science in Biology and Chemistry. Following a year of research training on Human tissue regeneration at the University of Oklahoma Medical Center, Kevin returned to Southern Nazarene University pursuing a second bachelor's degree in nursing. In 1988 he joined the organ procurement organization in Oklahoma as an Organ Recovery Coordinator. Then he moved to California, and

in 1990 he became Manager of Hospital Development for Golden State Donor Services in Sacramento, California. Two years later, September 1992, Kevin took the position as head of the organ procurement organization here in Mississippi. Since July 1st, 1994 he has been the President / CEO of the Mississippi Organ Recovery Agency.

He has served on national committee's for Organ Donation and Allocation, Co-author on several manuscripts, abstract presentations and invited talks on the topic of Organ Donation and Transplantation. In addition he has presented policies and issues surrounding the Organ Allocation at the National Institutes of Health.

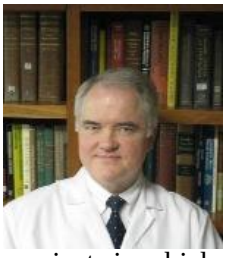
HEALTH SCIENCES

1:30-2:45 PM

Room TC Ballroom II/III

WHERE SCIENCE MEETS POPULATION HEALTH

Organizers**:** Olga McDaniel, Jana Bagwell**,** Amy Radican-Wald, George Moll
University of Mississippi Medical Center and Center for Mississippi Health Policy



James Wilson, MD, University of Mississippi Medical Center

Title: "**Large Scale Genetic Analysis in Mississippi and Worldwide**"

Dr. Wilson will discuss the rapid development of genotyping, sequencing, and genetic analysis methods, and some of their applications and findings, during the past decade. It will cover candidate gene and GWAS genotyping as well as exome sequencing and an explosive expansion of whole genome sequencing. There will be a particular focus on findings to which the Jackson Heart Study has contributed, and a discussion of ongoing projects in which we are participating.

Dr. Wilson in addition to academic career in Internal Medicine and Rheumatology, he has had a long-standing interest in the genetics of complex diseases in African Americans, serving as the Jackson Heart Study (JHS) Genetics Coordinator since the study began in 2000. During the past 15 years in collaboration with others he has used admixture mapping, GWAS, and exome sequencing to study an array of biologically important traits in JHS and other cohorts. Dr. Wilson's NIGMS-funded ARRA award supported, development of the most accurate recombination map of the human genome yet produced. In the process, they identified a novel set of African ancestry-specific recombinational hotspots and discovered the mechanism by which recombination is targeted to these sites. Dr. Wilson played a major role in JHS participation in NHLBI's Candidate Gene Association Resource (CARe), the Exome Sequencing Project, the T2D-GENES consortium, and the CHARGE consortium, serving on the Steering Committee of each of these projects. He is joint PI of two R01s "Leukocyte Telomere Length and Cardiovascular Disease in Jackson Heart Study" and "Sleep-Disordered Breathing and Risk for CVD and Stroke in the Jackson Heart Study", plus a U01 that is a key component of the "T2D-GENES" project. Thus he has extensive experience in multi-institutional and multi-cohort research collaboration.

Marino A. Bruce, PhD, MSRC, MDiv, CRC, Jackson State University

Title: "**Eliminating Health Disparities in Mississippi:**
The Promise of Precision

Dr. Bruce will discuss factors contribute to group differences in health outcomes. The influence and interaction of biological, social, economic, geographical, cultural, and physical factors can vary considerably. The presentation will highlight the importance contextual specificity for efforts to reduce and ultimately eliminate health disparities in Mississippi.

Dr. Bruce is a professor of Sociology and Criminal Justice at Jackson State University (JSU) and an affiliate faculty in Internal Medicine at the UMMC, Science Director for the Myrlie Evers-Williams Institute for the Elimination of Health Disparities, and founding Director of the Center for Health among Minority Males within the Evers-Williams Institute. His research focuses on the intersection of race, gender, age, and their implications for health behaviors and cardiovascular-related outcomes. He has recently completed a K01 award examining the relationship between social and psychological factors associated with chronic kidney disease among African-Americans using data from the Jackson Heart Study. Results from this work have led to a program of research examining social, psychological, and behavioral factors impacting the health of African American boys and men.

His training and expertise as a Certified Rehabilitation Counselor and an ordained Baptist minister, provide Dr. Bruce with a unique opportunity to leverage the strengths of research-, community-, and faith-based approaches to improve the health of disadvantaged and disenfranchised males, their families, and their communities.

Thomas E. Dobbs, III, MD, MPH
State Epidemiologist
Mississippi State Department of Health

Title: "HIV Prevention in Mississippi"

Dr. Dobbs will review the epidemiology of HIV in the U.S. with specific focus on Mississippi. Based on a brief discussion of the natural history of HIV, He will discuss prevention strategies that are effective in reducing HIV transmission. The presentation will highlight efforts under way by the Mississippi State Department of Health to ensure treatment and slow the spread of HIV.
Dr. Dobbs is Board Certified in Internal Medicine and Infectious Diseases. Prior to joining the Department of Health, he worked as an Internal Medicine and Infectious Diseases physician in Laurel and Hattiesburg, MS. He is a member of the Mississippi State Medical Association, the Infectious Diseases Society of America and the Council of State and Territorial Epidemiologists. He has clinical appointments at the University of Mississippi Medical Center and the University of Florida and serves as a clinical consultant for the Southeastern National TB Center in Gainesville, FL.

MATHEMATICS, COMPUTER SCIENCE AND STATISTICS
1:00-2:00 PM
TC 210

WORKSHOP: POWER AND SAMPLE SIZE ANALYSIS: IMPORTANCE IN RESEARCH AND APPROACHES TO BEST PRACTICES

Organizers: Elgeneaid Hamadain, Warren May, Jamil Ibrahim, Seth Lirette, and Chad Blackshear
University of Mississippi Medical Center

The workshop begins with a brief discussion of issues surrounding power analysis, adjustments necessary to the alpha levels and/or p-values to make valid inferences and ensuring adequate sample sizes are considered. As with all decision making, errors of false positives and false negatives are bound to happen so the complexity of the decision making process will be covered. Following the introductory presentation and discussions by Dr. Hamadain, Dr. Jamil Ibrahim will demonstrate these concepts using available software and tools, some easily found in major statistical packages and others available, such as GPOWER, as free online downloads. Finally,

Seth Lirette and Chad Blackshear will lead a discussion on the issues a consulting statistician often faces with sparse a priori information, when a power analysis is appropriate and when it is not, adjustments for cost and time as well as following up with examples and discussions with the workshop group."

Physics and Engineering
2:00 -3:00 PM
Room TC 228

WORKSHOP: Careers In Physics

Organizer: Pradip Biswas
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 218A

WORKSHOP: Essential Elements Of Effective Instruction

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

This workshop will focus on the improvement and evaluation of science instructional strategies. This includes three area of consideration for curriculum implantation; the planed, 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.

DIVISIONAL SYMPOSIA AND WORKSHOPS
Friday, February 19, 2016

SCIENCE EDUCATION
8:00-9:55 AM
TC 218A

Symposium On Stem Education And Broadening Participation

Organizers: Hongtao Yu, Christina McDaniel, and Ryan Walker
Jackson State University and Mississippi State University

There has been a long-standing national concern about the declining number of US citizens with degrees in Science, Technology, Engineering, and Mathematics (STEM). With respect to underrepresented minority (URM) students, the concern is even worse: a very low percentage of African American (6.6%) and Hispanic American (8.8%) students finish with undergraduate or graduate STEM degrees (Chu et al, 2006; NSF Report, 2011; Committee on Equal Opportunities in Science and Engineering, 2009). Thus, broadening participation is an issue that requires the effort of the whole nation (U.S. Commission on Civil Rights, 2010; NSF, 2008; National Academies of Science, 2011), as evidenced by President Obama's recent signing of the Executive Order to Promote Diversity and Inclusion in the Federal Workforce (U.S. Equal Employment Opportunity Commission, 2011). It has been one of the main goals of the all the federal and state agencies to promote diversity and broaden participation through various programs and program components in education and research.

The objective of the symposium is to bring together all Mississippi STEM educators and students to engage in learning the issue of broadening participation, the importance of science education, information exchange, and research presentations on broadening participation. It will cover the following topics: 1) Recruitment and retention of underrepresented minority (URM) students; 2) Construction of university-wide research and education programs for broadening participation; 3) Impact of federally-funded programs on broadening participation; 4) Impact of mentors, institutional settings, policy, and global society on broadening participation; 5) Impact of social, financial, religious and cultural status on broadening participation; 6) Academic preparation and high school teaching on broadening participation; 7) Governmental policy and economic impact on broadening participation.

SCIENCE EDUCATION
10:15-11:55 AM
TC Ballroom II/III

Symposium "Simulation-based Education in Mississippi: A Statewide Organizational Meeting"

Organizer: Robin Rockhold
University of Mississippi Medical Center

Individuals from institutions and organizations across Mississippi who engage in or have an interest regarding the use of simulation facilities and techniques in education will meet for an organizational session on Friday, February 19 in association with the annual MAS meeting. The feasibility of establishing a Mississippi Simulation Consortium to exchange information and advocate for best practices in simulation-based education will be the primary topic. Prior to this year, a Mississippi Simulation Alliance had existed that engaged instructors involved in simulation-based education to students of nursing in Mississippi. Individuals who had been members of the Mississippi Simulation Alliance will present the history and goals of that organization as a starting point for consideration of formation of a Mississippi Simulation Consortium. Additional presentations will be made by experts in simulation education who will address the advantages of such a consortium from the perspectives of the Community Colleges, Institutions of Higher Learning, William Carey University School of Osteopathic Medicine and the University of Mississippi Medical Center. Funding opportunities, economies of scale in purchasing procedures, educational needs/practices, scholarship possibilities and organizational structure are among the anticipated topics of discussion. Poster presentations will be given by a number of the participants in conjunction with the organizational meeting.

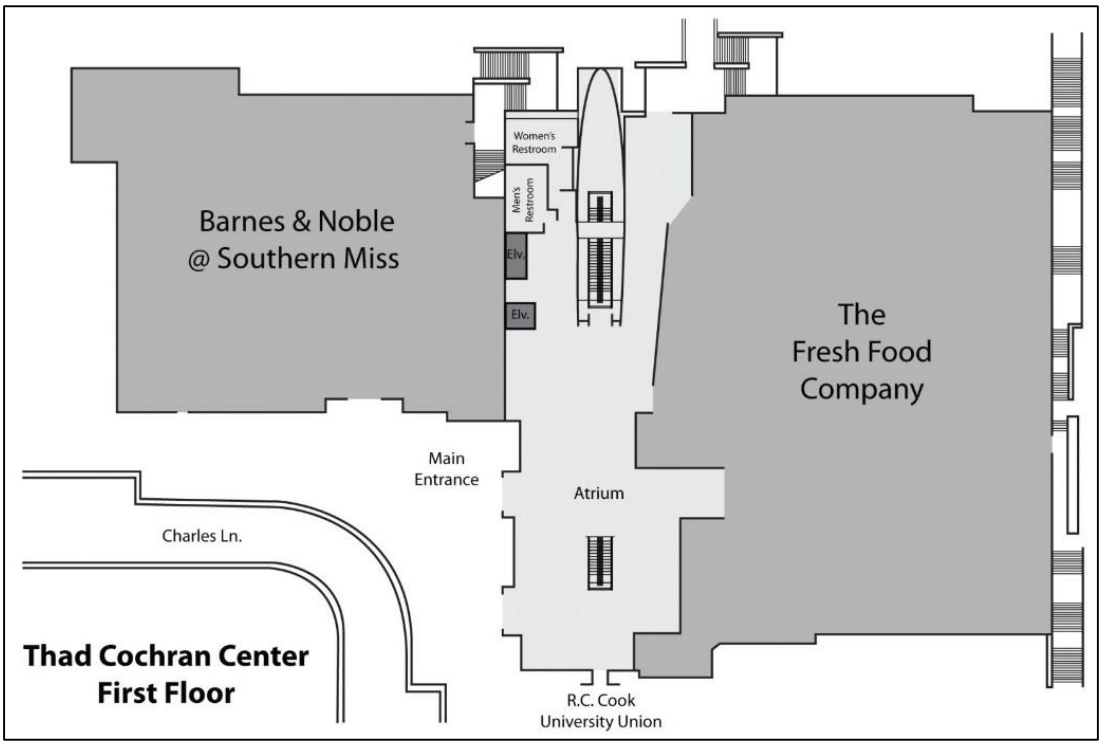
HEALTH SCIENCES
10:00-11:55 AM
Room TC 216

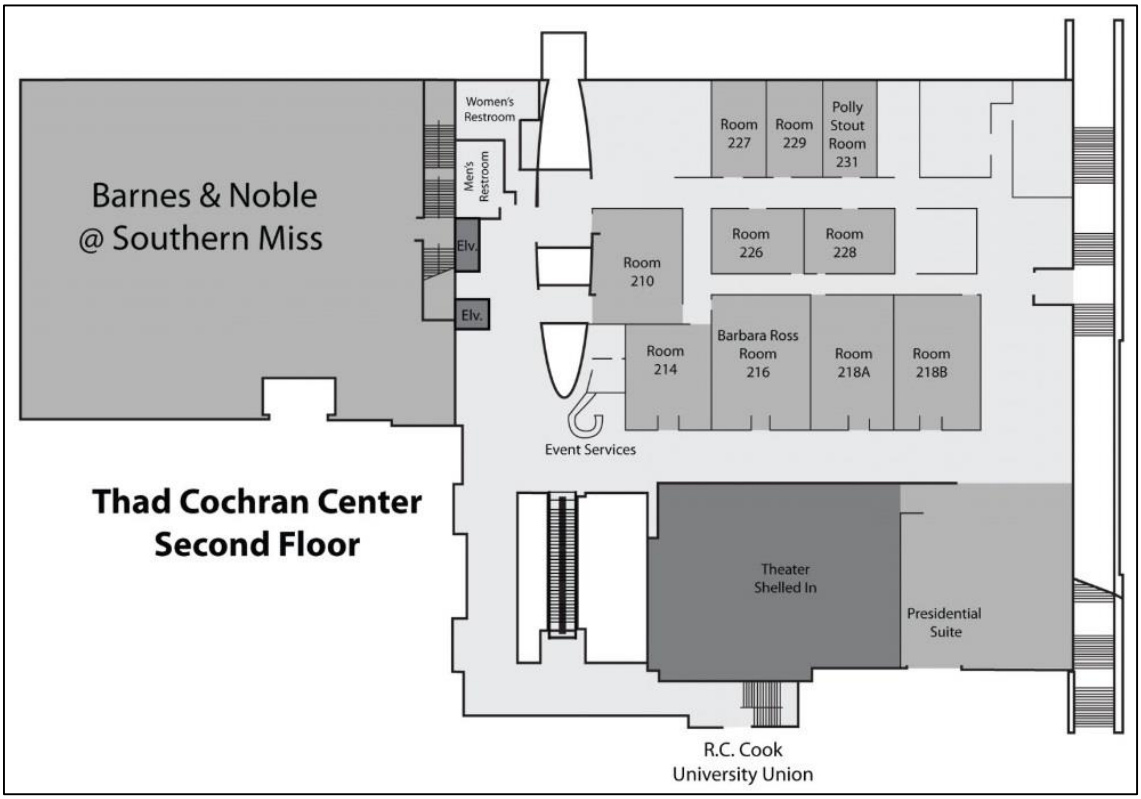
Population Health Hands-on Workshop

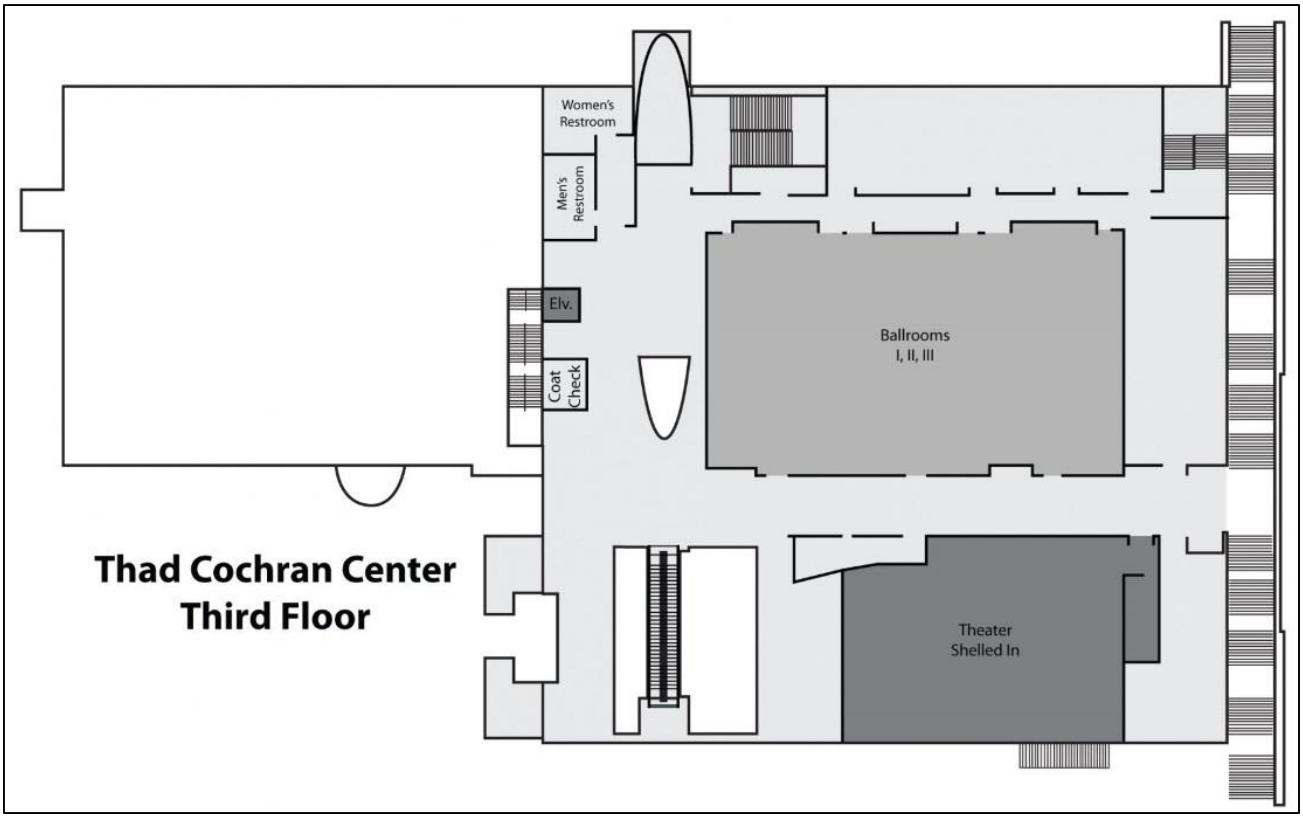
Dr. Michael Ryan and Dr. Eric George

This workshop is designed for undergraduate and highschool students interested in basic science and medicine.

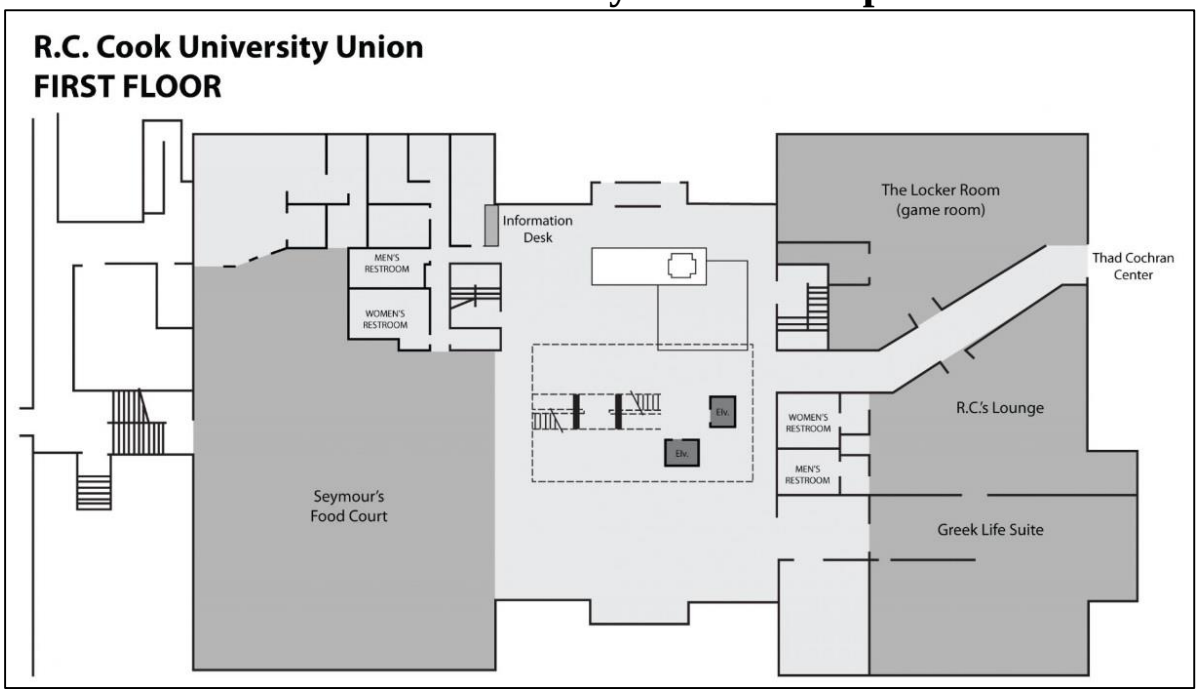
Thad Cochran Center Floorplans

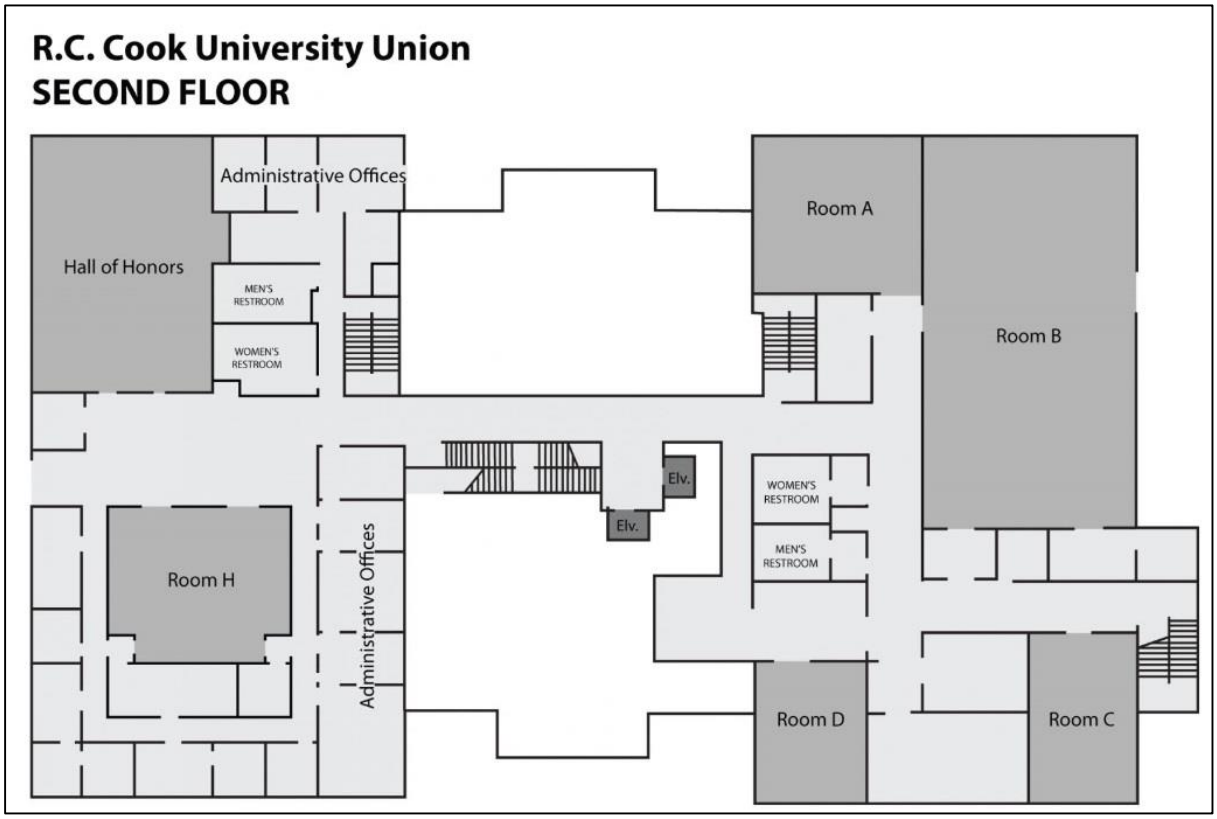





Women's Restroom
Men's Restroom
Elv.
Coat Check
Ballrooms I, II, III
Thad Cochran Center
Third Floor
Theater Shelled In

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 (pages,**
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: Girish Panicker
Alcorn State University
Vice-Chair: Victor Njiti
Alcorn State University

Thursday, February 18, 2016

MORNING

Room Union C

WELCOME 7:50

O1.01

8:00 SHORT-SEASON SUMMER COVER CROP ON FALL ORGANIC BROCCOLI (*BRASSICA OLERACEAE*) PRODUCTION

Girish Kumar Panicker[1], Carl Motsenbocker[2], William Evans[3], Rao Mentreddy[4]
[1]Alcorn State University, Lorman, Mississippi, USA, [2]Louisiana State University, Baton Rouge, Louisiana, USA, [3]Mississippi State University, Crystal Springs, Mississippi, USA, [4]Alabama A&M University, Normal, Alabama, USA

Soil erosion and leaching of crop nutrients from agricultural fertilizers are the major problems on farmlands. Cover cropping, organic farming, and building soil carbon are some of the major solutions recommended to develop healthy croplands. A short-season summer cover crop, Sorghum Sudan grass, was grown for two months and clipped down for raising organic broccoli on Memphis silt loam (Typic, silty, mixed, thermic Hapludalf) in the south-western part of Mississippi. The research plot was in randomized complete block design with four dosages of manuring system; control (no manure), low dosage (3,646 kg ha^1), medium dosage (7,291 kg ha^1), and high dosage (14,581 kg ha^1) of composted poultry manure. Cultural practices, including manual weeding and irrigation, were applied uniformly to all treatments. Based on the minimum requirements recommended by the USDA/NRCS for conservation planning, biomass development was recorded covering the parameters plant height, canopy height, canopy width, leaf area index (LAI), and percent canopy cover for each treatment thrice during the growth period. The total dry biomass was recorded after the final harvest of edible portion. Crop residue was analyzed for total dry matter, C:N ratios, and macro and micro nutrients. After the final harvest and decomposition of crop residues, surface soil was analyzed for macro and micronutrients, carbon build-up, NO_3-N, OM, pH, and CEC. While the percent canopy cover, yield, CEC, and carbon build-up were high for high dosage, the total dry biomass and LAI were correlated and high for medium dosage. The yield from the control blocks was non-marketable.

O1.02

8:15 THE EFFECT OF SEED PRIMING ON ARKANSAS GRAND PRAIRIE SWITCHGRASS STAND ESTABLISHMENT

LaShunda Anderson Hodges, Kelvyn Olowola, Byron Knox
Alcorn State University, Lorman, Mississippi, USA

Switchgrass has naturally low seed germination rates due to see dormancy. Issues with establishing switchgrass stands are mostly attributed to seed dormancy. A technique to increase low seed germination caused by seed dormancy is seed priming. Priming consists of allowing seeds to soak in solution to stop seed dormancy in order to increase seed germination. The objective of the research at Alcorn State University was to determine the effect of seed priming upon Arkansas Grand Prairie Switchgrass (AGPS) stand establishment in Southwest Mississippi. AGPS cultivated from primed (soaked in fertilizer for 96 hours) and non-primed seeds (no soaking in fertilizer) were used to establish a research plot to evaluate their potential for stand establishment in Southwest Mississippi. Seed priming was good for increasing plant germination, but did not result in high plant seedling survival. Plants grown from non-primed plants had significantly greater plant height during field stand establishment than plants grown from primed plants. There was no significant difference in the seed-head height of plants grown from primed seed or non-primed seeds. Therefore, plants from non-primed seeds have a greater potential for establishing AGPS stands in Southwest Mississippi. 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

O1.03

8:30 SCREENING STRAWBERRY PLANTS FOR ANTHRACNOSE DISEASE RESISTANCE USING TRADITIONAL AND MOLECULAR TECHNIQUES

Melinda Miller-Butler[1], Barbara Smith[2], Kenneth Curry[1], Brian Kreiser[1]

[1]*University of Southern Mississippi, Hattiesburg, Mississippi, USA,* [2]*USDA ARS Thad Cochran Southern Horticultural Laboratory, Poplarville, Mississippi, USA*

Anthracnose is one of the most destructive diseases of strawberry which may cause fruit rot, leaf and petiole lesions, crown rot, wilt, and death. Crop loss due to anthracnose diseases can reach into the millions of dollars. Three species of *Colletotrichum* are considered causative agents of anthracnose diseases of strawberry. Selective breeding for anthracnose resistance in strawberry requires the identification of cultivars with genes conveying some degree of disease resistance. The octoploid nature of commercial strawberries has tended to make working on their genetics difficult, but some traits do demonstrate disomic inheritance. Two disease resistance genes have been identified in strawberry through controlled crosses: *Rpf1* for resistance to *Phytophthora fragariae* and *Rca2*, a dominant gene that has been demonstrated to provide resistance to pathogenicity group 2 of *C. acutatum*. Two sequence characterized amplified region (SCAR) markers for the *Rca2* resistance allele were reported in a variety (22) of European and US cultivars, and although there was not a perfect association with anthracnose resistance to *C. acutatum* these SCAR markers provide a unique set of tools to use in screening selections for anthracnose-resistant genotypes in the strawberry breeding programs. The focus of this research was to establish the level of resistance or susceptibility of 80 US strawberry germplasm lines to all three anthracnose-causing *Colletotrichum* species and to determine the degree to which an association and agreement exists between the resistance or susceptibility of the strawberry plants to the presence or absence of the *Rca2* resistant allele SCAR markers.

O1.04

8:45 CONSTRUCTION OF FULL LENGTH GENOMIC cDNA CLONES OF SWEETPOTATO FEATHERY MOTTLE VIRUS

Landrick Akrong[1], Yan Meng[1], Victor Njiti[1], Christopher Clark[2], Chunquan Zhang[1]

[1]*Alcorn State University, Lorman, Mississippi, USA,* [2]*Louisiana State University, Baton Rouge, USA*

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

9:00 SWEET BASIL (OCIMUM BASILICUM) EVALUATIONS

Robert Williams, Patrick E. Igbokwe

Alcorn State University, Lorman, Mississippi, USA

A field study was used to evaluate four sweet basil cultivars (Spicy, Lettuce, Sweet and genovre) for survival, growth, yield potential, and quality. The shoot and root oil contents were also evaluated for quantity and quality. The study was conducted at the Alcorn Experiment Station, on the campus of Alcorn State University. Up-to-date findings suggest that the four sweet basil cultivars evaluated can successfully be grown to maturity on the Memphis silt loam soil in Southwest Mississippi as an annual herb if planted after the last killing frost in the region. The quality analysis for both plant root and shoots systems indicate that sweet basil cultivars have both medicinal and culinary benefits to humans.

O1.06

9:15 MELON (*CUCUMIS MELO* L.) PRODUCTION WITH COMPOSTED MANURES ON A HEAVY SOIL

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

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

Soil erosion and environmental pollution are the major problems the world faces today. Organic farming is the fastest growing sector in the field of agriculture in the US due to environmental problems on farmlands. As a part of the conservation research being carried out by Alcorn State University on horticultural crops for erosion prediction, nutrient management, and conservation planning, over one hundred varieties of Melons (*Cucumis melo* L.) from around the globe have been analyzed for their quality and adaptability. Selected two varieties of high quality melons, Pride of Wisconsin and Charentais (French variety), were raised on Memphis silt loam soil (Typic Hapludalf, silty, mixed, thermic) in southwest region of Mississippi. These melons received nutrients from three treatments of composted organic manures (cow-C; poultry-P; cow and poultry-C+P) in a split-plot design. The parameters evaluated were leaf area index (LAI), percent canopy cover, stem diameter, dry biomass, and yield. There was no significant difference in stem diameter, LAI, and percent canopy cover. The yield and dry biomass were significantly high for Charentais on all three treatments of manures. Charentais was also highly significant in total number of fruits produced per hectare. Since both these varieties of melons respond well to these organic manures and are highly adapted to this region, we strongly recommend these manures and varieties for commercial production.

O1.07

9:30 SPATIAL, SEASONAL AND TEMPORAL ABUNDANCE OF ROOT COLONIZING FUNGI IN GIANT MISCANTHUS

Margeria Smith, Keerthi Mandyam, Ananda Nanjundaswamy, Victor Njiti
Alcorn State University, Lorman, Mississippi, USA

Cultivating dedicated energygrasses is vital in achieving annual biomass production of billion tons required by 2030 for fulfilling the U.S. bioenergy vision for energy independence. Energygrass Giant Miscanthus is perennial, C4 grass with low or no nitrogen fertilization demand and commercial varieties like Freedom have been bred for highest biomass yield in southeastern U.S. Since C4 grasses are known to be obligately mycotrophic with high abundance of root fungal endophytes that play a role in facilitating nutrient uptake, enhancing host fitness and improving plant stress tolerance, we hypothesized that Freedom Giant Miscanthus (FGM) will exhibit more than 90% root length colonization (RLC) by both, arbuscular mycorrhizal fungi (AMF) and dark septate endophytic (DSE) fungi, and both endophytes will exhibit seasonal, temporal and spatial variation in abundance as seen in other C4 grasses. FGM root samples were collected i) from four different plots in three different locations in Mississippi, ii) four times a year coinciding with the seasons, and iii) annually in 2013, 2014 and 2015. Root samples were stained with trypan blue and Sudan IV to visualize AMF and DSE respectively, and the %RLC was recorded by magnified intersections method. Our preliminary results indicate fungal abundance trend as hypothesized. Statistical analyses of our data will be discussed. Since future large-scale biomass production will see the adoption of commercial, high biomass yielding, region-specific energygrass cultivars, data from this study will provide valuable insights into plant-fungal symbioses of a commercial energygrass variety.

O1.08

9:45 ABOVE-GROUND BIOMASS PRODUCTION OF 2 YEAR OLD ARKANSAS GRAND PRAIRIE SWITCHGRASS STAND

Kiara Tarleton, LaShunda Anderson Hodges, Byron Knox, Jazmarkey Wiggins, Napoleon O'quinn, Kendrick Dorsey, Khory Stark
Alcorn State University, Lorman, Mississippi, USA

Switchgrasses have been researched for their potential applications for biofuel productions. It is theorized that switchgrass stands are the most suitable for biofuel production when upon reaching maturity (3 years old). The objective of this research is to evaluate the fresh weight above-ground biomass production of a stand of Arkansas Grand Prairie Switchgrass for year 2. The stand consisted of switchgrass germinated from fertilizer soaked and non-fertilizer soaked seeds. The switchgrass plants were bound and harvested 6 inches above the soil surfaces. This technique was used because switchgrasses store their next year plant food nutrient growth reserves in the bottom 6 inches of their above-ground biomass. The harvested plants were then weighed to determine the fresh weight of biomass produced by soaked and non-soaked germinated plants. The above-ground biomass production of plants germinated from fertilizer soaked seeds had a maximum of 7.25 lbs. and minimum of 1 lb. The above ground biomass production of plants germinated from non-fertilizer soaked seeds had a maximum of 7.5 lbs. and a minimum of 1lb. In conclusion, the fertilizer soaking did not have a significant impact on the above-ground biomass production in year two.

10:00 –BREAK & BUSINESS MEETING

O1.09

10:15 OPTIMIZATION OF SUBTRATE AND ENZYME LOADIND FOR ETHANOL PRODUCTION RESPONSE SURFACE METHODOLOGY

Amber Jones, Ananda Nanjundaswamy, Victor Njiti, Girish Panicker, Franklin Chukwuma
Alcorn State University, Lorman, Mississippi, USA

United States is the largest producer of ethanol from corn. As mandated by Renewable Fuel Standard Association (RFA) and Energy Independence Security Act (EISA), US must be producing at least 36 billion gallons of ethanol from corn and cellulosic biomass by 2030. 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. *Miscanthus giganteus*and switchgrass (*Panicum virigatum*) were used for biofuel production. My objectives were to 1) Determine the optimal substrate loading and 2) enzyme loading for maximum ethanol production. The experimental approach involved use of commercial miscanthus and switchgrass varieties with mild acid pretreatment and RSM for process optimization. The impact of substrate and enzyme loading as optimized by RSM will be discussed for both feedstocks.

O1.10

10:30 CASEIN HYDROLYZATE AND TEA EXTRACT REDUCE PROTEIN OXIDATION OF CATFISH FILLET

Zahur Haque, Dipaloke Mukherjee
Mississippi State University, Mississippi State, Mississippi, USA

In the current study, antioxidative efficacy of casein hydrolyzate (CH), mutually supplemented with tea extract in a thermized Cheddar whey-based edible coating to reduce protein oxidation of Mississippi farm raised retail cut catfish fillet was investigated. The coating consisted of Cheddar whey powder [5%, weight/volume (w/v)], CH (0.25%), calcium chloride (0.125%), sorbitol (2.5%), carboxymethyl cellulose (0.25%) and glucomannan (0.25%) dispersed in 0.2 M McIlvaine's iso-ionic buffer (pH 7.0). Chinese Oolong tea leaves (1, 2 and 5%, w/v) were steeped in the same buffer for three minutes at 85^{O}C. Catfish fillet samples with uniform geometry and weight (5g each) were coated with either (1) only tea extracts, (2) the coating solution containing added CH, or (3) coatings with both tea extracts and CH. Carbonyl contents (CC) of the samples, as indicator of protein oxidation were measured at 0, 1, 3, 5 and 7 days of storage at 4^{O}C in polyover-wrapped styrofoam trays. Coating with both CH and tea extract (5%, w/v) significantly ($P<0.05$) reduced protein oxidation of the samples following 0, 1, 3 and 5 days of storage - evident by 28.8, 15.8, 48.9 and 44.4%, reductions of CCs, respectively, compared to the control (samples immersed only in the buffer). These results also tended to be numerically lower compared to the other treatments. The approach can potentially lead to development of novel preservatives based on natural products to protect muscle food items from the undesirable consequences of protein oxidation.

O1.11

10:45 DEVELOPMENT OF TRANSGENIC SWEETPOTATO WITH MULTIPLE VIRUS RESISTANCE IN US

David Henderson, Chunquan Zhang, Victor Njiti, Yan Meng
Alcorn State University, Lorman, Mississippi, USA

Sweetpotato (Ipomoea batatas (L.) Lam.; Convolvulaceae), a plant widely grown in all tropical and subtropical areas, is among the 10 most important food crops worldwide. As a crop produced by vegetative propagation, sweetpotato may accumulate pathogens, particularly viruses, in the planting stock. Sweet potato feathery mottle virus (SPFMV) and Sweet potato leaf curl virus (SPLCV) are two of the most prevalent sweetpotato viruses that cause devastating diseases and yield reduction in US. To date, immune resistance has not been identified in I. batatas and resistance to virus infections remains the most cost effective way of disease management. In this study, we explore a novel biotechnological method to develop transgenic sweetpotato (cv. Beauregard) plants with resistance to these two viruses. We engineered part of coat protein (CP) gene of SPFMV and the replication origin region of SPLCV into a binary vector for Agrobacterium-mediated genetic transformation for transgene expression. The SPFMV CP gene and SPLCV replication origin sequence are designed in antisense for the optimal induction of RNA silencing in transgenic sweetpotato. Expression of foreign genes has been achieved by using Agrobacterium

tumefaciens strain EHA105 harboring the expression cassette; similar results of transformation were observed when particle bombardment system of gene delivery was applied. Calli induced from transformed leaf and petioles showed positive signs of foreign gene expression by polymerase chain reaction (PCR). These results warrant further investigation on transgenic plant regeneration and resistance to virus infection under control and field conditions.

O1.12

11:00 QUALITATIVE AND QUANTITATIVE ASSESSMENT OF DARK SEPTATE ENDOPHYTIC (DSE) FUNGAL ASSEMBLAGES IN SWITCHGRASS

Ashley Williams, Keerthi Mandyam, Ananda Nanjundaswamy, Girish Panicker
Alcorn State University, Lorman, Mississippi, USA

Switchgrass (*Panicum virgatum* L.) is a native, drought-tolerant, warm-season perennial grass with stands lasting 15-20 years, requiring little or no fertilizer amendment, enhancing biodiversity and capable of accumulating abundant biomass with extensive root system. Accordingly, these ecologically relevant attributes have favored the use of switchgrass in ecological restoration, soil conservation and erosion control, livestock forage and bedding, and most importantly as bioenergy feedstock. The long-term and large-scale cultivation of switchgrass for bioenergy, and its cultivation for soil conservation necessitate the investigations of its associated microbial communities. Since C4 grasses host an abundance of root colonizing fungi like arbuscular mycorrhizal fungi (AMF) and dark septate endophytes (DSE), we hypothesized that switchgrass roots will have abundant DSE colonization and Periconia macrospinosa would be the most common DSE. Accordingly, we quantified and compared the percent root length colonization of DSE from four cultivars (Alamo, Bomaster, Colony and Kanlow) cultivated in Mississippi. Root samples were collected monthly from four different plants per cultivar, stained with Trypan Blue and Sudan Red, and the DSE and AMF quantified by magnified intersections method. Root colonizing fungi were isolated from all four cultivars on a variety of media, and representative strains were used for testing Koch's postulates to identify DSE fungi. Preliminary results suggest the high incidence of DSE, and several P. macrospinosa strains have been isolated. Statistical analyses of fungal abundance and their seasonal variation will be discussed. Further, the ecological significance of these symbioses in soil conservation and/or bioenergy feedstock production will be discussed.

O1.13

11:15 SUBMERGED AND SOLID STATE FERMENTATION OPTIMIZATION OF SWEETPOTATO USING BACILLUS SUBTILIS

Angela Jackson, Ananda Nanjundaswamy, Victor Njiti, Xia Qun, Franklin Chukwuma
Alcorn State University, Lorman, Mississippi, USA

Probiotics are live microorganisms which improve the health of animals and humans by improving the gastrointestinal track food absorption. Several *Bacillus* species are known to exhibit probiotic activity. Recent studies have indicated the probiotic activity of *Bacillus subtilis* in piglets to prevent diarrhea. The overall objective of the present study is to develop value added sweetpotato soymeal fermented probiotic enriched with *Bacillus subtilis*which can be potentially used as feed supplement in piglets to prevent diarrhea. Specific objectives of the study are to: 1) develop optimal media composition that support maximum colony forming units (CFU) and 2) conduct nutritional profiling of fermented and control samples. To achieve these objectives submerged fermentation using sweetpotato and soymeal were optimized using design of experiments (DOE). The best media composition was validated for CFU and fermented samples upon drying were subjected to nutritional profiling. Differences in biochemical profiling of the solid state and submerged fermentation samples will be discussed.

O1.14

11:30 BIOCHEMICAL CHARACTERIZATION OF SWEETPOTATO GROWN IN HYDROPONIC SYSTEM IN THE GREENHOUSE

Damerius Johnson, Victor Njiti, Ananda Nanjundaswamy, Franklin Chukwuma
Alcorn State University, Lorman, Mississippi, USA

Sweetpotato is an important crop of southern United States. Primarily the crop is cultivated for the valuable roots which are used as vegetable. Sweetpotatoisalso known to carry several health benefits apart from energy rich starch. Some of the secondary metabolites in sweetpotato which have gained importance in recent years are phenolic compounds, flavonoids, vitamin C and carotenoids. These metabolites are known to act like antioxidants and play a role in human health. The primary objective of our study is to determine the biochemical composition of the roots and shoots of sweetpotato grown under greenhouse conditions using hydroponic system. The study included one Alcorn State University breeding line and one cultivar

(O'Henry)grown in hydroponic and exposed to a growth retardant to reduce biomass and enhance storage root growth. Both root and shoot (vine) samples were collected at 2, 4, 6, 8 and 10 week interval and subjected to biochemical characterization. Specifically, total phenolics, total flavonoids, Vitamin C, Sucrose, caffeic acid, chlorogenic acid, apigenin and kaempferol were analyzed using HPCL and spectrophotometer. Impact of plant growth retardant and genotype on the profiled metabolites will be discussed.

O1.15

11:45 APPROACH TO IDENTIFYING THE FIRST ENZYME OF PLANT OIL SYNTHESIS

Anushobha Regmi, Philip Bates
University of Southern Mississippi, Hattiesburg, Mississippi, USA

To increase the probability of successful oilseed engineering, it is essential to identify the genes involved. However, the gene encoding the first enzyme involved in plant oil synthesis is yet to be characterized. A putative glycerol-3-phosphate acyltransferase (*GPAT9*) in *Arabidopsis thaliana* is suggested to be the GPAT involved in triacylglycerol (TAG) synthesis based on its localization in the endoplasmic reticulum where oil accumulates, sequence homology to mammalian *GPAT3* which makes fat in adipose tissue, and its elevated expression during embryogenesis when TAG synthesis also increases. However, the sequence analysis is not enough to prove that it is the GPAT involved in plant oil synthesis since there are at least ten *GPAT* genes in Arabidopsis (most of which are involved in cutin and suberin synthesis). The T-DNA knock out of the *GPAT9* in *A. thaliana* was found to be lethal. Seed specific RNA knockdown reduced oil accumulation implying its involvement in TAG synthesis. To confirm if reduction in oil is correlated with decreased *GPAT9* expression, GPAT enzymatic assays were performed on whole siliques microsomes of the knock down lines and compared to the activity of the wild type. Our data revealed decreased GPAT activity in the knock down lines suggesting it to be the GPAT involved in plant oil synthesis. If this is the main GPAT enzyme of TAG biosynthesis, overexpressing this gene might help increase oil production to meet the increasing demand for plant oil in petrochemical and pharmaceutical industry.

12:00 -1:00 General Sessions

Thursday, February 18, 2016

AFTERNOON

1:15 – 2:45 POSTER SESSION

P1.01

RAPID PLATE ASSAY FOR DETECTION AND CHARACTERIZATION OF HERBICIDE-RESISTANT WEEDS

Te-Ming Tseng, Erin Wilson, Brittany Jones, Jay McCurdy
Mississippi State University, Mississippi State, Mississippi, USA

There are currently 247 weed species resistant to a combined total of 157 different herbicides worldwide. With the constant increase in herbicide resistant cases, there is a need for rapid detection and characterization of herbicide-resistant weeds, so growers can incorporate weed control strategies in a timely manner. The objectives of this study is to develop a rapid agar plate assay for herbicide resistant trait, which can then be used for confirming resistance of weed samples from growers in less than two weeks. Annual bluegrass is used as a weed model. Greenhouse dose response studies revealed reunion bluegrass population to be 45-times more resistant to foramsulfuron than the susceptible annual bluegrass population. Reunion requires 331g/ha, compared to 7.2g/ha foramsulfuron by susceptible population, to achieve 50% control. ALS-gene mutation resulting in an amino acid substitution, Trp574 to Leu, was identified as the possible mechanisms of resistance in Reunion population. For plate assay, plants were grown in Murashige-Skoog medium, and three inoculation techniques were tested. Seed, and root tip inoculation proved to be most effective in discriminating between resistant and susceptible population. Total time required from seed planting to confirming resistance was 2 weeks (only 1 week to express injury symptoms). Daily non-destructive root scans were able to identify differences in root characteristics (number of laterals; root length, area, and growth rate) between resistant and susceptible population. This plate assay can potentially be used with any weed species to effectively detect resistance trait, and combined with molecular assays to further confirm resistance.

P1.02

GENERATION OF STABLE NANO-VESICULAR CURCUMIN-LOADED EMULSION SYSTEMS

Xue Zhang, Zahur Haque
Mississippi State University, Mississippi State, Mississippi, USA

Curcumin is known to exhibit remarkable antioxidantive, antimicrobial and anti-inflammatory efficacy, as well as protection against certain cancers. However, poor water-solubility and bioavailability limits its applications as nutraceuticals within foods. In this study, we have established a nano-vesicular emulsion system (NVES) stabilized by bovine serum albumin (BSA) that was ultra-high pressure homogenized at 210 MPa, with curcumin loaded as a cargo. At a constant BSA concentration of 0.5%, the mean globular size (dvs) and emulsion stability tended to increase and decrease, respectively, as peanut oil phase fraction (φ) was increased from 0.05 to 0.25, with no significant difference in surface load of BSA observable at the oil/water interface. The emulsion systems showed large variation in dvs indicating inherent instability. Next, φ was increased to 0.15 and the coarse emulsion was blended with 0.25-2.0% of BSA dispersions. The emulsion with BSA concentration of 0.25% showed the largest globules and instability. With BSA concentrations of 1.0-2.0%, there were less variations in terms of dvs with the smallest one, 102 nm, achieved at 2.0% of BSA. This condition was used to dissolve curcumin in peanut oil (φ=0.15) at 100 ºC followed by homogenization with 2.0% of BSA at pH 7.0 and 7.4, respectively. Results showed an increase in dvs to 150-160 nm and more BSA to oil/water interface. Both curcumin-loaded nanoemulsions showed enhanced stability with higher at pH 7.4 as indicated by turbidity and zeta potential measurements. Data provide useful information for stabilizing curcumin in NVES systems for application in foods and nutraceuticals.

P1.03

METAL UPTAKE AND GROWTH RESPONSES OF WHEAT EXPOSED AT DIFFERENT DURATIONS TO CHELATE-AMENDED CADMIUM-CONTAMINATED SOILS

Krystin Cook, Elsie Madison, Charles Davis, Gloria Miller, Maria Begonia, Gregorio Begonia
Jackson State University, Jackson, Mississippi, USA

Phytoextraction is gaining acceptance as a cost-effective and environmentally sound phytoremediation strategy for reducing toxic metal levels from contaminated soils. We hypothesized that the addition of synthetic chelates can increase the amount of bioavailable metal for root uptake and subsequent translocation to the shoots thereby improving the efficacy of phytoextraction. This study was conducted to evaluate the effects of cadmium (Cd) and ethylenediaminetetraacetic (EDTA) on metal uptake by wheat plants. Wheat (*Triticum aestivum* L. cv TAM-109) seeds were planted in plastic tubes containing topsoil and peat (2:1, v: v) spiked with various levels (0, 100, 250, 500 mg Cd/kg dry soil) of cadmium nitrate. After 30, 45, and 60 days of growth, plants were harvested. Results showed that after 30 days of exposure to Cd, there were maximal translocation of Cd to the shoots especially at the higher Cd treatments (e.g., 250 and 500 ppm Cd). However, EDTA did not enhance Cd transfer to the shoots. Although there were increased Cd root uptake at both 45- and 60-day exposure to Cd treatments, Cd shoot translocation was relatively less compared to the 30-day exposure period. Also, root uptake of Cd was enhanced by EDTA during the 45- and 60-day exposure periods. [Support provided by the National Aeronautics and Space Administration (NASA through the University of MS to JSU under the terms of Agreement/Grant No. NNX10AJ79H.]

P1.04

SHOOT BIOMASS AND CHLOROPHYLL PRODUCTION OF WHEAT EXPOSED TO CHELATE-AMENDED CADMIUM-CONTAMINATED SOILS

Jessica Gilbert, James Reede, Charles Davis, Gloria Miller, Maria Begonia, Gregorio Begonia
Jackson State University, Jackson, Mississippi, USA

The success of phytoextraction, a branch of phytoremediaton, depends upon the ability of plant species to absorb a substantial amount of heavy metals (HMs) into their roots and preferentially translocate the metal into the harvestable above-ground biomass for easier harvesting. Since metal removal by plants is a function of both tissue metal concentrations and biomass, this experiment was conducted to determine the effects of Cd and ethylenediaminetetraacetic (EDTA) on chlorophyll production and biomass of wheat (*Triticum aestivum* L.). Wheat seeds were planted in plastic tubes containing topsoil and peat (2:1, v: v) spiked with various levels (0, 100, 250, 500 mg Cd/kg dry soil) of cadmium nitrate. After 30, 45, and 60 days of growth, plants were harvested to obtain their biomass and leaf chlorophyll contents. Results indicated that shoot biomass generally increased with growth duration. The phytotoxic effects of Cd and EDTA were not evident at the earlier growth stages indicative of the relative tolerance of wheat to Cd and EDTA. There were slight reductions in biomass production at higher Cd treatments in combination with EDTA, especially at 60 days after emergence. Cadmium treatments with or without EDTA generally had no deleterious effects on chlorophyll production at all growth stages. [Support provided by the National Aeronautics and Space Administration (NASA through

the University of MS to JSU under the terms of Agreement/Grant No. NNX10AJ79H.]

P1.05

ESTIMATION OF THERMODYNAMIC STABILITY OF SOUTHERN MISSISSIPPI VALLEY LOESS ECOSYSTEMS

William Kingery[1], Barry Hart[2], Caleb Gulley[2], Rachel Stout-Evans[3], Hongqi Wu[4]
[1]Mississippi State University, Mississippi State, Mississippi, USA, [2]USDA-NRCS, Milan, Tennessee, USA, [3]USDA-NRCS, Metcalf, Mississippi, USA,[4]Rochester, New York, USA

Ecological site descriptions are being developed for use in conservation planning decisions, guiding establishment and restoration of desired plant communities, and maintaining existing conditions. Therefore, it is necessary to determine the stability of ecosystems relative to climax and altered plant communities. Thermodynamic methods have been developed to estimate anthropogenic impacts on ecosystems. However, because of the difference between physical and biological constituents, thermodynamic principles are not easily transferred to macroscopic descriptions of ecosystems. One such method, designed to address this obstacle, is based on dynamic equilibria in systems far from thermodynamic equilibrium. Its central concept is the rate of entropy production and dissipation of heat, which is related to net primary productivity and decomposition of biomass. The Southern Mississippi Valley Loess (SMVL) resource region extends north to south from the Ohio-Mississippi River region in western Kentucky into southeastern Louisiana. Stability in terms of estimated thermodynamic properties was compared with ecological site characterizations of ecosystems in the SMVL. Results confirmed a north-south differentiation based on degree of disturbance.

P1.06

INSECTICIDAL EFFECT OF TWO ANT-DERIVED OLEOCHEMICALS

Tahir Rashid[1], Jian Chen[2], Paul McLeod[3]
[1]Alcorn State University, Lorman, Mississippi, USA, [2]USDA-ARS, Stoneville, Mississippi, USA, [3]University of Arkansas, Fayetteville, Arkansas, USA

The management of insect pests of cultivated crops mostly relies on synthetic organic chemicals thus raising environmental concerns. Interest has grown in organic agriculture that encourages, among other methods, the use of environmentally friendly biological compounds to manage insect pests. The toxicity of fatty amines from *Monomorium minimum*, decylamine and dodecylamine, was evaluated against sugarcane aphid (*Melanaphis sacchari*) and corn earworm (*Helicoverpa zea*) larvae in laboratory bioassays. The LD50 values were determined against *H. zea* larvae by topical application in replicated trials. The 0.928 µl of the insecticidal solution was applied to individual larva with a pre-calibrated capillary tube. Acetone was used as solvent. Mortality was observed at 24, 48 and 72 hours after treatment. For *M. sacchari*, LC50 values were determined by spraying host grass leaves with insecticidal solution with a fine nozzle at different dosages. The treated leaf was placed on a filter paper inside a petri dish and adult *M. sacchari* were introduced into the arena. Mortality was observed 24 hours after treatment. The LD50 values of decylamine and dodecylamine for *H. Zea* were calculated as 116.6, 112.0 and 104.3 µg after 24, 48 and 72 hours, respectively for decylamine, and 40.0, 32.5 and 39.8 µg after 24, 48 and 72 hours, respectively for dodecylamine. Both compounds showed similar trend against *M. sacchari* where LC50 values were calculated as 1.11 and 0.65 mg/ml for decylamine and dodecylamine, respectively. The higher toxicity of dodecylamine indicates that this fatty amine may provide an environmentally safe method of insect control.

P1.07

EVALUTION OF SWITCHGRASS STAND ESTABLISHMENT UPON SOIL COLOR

Jazmarkey Wiggins, Lashunda Anderson Hodges
Alcorn State University, Lorman, Mississippi, USA

Soil color is used as an indicator and descriptor of soil processes, such as erosion, organic matter or iron content. Switchgrass is known to impact soil structure and soil carbon content. However, the effect of switchgrass stand establishment upon soil color has not been thoroughly researched. The objective of this preliminary study is to evaluate the effect a mature switchgrass stand has upon soil color. Soil samples were randomly taken through the switchgrass stand. Control soil samples were randomly collected from parameter soils on the outside of the switchgrass stand. Munsell color books were used to determine the soil color of each soil sample under field conditions and in digital photographs. Switchgrass stand and parameter soil samples did display slight differences in soil color. Therefore, switchgrass stand establishment does have an impact on soil color.

P1.08

ECONOMIC CHARACTERISTICS OF HONEY PLANTS IN MISSISSIPPI

Elena Kostyleva
Alcorn State University, Lorman, Mississippi, USA

The purpose of this work was to find out about the economic characteristics of honey plants in the state of Mississippi. So, by way of the botanical survey of the region under study, we registered more than 180 species of honey and pollen plants belonging to 99 genera of 41 families, out of which more than 87 species from 57 genera of 35 families are cultivated in a varying degrees. The greatest number of species of cultivated honey plants belongs to the following families: *Legumes* (*Fabaceae*) - 16 species; *Asteraceae/Compositae* -12 species; *Rosaceae* -6 species; *Aquifoliaceae*, *Cucurbitaceae*, *Magnoliaceae* - 4 species in each; *Oleaceae*, *Theaceae*, *Lamiaceae* - 3 species in each. In other families, there are 1-2 species of cultivated honey plants. Thirty-three species of honey plants in the region are used in agriculture, the most abundant of which are the region's leading arable crops - soybean and cotton. Fifty-five species of the region's honey plants are ornamental or garden ones. The most of registered honey plant species (60%) are found only in the wild. They are mostly represented by forest plants, obviously due to the fact that most of the study area is covered by forests. Thus, the forage base of beekeeping in the region of study is represented mainly by native honey plants.

P1.09

QUANTITATIVE ANALYSIS OF MAJOR ALLERGENS IN PEANUT VARIETIES GROWN IN MISSISSIPPI

Yan Liu, Udhghatri Kolli, Hamsini Balaji, Sam Chang, Jiaxu Li
Mississippi State University, Mississippi State, Mississippi, USA

Peanut allergy is one of the most severe food allergies, with the majority of fatal food allergies reported in the United States attributable to peanuts. Peanut allergy is typically life-long and the number of people with peanut allergies in the United States is increasing. Therefore production of a peanut that has reduced levels of allergens will benefit consumers who suffer from peanut allergies and be of considerable health and economic value. Peanut allergens are seed proteins that can trigger a potent and sometimes dangerous immune response in peanut-allergic individuals. Of the 13 recognized peanut allergens (Ara h 1*[Arachis hypogaea 1*] - Ara h 13), Ara h 1, Ara h 2, and Ara h 3 are the major concern because of their abundance and strong contribution in IgE binding. In this study, we profiled the levels of major allergens in nine peanut varieties grown in Mississippi using one- and two-dimensional protein gel electrophoresis. We identified a peanut variety with with low allergen (Ara h2 and Ara h3) levels. The allergen profiling results will help peanut growers compare the potential profitability of low-allergen varieties to that of conventional varieties. The selection of varieties that have low allergens and good yields can help growers profitably on the market.

P1.10

EFFECT OF SILICON ON THE GROWTH AND DROUGHT RESISTANCE OF SOYBEANS

Saroj Sah, Raja Reddy, Jiaxu Li
Mississippi State University, Mississippi State, Mississippi, USA

Drought is a major environmental factor limiting crop productivity. Soybeans are Mississippi's top row crop in terms of planted acreage and farm gate *value*. Over 50 percent of Mississippi soybeans are grown on non-irrigated sites. These soybean plants are more susceptible to yield loss from drought. The Intergovernmental Panel on Climate Change predicts that drought will increase in intensity and frequency in the United States, especially in Southern states. Therefore, there is a great need to develop production systems to maintain consistent yields of soybeans grown on nonirrigated sites across years. Silicon has recently been recognized as an important element in plant nutrition. Plants with supplies of silicon produce stronger cell walls and show increased biomass production. In this study, we evaluated the effects of silicon application on vegetative growth and drought resistance of two soybean varieties (Agri-Gold 5332 and Progeny 5333) grown in the greenhouse. Plants grown with potassium silicate had higher moisture index and chlorophyll content than plants grown with potassium silicate under drought condition. Other parameters like leaf area, number of leaves, and number of roots were more in case of potassium silicate treated than the control plants. These results indicate that silicon application can improve the growth and drought resistance of greenhouse-grown soybeans.

P1.11

OSMOTIC STRESS TOLERANCE CLASSIFICATION BASED ON *IN VITRO* SEED GERMINATION OF RICE

Bhupinder Singh[1], K. Raja Reddy[1], Timothy Walker[2]
[1]Mississippi State University, Mississippi State, Mississippi, USA, [2]Horizon Ag.LLC, Memphis, Tennessee, USA

The dry-seeded, delayed-flood culture with alternate wetting and drying weather irrigation management options to grow rice is favored in US Mid-south. Understanding the variation in response to soil moisture deficit among rice cultivars during seed germination would benefit in management and in breeding programs. An *in vitro* experiment was conducted to study the impact of osmotic stress using polyethylene glycol on germination properties of 15 rice cultivars commonly grown in US Mid-south production system. Time-series for seed germination was developed at wide range of osmotic potentials, 0 to -1.0 MPa, with -0.2 MPa increments. Cumulative seed germination over time was fit to 3-paramter sigmoid function to deliver the parameters needed for further analysis. Seed germination rate (SGR), maximum seed germination (MSG), maximum osmotic potential when seed germination is zero (MSGOPmax), and maximum osmotic potential when seed germination rate is zero ($GROP_{max}$) were derived using appropriate regression techniques between these parameters and osmotic potential. Cultivars differed significantly for MSG, SGR, $MSGOP_{max}$, and $GROP_{max.}$ MSG and SGR significantly decreases with decreasing osmotic potential. Seed weight for each cultivar was measured, but had poor correlation with MSG, SGR. Cumulative drought response indices (CDRI) were developed by summing individual response indices of all cultivars. Rice cultivars were classified based on means and standard deviations of CDRI into three drought-tolerant groups. The identified tolerance among the rice cultivars would help the rice producers to select a variety suited for niche environment and rice breeders to develop drought tolerance among the cultivars for variable climatic condition.

P1.12

PHENOTYPIC CHARACTERIZATION AND CLASSIFICATION OF RICE BREEDING LINES FOR EARLY-SEASON VIGOR

Salah Jumaa[1], K. Raja Reddy[1], Edilberto D. Redona[2]
[1]Mississippi State University, Mississippi State, Mississippi, USA, [2]Delta Research and Extension Center, Stoneville, Mississippi, USA

Holistic and stage-specific cultivar screening is needed to improve crop genotypes for tolerance to abiotic stresses. Early-season vigor that includes the whole-plant system is critical to canopy development for maximizing efficiency of the photosynthetic machinery. The objectives of this study were to evaluate root and shoot morphology and growth of over 100 key rice-breeding lines used in the Mississippi rice breeding program during early season and develop a screening tool to classify them into different vigor groups. An outdoor experiment was conducted in pots, with five replications per line, under optimum water and nutrient conditions. Above- and below-ground growth and developmental parameters were assessed at 30 days after transplanting. Root morphological traits were assessed using the winRHIZO root image analysis system and growth measurements for 11 root traits. Above-ground plant growth parameters such as plant height, leaf area, and leaf and tiller numbers were also measured. Rice breeding lines varied significantly for many of the traits measured. Individual and cumulative vigor response indices were developed using all the traits and means and standard deviations were used to classify the breeding lines into different vigor groups. The combined vigor indices for the lines tested ranged from 11.2 (RU14041194) to 20.4 (JES). Only 5% and 6% of the rice lines showed high to very high and very low vigor indices, respectively. Majority (81%) exhibited low and moderately low vigor indices. The early-season vigor index database will be useful in developing new varieties most suitable to the US Mid-south rice-growing environment.

P1.13

SOIL MOISTURE STRESS EFFECTS ON YIELD COMPONENT DISTRIBUTION IN SOYBEAN

Chathurika Wijewardana, K. Raja Reddy
Mississippi State University, Mississippi State, Mississippi, USA

Soil moisture stress is the major abiotic stress factor that causes extensive losses to soybean production worldwide. The objectives of this study were to examine the soil moisture stress effects on soybean reproductive growth and to quantify the yield component distribution on two cultivars, AG 5332 and Progeny 5333 with different growth habits. Plants grown in pots outdoors were moved into sunlit controlled environment at prior to flowering stage. Five moisture stress treatments, 100, 80, 60, 40, and 20% of daily evapotranspiration of the control were imposed at flowering and continued until maturity. Growth and development of plants were evaluated throughout the experiment at 7-day intervals. Final plant dry weights and pod and seed yield were determined. Midday leaf water potential, gas exchange, and fluorescence were measured weekly from 7 to 35 days after treatment. Growth and physiological parameters declined linearly with decreasing soil moisture levels. The distribution of pods on the main stem and branches varied significantly in both the cultivars. The middle region of the canopy in both cultivars was responsible for

approximately 55% of final yield compared to top and bottom regions. Approximately 45%and 64% reductions in seed number and seed weight were recorded under 20% moisture stress level compared to the control in Progeny 5333, while AG 5332 accounted 46 and 43% decline for those yield components. The information on the seed distribution patters across different soil moisture levels will be useful to optimize yield through proper management practices and scheduling irrigation during the growing season.

P1.14

INTERACTIVE EFFECTS ON CO_2, DROUGHT, AND ULTRAVIOLET-B RADIATION ON CORN GROWTH

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

Crop growth and development are highly vulnerable to global climate change components such as elevated carbon dioxide (CO_2), drought, and ultraviolet-B (UV-B) radiation. Interactive effects of these factors are clearly unknown to date. The objectives of this study were to test the hypothesis that corn hybrids differ in their response to multiple environmental factors of (CO_2) [400 and 750 µmol mol^{-1} (+(CO_2)], irrigation treatments based evapotranspiration (ET) [100 and 50% (-ET)], and UV-B radiation [0 and 10 kJ m^{-2} d^{-1} (+UV-B)]. Six corn hybrids (P1498, DKC 65-81, N75H-GTA, P1319, DKC 66-97, and N77P-3111) with known drought tolerance variability were grown in eight sunlit, controlled environment chambers in which control treatment consisted of 400 µmol mol^{-1} [CO_2], 100% ET-based irrigation, and 0 kJ UV-B. Plants grown at +UV-B alone or combination with 50% ET produced shorter plants and smaller leaf area while elevated CO_2 treatments ameliorated the damaging effects of drought and higher UV-B levels on corn hybrids. Total stress response index (TSRI) for each hybrid, developed from the cumulative sum of response indices of vegetative and physiological parameters varied among the corn hybrids. The hybrids were classified as tolerant (P1498), intermediate (DKC 65-81, N75H-GTA, N77P-3111) and sensitive (P1319 and DKC 66-97) to multiple environmental stresses. The differences in sensitivity identified among the corn hybrids implies the option to select corn hybrids with tolerance to multiple environmental stresses projected to occur in future climates.

P1.15

ORGANIC PRODUCTION OF ETHNIC VEGETABLE FOR SUSTAINING SMALL FARMS IN ALABAMA

Fayeann Crawford[1], Robert Spencer[2], S. Rao Mentreddy[1], Eddie Wheeler[2], Karen Wynn[4], Radhika Kakani[3]
[1]Alabama A&M University, Huntville Alabama, USA, [2]Alabama Coperative Extension Services, Huntsville Alabama, USA, [3]Indigo Market, LLC, Huntsville Alabama, USA, [4]Crotovina Inc, Huntsville Alabama, USA

Production of desirable ethnic vegetable crops can help sustain small farms in Alabama. With 7,100 acres under vegetable production and ranking 25th compared to 3rd ranking Georgia, Alabama has the potential and the need for increasing its vegetable production. In 2014 and 2015, field experiments were conducted at Alabama A&M University's Agricultural Research Station to determine adaptability and yield of ethnic vegetable crops. Six to eight week old seedlings of either Hispanic, Chinese or Indian vegetable varieties were transplanted to raised beds with composted poultry litter soil incorporated and covered with plastic mulch with drip tape underneath. Each crop was replicated four times in a randomized block design. Plants were fertilized with fish emulsion through the irrigation system bi or tri- weekly. Fruits or leaves from each crop were harvested when they were of marketable size and fresh weights recorded to determine crop yields. Research is currently ongoing and data from 2014 trials is presented. Eggplants produced 10-11 kg/Plant and 5 Kg/Plant for the Indian and Chinese varieties, respectively. Pepper yields ranged from 0.3 - 1.1 Kg/Plant, 1.3 Kg/Plant and 1.4 - 2.0 Kg/Plant for the Hispanic, Indian and Chinese varieties, respectively. Indian varieties of cucumbers had high yields of between 32.5-80 Kg/Plant and 10 and 32.5 Kg/Plant for some varieties. Chinese gourds gave yields of 45 kg/Plant. Indian Okra varieties ranged from 6 to 9 Kg/Plant in yield. Due to time and labor limitations, the crops were not fully harvested. Therefore, the yield data must be viewed with caution.

P1.16

SOYBEAN REPRODUCTIVE GROWTH, DEVELOPMENT, AND YIELD RESPONSES TO TEMPERATURE

Firas Alsajri, K. Raja Reddy
Mississippi State University, Mississippi State, Mississippi, USA

Temperature is the major factor affecting many developmental, growth, and yield attributes of crops. In spite several studies in the past, soybean plant processes and temperature relationships are not available under realistic radiation environments. An experiment was conducted to investigate temperature

effects on two different cultivars with determinate and indeterminate growth habit. Plants grown in large pots outdoor conditions were moved into sunlit plant growth chambers at initial flowering and five wide range of temperatures were imposed soon after flowering and continued to maturity. During the season, plant growth and development were estimated at frequent intervals. At maturity, plant-component dry weights and pod and seed numbers and weights were recorded. Significant temperature and cultivar differences were recorded among the many growth and developmental parameters measured. The time from flowering and pod maturity declined with increase in temperature and quadratic function described best described the response in the both the cultivars. Cultivar AG 5332 took more time across the temperatures compared cultivar PR 5333 from flowering to seed maturity. The optima temperature for pod and seed number and weights were slightly lower than the optima temperature for total or vegetative biomass production. Also, optima temperatures for yield parameters were significantly different between the two cultivars. The AG 5332 was more high temperature tolerant than the PR 5333. The functional algorithms between soybean growth and developmental processes and temperature will be useful in improving soybean crop models for effective field management.

P1.17

RADIOLOGICAL IMPLICATIONS OF LOCALLY PRODUCED FERTILIZERS

Caroline Mensah[1], Jermiah Billa[1], Fengxiang Han[3], Girish Panicker[2], Karthik Eti[1], Joseph Dimpah[1], Deborah Quaye[1], Sai Mayreddy[1]
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Fertilizers play a major role in the farming industry as they tend to impact plant growth and enhance crop yields. The major fertilizer ingredients (Phosphorus and Potassium) are derived from potash and phosphate rocks originated from earth's crust. Originated from earth's crust, rocks contain trace amounts of naturally occurring radioactive materials (NORM) . The levels of NORM in fertilizers are primarily dependent on the type of rock (potash or phosphate), amount of potash/ phosphate, and their origination (geographical location). To evaluate the levels of NORM in locally produced fertilizers in the state of Mississippi, a radiological assessment study is conducted. Fertilizers of phosphate (0-46-0, P2O5) and potash (0-0-60, K2O) are analyzed via the gamma spectrometry using a 35% efficiency high purity germanium detector purchased from Canberra, USA for the key isotopes, Radium-226 in Phosphate and K-40 in Potash. Also, the radioactivity levels of key isotopes (Ra-226 and K-40) in these fertilizers are theoretically estimated. Finally, based on the obtained radioactivity levels, the radiological health parameters are computed and compared with the acceptable limits. The presented data include estimated and measured radioactivity values in the fertilizer samples considered in this research, radiological implications of these fertilizing materials, and a statistical comparison of the obtained (theoretical and experimental) mean concentration values.

P1.18

MORPHOLOGICAL RESPONSE OF THE COTTON CHROMOSOME SUBSTITUTION LINES FOR LOW TEMPERATURE STRESS

Akanksha Awasthi[1], Sukumar Saha[2], Johnie N. Jenkins[2], David M. Stelly[3], K. Raja Reddy[1]
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The CS-lines constitute important breeding resources, increasing the genetic diversity available in Upland cotton. An experiment was conducted by imposing low (day/night, 22/14 °C) and optimum (30/22 °C) temperatures during growth stages under optimum moisture and nutrient conditions, using 21 CS-lines with parent TM-1 (*G. hirsutum*). Above- and below-ground growth parameters were assessed at 25 d after seeding. Several root morphological traits were assessed using WinRHIZO root image analysis system. CS-lines varied significantly for many traits measured, particularly, days to 50% seedling emergence, plant height, plant component weights, and root morphological parameters. CS-B08sh showed early emergence both at optimum and low temperatures, but other CS-lines were not different from TM-1. Plant height at low temperature ranged from 0.2 cm (CS-B08sh) to 1.2 cm (CS-B02) with an average of 0.48 cm, whereas at optimum temperature, it varied from 11.3 cm (CS-T02) to 17.4 cm (CS-B02) with the average of 13.6 cm. The average root diameter is greater (0.64 mm) at low temperature than (0.44 mm) at optimum temperature. CS-T02, CS-B08sh, and CS-M22sh have significantly lower root dry weight compared to TM-1. Combined low temperature

response index (CLTRI), a measure of all response indices combined at low to optimum temperature, was used to categorize CS-lines early-season tolerance to low temperature. Among the 21 CS-lines tested, CS-T04 and CSB08sh showed significantly higher and lower tolerance to low temperature compared to TM-1. The identified low and high temperature-tolerant CS-lines and temperature dependent growth responses might be useful in cotton breeding programs for further analysis.

P1.19

GENOTYPING BY SEQUENCING OF MELON MORPHOTYPES FOR GENERATING SNPs AND GWAS

Padma Nimmakayala[1], Umesh Reddy[1], Yan Tomason[1], Girish Panicker[2]
[1]West Virginia State University, West Virgina, WV, USA, [2]Alcorn State University, Lorman, Mississippi, USA

Melon (*Cucumis melo* L.) is an economically important horticultural crop and is a diploid (n=12) with the genome size of 450Mb. Melons are grouped into 15 morphotypes (*cantalupensis, reticulatus, adana, chandalak, ameri, inodorus, chate, flexuosus,dudaim* and *tibish* (subsp. *melo*), *momordica, conomon, chinensis, makuwa,* and *acidulous* (subsp. *agrestis*). Many of the taxonomic groups are widely disputed as their diverse accessions share genealogies of both *melo* and *agrestis* and are heterogenous exhibiting mixed features. Our study is the first comprehensive analysis of genetic diversity in melon, and describes more than 10,000 single sequence DNA variants (SNPs) that can differentiate these morphotypes at molecular level, We further used these SNPs for identifying fruit specific QTLs using a biparental cross and Genome Wide Association Study. We will present important phylogenetic information with regard to morphotype differentiation and QTL positions across the genome.

P1.20

STABILITY AND HYPER-ANTIOXIDATIVE PROPERTY OF OLIVE LEAVE EXTRACT

Ahmed Chaloob Saddam and Zahur Zee Haque
Mississippi State University, Mississippi State, USA

This study investigated the antioxidative properties and stability of aqueous extract obtained from olive (*Olea europaea*) leaves. Dried olive leave powder was extracted with 0.1% w/v Tween 20 in deionized water (pH 7) to obtain olive leave extract (OLE). Protein content of OLE was determined to be was 187 mg /g by Kjeldahl method (conversion factor 6.25). The total phenolic content was 10 mg/mL. Whey protein concentrate (WPC)(2%w/v) and a combination of two surfactants: Triton X-100 (10 %, w/w WPC) (non-ionic) and sulfobetaine (7.5 % w/w WPC)(zwitterionic), were used to stabilize nanoemulsions generated by high pressure homogenization (UHPH), without and with OLE. Optimum ultra-high pressure and dispersed phase fraction (φ) were respectively 210 MPa and 0.05. Stable nanoemulsions, with mean globular diameter (d_{vs}) of 212 nm were thus obtained and scavenging efficacy against peroxyl, alkoxyl and cationic ABTS•+ radicals were tested *in-vitro.* Results showed significantly greater antioxidative activity (AA), persistence (AP) and capacity (AC) of components in the OLE components by themselves compared to the standard antioxidant, Trolox. This property was not lost when the OLE components were introduced into the nanoemulsions. The study exhibited dramatic potential for use of OLE derived antioxidants as effective radical scavengers.

Thursday, February 18, 2016

EVENING

3:30 Dodgen Lecture and Awards Ceromony

5:30-7:00 General Poster Session

Friday, February 19, 2016

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

CELLULAR, MOLECULAR AND DEVELOPMENTAL BIOLOGY

Chair: Dr. Mary Bonds,
Northwest Mississippi Community College

Vice-Chair: Dr. Davida C rossley
Alcorn University

Thursday, February 18, 2016

MORNING

Room TC 214

O2.01

8:15 *PSEUDOGNATHALIUM OBTUSIFOLUM* EFFECTS ON *SACCHAROMYCES CEREVISIAE* HBO STRAIN PROLIFERATION AND MITOCHONDRIAL MORPHOLOGY

A Suller, K Bodige, C Lavallais, L Peavy, G Penumaka, T Price, R Sindhu, N Weber, K Bernius, S Felix, R Hancock, H Hart, J Hoye, T Irby, D Lumpkin, A McPhail, A Mosley, J Rittenhouse, E Tibbs, A Whittom Reiken
Mississippi College, Clinton, MS, USA

The purpose of this study was to examine the effects of three different plant extracts derived from *Pseudognaphalium obtusifolum* on the model eukaryotic organism *Saccharomyces cerevisiae*. *P. obtusifolum* is a regional plant historically used in Native American traditional medicine. Studies of *P. obtusifolium* phytochemicals have revealed the presence of flavonoids which are capable of inhibiting cellular proliferation and activating apoptosis. Additionally, some extracts exhibit high antioxidant levels and may be able to protect cells by neutralizing DNA-damaging free radicals. The dichloromethane-derived, ethanol-derived, and hexane-derived plant extracts, were obtained using a solvent extraction method and suspended in DMSO. Each of the extracts were tested by culturing *S. cerevisiae* HBO strain cells in liquid culture media containing one of the extracts. Cells cultured in media containing media only or DMSO were used as controls. Cells were treated for 0, 24, 48, or 72 hours prior to analysis. Changes in *S. cerevisiae* proliferation were determined using both quantitative and qualitative methods. The methods included plate colony counting, spectrophotometry, and hemocytometer counting. Whereas dichloromethane-derived, and ethanol-derived extracts appear to decrease proliferation, hexane-derived extracts have the opposite effect. Since certain phytochemicals in different extracts from this plant may contribute to inhibition of proliferation while others may have an antioxidant-protective effect, we observed changes in general cell and mitochondrial morphology using a mitochondrial stain by oil immersion light microscopy. Future experiments include a detailed component analysis of each derived extract and antioxidant-related studies.

O2.02

8:30 COMPLEMENTATION BASED APPROACH TO RESTORING RESPIRATORY ACTIVITY AND mtDNA IN *pcp1* MUTANTS

Pieter Both and Donna M. Gordon
Mississippi State University, Mississippi State, USA

Pcp1p is a transmembrane protease in the mitochondrial inner membrane of Saccharomyces cerevisiae. Mutations in PCP1 negatively impact cellular respiration due to defects in mitochondrial morphology and loss of mitochondrial DNA (mtDNA) that arise as a result of the improper processing of the Pcp1p substrate, Mgm1p. Given the link between mitochondrial morphology and mtDNA maintenance, we have used a qPCR based approach to show that pcp1 strains that exhibit the largest degree of mitochondrial fragmentation have lost the largest fraction of their mitochondrial genome, and vice versa. This indicates that the relative mtDNA : gDNA copy number may be used as a rough, indirect measure of Pcp1p functionality. Although diminished or absent growth of these mutants on a non-fermentable carbon source suggest nonfunctional mitochondria, our qPCR data indicate retention of small fractions of the mitochondrial genome. We will visually confirm these results using fluorescence microscopy of DAPI stained cells. Since damage to mtDNA may be repaired through mitochondrial fusion-dependent homologous recombination, we propose that reintroduction of functional PCP1 may restore mitochondrial fusion activity and promote mitochondrial genome recovery. We will directly test this by measuring cellular respiratory competency of pcp1 mutants based on their ability to utilize ethanol/glycerol as a carbon source before and after transformation with a wildtype copy of PCP1.

O2.03

8:45 UNDERSTANDING THE MOLECULAR INTERACTION AMONG TICK-BORNE PATHOGENIC MICROBES AND NATIVE MICROBIOTA

Khemraj Budachetri, Shahid Karim
The University of Southern Mississippi, Hattiesburg, USA

The tick physiology permits colonization of a variety of microbes, viruses, and protozoans known to be pathogenic to humans. Apart from harboring pathogenic bacteria *Rickettsia parkeri*, *Amblyomma maculatum* provides suitable environment to bacterial consortia importantly an endosymbiont of genus, *Francisella*. The study of interactions among tick-borne pathogenic bacteria and native microbiota has never been studied. We hypothesized that the host blood meal facilitates the propagation and colonization of *R. parkeri* by inhibiting other native bacterial consortia. In this study, we have identified *R. parkeri* and *Francisella endosymbiont of A. maculatum* in immature as well as adult *Amblyomma maculatum*. Further, we quantified *R. parkeri, Francisella endosymbiont* and overall bacterial load by qRT-PCR assays by detecting rickettsial outer membrane protein B (*OmpB*), *Francisella* specific *16S rRNA* gene and total bacterial load by universal *16S rRNA* gene primers respectively. Our results showed the proliferation of *R. parkeri* while the total bacterial load negatively impacted by blood meal. Our results also demonstrated that *R. parkeri* progressively displaces *Francisella endosymbiont of A. maculatum* to successfully colonize within the tick. Further, detailed alteration of the bacterial consortia assessed by metagenomics sequencing approach will provide clear picture of bacterial community change.

O2.04

9:00 TICK SALIVA AND THE INDUCTION OF α-GALACTOSE HYPERSENSITIVITY IN RED MEAT ALLERGY

Gary Crispell, Karthik Balamurugan, Shahid Karim
The University of Southern Mississippi, Hattiesburg, MS, USA

A rapidly increasing body of literature suggests that bites from the Lone Star tick (*Amblyomma americanum*) are capable of causing an unusual delayed allergic reaction to a carbohydrate found in red meat products. Sensitization to the oligosaccharide galactose-α-1,3-galactose (α-Gal) has been shown to be the mechanism of anaphylactic reactions in response to red meat following tick bites. The species *A. americanum* has been suspected to be uniquely associated with these symptoms of red meat hypersensitivity. In addition, the geographic range of *A. americanum*, from the eastern United States to mid-Texas, includes highly rural populations, containing large numbers of at risk individuals such as farmers and outdoor laborers. We hypothesized that the secreted salivary proteins of *A. americanum* are galactosylated with α-Gal, which acts as an adjuvant for the carbohydrate, thereby creating a future immune response within the host. To identify if α-Gal is present in *A. americanum and other tick species*, gut tissues, salivary glands, and saliva were used in an immune-proteome approach. SDS-PAGE coupled with immunoblotting, followed by trypsin digestion and LC-MS/MS were used to reveal the identity of the tick salivary proteins that are suspected to be responsible for inducing the red meat allergy. Our results work to pave the way for further research in the development of tick protein based vaccines, early recognition techniques, and treatments for allergic reactions that may lead to anaphylaxis, preventing serious health problems, or even death, in unsuspecting red meat allergy sufferers.

O2.05

9:15 STRUCTURAL CHARACTERIZATION OF TICK CEMENT CONES

Rebekah Bullard, Paige Allen, Jessica Douglas, Pradipta Das, Sarah Morgan, Shahid Karim
University of Southern Mississippi, Hattiesburg, MS, USA

Amblyomma americanum is endemic to the southeastern United States and capable of transmitting pathogenic and non-pathogenic diseases. To remain firmly attached to the host, the tick secretes a proteinaceous matrix termed the cement cone. This cement cone hardens around the tick's mouthparts to assist in the attachment of the tick as well as to protect the tick mouthparts from the host immune system. Cement cones collected from ticks on a host are commonly contaminated with host skin and hair making analysis of the cone difficult. To reduce the contamination found in the cement cone, an in vitro feeding system has been developed. Cones collected from in vivo and in vitro fed ticks are analyzed to determine changes in the cone morphology. Structural analysis techniques such as light microscopy, SEM, and FT-IR are performed to monitor any changes in the morphology or composition of the cone. General inspection of the cones reveal similar structural components. Closer examination using SEM exposes two distinct cone structures. This is further verified using FT-IR which exhibits varying secondary structure profiles between the two cone types. Additionally, proteomic analysis using LC-MS/MS yields further information regarding the composition of the cones collected from each feeding type including GRPs and other protein families. Identification of the tick cement cone proteins opens new avenues of tick research for control of these parasites. However, the properties of the cement cone and therefore the cement proteins could be used for biomedical applications such as skin adhesive or bone mimics.

O2.06

9:30 ABSENCE OF PIRNA PATHWAY IN THE HOUSE DUST MITE

Md Mosharrof Hossain Mondal and Alex Flynt
The University of Southern Mississippi, Hattiesburg, USA

House dust mite (HDM) is the most common type of allergy causing agent worldwide and alone affects more than 50% of allergic patients. They are responsible for major allergic diseases like asthma, allergic rhinitis or dermatitis. HDMs are very prevalent in human life as they live in dwellings on a diet of human skin scales. However, there is a void of knowledge about their molecular biology, particularly there is no study has been carried out describing small non coding RNA. In this study we analyzed small RNA biology of American House Dust Mite (*Dermatophagoides farinae*) as well as explored a method of RNAi that can have potential future implication to fight against this troublesome organism. We have found that piRNAs and their main effector protein piwi are completely absent in HDM. piRNAs are a class of small non coding RNAs that are different from other classes of small RNAs mainly by their size (25-31nt), biogenesis pattern and biological function. They are involved in epigenetic and post-transcriptional gene silencing of transposable elements (TE) in animal germ line cells. piRNAs are an essential part of organism's defense system against TE and it is an outstanding question to address how HDM compensate the loss of piRNA pathway.

O2.07

9:45 EXPRESSION ANALYSIS OF M46, A PHASE SPECIFIC GENE IN HISTOPLASMA CAPSULATUM

Davida Crossley[1], Glenmore Shearer, Jr[2]
[1]Alcorn State University, Alcorn State, 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 and cause infection. This research focuses on characterizing the mold specific *M46* gene. 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. The M46 ORF was conserved in all four strains, therefore the *M46* ORF is not a reason for lack of expression of *M46*. The *M46* promoter from all four strains was sequenced, to determine if the promoter may be a reason for lack of *M46* expression in the latter strains. Sequencing of the *M46* promoter 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. The deletion and insertion that is present in the *M46* promoter region of *M46* non-expressing strain G217B, could be a reason for lack of expression. The reason for lack of expression in strain G184AS could be due to a trans-acting element.

10:00 BREAK

O2.08

10:30 CHARACTERIZING THE MOLD PHASE SPECIFIC GENES MS88 AND MS95 IN HISTOPLASMA CAPSULATUM

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

Histoplasma capsulatum (Hc) is the causative agent for the upper respiratory infection, histoplasmosis. The organism can exist as a multi-cellular mold at 25˚C, or as a uni-cellular yeast at 37˚C. The yeast is the phase that causes histoplasmosis. This study focuses on the investigation of the mold specific genes, *MS88* and *Ms95*. The *Ms88* gene is 1145 bp long and encodes for a protein that is 219 amino acids long. A NCBI BLAST (p) search showed that MS88 was classified in the CFEM family, this suggests that the gene may play a role in pathogenesis. The mold specific, *Ms95* gene, was discovered from a cDNA subtractive library enriched for mold specific genes and is homologous to the *DDR48* gene that is responsible for DNA repair in the yeasts, *S. cerevisae* and *C. albicans*. An *Ms88* overexpression construct was made to determine if *Ms88* is involved in dimorphism. The construct was made by fusing the H2B promoter to the *MS88* open reading frame via PCR. The construct will be electroporated into an *Ms88* expressing strain of *Hc,* and morphology will be observed to determine if *MS88* is involved in dimorphism. An *Ms95* knockout was created to determine if *Ms95* is involved in DNA-damage repair. The *Ms95* knockout and parental strain, will be exposed to a susceptibility assay that involves

various concentrations of 4-nitroquinoline 1-oxide and paraquat dichloride. Comparison of hyphal growth with the *Ms95* knockout and parental strain, will determine if *MS95* is involved in DNA damage repair in *Histoplasma capsulatum*

O2.09

10:45 POLYANILINE AS SENSING PLATFORM FOR DETECTION OF DNA MIMIC TO MIRNA *LET-7*

Partha Sengupta, Jared Gloria, Alex Flynt
University Of Southern Mississippi, Hattiesburg, MS, USA

Micro-RNAs (miRNA) are an exciting focus of clinical study not only for targeted therapies but also as biomarkers. Conducting polymers (CPs) are polyconjugated, charged species which are highly sensitive to changes in the polymeric chain environment and other perturbations in the chain conformation that could be caused by nucleic acid chemistry. Here we used changes in the delocalized electronic structure are manifested in altered optoelectronic properties of CPs to sense miRNA molecules. In this research work we have synthesized processable CP polyaniline (PANI) in situ blended with polyethylene glycol (PEG) as a transducer element for miRNA sensing. PEG encapsulates the PANI molecule as observed in Scanning Electron Microscopy (SEM). 22 nucleotide DNA which complements *let-7* is immobilized to PANI coated on borosilicate glass cover slip and then subjected to UV irradiation to enhance the electrostatic bonding between PANI and 5′ phosphate group of DNA. The borosilicate glass was irradiated with H_2O-UV radiation to lower the surface contact angle and having a uniform coating with PANI-PEG blend. The change in fluorescence property of PANI by oligo immobilization and hybridization with mimic let-7 is measured by fluorescence microscope and the image analyzed by MATLAB. A heuristic algorithm determines color threshold of the fluorescent active image. This image segmentation helps to determine the average pixel intensity representing the active image foreground of PANI fluorescence triggered by DNA immobilization and hybridization process. This would help us to quantify response of PANI based biosensor for detecting miRNA *let-7*.

O2.10

11:00 PLASMA MEMBRANE STABILITY OF DF508 CFTR

Ghanshyam Heda, Oluwabukola Omotola
Mississippi University for Women, Columbus, USA

BACKGROUND AND OBJECTIVES: A mutated CFTR (Cystic Fibrosis Transmembrane-conductance Regulator) is responsible for causing the genetic disease cystic fibrosis. Our laboratory has shown that the plasma membrane half-life of the most common of CFTR mutations (DF508) is much shorter (~4 h) than that of wild-type CFTR (>48 h). [Heda et al, *Am J Physiol*, 280, C166-C174, 2001]. We hypothesize that this reduced DF508-CFTR half-life may be due to distinct role of proteasomes, lysosomes and/or CFTR-protein(s) interactions. In this study we present the effects of some potent inhibitors of proteasomes and lysosomes in rescuing the CFTR from degradation. METHODS: Epithelial cell lines from human lung (CFBE) and pig kidney (LLC-PK_1) stably transfected with DF508 or wild type CFTR were pre-treated with 5 mM sodium butyrate at 27°C for 60 hrs to up-regulate the plasma membrane CFTR expression. Cells were then "chased" at 37°C in the presence of protein synthesis inhibitor (cycloheximide) and/or inhibitors of proteasomes (MG132, lactacystin, ALLN, leupeptin), or lysosomal enzymes (E64, EST, chloroquine). Cell lysates were directly immunoblotted with anti-CFTR antibody or immunoprecipitated first with anti-CFTR antibody followed by immunoblotting with anti-ubiquitin or anti-CFTR antibodies. RESULTS: All of the inhibitors with the exception of chloroquine partially rescued the degradation of plasma membrane DF508-CFTR in CFBE and LLC-PK_1 cell lines. Immunoprecipitated DF508- CFTR in LLC-PK_1 cells also appeared to be more ubiquitinylated than its wide type counterpart. CONCLUSIONS: Our data suggests that CFTR degradation is partially controlled by proteasomes, ubiquitin dependent proteolytic system, and lysosomal enzymes.

O2.11

11:15 PROTEOMIC ANALYSIS OF EXOSOMES DERIVED FROM MAMMALIAN CIRCADIAN CLOCK CELLS

Dan Zhao[1], Jiaxu Li[1], Tibor Pechan[1], Olga Pechanova[1], David Earnest[2], Morgan Farnell[1], Yuhua Farnell[1]
[1]Mississippi State University, Mississippi State/MS, USA, [2]Texas A&M Health Science Center, Bryan/Texas, USA

Suprachiasmatic nuclei (SCN) is the master circadian pacemaker in mammals. , generates coordinated rhythms and drives oscillations in other peripheral tissues. We have identified that the conditioned media (CM) of SCN2.2 cells confer molecular rhythmicity to co-cultured fibroblasts via some diffusible factors. However, the mechanism of diffusible factors transfer

from the SCN2.2 cells to other cells is currently unknown. One potential mechanism is through exosomes. Exosomes, secreted by various cells, are nanometer-sized vesicles that contain distinct subsets of RNAs and proteins. They play important roles in cell signaling and intercellular communication. Therefore, protein contents were first analyzed to reveal the knowledge about the SCN2.2 cell-derived exosomes.

Exosomes were isolated from CM of SCN2.2 cells using a differential ultracentrifugation method. The presence of exosomes was confirmed by transmission electron microscopy and western blot analysis. A total of 79 proteins in SCN-derived exosomes were identified by nano-liquid chromatography-tandem mass spectrometry (LC-MSMS). Among them, 73 proteins were reported in the ExoCarta, a database of exosomal proteins, from exosomes of various cell types. Eighteen proteins were related to neuron-derived exosomes. Interestingly, carbamoyl phosphate synthetase 1, which has been reported previously to have circadian rhythmicity in liver tissue, has been found in SCN-derived exosomes. Most of SCN-derived exosomal proteins display unique characteristics with respect to compositions of many functional categories of proteins.

Taken together, our data provide a useful database of proteins from SCN-derived exosomes and is essential in furthering our understanding of the biological role of exosomes in circadian clock.

11:30 Divisional Business Meeting

Thursday, February 18, 2016

AFTERNOON

Room TC 214

O2.12

1:15 ACTIVATION OF THE MINERALOCORTICOID RECEPTOR BY O-GLYCOSYLATION THROUGH HYPERGLYCEMIA

Maniselvan Kuppusamy, Celso Gomez-Sanchez, Elise Gomez-Sanchez
University of Mississippi Medical Center, Jackson, USA

Introduction: Hypertension and diabetes are independent risk factors for cardiovascular disease, however why they frequently occur together is not clear. Inappropriate mineralocorticoid receptor (MR) activation is associated with diabetes and metabolic syndrome. MR antagonists are effective in reducing hypertension and delaying the onset of renal and cardiovascular complications in diabetes despite circulating aldosterone levels. Glucose concentrations increase O-glycosylation of many proteins, thus alter their function. Hence, we hypothesized that increased O-GlcNac modification of the MR by high glucose enhances MR activation. **Methods:** MR transcriptional activity was studied in a mouse cortical collecting duct (M1) cell line stably transfected with a cDNA construct including the MR and one with a hormone-response element driving a Gaussia luciferase reporter gene. The cells were incubated under high and low glucose condition with and without Thiamet-G and 6-diazo-5-oxonorleucine. Additionally, MR and GR antagonists were used to identify receptor specificity under low and high glucose conditions. **Results:** 1. Co-immunoprecipitation assays showed that high glucose and TMG increased O-GlcNac-MR by 3-fold. 2. Compared to low glucose, treatment with high glucose and with TMG increased the transcriptional activity of MR by 300%. 3. DON decreased MR-reporter activity by 75%. 4. High glucose alone had no significant basal effect but significantly increased MR activation by aldosterone. 5. MR reporter activity was increased similarly by aldosterone and corticosterone. **Conclusion:** High glucose increased **glycosylation of the MR**, augmenting its transcriptional activity. Enhancement of MR activation by hyperglycemia may explain how MRs play a significant role in the **cardiorenal pathology** in **Diabetes**.

O2.13

1:30 CHARACTERIZATION OF EXOSOMES FROM CARDIAC FIBROBLASTS IN OSSABAW PIGS WITH METABOLIC SYNDROME

Kellie Mitchell[1], James Stewart[1], Dan Zhao[1], Leonidas Koniaris[2], Michael Sturek[2], Mouhamad Alloosh[2], Yuhua Farnell[1]
[1]*Mississippi State University, Starkville, MS, USA,* [2]*Indiana University School of Medicine, Indianapolis, IN, USA*

Cardiovascular disease (CVD) is the leading cause of death worldwide, and patients with metabolic syndrome (MetS) are at higher risk to develop CVD. However, there is no current method to detect CVD and many MetS patients are unaware of their illnesses until advanced complications like heart attacks and strokes occur. A biomarker for CVD in diabetic patients could aid in early diagnostics and treatment of CVD and prevent the complications. In

this study we searched for such a biomarker on vesicles (exosomes) secreted by cardiac fibroblasts in Ossabaw swine. Ossabaw pigs possess a cardiovascular physiology and pathology similar to humans and have a natural predisposition for obesity and metabolic syndrome (MetS), which leads to diabetes. Male Ossabaw pigs were either fed a normal diet (control) or a diet high in calories, fructose, fat, and cholesterol (MetS) for 10-12 months. The primary cardiac fibroblast were isolated from fresh heart tissue. The exosomes were purified by ultracentrifugation from primary cardiac fibroblasts and cell-free plasma of male MetS/diabetic pigs and healthy littermates. Transmission electron microscopy and western immunoblotting were performed to confirm the exosome presence. The exosome concentration from cell-free plasma was higher in MetS pigs than controls as measured by Nanosight Tracking System. Based on morphology, size, and protein composition, we defined the release of exosomes from primary cardiac fibroblasts and provide their first extensive characterization. Our findings show that healthy cells from lean pigs may produce different exosomal RNAs and proteins than diseased cells from MetS pigs.

O2.14

1:45 ALTERNATE PROTEIN TARGETS & DRUG DESIGNING FOR BREAST AND PROSTATE CANCERS

Pradip Biswas
Tougaloo College, Tougaloo, USA

About 70% of breast and prostate tumors develop resistances in hormonal therapies and they sustain growth in hormone-independent manner. In order to develop inhibitors that could address the issue of hormonal therapy resistance, we elucidate protein-protein and protein-DNA interfaces of ER and AR and identify and validate alternate targets for drug designing. Using crystal structures of ER and AR DNA and Ligand binding domains, molecular modeling, molecular dynamics simulations, and bioinformatics we identified the hydrogen-bonding contacts and the sequence motifs that are responsible for dimerization and/or DNA recognition. The crucial amino acids of a motif are then grafted on stable helices (alanine or leucine) in order to develop peptidic inhibitors. In ER ligand binding domain, out of the three sequence motifs found to be responsible for dimerization, we are using DXXTD (480-484) and LQXXHQXXAQ (497-506), as templates for designing peptide-based and small molecule inhibitors for ER dimerization – an essential process in ER mediated transcription. In-vitro testing of peptide inhibitors developed based on LQXXHQXXAQ sequence motif is found to inhibit ER in the presence of hormone. In AR, we didn't find any suitable target in the ligand binding domain but found one in AR DNA binding domain: This LCAXRXD motif (578-584) has been grafted on alanine and glutamine helices and in-silico and in-vitro testings are in progress.

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

O2.14

2:00 MCF7 HUMAN BREAST CANCER PROTIEN EXPRESSION ANALYSIS OF DICHLOREMETHANE-DERIVED PSEUDOGNAPHALIUM OBTUSIFOLIUM EXTRACT

Ambreana Thompson, Jake Johnson, Jessica Witherspoon, Tanuja Boduggam, Swapna Burri, Gautam Dhawan, Jeremy Dixon, Sommyr Paden, Tycho Price, Flavio Salinas, Naina Singh, Whittom Reiken
Mississippi College, Clinton, USA

Pseudognaphalium obtusifolium, an annual flowering member of the Asteraceae family, is known to contain flavonoids which may have anti-carcinogenic activity. Our previous work has demonstrated that dichloromethane-derived extract obtained from P. obtusifolium is cytotoxic and causes significantly decreased proliferation of the MCF-7 human breast ductal adenocarcinoma cell line. In order to determine if apoptosis is induced following culture of MCF7 cells with dichloromethane-derived extract, experiments utilizing membrane-based antibody arrays were performed. By comparing data obtained from the extract-treated cells relative to the controls, changes in expression of apoptotic pathway proteins were analyzed. Data for the analysis of array proteins (CD40 ligand, dAP-2, cytoC, DR6, Fas, IGFBP 2, IGFBP 3, IGFBP 4, IGFBP 5, IGFBP 6, TNF alpha, TNF beta, TRAIL R1, TRAIL R2, TRAIL R3, TRAIL R4, bad, bax, bcl-2, bcl-w, BID, BIM, Caspase-3, Caspase-8, HSP 27, HSP 70, HTRA, IGF-1, IGF-1 sR, IGF-2, livin, p21, p53, SMAC, Survivin, sTNFRI, TRAIL R4, and XIAP) are presented and their possible roles in MCF7 apoptosis signaling following treatment with P. obtusifolium dichloromethane-derived extract are described.

O2.15

2:15 *SPLIT-TOP*: A MATERNAL REGULATOR OF DORSAL-VENTRAL PATTERNING AND CELL MIGRATION IN ZEBRAFISH

Yvette Langdon[1], Mary Mullins[0]
[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*. A number of mutants with defects in early developmental processes, including early morphogenesis and body axis formation were identified. One such mutant, *split top* exhibits a dorsalization of the embryonic axis. Clutches of embryos from *split top* mutant mothers are characterized by the five classic dorsalized phenotypic classes, as well as some additional defects. The mutant embryos show an expansion of dorsal markers and a corresponding reduction in ventral markers during gastrulation indicative of dorsalization. The dorsalization defects can be rescued by misexpression of either BMP2 or BMP7 ligands, or by derepression of BMP signaling by knockdown of BMP antagonists. The additional defects appear to be the result of altered morphogenesis, including defects in epiboly progression, the process by which the blastoderm cells migrate over and surround the yolk. Mutant embryos display altered microtubule and actin cytoskeletal networks in the yolk cell, which can account for the epiboly defects observed. *split top* mutant embryos also appear to be defective in the cell movement process of convergence and extension. We mapped the *split top* mutation to chromosome 17, and identified *cathepsin B, a* through RNA-Seq and traditional positional cloning methods as the gene disrupted in *split top* mutants.

Thursday, February 18, 2016

AFTERNOON

3:15-Dodgen Lecture and Awards Ceremony

Ballroom II/III

Thursday, February 18, 2016

EVENING

5:00-7:00

POSTER SESSION

P2.01

STRESS INDUCING AGENTS THAT IMPACT THE BIOACTIVITY OF OCCIDIOFUNGIN IN *S. cerevisiae*

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Occidiofungin is a cyclic glycolipopeptide with an apoptotic mechanism of action against various yeasts (1). To identify the biological target of occidiofungin activity, the lab is focused on identifying cellular pathways, which when altered, result in resistance to occidiofungin. Studies in S. cerevisiae have shown that pre-treating cells with non-lethal levels of stress-inducing agent results in increased resistance to other stressors and an increased likelihood of cell survival in a process called 'stress cross-protection' (2). Given these findings, we aimed to determine whether pre-treating cells with a stress-inducing agent altered sensitivity to occidiofungin. We focused on three stressors: ethanol (0%-15%), shown to alter membrane fluidity; dithiothreitol (0mM-25mM), a reducing agent that induces an endoplasmic reticulum stress response; and cycloheximide (0µg/ml-6µg/ml), an inhibitor of cytosolic protein synthesis. To characterize cell response to each stressor, we monitored culture growth over a five-hour time period to identify concentrations that slowed growth versus prevented growth. Data were confirmed by colony-forming unit (CFU) and spotting assays. To determine whether stress cross-protection interfered with the fungicidal properties of occidiofungin, we carried out minimum inhibitory assays (MIC), CFU assays, and spotting assays on cells exposed to dithiothreitol (DTT) prior to occidiofungin addition. We found that pre-exposing cells to DTT did not alter occidiofungin sensitivity, suggesting that the transcriptional profile activated in response to ER stress does not overlap with that induced by occidiofungin.

(1) Emrick, D., et. al. J. Nat. Prod. (2013) **76**: 829-838.

(2) Brown, A.J.P., et. al. J. Exp. Biol. (2014) **217**: 144-155

P2.02

CONSTRUCTION AND CHARACTERIZATION OF PLASMIDS TO MONITOR SIRNA-MEDIATED KNOCKDOWN OF PUTATIVE LINKER HISTONE CHAPERONES

Marina Ali[1], Thomas W. Flanagan[2], David T. Brown[2]
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Prothymosin α (ProT) and parathymosin (ParaT) are small, acidic proteins that are thought to function as chaperones to mediate the exchange of linker histones between chromosomal loci. Characterization of the molecular details of the function of these proteins by siRNA-mediated knockdown has been hampered by the fact that they are poorly immunogenic and do not bind well to membranes for Western blots. Using molecular subcloning we created plasmids to express mRNAs containing the coding region of the fluorescent protein mCherry and sequences from the 3' untranslated regions (UTRs) of ProT or ParaT. These plasmids were stably transfected into mouse fibroblasts and robustly expressed mCherry which could be easily detected by epifluorescence and quantitated by Western blotting. We demonstrate that mCherry levels can be significantly lowered using siRNAs targeted to sequences in the 3' UTRs of ProT or ParaT. Thus, expression of the fusion protein serves as a surrogate marker for ProT or ParaT levels. This work was supported by the Mississippi INBRE, funded by an Institutional Development Award (IDeA) from the National Institute of General Medical Sciences of the National Institutes of Health under grant number P20GM103476

P2.03

DO EXOSOMES FROM MESENCHYMAL STEM CELLS SUPPORT OSTEOSARCOMA GROWTH?

Ramanda Dace, Whitt Jason, Patrice Penfornis, Fernandes, Joseph, Krishna Vallabhaneni, Radhika Pochampally
Mississippi College, Clinton, MS, USA

Osteosarcoma (OS) is the eighth most common type of cancer found in children and adolescents, accounting for approximately 20% of all primary bone cancers. Unfortunately, the survival of patients with OS has not improved significantly in recent years because many osteosarcomas are detected at advanced stages. Also, there is no available animal model that accurately depicts human cancer, thus preventing a comprehensive study of early events in OS tumorigenesis. In this study,we explored the role of mesenchymal stem cells secretome in the tumor progression of osteosarcoma. We studied the role of exosomes specifically, which are (extracellular vesicles) extracted from mesenchymal stem cells . We then use exosomes in transwell assays and wound healing assays to determine their effect on OS migration and survival, respectively. Q-PCR and Agarose gel electrophoresis experiments were then utilized to assess the effect MSC exosomes had on inducing changes in microRNA expression in OS cells. These experiments support that EVs from MSCs: protect OS cells from apoptosis, enhance cell proliferation and increase rate of wound healing in OS cells, and induce dramatic changes in micro-RNA expression of OS Cells. 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.

P2.04

PAINLESS HEMATOPHAGY: THE FUNCTIONAL ROLE OF NOVEL TICK METALLOPROTEASES IN PAIN SUPPRESSION

Joseph Jelinski, Jaclyn Williams, Rebekah Bullard, Shahid Karim
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Ticks secrete a plethora of pharmacologically active molecules in their saliva. These allow the tick to feed upon a host over prolonged periods of time in an itch-free and painless attachment. The exact mechanism of pain suppression by the tick has barely been investigated. In this study, two angiotensin converting enzymes (ACEs), members of the metalloprotease family, are identified as potentially responsible for the degradation of pro-inflammatory peptides, such as bradykinin, involved in the host's pain response. It is hypothesized that these tick ACEs block the function of bradykinin through degradation of the peptide, contributing to the tick's ability to conduct a pain and itch-free host attachment. To elucidate the functions of the target tick molecules, the time dependent and tissue specific transcriptional gene expression has been investigated by qRT-PCR. Furthermore, an RNAi knockdown approach was used to assess the ability of saliva to degrade bradykinin in an in vitro assay. To measure degradation in ACE deficient saliva, HPLC was used to monitor bradykinin breakdown. Upon knockdown of the target genes, the ticks showed significantly reduced blood intake and the vertebrate host became highly agitated. It was observed through a HPLC of the saliva that the knockdown produced a markedly different pattern of degradation. This data, both quantitative and qualitative, shows that these genes have functional roles for bradykinin degradation and

tick feeding. Therefore, these highly conserved genes are attractive targets for tick control measures, or as a novel source of analgesics for medical 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

P2.05

GENERATING AND EXPRESSION OF MUTANT MUNC18 TO DISSECT MAST CELL DEGRANULATION

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The University of Southern Mississippi, Hattiesburg, MS, USA

Mast cell exocytosis is important for immunity, allergy, cancer and cardiovascular diseases. For mast cell exocytosis to take place, membrane-anchored Q-SNAREs (e.g., syntaxin4, SNAP-23) and R-SNAREs (e.g., VAMPs) are required to form a trans-SNARE complex. In addition, Munc18a has recently been identified as a regulator for SNARE function during mast cell exocytosis, by operating synergistically with VAMP2- and VAMP3- based SNARE complexes but not VAMP7- or VAMP8-based SNARE complexes. Importantly, Munc18a undergoes site-specific phosphorylations in activated mast cells and other secretory cells, but the biochemical consequences of these modifications are unclear. As a first step toward a comprehensive understanding of the significance of CDK5-dependent phosphorylation of Munc18 at Thr574, we exploited overlapping PCR to generate phosphorylation mutant Munc18a-T574A and phosphomimetic mutant Munc18a-T574E. We subcloned the mutant Munc18a cDNAs in bacterial expression vector pMBP-parallel1 and show by DNA sequencing that the point mutations were successfully generated. After E.coli Rosetta 2 cells were transformed with these constructs, they successfully express Munc18 proteins under inducible conditions. Subsequent protein purification will allow direct test of these Munc18 mutants in previously established membrane fusion assays. We expect the phosphomimetic mutant to change either the activity or specificity of Munc18a in SNARE-mediated fusion reactions.

P2.06

DECIPHER SYNAPTOTAGMIN II SPECIFICITY IN MAST CELL DEGRANULATION

Cheri Voth, Pratikshya Adhikari, Hao Xu
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Mast cells play a vital role in the inflammatory response triggered by environmental pathogens. Upon pathogen-dependent activation, mast cells rapidly release the contents (e.g., histamine, proteases) of their granules into the extracellular space, signaling the immune system and assisting in the destruction of foreign targets. This degranulation process requires SNAREs on the plasma membrane and the granule membrane to form a trans-complex. Synaptotagmin II (SytII) serves as a calcium sensor to provide temporal control for the degranulation reaction, but how exactly SytII works with six distinct set of degranulation-related SNAREs is not well understood. In an effort to decipher the function of SytII in reconstituted degranulation reactions, we decided to clone the SytII cDNA into a bacterial expression vector pMBP-Parallel. SytII cDNA has been amplified with PCR and inserted into pMBP-Parallel via EcoRI and SalI restriction sites encoded in the vector plasmid but absent within the SytII cDNA. The ligation mixture will be used to transform E. coli strain NovaBlue. The new construct will be verified via restriction digestion and DNA sequencing. The recombinant SytII will then be expressed in E.coli under inducible conditions. The affinity-purified SytII will be tested directly in established fusion assays. We expect the analysis to provide new information in regards to the specificity of SytII action in SNARE-mediated fusion.

P2.07

SYSTEMATIC IDENTIFICATION OF LYSINE ACETYLATION IN DEVELOPING RICE SEEDS

Xiaoxi Meng[1], Yuanda Lv[2], Mariola J Edelmann[3], Han Zhao[2], Zhaohua Peng[1]
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Protein Lysine acetylation is a highly conserved post-translational modification. Recent advances in high-throughput proteomics and affinity enrichment have led to identification of thousands of acetylation sites in human, mouse, yeast, and E coli, respectively. However, only limited acetylation sites have been reported in plants and the function of non-histone protein acetylation is still largely unknown. In this report, we found that developing seed is the organ with intensive protein lysine acetylation in rice plants. Using affinity enrichment followed by mass spectrometry analysis, we identified 1003 lysine acetylation sites in 692 proteins of developing rice seeds, which is the largest acetylation sites being identified from a single

plant organ thus far to the best of our knowledge. Eight distinguished acetylation motifs were found in the acetylation sites after motif analysis. Five of the motifs are common in both eukaryotes and prokaryotes while at least one is first reported in this study. Biological process analysis showed that 437 of the 692 proteins are related to metabolism. Further pathway-based enrichment analysis showed that carbon metabolism, starch and sucrose metabolism, citrate cycle, glycolysis/gluconeogenesis, biosynthesis of amino acids, ribosome components, oxidative phosphorylation, proteasome components, metabolic pathways, and protein processing in ER are significantly enriched with lysine acetylation. Our results suggest that lysine acetylation involves starch synthesis via modifying the key enzymes in the starch synthesis pathway and occurs on the storage protein by modifying lysine - the number one limiting essential amino acid in cereals.

P2.08

FUNCTIONAL SIGNIFICANCE OF BRANCH POINTS IN MIRTRONS

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MicroRNAs are a heterogeneous group of small regulatory RNAs generated by many pathways. Mirtrons are a class of microRNAs produced by splicing. During RNA splicing, a loop-like "lariat" structure is created when the 5' end of the RNA is attached to a site called the branch point. Location of branch points in mirtrons have yet to be studied or identified, and the goal of this project is to uncover the contribution of branch point location to the processing of mirtrons into functional gene regulators. This project approaches this issue from two directions. First, branch points were identified computationally by generating all possible lariat signatures from specific intronic samples using LaSSO (Bitton, 2014) and aligning the signatures to a Drosophila RNA library (Ashwal-Fuss et al, 2014) using Bowtie2 (Langmead et al, 2014). Second, a polymerase chain reaction (PCR) based branch point mapping strategy was used to experimentally isolate, mutate, and verify the branch point location of mirtron (miR) 1017. In addition, we have examined the mutation's affects on Drosophila S2 cells by transfecting the cells with a plasmid encoding the fluorescent protein dsRed and miR-1017 (dsRed1017), which induced ectopic expression of miR-1017 by illuminating red under fluorescent light. Northern analysis was also used to further examine RNA expression in the cells (Ladewig et al., 2012). We will expand this analysis to other species of mirtrons with the aim of identifying similarities in the different lariat RNAs and their function in gene regulation. 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.

P2.09

TRANSCRIPTOME PROFILING AND METHYLATION ANALYSIS OF PHYTOCHROME GENES IN *PHYA1*-RNAi COTTON LINES

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Upland cotton (Gossypium hirsutum L.) produces 90% of natural fiber for the textile industry. The improvement of cotton fiber quality along with high yield have long been a key interest for cotton geneticists and breeders. Using the RNA interference technology, Dr. Abdurakhmonov and his coworkers had developed phytochrome PHYA1 RNAi cotton plants. These RNAi plants showed improved fiber length, strength and micronair (finer fiber) when compared to the non-transformed Coker-312 line. The RNAi lines also exhibited earlier flowering, produced more flowers and bolls, and showed earlier boll maturing phenotypes. It is imperative to identify and characterize the genes that are differentially expressed in the RNAi cotton plants. A genome-wide transcriptome analysis via high-throughput RNA sequencing (RNA-seq) had been initiated to identify genes that are differentially expressed in 10-DPA (days post anthesis) fiber tissue. The methylation status of coding regions of four phytochrome genes, PHYA1, PHYB, PHYC and PHYE, in leaf tissue had also been determined using the bisulfite genomic sequencing method. It was found that the gene bodies of PHYA1, PHYC and PHYE in the PHYA1 RNAi line had higher methylation levels than those in Coker 312. The RNAi line, however, had lower methylation in PHYB than Coker 312.

P2.10

SILVER CLUSTERS INHIBIT THE BIOFILM FORMED BY BACILLUS THURINGIENSIS

Christa Corley[1], Keith Cobb, Jr.[1], Sudarson Sinha[2], Paresh C. Ray[2], Elrica Brown[3], Bianca Garner[3], Istvan Arany[4], Bidisha Sengupta[1]

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Biofilms are catenation of bacteria on a surface, which are caged by the extracellularly secreted proteins, carbohydrates, and/or DNA. The phenotypes of these multicellular aggregates are distinct from those of planktonic cells. The biofilm formation is resistant to anti-microbial agents, which give rise to chronic bacterial infections and death in human beings. The present study is designed to explore the effect of silver nanolcusters on the biofilm formation by the bacteria Bacillus Thuringiensis. The silver clusters was made on the single stranded DNA oligonucleotide CCCACCCACCCTCCCA without and with a 5' aptamer attached, in distilled water using AgNO3 and NaBH4 as the reducing agent. UV/Vis absorption and fluorescence emission studies characterized the absorption and emission properties. Bacterial growth and biofilm (using crystal violet stain) assay were performed in 96 well plate at 600 nm and 540 nm, respectively. Gram staining confirmed the purity of the samples. Transmission electron microscopy was performed on each sample. Silver nanoparticles formed on the cell membranes of the bacterial samples grown in presence of AgNO3, but no biofilm was observed in samples treated with Ag+ or silver nanoclusters. The present study proved the efficiency of silver as a potent anti-biofilming agent and opens a new door to the future perspectives for its possible usage in therapeutics. Further studies are underway.

P2.11

TOWARDS A BETTER UNDERSTANDING OF TRANS-SNARE COMPLEX FUNCTION IN MAST CELL DEGRANULATION

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Regulated secretion of pro-inflammatory molecules (e.g, histamines, proteases, proteoglycans) from mast cells play critical roles in immunity, allergic reactions, cardiovascular diseases and cancer. Mast cell exocytosis/degranulation follows a four-step pathway: 1) targeting, 2) docking, 3) priming and 4) fusion. At the center of the pathway are membrane anchored SNAREs (soluble N-ethylmaleidimide-sensitive factor attachment protein receptors) that can form the trans-SNARE complex, a 4-helical bundle, to bridge the two apposing membranes. There are 3 SNARE proteins that contribute to the 4-helical bundle in mast cell exocytosis: syntaxin4 and VAMP2 proteins each provide one helix, whereas SNAP-23 protein provides two helices. However, the assembly and function of the trans-SNARE complex is not well understood because under physiological conditions the trans-SNARE complex rapidly proceeds to fuse the two apposing membranes. To investigate the properties of the degranulation-related trans-SNARE complex, we decided to create a C-terminal truncation mutant of SNAP-23, which would arrest membrane fusion after the formation of the 4-helical bundle. We are in the process of purifying the wild-type SNAP-23 cDNA, which will be used as a template in PCR to yield the mutant SNAP-23 cDNA. The mutant SNAP-23 cDNA will be subcloned into E. coli expression vector pMBP-Parallel, and expressed under inducible conditions. The SNAP-23 truncation mutant protein will be purified from the bacterial lysates and tested in an established fusion reaction. We predict the mutant SNAP-23 will halt membrane fusion and provide fresh insights into the specific properties of the trans-SNARE complex and its dynamics.

P2.12

CLONING AND EXPRESSION OF THE LONE-STAR TICK (*AMBLYOMMA AMERICANUM*) GLYCINE-RICH PROTEINS

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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.

Introduction: Ticks, such as *Amblyomma americanum*, are obligate hematophagous organisms. The saliva of feeding ticks contains thousands of proteins. These thousands of proteins are divided into dozens of protein families. One family, Glycine-Rich proteins (GRPs), are difficult to study as the precise functionality of these proteins have not yet been determined. GRPs characterized from other organisms include anti-clotting, anti-inflammation, anti-freezing, anti-microbial, wound healing, and other possible functions. This research aims to clone and recombinantly express tick GRPs in a mammalian expression system.

Methods: PCR was performed to amplify the genes of interest from tick cDNA. The PCR products were then ligated into pcDNA 3.1/V5-His TOPO as a vector. The

vector was transformed into BL21 *E. coli* cells. The plasmids were isolated and sequenced to confirm the target genes before proceeding to transfection studies.

Results: Four genes were attempted in this study. Complications in PCR amplification resulted in only three of these genes (Aa34358, Aa41539, and Aa41913) being taken for further experiments. These genes were transfor med and sequenced for gene of interest verification.

Conclusions: Recombinant expression of tick GRPs will allow for biochemical analysis of these proteins. Elucidating the exact functions of multiple proteins from this family will expand the realm knowledge regarding this family.

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

P2.13

ACQUISITION AND TRANSMISSION OF TICK-BORNE *EHRLICHIA CHAFFEENSIS* USING AN ARTIFICIAL FEEDING SYSTEM

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Amblyomma americanum ticks are competent vectors of *Ehrlichia chaffeensis*, the causative agent of Human Monocyte Ehrlichiosis. In tick-transmitted infections, the pathogens induce tick gene expression 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* to assess the infection and transmission of *E. chaffeensis*. An artificial membrane feeding system was constructed of reinforced silicone covered membranes attached to an acrylic chamber. Blood collected from an abattoir was fed to *E. chaffeensis* infected adult ticks and tick exposed blood was tested for the presence of *E. chaffeensis* using nested PCR. Adult ticks were also fed in the artificial membrane feeding system with *E. chaffeensis* added to the blood to determine the acquisition. RNA isolated from male and female tissues was subjected to qRT-PCR for gene expression and probe based qPCR for the quantification of *E. chaffeensis* for both the transmission and acquisition studies. 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 genes tested). PCR of collected tick exposed blood showed the transmission of *E. chaffeensis* within the first 48 hours of feeding. 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 gene expression. 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

P2.14

MOLECULAR FUNCTION OF SELENOPROTEINS IN RICKETTSIA PARKERI SURVIVAL WITHIN THE TICK HOST

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The Gulf-Coast tick (Amblyomma maculatum) is a competent arthropod vector for a variety of infectious agents, including Rickettsia parkeri, gram-negative bacteria that cause spotted fever group rickettsiosis. The life cycle of R. parkeri within the tick host has barely been studied. We hypothesized that R. parkeriinduces the differential expression of tick's antioxidant and innate immune pathway genes to survive within the tick host. To test our hypothesis, R. parkeri infected, and uninfected A. maculatum colonies were maintained. The infection rate of tissue specific R. parkeri infection was confirmed by rickettsial outer membrane protein (ompB) gene based qPCR assay. The transcriptional expression of target tick selenoproteins and innate immune pathway candidate genes was examined in Rickettsia parkeri infected, and uninfected tick tissues. The expressions of tick selenoproteins SelM, SelO, SelS, SelK and TOLL pathway genes were upregulated in R. parkeri infected tissues. The functional significance of SelM gene wasfurther assessed in R. parkeri colonization by depleting the expression of target gene by RNA interference approach.The disruption of tick SelM reduced the colonization of the R. parkeri assessed by qPCR in silenced tick tissues. Our study demonstrated the functional importance of SelM in R. parkeri colonization within tick host and further underscores the likelihood of utilizing it as molecular target to control tick borne diseases. 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

RICKETTSIA PARKERI INDUCES DIFFERENTIAL PROTEIN EXPRESSION IN AMBLYOMMA MACULATUM

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Ticks are hematophagous ectoparasitic arthropods that are the second most deadly vector of disease after mosquitoes. *Amblyomma maculatum* is the known vector of *Rickettsia parkeri*, the causative agent of American Boutonneuse fever. We hypothesized that *R. parkeri* induces expression of different proteins to achieve the success in establishment in tick tissues similarly in both sexes. Differential protein expression was determined using *R. parkeri* free and *R. parkeri* infected *A. maculatum* males and females obtained from a colony maintained by the Karim lab. Proteins were isolated from gut tissues, salivary glands, and reproductive organs. SDS-PAGE was used to separate proteins based on their molecular weight. The protein bands of the gels were excised, and trypsin digestion was performed for the preparation of mass spectrometry. SDS-PAGE showed indication of the presence of differentially expressed proteins between uninfected and *R. parkeri* infected tick tissues. The proteins or peptides were identified by utilizing LC-MS/MS Tandem mass spectrometry. The proteins differentially expressed with infection of *R. parkeri* will serve as a database for tick-pathogen interaction studies as well as a foundation for medical research, and the development of anti-inflammatory, anti-coagulant, immunomodulatory, and anti-microbial drugs.

P2.16

REGULATION OF MSAB PRODUCTION FROM MSAABCR OPERON IN STAPHYLOCOCCUS AUREUS

Sarah Simmons, Megan Mullis, Gyan Sahukhal, Mohamed Elasri
The University of Southern Mississippi, Hattiesburg

Staphylococcus aureus causes a wide range of acute and chronic infections including severe invasive biofilm-associated 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 into the MsaB protein. In this study, we investigate the role of the 5' end and 3' end of the *msaABCR* operon in the regulation of production of MsaB. We also investigate mRNA stability and its role in biofilm development and virulence. We performed several mutagenesis analysis of the *msaABCR* operon transcript from the 5' end and the 3' end to define the regulatory functions of the 5' and 3' ends of the *msaABCR* transcript in the production of MsaB and Biofilm development. Our results showed that full *msaABCR* operon transcript with its complete intergenic region complemented to the wild type level. 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 results 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. This work was supported by the Mississippi INBRE, funded by an Institutional Development Award (IDeA) from the National Institute of General Medical Sciences of the National Institutes of Health under grant number P20GM103476

P2.17

ROLE OF *msaABCR* OPERON ON ANTIBIOTIC TREATMENT IN *Staphylocuccus aureus* BIOFILM

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Staphylococcus aureus strains cause severe infections among healthy individuals. Many of these infections are recalcitrant to antimicrobial therapy because of their ability to form biofilm within the host tissue and indwelling medical devices. msaABCR operon is a global regulator that is involved in biofilm development, antibiotic resistance and cell death in S. aureus. In this study we tested the impact of msaABCR deletion in the susceptibility of several antibiotics during biofilm formation. Deletion of msaABCR operon from S. aureus had no impact on the daptomycin, linezolids, and other antibiotics susceptibility in planktonic conditions. However, these antibiotics alone or in combination showed significant effect on biofilm formation. The MBEC assay showed statistically significant effect on the mutant's biofilm (18 fold) compared to the wild type in the presence of 40 μg/ml of daptomycin. None of the in vitro catheters colonized with WT strain were cleared even after continuous exposure of daptomycin (40 μg/ml) for 4 days, whereas the mutant's biofilm was completely cleared by day 4. Both wild type and mutant strains showed increased susceptibility to antibiotics when used in combination. The wild type strain showed

32-fold and 8-fold increased susceptibility in daptomycin and rifampicin when used in combination relative to individual use. The mutant showed an even higher increase with 80-fold for daptomycin and 16-fold for rifampicin. Using microfluidic bioflux system, we found that the mutant biofilm was effectively cleared in the presence of 5 μg/ml daptomycin and 0.3 μg/ml rifampicin, which is clinically relevant in terms of treatment.

P2.18

A ROLE FOR IL-17 TO ACTIVATE CYTOLYTIC NK CELLS IN RESPONSE TO PLACENTAL ISCHEMIA

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Women with preeclampsia (PE) and the reduced uterine perfusion pressure (RUPP) rat model of placental ischemia exhibit hypertension, small-for-gestational-age babies (IUGR), increased inflammatory cytokine IL-17, placental oxidative stress, and activated cytolytic natural killer (cNK) cells. However, a role for cNK cells nor IL-17 in the pathophysiology of PE is not clearly defined. In this study, we tested the hypothesis that hypertension in response to placental ischemia is associated with cNK cells. Furthermore we examined a causal role for IL-17 to activate cNK cells as a mediator of hypertension and IUGR in the RUPP rat. Blood pressure (MAP) and pup weight were measured, and PBMCs and placental lymphocytes were examined via flow cytometry for surface makers of cNK cell activation. MAP increased from 103±4.1 mmHg in Normal Pregnant (NP) (n=6) to 129.1±3.1 mmHg (n=8) in RUPP rats ($p<0.001$). Neutralization of IL-17 in RUPPs with a soluble receptor for IL-17 attenuated the hypertension to 106.3±2.3 mmHg in RUPP+IL-17RC rats (n=3). Pup weight decreased in RUPP rats from 2.52±0.18g in NP to 2.03±0.05g in RUPP ($p<0.05$), but increased to 2.54±0.36g in RUPP+IL-17RC. *Placental* cNK cells were 3.4±1.1 in NP and increased to 10.0±3.4% in RUPP but was completely attenuated with the soluble IL-17 receptor (RUPP+IL-17RC: 0.33±0.17%). These results suggest a role for IL-17 to stimulate cNK cells in response to placental ischemia and that suppression of IL-17 could be a potential new therapeutic target to improve maternal and fetal outcomes of PE.

P2.19

ROLE OF miR-205 AND miR-31 IN REGULATING GENES IN BREAST CANCER METASTASIS

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Breast cancer takes the lead for the most common cancer in women by accounting for more than 25% of all cancers. This aggressive disease that affects women worldwide often metastasizes and is the focus of this project. Research has discovered a few specific genes that are upregulated and downregulated in breast cancers. MicroRNAs (miR) are 22-25 nucleotide single stranded RNA molecules and have been shown to regulate gene expression. In this study, regulation of specific genes in breast cancer cells is detected by over expressing miR-205 and miR-31. MDA-MB-231 cells are transfected with plasmid DNA containing miR-205 and miR-31. Real-Time PCR is performed to test the regulation of EGFL7, CYP1B1, SMAD2, CAV1, NTSE and PRAT. The fold change is against housekeeper genes, B-actin and GADPH. After calculating the fold change from the PCR products, the fold change shows that the expression level of these genes regulated in breast cancer is decreased. The results from these experiments verify that over expression of these microRNAs down regulates CYP1B1, SMAD2, CAV1, NTSE, and PRAT. 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

P2.20

CHIKUNGUNYA VIRUS INFECTION INDUCES EXPRESSION OF OSTEOPONTIN

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Chikungunya virus (CHIKV) is a mosquito-transmitted alphavirus that can cause fever and chronic arthritis in humans for which no specific treatments are available. Due to the rapid spread of CHIKV vectors to North America and recent reports of huge outbreak of CHIKV in the Caribbean, CHIKV has great potential to cause epidemics in the US. However, the mechanism by which CHIKV causes chronic arthritis is poorly understood.

Osteopontin (OPN) is an immune modulator that regulates inflammation during microbial infections and autoimmune disease. OPN has been described to play a role in rheumatoid arthritis (RA). Interestingly, it has been described that CHIKV-induced arthritis and RA

may share some common signatures and biomarkers. However, the role of OPN in CHIKV arthritis has not been previously studied. Using RT-qPCR, we measured the expression of OPN after CHIKV infection. Herein, we report that CHIKV induces expression of OPN in various human and mouse cells that were infected with CHIKV. In addition, we also found higher expression of OPN in blood of CHIKV infected mice. Further studies will identify the role of OPN in controlling host immune response against CHIKV infection in a mouse model. This work was supported by the Mississippi INBRE, funded by an Institutional Development Award (IDeA) from the National Institute of General Medical Sciences of the National Institutes of Health under grant number P20GM103476

P2.21

URBAN PARTICULATE MATTER INHIBITS MIGRATION IN TROPHOBLASTS AND VASCULAR SMOOTH MUSCLE CELLS

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Pre-eclampsia is a pregnancy-specific condition characterized by hypertension onset past the 20th week of gestation. Abnormal trophoblast migration and subsequent spiral artery remodeling may be a contributing factor. Air pollution has been linked to increased risk of developing preeclampsia. We sought to determine the effect of urban particulate matter (UPM) on trophoblast and vascular smooth muscle cell (VSMC) migration. We hypothesized that exposure to UPM would inhibit cellular migration. BeWo and A10 cells were models for trophoblasts and VSMCs. To assess migration ability, we used a standard scratch-wound assay. Monolayers were wounded then exposed to UPM (1, 10, 100 µg/ml) for 48 hours. Wound images were obtained immediately, 24 and 48 hours following injury. Healing was quantified as wound area at 1 - (24 or 48hr wound area divided by initial wound area) x 100. At 24 hours, the average wound size of A10 cells had healed 58%, 78%, and 34% at concentrations 1, 10, and 100 µg/ml and 48 hours the wounds healed to 91%, 95%, and 61%. Count sizes (n) for A10 cells include 16, 10, and 16 with 6%, 2%, and 4% standard error (+/-) at 24hrs and 3%, 1.5%, and 5% at 48hrs. In BeWo cells, over 24 hours (n at 12 for all concentrations) healing occurred at 48%, 47%, and 32% with (+/-) 2%, 3%, and 2%. At 48 hours, the monolayer healed to 84%, 81%, and 50% with (+/-) 3%, 3%, and 4%. These findings demonstrate that UPM inhibits A10 and BeWo cell migration. 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

P2.22

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

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Rap1a is a member of the Ras GTPase superfamily that acts as a molecular switch coupling extracellular events to intracellular signaling. The purpose of this study was to identify a role for Rap1a in the AGE/RAGE signaling cascade. We hypothesized that Rap1a GTPase intersects the downstream signaling modulators of the AGE/RAGE signaling cascade to promote extracellular remodeling and fibroblast function in the diabetic heart. Initial observations demonstrated significantly elevated Rap1a protein expression levels in cardiac fibroblasts isolated from diabetic hearts. Therefore, a series of studies were performed to alter Rap1a activity and protein levels to determine the influence of Rap1a in AGE/RAGE signaling cascade. Cardiac fibroblasts were isolated from diabetic (db/db) fibroblasts and non-diabetic (het) fibroblasts. A Rap1a-EPAC agonist was used to increase Rap1a activity and protein levels resulting in elevated AGE/RAGE signaling markers, such as PKC-ζ and ERK1/2 phosphorylation, α-SMA, and RAGE protein levels. Furthermore, silencing Rap1a protein expression decreased PKC-ζ and ERK1/2 phosphorylation, α-SMA, and RAGE as a result of Rap1a siRNA treatment. These studies demonstrated that Rap1a crosstalk occurred in the AGE/RAGE cascade. Rap1a involvement in the AGE/RAGE cascade identifies a new molecular mechanism, which could further potentiate fibroblast differentiation and ECM remodeling in diabetes. Deactivation of this mechanism represents a potential therapeutic approach to regulate fibroblast phenotype changes, collagen accumulation, and RAGE expression.

P2.23

EFFECTS OF MULTIPLE USE OF GEL ELECTROPHORESIS AND ELECTROTRANSFER BUFFERS ON IMMUNOBLOTTING

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BACKGROUND AND OBJECTIVES: SDS-PAGE and western blotting are two of the commonly used biochemical methods for protein analysis. Proteins are electrophoretically separated based on their molecular mass by SDS-PAGE, and then electrotransferred to a membrane surface for protein-specific analysis by western blotting. Electrophoresis buffer (EB) and Towbin's transfer buffer (TTB) used for these procedures are salt-based with later consisting of 10-20% methanol. Methanol serves in removing SDS from the proteins and facilitate their binding to membrane, however, known for its toxicity. Previous reports present a contradictory view in favor [Pattegrew et al, 2009] and against [Y. Dorri et al, 2010] reusing of TTB in order to reduce the toxic waste. In this report, we therefore present a detailed analysis of not only reusing TTB but also EB. METHODS: SDS-PAGE and western blotting were performed as per the standard procedures. EB and TTB were saved at the end of each run and were reused for subsequent SDS-PAGE and/or western blotting. RESULTS: Multiples usage (upto 5-times) of EB didn't have any effect on protein profiles of a broad range protein molecular weight marker, BSA, and crude cell lysates. Additionally, reusing of EB didn't affect the quality of subsequent western blotting. Reuse of TTB on the other hand diminished the signal of a high molecular weight plasma membrane protein called CFTR in western blotting. CONCLUSIONS: EB can be used atleast for 5-times without compromising the quality of protein profiles and western blotting. TTB on the other hand cannot be reused in western blotting. 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

ENVIRONMENTAL FACTORS THAT AFFECT BIOFILM FORMATION IN *STAPHYLOCOCCUS EPIDERMIDIS* RP62A

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Staphylococcus epidermidis is known to cause infections related to indwelling medical devices. Their ability to form biofilm and evade host immunity allow for survivability and antibiotic resistance. A newly described operon, *msaABCR*, has been linked to biofilm development, virulence, and antibiotic resistance in *Staphylococcus aureus* and shows good homology with the same operon in *S. epidermidis*. Also, decreased transcription of *icaADBC* operon has been observed with the deletion of *msaABCR* in *S. aureus.* Therefore, we hypothesized that *msaABCR* plays a similar role in the regulation of biofilm development in *S. epidermidis*. The mechanism of biofilm development between the two species, however, is different.

Bioinformatics analysis showed homology for msaA (84%) and msaB (93%) between *S. aureus* and *S. epidermidis* RP62A strains, but only 28% for *msaC*. The only protein translated, *msaB*, showed 97% homology between these two strains. The *msaABCR* deletion construct has been made, verified, and moved to *S. aureus* RN4220 strains. The construct will be introduced to RP62A to delete *msaABCR* and study its effect on biofilm development. The RP62A biofilm is more sensitive to Dispersin B and sodium metaperiodate compared to proteinase K and DNase I, suggesting its biofilm development is more PNAG-dependent. Also, environmental stressors like NaCl, glucose, and ethanol induced biofilm development.

This study will allow us to define the role of the *msaABCR* operon in the *S. epidermidis* RP62A strain in biofilm development and virulence. The findings may be therapeutically relevant to control the biofilm-associated infections in both *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

P2.25

EFFECTS OF ALFALFA EXTRACT ON MOUSE B LYMPHOCYTE HYBRIDOMA CELL PROLIFERATION

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With approximately 1 in 5 Americans suffering from an autoimmune disease, it is important to understand how environmental factor can affect incidence and severity of these diseases. The purpose of this study is to examine the effect of alfalfa extract, a common dietary supplement, on proliferation of a mouse B lymphocyte hybridoma cell line. Alfalfa extract contains canavanine, a dietary amino acid known to cause protein malfunction following incorporation into the proteome of immunocompromised individuals. The cells were treated with liquid alfalfa extract at 0.8 and 0.4 mg/mL for four days and live cell counts were obtained daily. The cells were initially seeded at 1E+5 cells/mL on day zero. On days one through four, live cell counts were obtained using trypan blue and a hemocytometer before daily alfalfa treatment. On day

four, the alfalfa treated cells exhibited decreased proliferation compared to untreated cells (untreated, 5.85E+5 cells/mL; 0.4 mg/mL alfalfa, 4.05E+5 cells/mL; 0.8 mg/mL alfalfa, 3.25E+5 cells/mL). Additionally, it was apparent that treated cells exhibited decreased size. From this data, we conclude that alfalfa extract negatively affects the proliferation of the B cell hybridoma with additional morphological changes also observed. Future work will include qRT-PCR and protein quantification to measure antibody expression changes in these cells and other B cell lines, as well as transfection of a yeast gene which confers resistance to canavanine incorporation. These findings will hopefully add to the understanding of the role of dietary factors in autoimmune disease prevalence and severity.

P2.26

EXPANDING THE REPERTOIRE OF AMINO AND NUCLEIC ACID ANALOGUES

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Aminoacyl-tRNA synthetases (aaRSs) are a critical family of translation factors. These enzymes are responsible for linking amino acids (AAs) with the cognate tRNA to produce aminoacyl-tRNAs (aa-tRNAs). The purified recombinant elements (PURE) system is a cell free translation system capable of utilizing the plasticity of AARS substrate recognition to produce peptides containing nonstandard AAs. To date, approximately 75 unnatural AA substrates have been incorporated into peptides using the PURE system. Building on this platform, we have expanded our list of substrates to include additional AA substrates such as phosphatidylserine (PS) and nucleic acid substrates such as peptide nucleic acids (PNAs). PS was examined as an AA substrate for seryl-tRNA synthetase (SerRS). A hybrid nucleic acid duplex composed of a peptide nucleic acid (PNA) and RNA was developed to mimic the acceptor stem of $tRNA^{Ala}$. This hybrid duplex was examined as a substrate for alanyl-tRNA synthetase (AlaRS). Both substrates were examined using an α^{32}P-radiolabled assay. Preliminary results suggest that both PS and the RNA/PNA hybrid are viable substrates for SerRS and AlaRS, respectively.

P2.27

3-DIMENSIONAL CO-CULTURE SYSTEM: EFFECTS OF CAFFEINE ON LUMEN-TO-ENTERIC NEURON SIGNALING

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We have developed a 3-dimensional co-culture system of transformed colon epithelial cells (Caco-2) grown to polarized confluency on 0.4 micron filters which allows trans-communication to underlying neuroblastoma cells (SH-SY5Y) - a system being proposing as a model of lumen-to-enteric nerve signaling. Caffeine is known to bi-directionally pass through Caco2 cells grown on these filters by a process of passive cellular diffusion, but the endothelium also expresses A2A adenosine receptors and therefore an A2A-antagonist, caffeine, elicits signals from the Caco-2 cells even as it traverses the cells. At MSAS-2014 we reported metabolic dose response curves of caffeine on each individual cell line and when the two cell lines were grown together for 12 days in non-polarized fashion, caffeine (2 mM) was found to promote neurospheres in the SH-SY5Ys. The results were interpreted in terms of oxidative stressor properties of caffeine. Much of the past year has been spent resolving baseline issues about neurospheres due to variations in the fetal bovine serum. With that issue understood, we now report different effects of caffeine on the lumen side of 12-day polarized confluent Caco-2s with the model's readout being on transplanted underlying SH-SY5Ys. The SH-SY5Ys alone proliferated normally during 2 days caffeine exposure (2 mM) but showed signs of puffiness. When co-cultured with Caco-2 cells in the 3D model the SHSY5Ys had approximately 10% greater viability. Treatment with caffeine caused many SH-SY5Ys to round up and some (approx. 30%) to detach. In conclusion, caffeine is a more potent stressor when co-cultured with Caco-2 cells.

P2.28

MALE LAYS EGGS: MATE PREFERENCE, W-LINKED GENES IN CHIMERIC ZEBRA FINCH LINEAGE.

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In birds, ZZ denotes male and ZW denotes female sex chromosomes. In zebra finches, sexually dimorphic plumage patterns are determined by genes. The song system, reproductive system, and nervous system are organizationally influenced by steroid hormones. The contribution of sex chromosomes genes, autosomal genes, and hormones on sexual differentiation in zebra finches is not completely understood. Birds that have males and female phenotypic characteristics can help

us understand sexual differentiation and mate preferences. A bird in our aviary had male plumage, laid eggs, had a male partner, and produced viable offspring. We hypothesized that we would find a lack of W-linked genes in the chimera and unusual mate preferences in the chimeric lineage. We ran PCR for three different sex linked genes, and found that the chimera and the six female-plumaged offspring and a control female had W-linked genes in tissues sampled, while the single male-plumaged offspring and the partner had no W-linked genes. Samples included blood, eggs, gonads, sexually dimorphic feathers and underlying skin, beaks, and hearts. Using a mate preference assay we found that chimeric birds were less preferred as mates than controls suggesting cryptic abnormalities that make them less attractive to other birds in our aviary. In addition, that males of the chimeric lineage had abnormal same-sex mate preferences compared to chimeric linage and control females, and control males. We are currently examining differences in song nuclei volume between the chimera and control males and female.

P2.29

EFFECTS OF DIFFERENT FETAL BOVINE SERUM SOURCES ON HRA-19 CELL GROWTH CHARACTERISTICS

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Here, commercial sources of serum are compared for growing the human HRA19a1.1Alpha2F rectal-colon adenocarcinoma cell line. This cell line displays endothelium-like tight junction-forming cells. A companion poster describes responses of a neuroblastoma cell line. All sera were commercially-prepared at 0.1 micron filtration specifications, many coming as free samples: Rocky Mountain Biologicals (RMBI) fetal bovine serum (FBS), RMBI Fetalgro, RMBI Lipogro, Corning Inc. FBS, Gemini Bio Products Benchmark FBS, Gemini Bio Products Foundation FBS, Biowest FBS (2 lots), Access FBS (2 lots), Access Huma Cell, Gibco FBS, Seradigm FBS (two lots), Sigma heat-inactivated FBS, ATCC Inc. FBS, and Atlanta Biologicals FBS (one lot; two bottles). Each was (1) incubated alone for 2 weeks' monitoring of debris, and (2) diluted (to 10%) with 50:50 mixture of DMEM/F12 medium plus glutamine (Hyclone), plus standard penicillin/streptomycin, except bottle-2 of Atlanta Biologicals FBS underwent in-house heat inactivation and subsequent re-filtration to be used as seeder complete medium, for growing the adenocarcinoma. Day-0: the cells were passaged 1:5 into 12-well plates with seeder complete medium. Day-6: half of each well was scraped/removed and media replaced with tester media (n=3 per). Media was replenished again on day-11, and from days 13-14 measurements were made in the scraped regions of cell migration (0.1-10 scale), in the interface region of tumorsphere numbers, and counts were made of percent viability, cell diameter, and numbers. Growth varied significantly with Lipogro being the worst (led to floating low-CO2 consuming cells). RMBI Fetalgro appears most cost-effective for our model system.

P2.30

EVALUATION OF THE NUCLEASE RESISTANCE OF NOVEL FOUR-WAY JUNCTIONS

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High Mobility Group Box 1 (HMGB1) is a ubiquitous chromosomal protein known to bind cruciform or bent DNA with high affinity. HMGB1 is involved in a variety of nuclear functions such as chromatin remodeling and genetic recombination and repair. It is now clear that HMGB1 also functions as a proinflammatory cytokine. In this capacity, HMGB1 is linked to pathogenesis in various disorders such as: cancer, inflammatory bowel disease, rheumatoid arthritis, and lupus. Our long-term goal is to develop intramolecular DNA four-way junctions (intra-4WJs) and hybrid 4WJs composed of DNA and PNA (peptide nucleic acids) as high affinity ligands against HMGB1. The objective of this study is to evaluate the stability of intra- and hybrid 4WJs against three nucleases: Deoxyribonuclease I (DNase I), Exonuclease III (Exo III) and Lambda Exonuclease (Lambda Exo). Our data clearly shows that intra-4WJs (J4 and i-J1) and hybrid PNA-DNA junctions (4WJ-PNA1,3 and b4WJ-PNA1,3) composed of multiple PNA strands are more resistant to DNase I and Exo III vs. the DNA control J1. Future studies will focus on evaluating the stability of 4WJs in sera (e.g. human and bovine). 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

P2.31

EVALUATION OF CEREBELLAR NEUROSTEROID EXPRESSION OF SEVERAL BIRD SPECIES (MANAKINS: FAMILY PIPRIDAE)

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Manakin males perform displays involving complex body and limb movements. It's well known that non-vocal courtship displays of manakins vary dramatically across species. Neural networks and endocrine hormones certainly contribute to performance of complex courtship displays but, the mechanisms regulating these behaviors are not fully understood. Research shows that high plasma testosterone (T) activates the display, but T levels are not correlated with maintenance of courtship behavior throughout the breeding season. T, estradiol (E), and estrogen synthase, Aromatase, (AROM) likely influence brain and neuromuscular function in a expression dependent manner that directly correlates with greater demand for precise motor control. This project aims to determine if display complexity positively correlates with steroid receptor density for T and E, and abundance of AROM in, the cerebellum, and positive (hypothalamus) and negative (optic tectum) control regions,which have known relative quantities of AR, ERα & ERβ, and AROM. Real-time quantitative PCR (qPCR) will be used to determine the quantity of ERα, ERβ, AR, and AROM in manakins is positively correlated with display patterns complexity in the cerebellum. Thus far, we have obtained gene sequences from for several species. These sequences will aid in optimizing qPCR conditions and determination of necessary primer sequences, which will be uniformly used to measure expression in each brain region for each species.

P2.32

GROWTH PATTERNS OF NEUROBLASTOMA SH-SY5Y CELLS EXPOSED TO DIFFERENT GROWTH SERUM

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Here, commercial sources of serum are compared for their growth-promotion of the human SH-SY5Y neuroblastoma cell line. This cell line is of interest for reversible phenotypic plasticity under different serum conditions. A companion poster describes responses of a rectal-colon cell line. All sera were commercially-prepared at 0.1 micron filtration specifications, many coming as free samples: Rocky Mountain Biologicals (RMBI) fetal bovine serum (FBS), RMBI Fetalgro, RMBI Lipogro, Corning Inc. FBS, Gemini Bio Products Benchmark FBS, Gemini Bio Products Foundation FBS, Biowest FBS (2 lots), Access FBS (2 lots), Access Huma Cell, Gibco FBS, Seradigm FBS (two lots), Sigma heat-inactivated FBS, ATCC Inc. FBS, and Atlanta Biologicals FBS (one lot; two bottles). Each was (1) incubated alone for 2 weeks' monitoring of debris, and (2) diluted (to 10%) with 50:50 mixture of DMEM/F12 medium plus glutamine (Hyclone), plus standard penicillin/streptomycin, except bottle-2 of Atlanta Biologicals FBS underwent in-house heat inactivation and subsequent re-filtration to be used as seeder complete medium, for growing SH-SY5Ys. Day-0: the cells were passaged 1:5 into 12-well plates with seeder complete medium. Day-6: half of each well was scraped/removed and media replaced with tester media (n=3 per). Media was replenished again on day-11 and from days 13-15 measurements were made in the scraped regions of cell migration (0.1-10 scale), in the interface region of neurosphere numbers, and counts were made of percent viability, cell diameter, and numbers. Lipogro was unable to support healthy cells. Interpretations vary by usage, but RMBI Fetalgro appears cost-effective for our model system.

P2.33

BVES AND BCAR3 SIGNALING AXIS: IMPLICATIONS FOR WNT AND RHO SIGNAL INTEGRATION

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Background: The purpose of these data is to show that BVES modifies epithelial phenotypes via interactions with BCAR3- an oncoprotein that possesses GEF activity and known regulator of RhoA activityand these interactions regulate the Wnt and RhoA signaling pathways.

Methods: A yeast two-hybrid screen, Co-immunoprecipitation, and Co-Immunoflourescence identified BCAR3 as a BVES interacting protein. BVES inducible SW620 cells created and transduced with BCAR3 lentiviral constructs. BCAR3 on BVES phenotypes was assayed via measurement of cell attachment, detachment, apoptosis, migration and invasion.

Results: We have identified BCAR3 as a BVES interacting protein. Following induction of BVES, there was a trend toward increased cell attachment to the culture dish at Day 11 as compared to non-induced SW620s. There was an increased number of cells detached in non-BVES induced SW620 cells at Day 11, suggesting that BVES has an effect on cell adhesion. Constitutive expression of BCAR3 in BVES induced SW620 cells resulted in increased cell attachment when compared to uninduced SW620 cells and a significant number of detached uninduced SW620's when compared to BVES induced SW620 cells. These results suggest that BVES may impact apoptotic programs. Increased cleaved caspase 3 levels were present in BVES SW620 cells when compared to uninduced cells. BCAR3, in isolation, had no impact on the aforementioned phenotypes. BVES expression in SW620 cells resulted in a significant increase in migration and invasion. BCAR3 augmented these effects in BVES inducible SW620 cells. These results suggest that BCAR3 may play a role in modulating BVES mediated wound repair and invasion.

P2.34

AGMATINE, DECARBOXYLATED ARGININE, IS A POSSIBLE GUT MICROBIOTA SIGNAL TO ENTERIC NEURONS

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The gut microbiota is garnering increasing awareness in biological and medical research due to its implications in health and disease. It has gone from being recognized as a simple mutualistic symbiotic relationship to being described as an "accessory organ" intimately tied with our physiology. The composition and balance of the gut microbiota has been related to obesity, diabetes, and even psychological health. In human studies, agmatine, a polycation formed from the decarboxylation of arginine, has been extensively studied for its protective and proliferative effects on neurons of the CNS, yet few studies have examined its role in the digestive system. The few studies that have, have shown agmatine in the gut to be a cytoprotective agent for gastric functions. Moreover, certain types of gut bacteria secrete high concentrations of agmatine, probably explaining that the highest tissue concentrations of agmatine in humans (600 nM range) exist in stomach and small intestinal cells. We show here preliminary findings on the effects of agmatine on a human colon cell line CaCo-2, a human colorectal HRA-19a1.1alpha2F cell line, and a human neuroblastoma SH-SY5Y cell line. The neuroblastoma cell line is of interest for reversible phenotypic plasticity in response to different cell-mediated signals. We have examined the effects of agmatine on the proliferation and metabolic activities of these cell lines and the results indicate proliferative effects at low doses, followed by toxic effects at higher doses. The findings suggest that agmatine may be an important signal from the gut microbiota for human health.

P2.35

INVESTIGATION OF PHOSPHOLIPIDS AS NOVEL REAGENTS TO ISOLATE LABILE PROTEIN-NUCLEIC ACID COMPLEXES

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High Mobility Group B1 (HMGB1) is an abundant multifunctional or "moonlighting" protein that controls critical nuclear and extracellular reactions. In the nucleus, HMGB1 mediates transcription by "loosening" or remodeling chromatin. During chromatin remodeling, HMGB1 binds and bends DNA to expose transcription factor binding (TF) sites that are recognized by TFs such as nuclear factor-kB. Hence, a great deal of effort has been put forth to define HMGB1-DNA binding mechanisms. Electrophoretic mobility shift assays (EMSAs) have been used extensively to measure the binding affinity (K_D) of HMGB1 and its subunits (HMGB1a and HMGB1b) toward bent DNA substrates such as four-way junctions (4WJs). These studies show that the HMGB1a and HMGB1b bind 4WJs with a binding stoichiometry of four to one (4:1). A 4:1 complex consists of four protein monomers bound to one junction that migrate in EMSAs as a single species. The intermediate binding species (3:1, 2:1 and 1:1) are labile complexes that are not detected by EMSA or analytical ultracentrifugation. Here, we use competition EMSAs with a known HMGB1b extracellular substrate phosphatidylserine (PS) to isolate HMGB1b:J1 intermediate binding species. Preliminary data shows that PS can be used to detect 3:1 and 2:1 complexes. Future studies will focus on optimizing the PS conditions to determine the ideal ratio of each component (HMGB1b, 4WJ and PS) to more accurately characterize HMGB1b:J1 binding mechanisms.

P2.36

PERSISTANT ORGANIC POLLUTANTS INCREASE RAGE SIGNALING AND OXIDATIVE STRESS IN DIABETIC HEARTS

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USA

Consuming environmental contaminants with a high, saturated fatty diet has been demonstrated to promote precursors for metabolic syndrome (hyperglycemia, hyperinsulinemia, and hypertriglyceridemia). The purpose of this study was to determine if exposure to the most prevalent persistent organic pollutants (POPs) would act as causative agents to promote metabolic syndrome independent of dietary intake. We hypothesized that AGE/RAGE signaling cascade will activate downstream signaling modulators to promote extracellular matrix remodeling and oxidative stress in the heart. At 5-weeks of age nondiabetic (wt) and diabetic (ob/ob) mice were exposed to sham or POPs mixtures through oral gavage twice a week for 6-weeks. At the end of 6-weeks, animals were sacrificed and the heart was taken for biochemical analysis. Initial observations in ob/ob mice revealed AGE/RAGE signaling components (NF-κB, PKC-ζ, and ERK1/2) had increased phosphorylation levels as compared to nondiabetic wt shams. Increased activation of these signaling proteins resulted in elevated levels of downstream markers for fibroblast differentiation, extracellular matrix remodeling, RAGE, and oxidative stress. POPs treatment did little to increase protein activation levels or outcomes in the diabetic animals. Conversely, greater changes in oxidative stress markers and AGE/RAGE signaling components were observed in nondiabetic POPs treated animals than other groups. These adverse changes could be attributed to a delayed or depressed acute protective mechanism to offset oxidative and inflammatory stressors present in the nondiabetic mice, whereas cardioprotective agents (SOD-1 and -2) are primed in the diabetic mice allowing for POPs treatment to have less of an impact on the heart.

P2.37

ROLE OF BVES AND BCAR3 IN COLORECTAL CANCER

DeAmber Doughty[1], Shenika Poindexter[1], Christopher Williams[2]
[1]Alcorn State University, Alcorn State,MS, USA,
[2]Vanderbilt University, Nashville,TN, USA

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 oBVES interacting proteins. To determine unknown protein –protein-interactions, a BVES yeast two-hybrid screen was employed. This screen revealed several candidate proteins. For the focus of this study, 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 then I will determine the effect of BCAR3 on the BVES dependent phenotypes in colorectal carcinoma cell lines using knockdown and overexpression approaches.

P2.38

ROLE OF MsaB and CodY IN REGULATION OF CAPSULE IN ***STAPHYLOCOCCUS AUREUS***

Brittany Trunell, Justin Batte, Mohamed Elasri
University of Southern Mississippi, Hattiesburg, MS, USA

There are many transcriptional regulators in Staphylococcus aureus. Many of these regulators are essential for the organism's ability to switch from commensal to the pathogenic form. One of these regulators identified as a link between metabolism and virulence is CodY. We have recently found that MsaB, the only protein coding ORF 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 are generating a codY and an msaABCR/codY mutants. We will use these mutants to study the regulation of capsule production under various growth conditions. 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 as a repressor of cap transcription and MsaB binds to this region in the later phase of growth as an activator of cap transcription. Other studies have shown that CodY responds directly to nutrient availability. Using a

chemically defined medium (CDM), we have also shown that MsaB may also be involved in nutrient sensing. This study will allow us to further characterize the regulation of capsule production in response to nutrient availability. 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

P2.39

MUTAGENESIS APPROACH TO CHARACTERIZING Rtg2p FUNCTION IN *S. cerevisiae*

Jian Jiang and Donna M. Gordon'
Mississippi State University, Mississippi State

In Saccharomyces cerevisiae, conditions that disrupt normal mitochondrial function activate a mitochondria-to-nuclear signaling cascade called retrograde signaling. This pathway regulates the transcription of gene products to bypass these mitochondrial deficiencies. The peroxisomal isoform of citrate synthase, CIT2, is a prototypical retrograde signaling gene with transcript levels >10 fold higher in cells with mitochondrial defects than cells with functional mitochondria. The players central to regulating CIT2 expression include Rtg1p, Rtg2p, and Rtg3p. Rtg2p functions as the cytosolic sensor of mitochondrial malfunction to promote the nuclear translocation of the Rtg1p-Rtg3p transcription factor complex. Previous work from our lab has identified four RTG2 homologs from other fungus including Candida glabrata, Ashbya gossypii, Kluyveromyces lactis, and Vanderwaltozyma polyspora (1). Interestingly, complementation based studies in S. cerevisiae showed that expression of RTG2 from V. polyspora was capable of complementing the glutamate auxotrophy of a Δrtg2 strain, but CIT2 transcript levels were 10-14 fold less than S. cerevisiae RTG2 under the same inductive conditions. The RTG2 gene from V. polyspora therefore presents a unique tool for the identification of domains within Rtg2p responsible for different aspects of retrograde signaling. To this end, we are taking a random mutagenesis approach to identify mutations that convert a partially functional Rtg2p into a fully functional retrograde signaling protein capable of triggering downstream transcriptional activities. Rescue of Rtg2p activity will be determined visually by monitoring expression of ADE2 using both growth on selective plates and red/white colony color.

(1) Ünlü, E, et al. (2013) FEMS Yeast Research 13(5): 495-503.

Friday, February 19, 2016

MORNING
TC214

O2.16

8:15 A POTENTIAL ROLE FOR TTSNX4 IN MACRONUCLEAR DEGRADATION IN *TETRAHYMENA THERMOPHILA* CONJUGATION

Allison Ariatti[1], Brianna McField[1], Marcella Cervantes[2], Jeff Kapler[2], Sabrice Guerrier[2]
[1]Millsaps College, Jackson, MS, USA, [2]Texas A and M, College Station, TX, USA

Background: Autophagy is a process by which cells degrade cellular material for recycling in the absence of nutrients. 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. In this study, we identify a gene, TtSNX4 that appears to localize to the degrading macronuclues of mating *Tetrahymena* and may play a role in its degradation by regulating the activity of lysosomes.

Methods: We generated Tetrahymena that expressed TtSNX4-GFP fusion protein using biolistic transformation. We then used fluorescence microscopy to determine the localization of this fusion protein during Tetrahymena development. We determined its localization to the degrading macronucleus via DAPI staining and Lysotracker. Finally we determined the role of autophagosomes in this localization using 3 methyladenine (3-MA) to disrupt autophagosome formation.

Results: TtSNX4 expression was verified by western blot analysis and fluorescence microscopy. TtSNX4 localized to the degrading macronucleus and to lysosomes. This was evident from co-staining of degrading nuclei with Lysotracker and TtSNX4-GFP. Importantly, this localization appeared to be dependent on autophagosome formation since depletion of autophagosome via treatment with 3-MA disrupted the localization of TtSNX4 to the nucleus but not the lysosome.

Conclusion: This study suggests that TtSNX4 may be required for macronuclear degradation through the regulation of lysosome-autophagosome interactions.

O2.17

8:30 REGULATION OF BIOFILM FORMATION IN THE ENTOMOPATHOGENIC BACTERIUM *XENORHABDUS NEMATOPHILA*

Elizabeth Hussa, Tilak Patel, Carlitos Fernandez
Millsaps College, Millsaps College, 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, there have been no studies to date investigating biofilm formation in these bacteria. We used standard *in vitro* assays to characterize *X. nematophila* biofilm formation under a variety of environmental conditions. Further, we investigated the role of the global transcriptional regulator Lrp in biofilm formation. We found that Lrp is required for biofilm formation, and increased *lrp* expression correlates with increased biofilm mass. Preliminary evidence also suggests that Lrp is responsible for increased biofilm formation in nutrient broth media as compared to LB media. These data contribute to the establishment of *X. nematophila* as a model system for the study of biofilm formation. Future experiments will focus on the role of biofilms in mutualistic and pathogenic behaviors by this bacterium, representing a unique opportunity to study biofilms in the context of a natural symbiotic system.

O2.18

8:45 CHARACTERIZING THE FUNCTIONAL ROLES OF MIR-1017

Matthew de Cruz and Alex Flynt
University of Southern Mississippi, Hattiesburg, Mississippi, USA

microRNAs (miRNAs) are recognized as regulators of most mRNAs within multi cellular animals. Despite the pervasive nature of these genes relatively few have been characterized, let alone non-canonical family members. Here we investigate the functional roles of miR-1017, a 3' tailed mirtron. miR-1017 is encoded within an intron of nAChRα2. We utilized the UAS/GAL4 system to drive GFP expression under the control of nAChRα2 transcriptional enhancer sequences. Visualizing GFP reporters for nAChRα2 expression showed the mir-1017 host transcript present in the proboscis and maxillary palp in *Drosophila* pupa brains and restricted expression in adult brains, localized to the suboesophageal ganglion. Numerous miR-1017 predicted targets serve neurological roles. Using mir-1017 knock out (KO) mutants, we found derepression of many predicted targets including nAChRα5, Rrp45 and most interestingly, its host transcript nAChRα2. Utilizing GFP reporters for nAChRα2, we will examine the development of the *Drosophila* brain within mir-1017 KO mutants. Based on our data, miR-1017 may be an important player in regulating acetylcholine receptor activity. Numerous neurodegenerative diseases have shown that increased receptor activity causes reactive oxygen species to develop, which leads to neurodegeneration. Therefore we will examine whether varying levels of miR-1017 may serve a functional or protective role during neurodegeneration.

O2.19

9:00 ROLE OF *msaABCR* OPERON IN CELL WALL BIOSYNTHESIS IN *STAPHYLOCOCCUS AUREUS*

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

Staphylococcus aureus is an important human pathogen in both community and health care settings. Staph infections can range from mild superficial (e.g., skin and soft tissue infections) to life threatening infections (endocarditis and septicemia). Previously we have shown that, that deletion of the msaABCR operon affects cell wall thickness and antibiotic resistance in S. aureus. We have also shown that msaABCR affects the expression of PBP4, which is involved in cell wall biosynthesis as a DD-carboxypeptidase and transpeptidase enzyme. However the mechanism by which this operon regulates the cell wall biosynthesis in S. aureus is not known. Our preliminary results from RNA-seq transcriptomic showed that in addition to PBP4, other important genes are involved in cell wall biosynthesis like femA, femB, mraY, murD, murA which are downregulated in the msaABCR deletion mutant. In order to investigate the role of msaABCR in cell wall biosynthesis of S. aureus, we will perform a comparative HPLC-MS analysis of Peptidoglycan muropeptides between msaABCR mutant and wild type S. aureus. The muropeptides generated from the msaABCR mutant and wild type will be separated by reversed phase HPLC and analyzed by MALDI-TOF. Direct comparisons of HPLC PG analyses (HPLC peaks) between wild type and mutant strains will be used to infer differences in wall composition, cell wall length, degree of crosslinking of murein monomer and elasticity. Differences in muropeptide abundances will

also be used to link proteins to enzymatic activities that will help to illustrate role of msaABCR operon in cell wall biosynthesis in S. aureus.

O2.20

9:15 MSAB AND CODY INTERACTIONS ON THE REGULATION OF CAPSULE IN *STAPHYLOCOCCUS AUREUS*

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

Capsule production in *Staphylococcus aureus* plays a major role in pathogenesis. Capsule allows *S. aureus* to evade phagocytosis during the course of an infection. *S. aureus* has developed a complex regulatory network that is responsible for regulating capsule production. We have shown that the *msaABCR* operon regulates capsule production by activating the *cap* operon. We found that a protein product of the *msaABCR* transcript, MsaB, binds upstream of the promoter region of the *cap* operon as an activator of CP production in a growth phase-dependent manner specifically in the late and post-exponential growth phases. Additionally, a nutrient sensing repressor of capsule production, CodY, binds in close proximity to the MsaB binding site. To investigate the regulatory interactions between MsaB and CodY, we have cloned *codY* ORF into an expression vector that we will use to express and purify functional CodY protein. We will use the CodY protein in combination with purified MsaB protein to perform competitive binding assays to the *cap* promoter region and to investigate protein-protein interactions. Furthermore, using a chemically defined medium (CDM), we have observed that MsaB may be involved in sensing nutrient availability. Understanding of these interactions will allow us to identify the environmental signals that control the *msaABCR* operon.

O2.21

9:30 ROLE OF *msaABCR* OPERON IN DEVELOPMENT OF PERSISTER CELLS IN *STAPHYLOCOCCUS AUREUS*

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

Bacterial resistance and tolerance to antibiotics lead to failure of treatment of infections. Antibiotic resistance often stems from genetic changes, whereas antibiotic tolerance is a property of a small fraction of phenotypic variants called persister cells. Persistence is not well understood. The evidence of causal link between persister cells and drug failure underscores the great urgency to identify the molecular mechanism by which persister cells contribute to antibiotic tolerance. Our lab has characterized the msaABCR operon in S. aureus that is involved in regulating virulence, biofilm development, and antibiotic resistance. We hypothesized that the msaABCR operon in S. aureus regulates persister cell development. In this study, we compared the number of persister cells generated by wild type S. aureus (USA300_LAC strain) and msaABCR mutant in the presence of different antibiotics. Herein, we report that the number of persister cells significantly decrease in the msaABCR mutant after vancomycin and rifampicin treatment. We will also test the role of msaABCR in S. aureus persistence using other antibiotics and different S. aureus strains. Ultimately we seek to define the mechanism that leads msaABCR to control persistence.

O2.22

9:45 IMPACT OF *msaABCR* OPERON DELETION IN CHRONIC OSTEOMYELITIS PATHOGENESIS

Gyan S. Sahukhal[1], Michelle Tucci[2], Gerri A. Wilson[2], Hamed Benguzi[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 operon, msaABCR in osteomyelitis pathogenesis. In this study, 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.

Friday, February 19, 2016
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

CHEMISTRY AND CHEMICAL ENGINEERING

Chair: Fengxiang (Frank) Han,
Jackson State University
Vice-Chair: Song Guo,
University of Southern Mississippi

Thursday, February 18, 2016

MORNING
Room TC 218B

8:00 Welcome

Session 1. Environmental Chemical Science, Chair Zikri Arslan

Invited Talk
O3.01

8:05 SENSING OF ANIONS BY ARTIFICIAL HOSTS

Alamgir Hossain, Md Mhahabubur Rhaman, Corey R. Johnson, Syed A. Haque
Department of Chemistry and Biochemistry, Jackson State University, USA

Development of artificial hosts for anion sensing is an important field of research at the interface of chemistry and biology. In particular, the sensing of anions with molecular hosts *via* colorimetric and spectroscopic techniques is a rapid and cost-effective way for anion detection. Therefore, much efforts have been made towards the design of molecular *receptors* that can selectively recognize anions and act as sensors. During course of our study, we have synthesized molecular sensors which effectively bind and sense environmentally important anions. This presentation will highlight anion sensing and selectivity with synthetic receptors.

Acknowledgements: The National Science Foundation is acknowledged for a CAREER award (CHE-1056927) to MAH. The analytical core facility at Jackson State University is supported by the National Institutes of Health (G12MD007581).

Contributed Papers

O3.02

8:25

ADSORPTION OF RADIONUCLIDES A ND HEAVY METALS BY MESOSILICA-TEMPLATED NANO CARBON AND NOVEL NANO MA GNETIC CALIX COMPOUNDS

Kai Guo, Fengxiang Han, Zikri Arslan, Rong Zhang, Hongtao Yu
Jackson State University, USA

With rapid global population and fossil energy consumption, global warm has become a global environmental challenge. Nuclear energy emerges as a clean zero emission energy. However, the recent Japanese Fukushima nuclear power plant accident issues an environmental concern, especially recently a couple of workers who conducted the cleaning work have been tested of leukemia. Moreover, manufacturing of paper, pharmaceuticals and battery has generated a significant wastes, which are the potential sources of the contamination of drinking and irrigation water. The present study aims at the adsorption of Cs, Sr and Co by the mesosilica templated nano carbon. The porous nano carbon with a high amount of carboxyl and hydroxyl function groups templated by mesosilica was synthesized. Ferulic acid and ascorbic acid were used as carbon sources. The ferulic acid-nano carbon showed a good adsorption capacity for all three metals. The adsorption capacities of Co, Sr and Cs were 12.14 mg/g, 15.9 mg/g and 23.87 mg/g, respectively. Nano carbon from ascorbic acid acquired a maximum adsorption capacity of 80 mg/g and 60 mg/g for Hg and Pb, respectively. The most recent study was focused on the adsorption of Co, Sr and Cs using magnetic sulfonic calix and phosphoryl calix compounds, the adsorption efficiency of which will be discussed.

O3.03

8:40 **ORGANIC RESIDUE ANALYSIS OF ARCHAEOLOGICAL BIOMARKERS AND IMPLICATIONS OF POTENTIAL DEGRADATION PRODUCTS**

Ardith Bravenec, Sara Barker, Amanda Kaminski, Co Quach, Trista Tian, Ha Lam, Ty Patterson, Timothy J. Ward
Millsaps College, USA

Biomarkers are organic remains that can be characterized using modern instrumentation such as gas chromatography- mass spectrometry (GC-MS) and liquid chromatography- mass spectrometry (LC-MS). Biomarkers can be used to identify archeologically and anthropologically significant ingredients believed to be used in ritual ceremonies and other cultural practices. The inner pores of many pottery vessels and other artifacts serve as effective storage basins for organic residues due to the pores within the sherd where residues can persist for extended periods of time. Analyses of organic residues on archaeological artifacts can provide insight into cultural practices and reveal the extent of practices or ceremonies across geographical areas. One important consideration is the potential degradation of biomarkers and the impact of their interpretation on archaeological analyses. For example, some biomarkers may have degradation products that may persist and serve as more suitable markers than the substance originally sought. Conversely, analysis for cacao relies in part upon specific ratios of theobromine to caffeine, but if the compounds degrade at different rates, adjustments may need to be made to the analyses.

O3.04

8:55 CNT-BRIDGED GRAPHENEOXIDE MEMBRANE FOR DISINFECTION OF PATHOGENICBACTERIA AND REMOVAL OF TOXICMETALS FROMWATER

Bhanu Priya Viraka Nellore[1], Rajashekhar Kanchanapally[1], Ashton T Hamme[1], Dhiraj Sardar[2], Paresh C. Ray[1]
[1]Jackson state university, USA, [2]University of Texas at San Antonio, USA

More than billion people in this world lack access to safe drinking water which is free from pathogenic bacteria and toxic metals. World Health Organization estimates several million people, mostly children, die every year due to the lack of good quality water. Driven by the need, current project reports the development of PGLa antimicrobial peptide and glutathione conjugated carbon nanotube (CNT) bridged three dimensional (3D) porous graphene oxide membrane, which can be used for highly efficient disinfection of E. coli O157:H7bacteria and removal of As(III), As(V) and Pb(II) from water. Reported results demonstrate that versatile membrane has the capability to capture and completely disinfect pathogenic E. coli O157:H7 bacteria from water. Experimentally observed disinfection data indicate that the PGLa attached membrane can dramatically enhance the possibility of destroying pathogenic E. coli bacteria via synergistic mechanism. Reported results show that glutathione attached CNT bridged 3D graphene oxide membrane can be used to remove As(III), As(V) and Pb(II) from water sample at 10 ppm level. Our data demonstrated that PGLa and glutathione attached membrane has the capability for high efficient removal of E. coli O157:H7 bacteria, As(III), As(V) and Pb(II) simultaneously from Mississippi river water.

O3.05

9:10 MOLECULAR RECOGNITION OF ANIONS WITH MACROCYCLE AND ITS DINUCLEAR COPPER COMPLEX

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

The interaction of anions with artificial receptors is an important field of research, because of the pivotal roles played by anions in chemistry, environment, biology, medicine and catalysis. This research area is developing with diverse acyclic and cyclic systems with different functional groups (urea, thiourea, polyamines and amides) which are potentially capable of encapsulating different anions in solution and solid state. Among the various receptors, polyamine-based macrocycle are promising. Because they bind anions by making hydrogen bond and after converting them to dinuclear transition metal complexes that can bind anions with Lewis acid-base interaction which is in general stronger than H-bond interaction. During the course of our studies, a polyamines macrocycle was synthesized using 2,6-pyridinedicarboxaldehyde spacers and N-methyl-2,2′-diaminodiethylamine linkage by the Schiff base condensation followed by $NaBH_4$ reduction. This polyamines macrocycle was studied for anions (F^-, Cl^-, Br^-, I^-, NO_3^-,ClO_4^-, HSO_4^- , $H_2PO_4^-$ and CN^-) binding by ^1H NMR spectroscopy technique in solution and single crystal X-ray diffraction method in solid state. In solution, protonated receptor showed the highest binding constant for sulfate and the binding mode is 1:1 as confirmed by the Job plot. Then the polyamines macrocycle was converted to dinuclear copper(II)

complex which was investigated for same anions by colorimetrically and fluorescence technique by using commercially available dye (disodium eosin Y). Dinuclear copper(II) complex showed highest binding constant for cyanide by Indicator Displacement Assay.

Acknowledgement: The National Science Foundation is acknowledged for a CAREER award (CHE-1056927) to MAH.

Session 2. Chemistry of Life Processes, Chair: Dr. Prasanta Das

Invited Talks

O3.06

9:25 N-SUBSTITUTED HETEROAROMATIC SALTS AS PRECURSORS OF REACTIVE SPECIES

Wolfgang Kramer, Courtney Mullins, Melinda Solomon, Lauren Hoth, Anna Allred
Millsaps College, 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. The transient species, a heteroaromatic radical cation and a methoxy radical are produced with a quantum yield of about 0.55 as determined by trapping experiments. The quantum yield was also measured indirectly by analyzing the geminate radical ion pair recombination, which produces a proton. Titration with p-nitrophenolate and spectroscopic analysis as well as pH monitoring in a buffered solution confirms the trapping experiment results.

The N-substituted heteroaromatic salts were combined with 1,8-naphthalimide to enhance ground state association with biomolecules such as DNA. The increased binding was detected with UV/Vis, fluorescence and CD titrations. The DNA-cleaving efficiency and mode was determined by irradiation experiments and gel electrophoresis. Interestingly, comparison with restriction endonuclease cleaving assays indicates that both chromophores might be involved in the cleaving process.
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.

O3.07

9:45 FLAVONOIDS, THE POLYHYDROXY COMPOUNDS AGAINST NICOTINE INDUCED DAMAGES: MOLECULAR AND CELLULAR STUDIES

Bidisha Sengupta[1], Istvan Arany[2]
[1]Tougaloo College, USA, [2]The University of Mississippi Medical Center, USA

Background: Nicotine exposure via long-term smoking, nicotine replacement therapies or E-cigarettes- is associated with decreased renal function and accelerated progression of chronic kidney disease (CKD) that involves augmented renal oxidative stress. Flavonols and related phenolic compounds of the flavonoid group are ubiquitous in plants of higher genera. The importance of such compounds lies in their novel therapeutic properties of high potency and low systemic toxicity. The major goal of this study is to explore the potential usefulness of the intrinsic antioxidant and other therapeutic properties of the flavonoids in preventing free radical mediated damages associated with long-term smoking and exposure to high doses of nicotine.

Methods: Human serum albumin and small oligonulceotides were chosen for the molecular studies. The cellular studies were conducted in cultured renal proximal tubule cells. The impact of those flavonols on NIC-mediated reactive oxygen species (ROS) production as well as on promoter activity of the anti-oxidant manganese superoxide (MnSOD) gene and on the pro-survival cAMP-response element binding (CREB) transcription factor-dependent transcriptional activity were determined in reporter luciferase assays.

Results: Circular dichroism spectra reveal that in presence of flavonoids the changes in the secondary structures of the macromolecules were reduced to a significant extent. For the cellular studies, flavonoids with 3-and 5-hydroxyl groups are found more effective to induce antioxidant and pro-survival responses that correlated with their ability to reduce nicotine-induced oxidative stress.

Acknowledgment: MS-INBRE grant number P20GM103476, MS-EpscoR grant # 0903787; HHMI grant # 52007562, at Tougaloo College.

10:05 Break

Contributed Papers

O3.08

10:15 PYROMELLITIMIDE POTOCHEMISTRY

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

ω-carboxylic acid pyromellitimide has been used in the decarboxylative photocyclization. The photoreaction yields cyclization products similar to phthalimide but the reaction mixture is more complex due to a large number of isomers. The reaction mixtures turns dark green upon irradiation which is due to a long lived radical anion intermediate.The cyclization reaction exhibits an interesting spacer length dependence. Spectroscopic and pH changes are discussed. 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."

O3.09

10:30 THERANOSTIC PLATFORM FOR SELECTIVE TWO-PHOTON IMAGING AND PHOTOTHERMAL KILLING OF MELANOMA CELLS

Suhash Chavva, Christine Tchounwou, Sudarson Sinha, Paresh Ray
Jackson State University, USA

Even in the 21st century, despite advances in the medical field, cancer is one of the primary causes of death for men and women. Since the second biological window between 950 and 1350 nm offers highly efficient tissue penetration, we have developed hybrid theranostic platform using anti-GD2 antibody attached gold nanoparticle (GNP) conjugated, single-wall carbon nanotube (SWCNT) for second near-IR light triggered selective imaging and efficient photothermal killing of human melanoma cancer cells. The results demonstrate that, due to strong plasmon-coupling, two-photon luminescence (TPL) intensity from theranostic GNP attached SWCNT materials is 6 orders of magnitude higher than GNP or SWCNT alone. Experimental and FDTD simulation data indicate that the huge enhancement of TPL intensity is mainly due to strong resonance enhancement coupled with the stronger electric field enhancement. Due to plasmon coupling, the theranostic material serves as local nanoantennae to enhance the photothermal capability via strong optical energy absorption. The developed theranostic SWCNT can be used for selective two-photon imaging of melanoma UACC903 cells using 1100 nm light. Photothermal killing experiment with 1.0 W/cm^2 980 nm laser light demonstrates that 100% of melanoma UACC903 cells can be killed using theranostic SWCNT in just 8 minutes of exposure. These results demonstrate that, due to plasmon coupling, the theranostic GNP attached SWCNT material serves as a two-photon imaging and photothermal therapy source for cancer cells in the second biological window.

O3.10

10:45 SYNTHESIS AND CATALYTIC ACTIVITY OF (R)-3-METHYLPYRROLIDINE-3-CARBOXYLIC ACID

Shelby Dickerson, Douglas Masterson
University of Southern Mississippi, USA

L-Proline is an organocatalyst widely used in pharmaceutical research. It is used in a variety of chemical reactions, especially the Aldol, Mannich, and Michael reactions. Organocatalysts have contributed to advancements in green chemistry. The absence of transitions metals in organocatalysts prevents the production of hazardous waste and allows “cleaner” synthetic reactions. Another advantage is the chiral centers that allow stereoselective reactions to occur. This research will focus on the production of a unique proline analogue and the potential reactions to be used to explore its reactivity and compare to known proline analogues.

The steps display the known synthesis that will be utilized to produce the proline analogue. There are many reactions that utilize organocatalysts. This includes the Aldol reaction. One issue with organocatalysts is low solubility in organic systems. Using the Aldol reaction, the difference in reactivity of reported proline analogues will be compared to the analogue produced in this research.

O3.11

11:00 USING FOUR WAY JUNCTIONS TO ELUCIDATE THE ROLE OF HMGB1 IN APOPTOSIS

Alexis Sanders, Jalisa Keys, Crystal Seranno, Paul Stoulig, Vaniecia Wilson, Anthony Bell
University of Southern Mississippi, USA

During apoptosis, cells undergo a highly organized series of steps that ultimately lead to clearance or removal by macrophages. When apoptotic cells are not cleared, apoptotic cells undergo an alternate version of

cell death referred to as necrosis. Studies indicate that the DNA-binding cytokine, high mobility group box 1 (HMGB1), prevents the clearance of apoptotic cells by "coating" critical cell clearance biomolecules. It is well known that HMGB1 binds specifically to the phospholipid phosphatidylserine (PS) located on the surface of apoptotic cells to inhibit cell clearance. *Our hypothesis is HMGB1 is a key modulator of apoptosis that binds additional cell clearance molecules located on the surface of: i) apoptotic cells, ii) macrophages and iii) within the extracellular matrix.* With respect to experimental methods, competition electrophoretic mobility shift assays (EMSAs) are used to investigate the relative binding affinity of HMGB1 toward clearance biomolecules. DNA four-way junctions (4WJs) are the substrates or probes for the EMSAs. 4WJs are natural DNA ligands of HMGB1 that bind the protein with very high affinity. The resulting HMGB1:4WJ complexes are incubated in the presence of cell clearance molecules to dissociate (compete with) the protein: nucleic acid complex. Our EMSA studies show that, as expected, PS binds to HMGB1 with high affinity. Preliminary studies indicate that additional cell clearance molecules such as intracellular cell adhesion molecule 1 (ICAM-1), fractalkine (CXCL1) and T-cell immunoglobulin (TIM-1) also bind to HMGB1.

O3.12

11:15 **TWO-PHOTON INDUCED LONG RANGE SPECTROSCOPIC-RULER FOR SPECIFIC DETECTION OF PROSTATE CANCER CELL**

Sudarson S. Sinha, Paresh C. Ray
Jackson State University, USA

FRET, the very common biological optical ruler, is only limited to 10 nm spatial distance. In order to monitor real life biological processes, development of long range optical ruler is very important. Driven by this need, for the first time, we have designed of long-range two-photon induced scattering (TPS) spectroscopy rulers using gold nano-antenna separated by double strand DNA as quantitative ruler length, is discussed. We have also demonstrated that the TPS spectroscopy ruler's working window is within 25 nm distance, which is more than twice than that of FRET distance. A possible mechanism for such ruler's long range capability have been discussed using angle-resolved TPS measurement and FDTD simulations. The solution-phase experiment with A9 aptamer demonstrated that a long-range TPS ruler can be used for the screening of prostate-specific membrane antigen (PSMA) (+) prostate cancer cells at very low concentration. The controlled experiment with PSMA (-) normal skin HaCaT cells indicate that this ruler based assay is highly specific to prostate cancer cells to others.

O3.13

11:30 **Zn(II)/H_2O MEDIATED MILD AND UNUSUAL TRANSFORMATION OF PROPARGYL *N*-HYDROXYLAMINES TO α,β-UNSATURATED KETONES**

Prasanta Das, Ashton T. Hamme Ii
Jackson State University, USA

Recently, the versatile nature of propargyl hydroxylamines have stimulated lots of interest and comprehended to be the key milestone in organic synthesis. The suitably located of a C-C triple bond adjacent to *N*-hydroxylamine facilitated its versatile mode of reactions toward oxidation, reduction, hydrogenation, hydroboration and cyclization lead to the formation of a wide number of synthetically useful class of moieties including amino acids, isoxazolines, amines, keto amines, and lactams. Zn-salt mediated organic transformations have also been found to have significant applications owing to their abundance, affordability, and environmental friendliness.

Herein, we are reporting the mild behavior of zinc salts for an unusual transformation of propargyl hydroxylamine while excluding what is already known so far. During the course of synthesizing isoxazolines, we realized that stoichiometric Zn(II)-salt in the presence of water under reflux condition facilitated an decomposition of propargyl hydroxylamine and lead to the formation of an α,β-unsaturated ketone. A variety of available zinc salts have been utilized for optimizing the reaction conditions. We will also describe the substrate scope to understand the efficacy of our reaction conditions and will disclose a plausible mechanism as well.

Acknowledgements: The project described was supported by NIH/NIGMS (Award Number: 5 SC3 GM094081-06) and the Analytical and NMR CORE Facilities were supported by NIH/NCRR (Award Number: G12RR013459) and NIH/NIMHD (Award Number: G12MD007581).

O3.14

11:45 A TUNABLE AND GENERAL METHOD FOR THE REDUCTION OF ESTERS TO ETHERS

Alison Hart
University of Southern Mississippi, USA

The ether functional group is extremely useful in natural product synthesis 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 do 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 their broad applicability has been hindered, especially for one-step conversions. Therefore we are interested in developing a general and tunable two-step method for the reduction of esters to ethers via an acetal intermediate, with a significant ester substrate scope including aromatic and non-aromatic esters. By using *in situ* reaction monitoring with React IR, the completion of the ester reduction can be observed by the loss of the carbonyl peak, allowing for the shortest possible reaction times for specific substituent classes. A brief outline of our results using two ester model substrates will be given, along with progress towards developing an overall tunable one-pot methodology.

12:00- Business meeting

12:30-1:30 Lunch

Thursday, February 18, 2016

AFTERNOON

Session 3. Nano Sciences: Dr. Yongfeng Zhao

Invited Talks

O3.15

1:30 ILLUSTRATING THE HETEROGENEITY OF CIRCULATING TUMOR CELLS USING MULTICOLOR FLUORESCENT-MAGNETIC NANODOTS

Paresh Ray, Avijit Pramanik, Sudarson Sinha, Aruna Vangara, Stacy Jones, Jasmine Burrell, Suhash Chavva, Yongliang Shi
Jackson State University, USA

Circulating tumor cells (CTC) are the main vehicles of metastatic relapse and becoming a dynamic prognostic biomarker for oncologists in clinics. Two major barriers for the exploitation of CTC analysis as "liquid biopsy" in clinics are the following: CTCs are highly heterogeneous in nature due to epithelial-mesenchymal transition (EMT) and also they are extreme rare cells. Current FDA approved tecahnology can only isolate epithelial CTCs and it does not differentiate subpopulation CTCs that have high clinical relevance. Here we will discuss our recent report on the development of multicolor nanodots conjugated magentic nanoparticle based multifunctional fluorescent-magnetic nanoplatform for targeted capturing and fluorescence mapping of heterogeneous CTCs from whole blood sample. Reported data demonstrate that multicolor fluorescence nanoplatforms are capable of mapping heterogenity of circulating tumor cells by accurate capturing and identification of multiple subpopulations of CTCs from blood.

O3.16

1:50 IMPACT OF LIGANDS AND LIGHT EXPOSURE ON SOLUBILITY OF SILVER NANOPARTICLES (AgNPs)

Zikri Arslan[1], Husniye Imamoglu[2], Ahmet Celik[1], Oliva Premira-Pedrozo[3], Mehmet Ates[4], Ibrahim Farah[1]
[1]Jackson State University, USA, [2]Sabahattin Zaim University, Turkey, [3]Universidad Metropolitana, USA, [4]Tunceli University, Turkey

Silver nanoparticles (Ag NPs) are used in numerous consumer products. In this study, the stability and ion release properties of various AgNPs were investigated in the presence of chelating agents and light exposure. Three different AgNPs were examined: uncoated (20-30 nm), PVP-coated (20-30 nm) and oleic acid-coated (30-50 nm) Ag NPs. Stock NPs were suspended in pure octanol. Treatments were prepared by taking small samples of the stock NP and re-suspending in equal volume of water/octanol mixture (total 5 mL). pH was varied from pH 2 to 10 with sodium carbonate buffer. Dissolution was investigated in the presence of EDTA, NTA, L-cysteine and citric acid. Additionally, AgNPs suspensions were exposed to day light (365 nm) continuously. Samples were gently shaken for 1, 6, 12, 24 48 h, and portions from water and octanol were analyzed for Ag concentration. Additional samples from water phase filtered to determine Ag ion content. Measurements were made with ICP-MS for total and ionic Ag content. The results showed that AgNPs dissolve in lower pHs significantly. Dissolution accelerated in the presence of chelating agents and light exposure. The largest Ag ion concentration was measured from suspensions that were exposed to light in the presence of chelating agents. All ligands increased dissolution, but L-cysteine for which analysis solutions showed minimal Ag ion levels. The dissolution of PVP- and uncoated AgNPs were similar. Oleic acid coated AgNPs were found most stable against light exposure and chelating agents at neutral pHs.

O3.17

2:10 SYNTHESIS OF CHELATOR FREE COPPER-64 INCORPORATED GOLD NANOSTRUCTURES FOR CANCER IMAGING

Yongfeng Zhao[1], Yongjian Liu[2]
[1]Jackson State University, USA, [2]Washington University in St Louis, USA

Gold nanoparticles have been widely utilized for biomedical applications including imaging and therapy. That is because the gold nanoparticles can be synthesized by a straightforward chemistry with tunable structure and easy surface modification. More recently, positron emission tomography (PET) imaging of gold nanoparticles labeled with radioisotopes,like Cu-64, have gained steady increasing attention. Thanks to the high sensitivity, unlimited depth and clinic translational potentials of PET imaging. Current method to conjugate radioisotope to nanoparticles is through a macrocyclic chelator, for example DOTA. However, the radiolabel stability may be a limiting factor for further translational research. It could lead to false interpretation of imaging. In addition, the introduction of DOTA on the surface of gold nanoparticles will change the surface charge and could alter the chemical behavior of nanopaticles. To address these problem, here we reported the development of gold nanoparticles with Cu-64 directly incorporated into the cores of the nanoparticles. With this strategy, the stability of the nanoparticles can be significantly improved. In the meantime, the specific radioactivity of the radioactive gold nanoparticles could be tuned. The superior pharmacokinetic and positron emission tomography imaging capabilities demonstrate high passive tumor targeting and contrast ratios in a mouse breast cancer model, as well as the great potential of this unique alloyed nanostructure for preclinical and translational imaging.

Contributed Papers

O3.18

2:30 ANTIBACTERIAL ACTIVITY OF ANTIBIOTICS COMBINED WITH METAL OXIDE NANOPARTICLES AGAINST *Salmonella* DT-104

Thabitha P Shareena Dasari, Hongtao Yu
Jackson State University, USA

Infectious diseases are one of the leading causes of mortality because drug-resistant bacteria have arisen under broad use and abuse of antimicrobials. This threat demands the development of new drugs for combating antibiotic resistance caused by bacteria. Combination therapy with antibiotics and metal oxide nanoparticles might be a potential strategy to overcome drug-resistance. This study evaluates the enhanced antibacterial activity of antibiotics (penicillin, tetracycline, neomycin and enoxacin) with six metal oxide nanoparticles (ZnO, CuO, TiO_2, SiO_2 Al_2O_3 and Fe_2O_3) against multidrug resistant Salmonella DT-104 bacteria. The spread plate method was used to determine the inhibition of bacterial growth. We found that ZnO and CuO NPs were antibacterial with IC_{50} of 3 and 65 µM respectively. The combination of penicillin, tetracycline, neomycin, and enoxacin at 100 µM with ZnO NPs (1 and 3 µM) inhibited the growth of Salmonella by 56 and 41, 51 and 57, 100 and 95, and 85 and 95%, respectively. However, CuO NPs (20 and 65 µM) in combination with neomycin and enoxacin (100 µM) has significant inhibition of 99 and 62, and 63 and 77 % against Salmonella growth. However, the combination of neomycin and enoxacin with ZnO NPs (1 and 3µM) and CuO NPs (20 and 65 µM) has significant inhibition against Salmonella growth compared to penicillin and tetracycline. These results confirm that ZnO NPs has a strong antibacterial activity with antibiotics (neomycin and enoxacin) when compared to CuO NPs. The research on the other metal oxide nanoparticles in combination with antibiotics is underway.

O3.19

2:45 SYNERGISTIC ANTIBACTERIAL MECHANISM OF SILVER NANOPARTICLES COMBINED WITH TRADITIONAL ANTIBIOTICS

Hua Deng, Danielle McShan, Ying Zhang, Sudarson Sekhar Sinha, Zikri Arslan, Paresh Chandra Ray, Hongtao Yu
Department of Chemistry and Biochemistry, Jackson State University, USA

Combination of silver nanoparticles (AgNP) and an antibiotic can produce synergistic effect on bacteria growth. However, the mechanism for the synergistic activity is not known. This study chooses four classes of antibiotics, β-lactam (ampicillin and penicillin), quinolone (enoxacin), aminoglycoside (kanamycin and neomycin), and polykeptide (tetracycline) to explore their synergistic effect with AgNP against multi-drug resistant Salmonella DT 104. Tetracycline is chosen as an example to quantitatively study cellular uptake of AgNP and released Ag^+ using ICP-MS. Enoxacin, kanamycin, neomycin and tetracycline combined with AgNP all show synergistic growth inhibition against Salmonella DT104, while ampicillin and penicillin

don't. Interestingly, UV-Vis and Raman spectroscopies reveal that enoxacin, kanamycin, neomycin and tetracycline can interact with AgNP and cause either aggregation or surface Raman resonance enhancement. ICP-MS results show that combination of 10 μM tetracycline with 1μM AgNP can enhance cellular uptake of Ag element by 8.8% while the release of Ag^+ is enhanced by 2-3 fold upon the interaction of AgNP with the bacterium. The synergistic effect of AgNP and tetracycline is found to depend on the interaction of AgNP-tetracycline complex with the Salmonella cells, which enhances the release of Ag^+ and further increases cellular uptake of Ag^+. These findings provide the first evidence for the mechanism of the synergistic effect of AgNP and antibiotics.

O3.20

3:00 INVESTIGATION OF ELECTROSPINNING NOVEL OXIDIZED ALGINATE NANOFIBERS

Kathyrn Penton, William Weeks, Sharon Hamilton
Delta State University, 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 yields nanofibers that have shown promise as tissue scaffoldsand drug delivery vehicles. However, little research has been published on the controlled delivery of drugs from alginate nanofiber dressings. The lack of studies in this area is due in part to the difficulty of electrospinning alginate and the slow degradation of alginate under physiological conditions. This project investigated the development of novel alginate-based, degradable nanofibers. Alginate biopolymer was oxidized to help facilitate the degradation of the biopolymeric backbone. The oxidized alginate was then electrospun into fibers and their degradation profiles analyzed. It is anticipated that the oxidized alginate nanofiber scaffolds can be used for drug delivery and future studies will investigate the time-release of small molecules from these fibers. This study has helped to generate a better understanding of alginate-based nanofibers that can be utilized in biomedical applications such as drug delivery and wound healing.

Thursday, February 26, 2015

3:30 Dodgen Lecture

EVENING

Poster Session
Immediately Following Dodgen Lecture

P3.01

MODEL AND DOPED GRAPHENES INTERACTIONS WITH SOME P- AND M-SUBSTITUTED NITROBENZENE COMPOUNDS

Md Mehedi Khan, Devashis Majumdar, Jerzy Leszczynski
Jackson State University, USA

Graphene sheets could be used as π-stacking agents to bind potentially explosive aromatic nitro compounds. Doped graphenes might increase such interactions to a great extent and such platforms could be used for trace level detection of such materials through spectroscopic techniques. Thus investigations of the interactions between such materials are very important research topic. Density functional theory (DFT) level computations were carried out on the π-complexes of pristine and N-and B-doped model (5,5)-graphene systems with various p- and m- substituted nitrobenzene compounds to analyze the structural characteristics and the nature of interactions of such binary π-complexes. The various p- and m-substituents in the nitrobenzene included electron donating -NH2, -OC2H5, -OCH3, -OH, -CH3 and electron withdrawing-NO2, -CN, -I, -Br, -Cl species. In the case of electron donating substituents, The B-doped graphene system forms weaker π-complexes with respect to the pristine and N-doped graphenes. The electron withdrawing substituents, on the other hand, show stronger interactions towards both B- and N-doped graphenes. The nature of such interactions would be explained through molecular electrostatic potential (MEP) map analysis and would be useful to analyze the nature of interactions of the graphene systems with real explosive materials e.g. TNT and picric acid. The work is on progress in that direction.

P3.02

GEOCHEMICAL CHARACTERISTICS OF DISSOLVED STRONTIUM & PHOSPHORUS IN ESTUARINE WATERS(GRAND BAY NERR)

Jacqueline McComb, F.X. Han, Christian Rogers, Paul Tchounwou
Jackson State University, USA

Geochemical processes occur at major interfaces such as seawater mixing zones(Estuaries). Isotopic and geochemical tracers are often used to investigate

estuaries that are subjected to anthropogenic inputs. Natural tracers or isotopes with characteristic and contrasting levels have to be identified. Strontium and Phosphorus have been highlighted due to a catastrophic pollution event where 17.5 million gallons of phosphates for fertilizer was released into Grand Bay NERR. The 87Sr/86Srratio distribution in combination with the strontium and phosphorus content is controlled by water chemistry and act as tracers. Sampling was conducted during low tide, along a salinity gradient within the Grand Bay National Estuarine Research Reserve Estuary September 2014. Water column physiochemical properties were determined using an YSI HI 9828/10Multiparameter Water Quality Meter that allowed obtaining data from temperature, salinity, dissolved oxygen, and pH at each sampling site. All samples were collected in the vicinity of the 4 major bayous (Cumbest, Heron, Crooked, and Bangs Lake). Forty samples were analyzed for dissolved trace elements (Sr, Ca, Mg, Fe, Mn, Cu, Zn, Ni, Pb, Cr, P, and Cd). This study examines the spatial variability, sources, and the quality of brackish water.The results showed that the measured trace elements in the brackish water could be divided into three categories: High concentrations(2000- 4000 µg/L Sr), moderate concentrations (20– 100 µg/L; Fe, Cd, Pb, Zn,), and low concentrations (0.1 -10 µg/L; P, Ni, Cu, Cd, Mn, Cu, and Cr). Cadmium and Mg were highly soluble in all 40 samples collected from all bayous sampling locations.

P3.03

BIOACCUMULATION OF HEAVY METAL AND METALLOID (CRASSOSTREA VIRGINICA) IN GULF OF MEXICO

Turquoise Perlote, Fengxiang Han, Paul Tchounwou, Zirki Arslan
Jackson State University, USA

Metals and metalloids including arsenic (As) and zinc (Zn) are naturally occurring trace elements in estuarine ecosystems. There remains an insufficient understanding on the bioaccumulation and detoxification of As and Zn on the eastern oyster, Crassostrea virginica, particularly in the context of anthropogenic loads from water pollution such as industrial offshore oil spills. Working in the Grand Bay NERR located in the northern Gulf of Mexico, we aim to assess bioaccumulation and toxicology of As and Zn exposure in oysters through 1) determining the concentrations of As and Zn in sediments and soft tissue of oysters; 2) elucidating the enzymatic activity following treatments to As and Zn; 3) performing a sequential extraction for arsenic fractionation in sediments. Preliminary ICP-MS analyses indicated a differential accumulation of Zn and As in oyster tissues, including muscle, gill, heart and kidney that may translate into respective differences of metal/metalloid detoxification. Results also showed that oysters' gill and digestive gland are the primary sites of their bioaccumulation. Antioxidant enzymes play an important role in detoxification of As at various Zn levels in oysters in the Northern Gulf of Mexico. The details in As speciation and fractionation in sediments of the Gulf of the Mexico will be discussed as well.

P3.04

COMBINATION EFFECT OF SILVER NANOPARTICLES AND COMMONLY USED ANTIBIOTICS AGAINST E. COLI

Denise Yancey-Gray, Shareena Dasari, Hongtao Yu
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. Studies have shown that the combination of AgNP with antibiotics have a higher antibacterial efficiency on nonpathogenic *E. coli* 1431 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 and enoxacin at concentrations of 0.1, 0.5, 2.5, 8.5, and 16 µM, combined with 50 µM AgNP. Results for neomycin show that without the combination of AgNP, Neomycin (0.1 µM) inhibits about 25% of the bacterial growth. The amount of inhibition increased by 10% with each increased concentration of neomycin. The highest concentration of neomycin inhibited about 49% of bacterial growth. However, when neomycin is combined with 50 µM AgNP, the lowest concentration of 0.1 µM inhibits about 47% bacterial growth, and the highest concentration of 12.5 µM inhibits about 95% of the bacterial growth. Experiments are still in progress for enoxacin.

P3.05

EFFECT OF CHAIN NUMBERS ON CYTOTOXICTY OF AMMONIUM SURFACTANTS AS NANOPARTICLE COATING

Ying Zhang, Salma Begum, Makiesha James, Hongtao Yu
Jackson State University, USA

Surface coating agents are an integral part of synthetic nanoparticles for stability, solubility, protection etc. It has been shown that some coating agents are toxic, complicating the toxicity research of nanoparticles. Our previous research showed that surfactants used as coating agents have the highest toxicity among those tested, and chain length affect their toxicity. Here we investigate the effect of the number of chains on in-vitro cytotoxicity of ammonium surfactants. For *mono-, di-, tri- and tretra*-octyl ammonium salts, the *mono*- and *tri*-branched are not or very weekly toxic against HaCaT and TIB-152 cells; while the *di*- and *tetra*-branched are highly toxic to both cell lines, with the *tetra*-branched being slightly more toxic than the *di*-branched. For *mono*- and *di*-dodecylmethylammoium bromides. *di* -branched is slight more toxic than the *mono* –branched. *Mono*-octadecylammonium bromide is toxic, while *di*-methyl dioctadecylammonium bromide is not toxic due to micelle formation. This research also investigated the membrane damage caused by ammonium surfactants. Lactate Dehydrogenase (LDH) release assay shows that membrane damage increases with increased concentration of the surfactants. For cationic C10 and C14 and anionic C10 surfactants, these is no or very low LDH release at low cytotoxicity levels, and the LDH release increases as cytotoxicity increases; while for the anionic C14 surfactant, the LDH release correlates better with the cytotoxicty from very low cytotoxicity levels. The microscopy images of the cells show membrane damages caused by these surfactants. Apoptosis is observed and the main mechanism of cell death at low surfactant concentrations.

P3.06

DEACRBOXYLATIVE PHOTOCYCLIZATION OF PYROMELLITIMIDE ω-CARBOXYLIC ACIDS

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

The decarboxylative photocyclization is an elegant photochemical way to synthesize small to medium sized heterocycles. The photochemical starting material is a phthalimide chromophor and a ω-carboxylic acid. The products are pyrrolizidine-annelated structures.The pyromellitchromphor has so far been used extensively in polymeric films such as Kapton in the aerospace industry. In photosynthetic systems pyromellitimides are used as electron-acceptor moeities. No synthetic applications involving the pyromellit chromophor have been reported so far.

Simple condensation products of ω-carboxylic acids (with spacer lengths of 1 to 10) gave the photochemical starting materials which were irradiated at 300nm in aqueous solution.

The photochemical reaction led to the formation of cyclization products. The possible regio- and stereoisomers made product analysis complex. Yields were small to poor due to undesired side reactions. The irradiation solution developed a strong color with an absorption maximum of about 720 nm, which is indicative of the radical anion. The pH increases which is expected for the decarboxylative photocyclization.

The pyromellit chromophor can be ued for the decarboxylative photocyclization. The complex product mixtures makes is difficult to predict products but optimization of the reaction conditions can improve the overall yield of desired products. This is the first time pyromellitimides have been shown to exhibit synthestic photochemical potential. Acknowledgment: "This work was supported by the Mississippi INBRE, funded by an Institutional Development Award (IDeA) from the National Institute of General Medical Sciences of the National Institutes of Health under grant number P20GM103476."

P3.07

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

Leon Karekezi, Marcus Powell, Courtney Mullins, Lauren Hoth, Emily Stewart, Wolfgang Kramer
Millsaps College, 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. The synthesis of the nitrogen onium salts includes the oxidation of the heteroaromatic nitrogen and subsequent O-alkylation. To increase the DNA cleaving effiency by enhancing ground-state association we synthetically attached a known DNA-binder, 1,8-naphthalimide. Here we present the DNA cleaving efficiency of a series of bifunctional DNA-cleavers which has been analyzed by gel

electrophoresis and CD spectroscopy. Interestingly, the bifunctional compounds appear to be double-strand cleavers. A thermal effect is explained by molecular docking studies. The influence of quenchers has been analyzed and indications of the reaction mechanism are discussed. It appears as though oxygen is inhibiting the photocleavage.

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."

P3.08

ELECTROSPINNING NATURAL POLYMER FIBERS

Kathryn Penton[1], William Weeks[1], Lucas Veide[2], Sharon Hamilton[1], Gisela Buschle-Diller[2]
[1]Delta State University, USA, [2]Auburn University, 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 scaffoldsand drug delivery vehicles. However, these renewable biopolymers contain inherent charges, which make it difficult to electrospin these polymers, thus researchers continue to investigate the optimal electrospinning conditions for biopolymer fiber formation. In this project, the formation of nanostructures was explored using alginate and chitosan solutions with a variety of additives that could assist nanofiber formation, including co-solvents, co-polymers, and neutralizing solutions. Other electrospinning parameters were also explored including distance to the target and flow rate. It was found that chitosan fibers formed most easily when they were electrospun with another polymer while alginate fibers were able to form when electrospun with a co-solvent system. Changing of other electrospinning parameters generally had little effect on the formation of fibers. This study lead to valuable results for the production of natural electrospun fibers. Several natural polymers electrospin best when an additive, either a co-solvent or a co-polymer, is added to the biopolymer solution. Positive results were also obtained when chitosan was electrospun with a neutralizing polymer.

P3.09

CHARACTERIZING PROTEIN ADSORPTION TO GOLD NANOPARTICLES

Mackenzie Davidson[1], Karen Woods[1], Chloe Wilks[2], Nicholas Fitzkee[1]
[1]Mississippi State University, USA, [2]Vanderbilt University, USA

The utilization of gold nanoparticles (AuNPs) for drug delivery to tumors is limited by the stoichiometry and activity of the protein adsorbed to the surface. The size of the AuNPs can be determined by dynamic light scattering (DLS) and transmission electron microscopy (TEM). When proteins are added to AuNP solutions, they adsorb to the nanoparticle surface, creating a protein corona and therefore increasing the size of the AuNP. This increase is used to estimate the number of protein layers bound to the sample. By comparing this change in diameter to the radius of gyration of the folded protein, we can predict whether the proteins have remained globular upon adsorption. We have tested the binding behavior of several proteins, including wild type GB3, chemically methylated GB3, and bovine carbonic anhydrase. In addition, we have investigated binding on several differently-sized AuNPs with diameters of 15 nm, 24.5 nm, 41 nm and 97.5 nm. Our results support previously recorded NMR measurements, which suggest that a singular layer of globular protein is bound to the AuNP surface. By using DLS and TEM, an accurate approximation of the size of the AuNPs was determined with and without the protein; therefore also determining the number of adsorbed protein layers and predicting whether or not they have remained globular on the surface. Our results are in agreement with previous NMR data, strengthening the case that proteins are compact and globular on the AuNP surface. This principle may be useful for optimizing nanoparticle-based therapeutics in the future. 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

P3.10

SYNTHESIS OF TOOTH ANESTHETIC: (*E*) N-[2-(4-METHOXYPHENYL)ETHYL-N-METHYLCINNAMAMIDE

Samuel Dasary[1], Kwangyul Moon[2], Precious Cooper[1], Yunho Kim[3], Ken Lee[1]
[1]Jackson State University, USA, [2]The University of Arkansas, USA, [3]The University of West Alabama, USA

Zanthoxylum clava-herculis is commonly called toothache tree since it was used by Native Americans as an anesthetic for tooth aches. We have earlier isolated three fractions from Zanthoxylum clava-herculis tree bark. The major product is characterized by NMR experiments, GC MS, X-ray single crystallography and the structure is identified to be (E)-N-(4-methoxyphenethyl)-N-methylcinnamamide. We hypothesize that this natural product also has biological effect on mammals. Therefore, we propose to synthesize this natural product to by one step reaction (Scheme 1) of trans Cinnamic acid with N-[2-(4-Methoxy-phenyl)-ethyl]-methyl-amine in the presence of the dehydrating agent N,N'-dicyclohexylcarbodiimide (DCC) to obtain our desired amide: (E)-N-(4-methoxyphenethyl)-N-methyl-cinnamamide. The yielded product will be further characterized using NMR, GC-MS, FT-IR and X-Ray crystallographic studies. Upon successful completion of the synthesis, we will test the synthesized product for biological activity. The activity of our synthetic product will be compared with natural product that we have extracted earlier.

P3.11

A PRELIMINARY ANALYSIS OF PHOSPHORUS FRACTIONATION IN SURFACE SEDIMENTS OF GNDNERR

Jacqueline Q. McComb, Stephanie L. Njemanze, Fengxiang X. Han
Jackson State University, USA

The Grand Bay National Estuarine Research Reserve (GNDNERR) is an estuary located in the coastal region of southeastern Mississippi in Jackson County. This 18,000 acre reserve contains a variety of fish and wildlife that reside in the various wetland habitats including salt marshes, bays, and maritime forests. In 2005, 17.5 million tons of wastewater was accidently released from a local fertilizer plant which has polluted the GNDNERR with results of fish kills and an overall decline in water quality due to eutrophication. A sequential extraction method (SEDEX) developed by Ruttenburg (1992) was implemented to fractionate P in sediments. A total of 48 surface soil samples were collected from four major bayous (Bayou Cumbest, Bayou Heron, Crooked Bayou, and Bangs Lake) in May 2015 to investigate the geochemical characteristics and P status after 10 years of the accident. Surface sediment samples were homogenized and sieved through a 250 µm stainless steel sieve. Six forms of phosphorus included Ads-P (loosely bound phosphorus), Al-P (aluminum bound phosphorus), Fe-P (iron-bound phosphorus), BD-RP (reductant soluble P), Ca-P (CaCO3 bound P), and TP (total phosphorus). P in the extracts was analyzed using Inductively Coupled Plasma -Optical Emission Spectroscopy (ICP-OES).The detailed distribution of P fractionations in the reserve as affected by 2005 accident will be discussed.

P3.12

3D CONSTRUCTION OF GO WITH AgNP AND ITS APPLICATION AS WATER FILTER

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Silver nanoparticles (AgNP) as novel antimicrobials have been widely studied. The conjugation with graphene oxide (GO) whereas their further applications are greatly limited due to the lacking of proper method for 3D structure construction. The present study developed a facile 3D preparing method based on GO-AgNP colloid. GO was synthesized via the modified Hummers method. AgNP was embedded by in situ reduction of silver ions using sodium borohydride as well as sodium citrate. Two size ranges of AgNP are observed, 9 - 12.5 nm and 36 - 41 nm. The GO-AgNP solution was crosslinked by polyethylene glycol (PEG) in the presence of Na_2S to yield GO-AgNP colloid consisting of 3D GO-AgNP structures. Vacuum filtration was utilized to shape the GO-AgNP colloid as filter, followed by drying in the oven. The filter remained stable in water for over 6 months and released Ag^+ with concentrations below 45 nM. Scanning Electron Microscopy (SEM) images demonstrated that the filter is comprised of dense porous structure ranged from 8 – 18 µm. Energy-dispersive X-ray spectroscopy (EDS) results also demonstrated that AgNP spread uniformly in the filter. The filter was highly efficient to filter off E. Coli BAA 1431and Salmonella DT 104 from water. Spread-plate methods indicated that over 99% of both E. Coli and Salmonella were filtered off. These results suggest that this is a promising method to fabricate 3D GO-AgNP structures that can be potentially used as water filters.

P3.13

FLUORESCENCE QUENCHING OF DIFFERENT DYE MOLECULES BY SILVER NANOPARTICLES

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Silver nanoparticles (AgNP) are known to quench the fluorescence of organic molecules. This paper studies the fluorescence quenching of indole derivatives (indole, 3-indole propan-1-ol, tryptamine, L-tryptophan and 3-indolepropionic acid) by AgNPs, to understand the effect of the indole side chains on the quenching. Their quenching effects are also compared to that of rhodamine 6G (R6G). Indole derivatives have weak interaction with AgNP and their fluorescence quenching by AgNP includes both collisional/dynamic and static quenching. The static quenching dominates when the ratio of AgNP to indole molecules is lower than 1.5, indicating indole-AgNP complex formation dominates when there are few AgNPs. When the AgNP-Indole ratio increases from 1.5, the collisional quenching gradually increases and eventually plays the dominant role, as indicated by the curving-up of the Stern-Volmer plot. On the other hand, R6G has a strong binding affinity to AgNP and the quenching is mostly static due to the R6G-AgNP complex formation. At saturation quenching where the fluorescence intensity does not change upon addition of further AgNPs, the ratio of R6G and AgNP is estimated to be about 400,000 to 1. Assuming that R6G molecules are packed onto the surface of the AgNPs vertically and layer-by-layer, about 10 layers of R6G molecules are on the surface of AgNP. This packing would increase the size of AgNPs by about 20 nm since the length of R6G is about 2 nm. Using the 32 nm AgNP, the addition of R6G increases the dynamic size to about 50 nm, as shown by DSL experiments.

P3.14

ANALYSES OF FATTY ACID RESIDUES IN ARCHEOLOGICAL VESSELS BY GC-MS

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Fatty acids are thermally stable biomarkers found in food substances, and these persist as organic residues in the environment for extended periods. Pottery vessels found in archeological digs serve as effective storage basins for organic residues due to the pores within each sherd and the duration of exposure with numerous food items through cooking and storage. When fatty acid residues are extracted from the vessels' pores and are present in certain ratios, it can indicate what types of foods were stored or consumed within the vessels. Analyses of organic residues on ceramic artifacts can complement other types of archaeological evidence and provide insight into the diets of other cultures. Gas Chromatography - Mass Spectrometry (GC-MS) can be used to identify various biomarkers extracted from archaeological samples. In this research we examine fatty acids that are found in various ratios among different food sources such as seeds, meats, foliage, etc. to identify possible origins of the residue left in vessels and pottery.

P3.15

ANALYSES OF ORGANIC RESIDUES AS BIOMARKERS TO EXAMINE RITUALISTIC PRACTICES

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Biomarkers are specific compounds which can be used to identify diets or substances used in ritual ceremonies. Various biomarkers can be found in local environments where they can persist as organic residues for extended periods of time. For example, mescaline in peyote (*lophophora williamsii*) and tropane alkaloids such as scopolamine in jimson weed (*datura stramonium*), were used in many ritualistic practices and often mixed with other plants and foods during preparation of ceremonial beverages and other concoctions, which could lead to the discovery of multiple types of biomarkers, including fatty acids, in the same sherds. Other biomarkers such as methylxanthines can be utilized to determine the presence of chocolate, as well as various herbs and elixirs. All of these biomarkers and the substances they note the presence of can assist in expanding our knowledge of ancient cultures by which substances persist in the artifacts they left behind. Liquid Chromatography - Mass Spectrometry (LC-MS) and Gas Chromatography - Mass Spectrometry (GC-MS) can be used to identify various biomarkers extracted from archaeological samples.

P3.16

SYNTHESIS OF CAP-ANALOGUE M^7GPPPA ON SOLID BEADS FOR SELECTION OF MRNA-CAP APTAMERS

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The translation of messenger RNA (mRNA) in the eukaryotic cell requires 7-methyl guanosine (m7G) cap at the 5' terminus bound to the first transcribed nucleotide by an inverted 5'-5'- triphosphate linkage. We successfully synthesized an mRNA cap analog m7GpppA linked to solid beads using our unique chemical method. We phosphorylated the 5' hydroxyl of 6-chloropurine riboside and guanosine by phosphorous oxychloride. We added a TOTDDA (4, 7, 10-Trioxa-1, 13-tridecandiamine) linker molecule to 6-chloropurine diphosphate to form TOTDDA-ADP, which was activated by imidazole and coupled to another phosphate on 7-methyl GMP using a ZnCl2 catalyst. The TOTDDA linker provides enough space between the beads and m7GpppA for the selection of nucleic acid molecules capable of binding a specific ligand with high affinity and specificity known as aptamers. Using the synthesized m7GpppA beads, we will select the DNA/RNA aptamers specific for mRNA cap from a chemically synthesized random DNA/RNA library. The isolation of m7G cap binding aptamers is not only vital to the purification of synthetic mRNA used in cell reprogramming but these aptamers also can have therapeutic applications as translation inhibitors in cancer cells due to their affinity for the eurakyotic m7G-mRNA cap.

P3.17

FLAVONOIDS, THE POLYHYDROXY COMPOUNDS AGAINST NICOTINE INDUCED DAMAGES: MOLECULAR AND CELLULAR STUDIES

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Background: Nicotine exposure via long-term smoking, nicotine replacement therapies or E-cigarettes- is associated with decreased renal function and accelerated progression of chronic kidney disease (CKD) that involves augmented renal oxidative stress. Flavonols and related phenolic compounds of the flavonoid group are ubiquitous in plants of higher genera. The importance of such compounds lies in their novel therapeutic properties of high potency and low systemic toxicity. The major goal of this study is to explore the potential usefulness of the intrinsic antioxidant and other therapeutic properties of the flavonoids in preventing free radical mediated damages associated with long-term smoking and exposure to high doses of nicotine.

Methods: Human serum albumin and small oligonulceotides were chosen for the molecular studies. The cellular studies were conducted in cultured renal proximal tubule cells. The impact of those flavonols on NIC-mediated reactive oxygen species (ROS) production as well as on promoter activity of the anti-oxidant manganese superoxide (MnSOD) gene and on the pro-survival cAMP-response element binding (CREB) transcription factor-dependent transcriptional activity were determined in reporter luciferase assays.

Results: Circular dichroism spectra reveal that in presence of flavonoids the changes in the secondary structures of the macromolecules were reduced to a significant extent. For the cellular studies, flavonoids with 3-and 5-hydroxyl groups are found more effective to induce antioxidant and pro-survival responses that correlated with their ability to reduce nicotine-induced oxidative stress.

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P3.18

SILVER NANOCLUSTERS AS LUMINESCENCE PROBES

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Small silver clusters that form with single stranded oligonucleotides are distinguished by their strong spectroscopic properties. To understand how the bases and base sequence influence cluster formation, studies with different sequences are carried out. We initiated studies with a sixteen bases long sequence. The fluorescent Ag-NCs is formed in a slightly acidic aqueous solution where the C-rich DNA can form unusual i-motif structures, commonly found in human telomeres. Near infrared (NIR) emissive and highly stable bio-probes are important in advancing studies of individual biomolecular function. We initiated our studies using single stranded DNA oligonucleotide CCCACCCACCCACCCA and mutated the adenine (A) with bases gunanine (G), thymine (T) and cytosine (C) resulting in a total of seventeen sequences. UV/Vis absorption and fluorescence spectroscopic investigations were carried out and results indicate a specific sequence CCCACCCACCCTCCCG to have three types of NIR absorbing species, which were not observed for other sequences. Specific emission and absorption bands are characteristics of a particular DNA oligonucleotide. Influence of silver concentration, solvents of different polarity and a

confined environment (e.g. cyclodextrin) on the formation of the NIR absorbing species were studied.

Methods: Measurements were carried out using UV/Vis absorption, steady state and time resolved fluorescence, circular dichroism spectroscopy and size exclusion chromatography.

Results: The significant change in the properties of the nanoclusters with a single base mutation in the scaffold sequence, opens the door toward its applications in cellular and biophysical studies.

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P3.19

BINDING OF FLAVONOIDS WITH BIOMACROMOLECULES: A COMPUTATIONAL STUDY

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We have explored the interactions of myricetin and robinetin with their physiological targets which include DNA, protein, and membrane. Here we have used computational and experimental approaches to study the binding of the flavonoids with different forms of DNA and normal human hemoglobin (HbA). Myricetin and robinetin, ubiquitous bioactive flavonoids, abundant in common fruits and vegetables are known to possess antioxidant, anti-carcinogenic, hypolipidemic, vasoprotective and other important therapeutic properties. Apart from duplex DNA such as A, B, Z DNAs, investigation was also performed on non Watson-Crick structures namely quadruplex and I-Motif DNAs. Flavonoids tend to bind at the loop region of the unusual DNA structures, whereas they like to bind at the groove regions of the duplex DNAs. In Hemoglobin flavonoids bind at the core region. Specific interaction of the flavonoid with HbA is confirmed from flavonoid-induced quenching which is evident from steady state fluorescence and fluorescence anisotropy. Molecular docking studies reveal that apart from hydrogen bonding and van der Waals interactions, electrostatic interactions are also play crucial role in myricetin and robinetin-target interactions.

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P3.20

SILVER NANOCLUSTERS AS FLUORESCENCE PROBES FOR NICOTINE INDUCED OXIDATIVE STRESS

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Background: Nicotine exposure via long-term smoking, nicotine replacement therapies or E-cigarettes- is associated with decreased renal function and accelerated progression of chronic kidney disease (CKD). Probing the modifications in biomacromolecules, induced by oxidative stress, is important. Small silver clusters that form with short single stranded oligonucleotides are distinguished by their strong and unique spectroscopic properties. Here we used DNA templated silver nanoclusters as fluorescence probes to understand the structural alterations in DNA, caused by nicotine.

Methods: We initiated studies with two 28 bases long single stranded DNA oligonucleotides with similar sequences, which form i-motif and are common at the telomeric regions of human chromosomes. The silver clusters are formed on the scaffold in absence and presence of nicotine. Studies are performed using different concentrations of nicotine, DNA and silver ions. The influence of pH is investigated.

Results and discussions: The remarkable fluorescence spectroscopic properties of silver nanoclusters is exploited, well, to understand the oxidative stress mechanism. DNA scaffolded silver nanoclusters can act as intrinsic probe to study structural modifications of DNA in presence of nicotine.

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P3.21

RELATIONSHIP BETWEEN INCREASED STEREOSELECTIVITY OF PLE AND ENHANCED SUBSTRATE HYDROGEN BONDING ABILITY

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Pig Liver Esterase is a cost effective enzyme for ester hydrolysis. In our group, it is vital for creating chiral molecules for the synthesis of unnatural amino acids of potential biological importance. It has been previously found that the enantiomeric excess (ee%) of the PLE hydrolysis reaction increases drastically with

the addition of cosolvents that are able to both accept and donate hydrogen bonds. This research endeavors to see if substrates of enhanced hydrogen bonding ability also increase the stereoselectivity of PLE hydrolyses. Diester malonate was combined with a furan ring in both the third and second position from the oxygen atom to test this, which would only be able to accept hydrogen bonds. It was found that the substrate with the furan in the second position gave an ee% of 70% with no added cosovlent while the substrate in the third position gave a racemic mixture with no added cosolvent. This hints that there may be an amino acid anchoring the substrate in one position over the other to favor the creation of one enantiomer over the other. When 2.0% ethanol cosolvent was used in the PLE hydrolysis reaction the ee% rose to around 35%. To complete the series, diester malonate will be combined with a pyrrole ring in the second position from the nitrogen atom, which can only donate hydrogen bonds. This substrate will then undergo PLE hydrolysis with and without cosolvent to see the reactions' respective enantiomeric excesses.

P3.22

TEMPERATURE DEPENDENT STUDIES ON MauG-LIGAND COMPLEXES

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MauG is a diheme protein that catalyzes the posttranslational modification of precursor methylamine dehydrogenase). It contains two c-type heme centers, a penta-coordinated high spin heme with histidine as the proximal ligand and a hexa-coordinated low spin heme with histidine and tyrosine as the axial ligands. Some unique properties of this protein such as redox cooperativity, formation of the distinctive Bis-Fe(IV) species through charge-resonance, have drawn a lot of interests in this protein. The main focus has been how this protein achieve fast long-range (>40A^{o}) electron transfer in the catalytic process. It is now known that the high spin heme reacts directly with hydrogen peroxide and then generates the catalytically active Bis-Fe(IV). In a recent study we have found that the high spin heme binds to CN^{-} and Imidazole with Kd of 0.00073 and 0.024 M, repsectively. In the present study, temperature effects on the MauG complexes have been investigated using UV-Vis spectroscopy. It is found that the Soret peak the MauG complexes exhibits a red shift with decreasing temperature. Based on this, we have proposed a model suggesting that MauG has two dynamic-states. In one of the state, the high spin heme is six coordinated while in the other state it is 5 coordinated. The two structural states are in equilibrium via fast structural motion due to on/off of a distal water molecule. This could be related to the charge-resonance effects and long-range electron-transfer.

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P3.23

SPATIALPATTERNSINVEGETATIONCHARACTERISTICSANDCARBONSTORAGEABILITY OF THE GRAND BAY NATIONAL ESTUARINE RESEARCH RESERVE (NERR), MISSISSIPPI, USA

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Wetlands serve as important carbon sinks for the atmospheric carbon, and play an important role in the terrestrial carbon cycle. However, their role in the terrestrial carbon cycle is generally under-estimated, mainly due to the lack of reliable and timely estimates on their carbon stocks. The capacity of intact wetlands to absorb and sequester carbon varies widely depending on the site specific characteristics relating to climatic, terrain, vegetation and soil factors. Thus, depending on their site specific characteristics, wetlands may either be sources or sinks of carbon, and can even switch between being sinks and sources. Within this background, this study was implemented with the goal of evaluating carbon storage ability of the Grand Bay National Estuarine Research Reserve (NERR) of Mississippi, USA. The specific objectives of this study were to: 1) evaluate spatial patterns of vegetation characteristics; and; 2) quantify biomass and carbon stocks of *Juncus roemerianus* dominated wetland habitats. These findings will contribute to improve our understanding on the productive capacity of similar marsh communities and thereby will help decision makers to identify potential carbon sinks with varying levels of contributions for the cycling of atmospheric carbon.

P3.24

CATIONIC-BLOCK-HYDROPHILIC COPOLYMERS WITH VARIABLE HYDROPHILIC BLOCK LENGTH FOR COMPLEXATION WITH siRNA

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Block ionomer complexes (BICs) formed from electrostatic association between hydrophilic-block-

cationic copolymers and small interfering RNA (siRNA) are known to serve as superior vehicles for gene delivery. Such BICs stabilize and protect the siRNA while conferring hydrophilicity and reduced cytotoxicity, and incorporation of a cellular targeting moiety deters nonspecific cellular uptake. Our group has previously demonstrated that BIC stability and siRNA delivery efficacy strongly depend upon cationic block length: increased block length greatly stabilizes the complexes and also increases the time required to achieve maximum gene knockdown. However, the effect of varying hydrophilic block length on complex stability and gene delivery efficacy is unknown. To explore this phenomenon, aqueous RAFT (aRAFT) polymerization was utilized to synthesize cationic-block-hydrophilic copolymers in which the cationic block remains constant, but the hydrophilic block varies in length. Once purified, the polymers were characterized via combination of aqueous size exclusion chromatography (ASEC) and nuclear magnetic resonance (NMR) spectroscopy. Future studies will include potentiometric titration and in vitro gene delivery to evaluate the polymer-oligonucleotide binding strengths and cellular delivery efficacy as a function of hydrophilic block length. 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

P3.25

THE DEVELOPMENT OF CALIXARENE COMP LEX FOR THE ADSORPTION OF MULTI-HEAVY METAL CATIONS

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Heavy metals have become severe environmental hazards in anthroposphere, which mainly come from industrial wastes including vehicles emissions, lead-acid batteries, paints, treated woods and aging water supply infrastructures etc. The present study focus on the adsorption of Cd^{2+}, Pb^{2+}, Hg^{2+}, Co^{2+} and Sr^{2+} in waste water using core-shell structure Fe_3O_4-meso silica-Calixarene. Two kinds of calixarene, 4-sulfonic calix[4]arene and O,O-Bis(diethoxyphosphoryl)-calix[4]arene, have been attempted. The preliminary adsorption results showed that the maximum adsorption capacities ranged from 1000 to 3000 mg/g for all the aforementioned heavy metal cations. The TEM pictures presented the overlay core structure of this complex, which depicted the grafting of supermolecular calix on the core of Fe_3O_4. The FTIR spectra also confirmed the binding of calix in the complex. The following study will focus on the adsorption efficiency of these two calix complex to each of those individual cation.

P3.26

FLUORESCENCE IMAGING OF MRSA USING CARBOXYLIC ACID EDGING PLANAR SURFACE GRAPHENE QUANTUM DOTS

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Methicillin-Resistant Staphylococcus Aureus (MRSA) is a common "staph" bacteria that causes infections in different parts of the body. WHO report says, a high percentage of hospital-acquired infections are caused by highly resistant bacteria such as MRSA or multidrug-resistant Gram-negative bacteria. Though most MRSA infections are minor, some can be life-threatening. As a result, there is an urgent need for reliable method and early detection of MRSA. We have synthesized carboxylic acid edging planar surface Graphene Quantum Dots which can be used for rapid detection of MRSA using Fluorescence imaging technique. The aim of this study was to investigate multicolor imaging of MRSA with CAEPS-GQDs. Graphene quantum dots show considerably low toxicity, excellent solubility, less fluorescence background and photo damage, thus making them promising potential in fields like fluorescent probe, optoelectronic devices, sensors, cell imaging etc compare with organic fluorescence materials. On the other hand, conjugated CAEPS-GQDs has higher penetrating ability to enter the MRSA and also shows high quantum yield and wide range of emission Ultraviolet to near infrared regions compared to graphene quantum dots. Hence, a broad excitation coupled to a narrow and symmetric emission spectrum renders multicolored CAEPS-GQDs excitable with a single wavelength that enables MRSA imaging. A significant fluorescence was observed upon addition of MRSA to antibody conjugated CAEPS-GQDs. Fluorescence kinetics results show that the binding was saturated after few hours of mixing. Furthermore, we have detected MRSA bacteria, covered by antibody conjugated CAEPS-GQDs using transmission electron microscopy (TEM) and inverted fluorescence imaging microscopy.

P3.27

COLORIMETRIC AND OPTICAL DISCRIMINATION OF HALIDES BY A SIMPLE CHEMOSENSOR

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A thiophene-based tripodal copper(II) complex has been synthesized as a new colorimetric and optical chemosensor for the naked-eye discrimination of halides in acetonitrile. The binding interactions of the new receptor with several anions were analyzed by UV-Vis titrations, electrospray ionization mass spectrometric (ESI-MS) experiments and density functional theory (DFT) calculations. The results from UV-Vis titrations indicate that the coordinative unsaturated copper(II) complex strongly binds a halide at its vacant copper(II) centre *via* a metal-ligand bond forming a 1:1 complex, exhibiting binding affinities in the order of fluoride > chloride > bromide > iodide. The interactions of the receptor with halides were further confirmed by ESI-MS, showing a distinct signal corresponding to a 1:1 complex for each halide, suggesting that the noncovalent interactions also exist in the gas phase. In addition, time-dependent DFT (TD-DFT) calculations were also carried out to understand the excited-state properties of the chemosensor complexes. A detailed analysis of the TD-DFT calculations shows a consistent red-shift in the first optically-allowed transition, consistent with the observed colorimetric experiments.

P3.28

ANTHROPROGENIC ISTOPIC DISTRIBUTION IN THE VICNITY OF GRAND GULF NUCLEAR PLANT

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Being one of the major energy sources in the US, nuclear energy contributes up to 20% of total energy generated from various sources. In the year 2014, about 797.1 billion KWh of power was generated by nuclear energy sources. The vast majority of the nuclear energy in the US is generated by approximately 100 commercial nuclear plants. Though nuclear plants are considered as one of the clean energy sources, nuclear operations are well regulated in the US, reactors tend to release trace quantities of fission products. Also, reactors are constructed in the vicinity of water bodies and may result in release of trace quantities of isotopes into the water bodies. Grand Gulf Nuclear Plant, the biggest boiled water nuclear plant located in the Claiborne County, MS and supplies power to Mississippi and Louisiana. Due to its close proximity to the Mississippi River a study on upstream and downstream sediments is performed. A set of 60 samples (25 upstream, 25downstream, and 10 discharge point) are collected and analyzed for primarily fission products of concern (Cs-137). Further, a two-tailed test is performed on the two sets of samples (upstream and downstream) to justify if there is any release from the GGNS as part of its routine operation. Finally, the obtained values are compared to the NRC regulated values to evaluate if there are any releases beyond the regulatory limit.

P3.29

CHARACTERIZATION OF TRANSPORT AND THERMAL PROPERTIES OF PURE MePEGn POLYMERS AND COPOLYMERS

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The H^+ ion conducting Polyethylene glycol polymers ($MePEGnSiO_{1.5}$; n= 3, 7, 12, 16) and their copolymers containing bulky groups (isobutyltrimethoxy siloxane and diphenyldimethoxy siloxane) were synthesized in order to study the effects of added bulky groups on the observed transport properties and the thermal properties of the polymers. All the polymers and copolymers were synthesized by sol-gel method. The AC-Impedance spectroscopy, and Differential Scanning Calorimetry (DSC) were used for characterization.The Fractional Free Volume (FFV) data showed that the copolymerization of the $MePEG_n$ monomers with bulky groups adds free volume to the polymer, while decreasing the volume fraction of PEG ($V_{f,\ PEG}$) due to the dilution of the PEG fraction in the polymer. The glass transition temperatures (T_g) were measured in the pure $MePEG_n$ polymers and copolymers and observed lower glass transition temperature values in copolymers (220-240K) compared to the pure $MePEG_n$ polymers (240-260K). The decrease in T_g resulted from the observed increase in FFV in the copolymer. However the ionic conductivity is slightly decreased in the copolymers compared to the pure $MePEG_n$ polymers ($MePEG_7$ = $4.77x10^{-6}$ S cm^{-1}, $MePEG_7$/ iBuSi = $1.7x10^{-6}$ S cm^{-1}, $MePEG_7$ / Ph_2Si = $1.47x10^{-6}$ S cm^{-1} at 0.26 M $MePEG_7SO_3H$ acid concentration). These results indicate that the increase in FFV (and corresponding decrease in T_g) did not result in the expected increase in ionic conductivity. Ionic conductivity in our

$MePEG_n$ polymers occurs through segmental motion of ethylene oxide units (Grotthus mechanism) and appears to be more a function of $V_{f, PEG}$.

P3.30

COMPUTATIONAL STUDY ON THE BINDING ENERGY BETWEEN SELECTED CEPHALOSPORINS AND MAA

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The aim of this work is to perform an introductory study on the binding energy between selected cephalosporins and methacrylic acid, MAA. These calculations are performed in a gas phase and in different solvents. We want to find the cephalosporin which has the strongest binding energy with MAA. Next, we will design a molecular model of the molecularly imprinted polymer active site for this specific cephalosporin. Molecular imprinting is an excellent method for selective extraction of a targeted substance from the solution. During the imprinting process a target molecule (a cephalosporin) is non-covalently bound to the monomers, here MAA, and then the polymerization process occurs. After the polymerization, a cave, complementary with size and shape to the target molecule, is formed. Molecular modeling of the cave, and analysis of the binding energy between monomer and a template can help with determination of selectivity of molecularly imprinted polymers. This work uses an ab initio, density function theory method and standard Gaussian basis set for calculations on molecular structures, vibrations, and binding energies of selected antibiotics from the cephalosporin group. The preliminary results indicate that the binding energy depends on the number of hydrogen bonding sites in the cephalosporin molecule. Binding energy is weaker in the presence of the solvent, the more polar the solvent, the weaker the interaction between cephalosporin and MAA is.

P3.31

SULFONAMIDE-BASED DIPODAL RECEPTORS FOR ANION BINDING

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The anion recognition with synthetic receptors is one of the frontier research areas in chemical science because of the significant roles of anions in many chemical, biological, and environmental systems. Thus, there is an acute need in designing sensitive and selective receptors for the detection and monitoring of anions and consequently, this area has rapidly expanded over past years. A diverse variety of noncovalent interactions such as hydrogen bonding, electrostatic, Lewis acid -base, and metal-ligand interactions are commonly employed for selectively binding anions at the molecular level. In particular, deigned receptors with integrated sensing groups have recently received considerable attention in anion binding chemistry, since they interact with certain anions strongly and selectively via reversible non-covalent interactions under variety of conditions. During this study, a sulfonamide-based molecular cleft has been synthesized and studied for anions in solution by fluorescence and/or UV titrations. This presentation will focus on the synthesis of a new molecular cleft functionalized with two dansyl groups and the results of its binding studies for halides and oxo-anions.

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P3.32

RADIATION DOSE FROM CONSUMPTION OF LOCALLY PRODUCED CATFISH

Shimi Didla[1], Girish Panicker[2], Jermiah Billa[1], Fengxiang Han[3], Keisha Queen[1], Santhosh Kanaganti[1]
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Catfish, a major food source to the southern US residents and are vastly produced in the states of Mississippi, Alabama, and Arkansas. As part of their life, fish (catfish in this case) tend to rely on soil and surface water based resources and may uptake various pollutants (if present) in soils and waters. The pollutant levels in fish are primarily dependent on factors like presence of natural isotopes/elements in soils and surface waters; and more importantly presence of pollution activities in the vicinity of water bodies. In consideration of the importance of catfish in the southern US, a study was conducted on a catfish produced in Claiborne County, Mississippi. Channel catfish (Ictalurus punctatus) were collected from local farms and Mississippi River and were analyzed using gamma spectroscopic analysis. Based on the experimental isotopic concentration values in fish, the resultant doses from consumption of fish samples analyzed in this study were estimated. In addition, RESidual RADioactivity in Biota (RESRAD Biota)

will be used to assess the activity & dose in fish based on the radioactivity levels in sediment and surface water of MS River and local farmland. Finally, the RESRAD dose values and activity based dose values in fish samples were statistical compared using two-tailed T-test and the dose results were compared with the federal government recommended dose values.

P3.33

RADIOACTIVITY LEVELS IN SOILS COLLECTED NEAR A POTASH FERTILIZER MANUFACTURING FACILITY

Michael Atkins[1], Jermiah Billa[1], Fengxiang Han[3], Girish Panicker[2], Cherish Burrell[1], Jakeria Bailey[1], Oluwafemi Oloko[1]

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Living organisms continuously get exposed to radiation that is primarily contributed by naturally occurring radioactive materials (NORM) such as U-238 series, Th-232 series, and K-40, originating from earth's crust (soils). Depending on the geographical location, the radioactivity levels of these NORM materials vary significantly in soils. If there are any human activities in the vicinity, levels of these NORM tend to elevate and may pose external radiation dose to the living organisms in the vicinity. To asses if there is any elevation in NORM levels in soils due to a phosphate based fertilizer facility located in Pascagoula, Mississippi a pilot study on top layers of soil samples collected around the facility was performed. The samples were cored up to 10 cm in depth at selected locations around the facility. Samples were then analyzed via the gamma spectroscopic analysis to evaluate the key isotopes. Based on the obtained radioactivity levels in the soils, the radiological health hazard indicating parameters were computed and compared to the standard acceptable limits. Finally, the measured radioactivity values were compared to the background radioactivity values in the available in the documented literature.

P3.34

ISTOPIC TRANSFER FACTOR OF ISTOPES IN SELECTED VEGETATION

Jermiah Billa[1], Girish Panicker[2], Fengxiang Han[3], Steve Adzanu[1], Obed Brempong[1], Elecia Harris[1], Antonnie Giddings[1], Mahesh Katakam[1]

[1]Advanced Technologies, Alcorn State University, USA, [2]Conservation Research Center, Alcorn State University, USA, [3]Department of Chemistry, Jackson State University, USA

As part of their growth, plants tend to uptake various nutrients present in soils. During absorption process, various isotopes (if present in soils) tend to transfer into various parts of plants and eventually tend to act a radiation pathway to living organisms if selected vegetation is part of their diet. In this context, a simple study on transfer rate of selected radioisotopes from soils to edible parts of pumpkins was performed. As part of this study, samples of pumpkins were collected from a farmland located in Richmond, KY and were analyzed using a 35% relative efficient gamma spectrometer for various gamma emitters of interest. To further understand if there is any uptake of isotopes from the added fertilizers, two sets of pumpkins were analyzed - fertilized and unfertilized. Also, the added fertilizers were analyzed for the prominent isotopes of interest -Ra-226 and K-40. The results will include radioactive isotopes in soils, fertilizers, and edible parts pumpkins. Also, considering the measured radioactivity values, the internal dose from consumption of pumpkins analyzed in this study will be computed. Finally, based on the measured isotopes, the transfer rates of individual isotopes from soils to edible parts will be presented.

P3.35

SYNTHESIS AND BINDING EVALUATION OF A 4-(METHYLTHIO)PHENYL-BASED THIOUREA TRIPODAL RECEPTOR FOR ANIONS

Corey Johnson, and Md. Alamgir Hossain
Jackson State University, USA

Molecular recognition of anions is a current area of research since they are important in environment, medicine and biology. Toxic anions in the environment often go undetected due to limitations in modern gold standard methods for anion detection. Previous studies have been proven supramolecular molecules to be selective anion receptors in the solution and solid phases detectable by common characterization methods. In the course of our study, we have developed a novel supramolecular anion receptor, tris([(4-(methylthio)phenyl)amino]propyl)thiourea, L. This receptor was synthesized through the reaction of tris(3-aminopropyl)amine and 4-(methylthio)phenyl isothiocyanate in dichloromethane. This poster will focus on the synthesis, characterization, and anion binding evaluation of this compound.

P3.36

SULFATE BINDING WITH A NOVEL HEXAFUNCTIONAL UREA-BASED RECEPTOR

Bobby Portis, Maryam Emami Khansari, Md. Alamgir Hossain
Jackson State University, USA

Sulfate plays an important role in both environment and biology. However, because of the high hydration energy of sulfate, it is often difficult to bind to a synthetic receptor. Therefore, it is highly desirable to developed a synthetic molecule that selectively binds a sulfate anion. During this course of this study, a new hexaurea-based urea has been synthesized and characterized. As investigated by NMR titrations, this new molecule shows high a selectivity for sulfate over other common anions. This presentation will describe the synthesis and anion binding studies of this receptor.

P3.37

RAPID, SIMPLE SYNTHESIS OF GOLD NANOCLUSTERS AS PROBES FOR MERCURY(II) DETECTION

Stacy Jones, Paresh Ray
Jackson State University, USA

Fluorescent metal nanoclusters have become popular alternatives to organic fluorophores for cell imaging. Usually consisting of only a few atoms, these unique nanoparticles exhibit size tunable emission due to quantum confinement of their available transition states. By carefully choosing the capping agents, metal nanoclusters can be used to bind to specific ions, thereby altering their spectroscopic properties.

This work highlights a novel, rapid approach to synthesizing gold nanoclusters using cellulose filter paper and a simple filtration process. The advantage of this method over conventional methods is that the synthesis is completed with high yield in seconds and can produce nanoclusters in high concentration and with a variety of capping agents.

Cysteine, an amino acid found in many enzymes, contains a thiol on the carbon side chain. Gold nanoclusters modified with cysteine exhibit bright green fluorescence. Cysteine coordinates with Hg(II) causing luminescence quenching. The probe has excellent linearity in the nanomolar range and has a detection limit of only Hg(II) as low as a few nanomolar. These properties make cysteine-gold nanoclusters excellent candidates for the sensing of mercury ion contamination.

P3.38

CHEMICAL VAPOR GENERATION FOR SENSITIVE DETECTION OF URANIUM AND THORIUM

Ahmet Celik[1], Vedat Yilmaz[2], Zikri Arslan[1]
[1]Jackson State University, USA, [2]Erciyes University, Turkey

Uranium and thorium are found in seawater and freshwaters. Detection of these radionuclides in environmental and geological samples mostly involves preconcentration techniques and ICP-MS technology due to their very low concentrations. In this study, we examined the chemical and physical conditions for generating volatile species of U and Th for the first time. A number of chelating agents, including 1,10-phenanthroline, 8-hydroxyquinoline, diethyl dithiocarbamate (DDC) and dibenzyldithiocarbamate (DBC) were investigated. The effects of mineral acids, including HCl, HNO3, HClO4 and acetic acid were examined by reacting 10 ppb U and Th solution with sodium borohydride (NaBH4). Different gas liquid separators were examined for most efficient generation of volatile species. Among the acids, HCl and HNO3 appeared to be equally suitable for generating vapor of U and Th. 8-hydroxyquinoline (8-HQ) was suitable for Th while DBC was the only reagent allowing the formation of volatile species of U. Scott-type cooled spray chamber was optimum for smooth generation and transport of volatile species to ICP-MS. Signals were highly sporadic when cyclonic spray chamber was used as gas-liquid separator. Interferences from transition metal ions and hydride forming elements were also examined on the generation of volatile species of U and Th. The results indicated that HCl is suitable for both U and Th vapour generation. A concentration of 3% (v/v) was used. The analytical potential of the methods were verified by determination of U and Th by vapour generation ICP-MS in seawater reference samples and coastal waters collected from the Gulf Coast.

P3.39

RAMAN SPECTROSCOPIC AND ELECTROCHEMICAL STUDIES ON BLUE COPPER PROTEIN AMICYANIN

Breland Crudup Crudup, Contesa Franklin Franklin, Manliang Feng Feng
Tougaloo College, USA

Amicyanin is a type I copper protein that mediates the electron-transfer in a three-member redox complex involving methylamine dehydrogenase (MADH) and cytochrome c-551i in Paracoccus denitrificans. The active site of amicyanin is a single copper ion coordinated by H53, H95, C92 and M98. One of the interesting properties of amicyanin is that it's redox potential is lowered in the MADH-amicyanin-cytochrome c51i complex due to the conservation of

coordination in the Cu(I) species. In this research, direct electrochemistry and Raman spectroscopy have been used to study the redox and electron-transfer properties of amicyanin and its complex with MauG, a diheme protein. Raman Spectrum of Cu(II) Amicyanin shows 3 major Raman bands between 300-500 cm-1. These bands are assigned to Cu(II)-S(Cys) vibration. Cyclic voltammetry of amicyanin yields a mid-point potential of 237 mV which is lower than the reported redox potential for free amicyanin. The lowering of redox potential is attributed to the adsorption of protein on the electrode surface which hinders the rotation of the H95, a structure feature that is relevant to that in the actual MADH-amicyanin-cytochrome c551i complex. It is difficult to investigate the electrochemical properties of individual heme in MauG as they always act in concert. The current studies on electron chemistry of free amicyanin and amicynin-MauG complex could help us to gain more insight in electrochemical properties of both amicyanin and MauG.

This work is supported by NSF Research Initiation Award under HBCU-UP program (Award number: 1505446).

P3.40

COPRECIPITATION OF CADMIUM IMPURITIES FROM MULTIVITAMIN TABLETS AND DETERMINATION BY ID-ICP-MS

Robert Washington[1], Ahmet Celik[1], Jeremy White[1], Vedat Yilmaz[2], Zikri Arslan[1]
[1]Jackson State University, USA, [2]Erciyes University, Turkey

Multivitamin (MV) supplements are extensively used by humans. However, Cd is encountered as a trace impurity in many multivitamin supplements. Monitoring of Cd content in commercially available MV supplements is critical to protect humans. MV supplements are very complex samples containing percent levels of elemental species. Additionally, tin (Sn) and molybdenum (Mo) are present in MV supplements at ppm (µg/g) levels. These elements exhibit isobaric overlaps on various Cd isotopes during ICP-MS measurements. Therefore, it is important to separate Cd from heavy elemental matrix of MV tablet and remove the interfering Sn and Mo. In this study, sequential co-precipitation was performed using hydrofluoric acid, ethylamine, ammonium sulfide. Hydrofluoric acid proved to be effective for eliminating all matrix elements but Sn and Mo that remained largely in solution as fluoride complexes along with Cd. Ethylamine resulted in precipitation of Cd as hydroxides along with interfering Sn and Mo. Co-precipitation in acidic solution with ammonium sulfide was best for removing matrix elements and interfering Mo and Sn. This approach caused precipitation of sulfides of Fe, Cd, Cu, Zn, and Sn. To eliminate the remaining interfering elements, the resulting pellet was dissolved in nitric acid and treated with HF. This scheme allowed extraction of Cd as fluoride complex in solution. The method was applied to determination of Cd in multivitamin tablets (SRM 3280) with isotope dilution technique ICP-MS.

P3.41

NOVEL ION-IMPRINTED POLYMER FOR SELECTIVE SOLID PHASE EXTRACTION CADMIUM FROM SALINE MATRICES

Vedat Yilmaz[2], Hayriye Yilmaz[2], Zikri Arslan[1], Jerzy Leszczynski[1]
[1]Erciyes University, Turkey, [2]Jackson State University, USA

Determination of toxic cadmium in environmental, biological and food samples is important for environmental monitoring. In this study, a new Cd(II)-imprinted sorbent is prepared by using N-methacryloyl-L-histidine (MAH) for on-line preconcentration of Cd(II) for determination by ICP-MS. The Cd(II)-MAH complex was synthesized and copolymerized in the presence of ethyleneglycol dimethacrylate cross-linker via bulk polymerization method. The resulting Cd(II)-imprinted polymer was characterized by FT-IR. The ion imprinted polymer extracted Cd(II) in aqueous solutions quantitatively between pH 6.0 and 7.0. The experimental conditions for effective sorption of Cd(II) were optimized with respect to different analytical parameters using a minicolumn of ion imprinted polymer. A volume of 5 mL sample solution was loaded onto the column at 2.0 mL min-1 by using a sequential injection system (FIALab 3200) followed by elution with 1.0 mL of 0.5 mol L-1 HNO3. The IIP also exhibited excellent selectivity for Cd(II) against the competing metal ions, including Cu, Co, Ni, Pb and Zn. Computational calculations revealed that the selectivity of IIP was mediated by the stability of Cd(II)-MAH complex which was far more stable than those of commonly used monomers, including 4-vinyl pyridine, methacrylic acid and vinylimidazole. The relative standard deviation (RSD) and limit of detection (LOD, 3s) of the method were found to be 3.2% and 0.006 µg L-1, respectively. The method was successfully applied to determination of Cd(II) in certified reference seawater (CASS-4), coastal seawater and estuarine water samples.

P3.42

THEORETICAL CALCULATION OF THE C-H QUANTUM VIBRATIONAL ENERGIES IN HYDROGEN CYANIDE

Kathryn Penton, Joseph Bentley
Delta State University, USA

Hydrogen cyanide has been frequently used as a test case for new theoretical models. We have used the electronic structure program GAUSSIAN to compute a set of single point energies for various C-H bond lengths in HCN. A potential energy curve was created by fitting the dataset to a polynomial. This became input to a one-dimensional quantum calculation solving the Schrödinger equation to obtain the C-H vibrational energies. The discrete variable representation (DVR) was used as a basis set. The resulting vibrational frequencies agree well with the experimental results.

Catfish, a major food source to the southern US residents and are vastly produced in the states of Mississippi, Alabama, and Arkansas. As part of their life, fish (catfish in this case) tend to rely on soil and surface water based resources and may uptake various pollutants (if present) in soils and waters. The pollutant levels in fish are primarily dependent on factors like presence of natural isotopes/elements in soils and surface waters; and more importantly presence of pollution activities in the vicinity of water bodies. In consideration of the importance of catfish in the southern US, a study was conducted on a catfish produced in Claiborne County, Mississippi. Channel catfish (Ictalurus punctatus) were collected from local farms and Mississippi River and were analyzed using gamma spectroscopic analysis. Based on the experimental isotopic concentration values in fish, the resultant doses from consumption of fish samples analyzed in this study were estimated. In addition, RESidual RADioactivity in Biota (RESRAD Biota) will be used to assess the activity & dose in fish based on the radioactivity levels in sediment and surface water of MS River and local farmland. Finally, the RESRAD dose values and activity based dose values in fish samples were statistical compared using two-tailed T-test and the dose results were compared with the federal government recommended dose values.

Friday, February 19, 2016

MORNING

Room TC 218B

Session 4. Computation, Polymer, Energy Chemistry and Biogeochemistry. Chair: Dr. Song Guo

7:55 Welcome

Invited Talks

O3.21

8:00 ACCELERATED DYNAMICS OF STRESS RELAXATION IN A BEAD-SPRING ELASTOMER

Gopinath Subramanian
University of Southern Mississippi, USA

We present results from the generalized parallel-replica method applied to 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.

O3.22

8:20 MOLECULAR IMPRINTING OF PENICILLIN -A COMPUTATIONAL STUDY

Julia Saloni
Jackson State University, USA

This work introduces a computational research on the molecular imprinting of penicillin in methyl methacrylate/ methacrylic acid copolymer. Presented copolymer can be used as the enteric coating for antibiotic to create a barrier protecting the medication from low pH of the stomach. This computational study presents: penicillin and polymer active sites, cave models with interaction energy analysis (between antibiotic and monomers), solvent influence on the binding energy, and pH effect on the polymer coating. The density functional theory, DFT, method has been used for all structural, vibration frequency, and solvent calculations.

Contributed Papers

O3.23

8:40 REACTION MECHANISM ON GENERALIZED FORCE MODIFIED POTENTIAL ENERGY SURFACES FOR DIELS-ALDER REACTION

Sanjiv Jha[1], Katie Brown[2], Gopinath Subramanian[1]
[1]University of Southern Mississippi, USA, [2]Auburn University, USA

We apply a recent formulation for searching minimum energy reaction path (MERP) and saddle point to atomic systems subjected to an external force. We demonstrate the effect of a loading modality resembling hydrostatic pressure on the trans to cis conformational change of 1,3-butadiene, and the simplest Diels-Alder reaction between ethylene and 1,3-butadiene. The calculated MERP and saddle points on the generalized force modified potential energy surface (G-FMPES) are compared with the corresponding quantities on an unmodified potential energy surface. Our study is performed using electronic structure calculations at the HF/6-31G** level as implemented in the AIMS-MOLPRO code. Our calculations suggest that the added compressive pressure lowers the energy of cis butadiene. The activation energy barrier for the concerted Diels-Alder reaction is found to decrease progressively with increasing compressive pressure.

O3.24

8:55 SYNTHESIS AND CHARACTERIZATION OF CARBON QUANTUM DOTS WITH VARYING AMOUNTS OF NITROGEN

Stacy Jones, Paresh Ray
Jackson State University, USA

Carbon quantum dots (CQDs) represent a new class of quantum dots with unique properties. Doping CQDs with heteroatoms provides an attractive means of effectively tuning their intrinsic properties and exploiting new phenomena for advanced device applications. Herein we report a simple microwave assisted hydrothermal approach to luminescent CQDs with nitrogen-rich functional groups. The effect of nitrogen content and nitrogen location on chemical and physical properties is investigated using a variety of spectroscopic techniques.

Carbon quantum dots are a class of graphene quantum dots synthesized by a "bottom-up" approach. In a typical approach, a carbon source, usually a carbohydrate, carboxylic acid, or ketone, is dehydrated to produce a carbon nucleus that grows due to carbonization until it become self-passivated. By carefully choosing the carbon source, CQDs with different amounts of heteroatoms can be produced. By varying the nitrogen content and size of a CQD, the emission wavelength of the quantum dot can be tuned to a variety of colors and quantum efficiency. The high solubility and benign starting materials make CQDs excellent candidates for cellular imaging.

O3.25

9:10 KINETICS STUDY ON THE REDOX REACTION INVOLVING CONJUGATED POLYMERS

Lindsey Bonnette, Frederick McFarland, Song Guo
University of Southern Mississippi, USA

Conjugated polymers like polythiophene (P3HT) molecules can be used in optoelectronic applications including organic solar cells and organic field effect transistors. Chemical doping can greatly improve the electronic properties of conjugated polymers, allowing them to be readily used in these applications. The reaction kinetics of the reaction of dopant F4-TCNQ with P3HT was studied using UV-Vis spectroscopy. P3HT has been shown to slowly aggregate into packed structures when dissolved in toluene. The characteristic absorption peak of the F4-TCNQ anion, one of the doped product, is used to monitor the reaction progress in UV-vis. The reaction kinetics between different forms of P3HT and the chemical dopants are analyzed to show the correlation between the P3HT morphology and its capability of charge transfer. The difference in doping reaction rate is likely due to the variation in charge delocalization immediately after the charge-transfer or stabilization of doped cation and anion. Understanding the chemical doping kinetics of this type of reaction will help the development of future uses for chemical dopant in organic electronic devices with precise doping control.

O3.26

9:25 DOPING-INDUCED MOLECULAR PACKING OF CONJUGATED POLYMERS

Frederick McFarland[1], Lindsey Bonnet[1], Benjamin Brickson[2], Song Guo[1]
[1]University of Southern Mississippi, USA, [2]Petal High School, USA

Doping-induced charge transfer kinetics and molecular packing dynamics are studied by absorption spectroscopy and atomic force microscopy. UV-Vis absorption spectra show two distinctive bands for molecular packing and doping products. By systematically changing the dopant concentration, quantitative kinetic studies are carried out to correlate

the growth dynamics of the two absorption bands and the impact of molecular packing on p-doping kinetics. Further morphological characterization of the samples was carried out using AFM imaging. Dip-casted samples of doped and neutral P3AT on SiOx show dramatic conformational changes that are likely due to changes in the Coulomb interactions within the molecular packing of P3AT upon doping. Investigation on the cooperative interactions between these two factors during chemical doping will greatly strengthen our understanding on the doping process for conjugated polymers.

O3.27

9:40 STUDY OF TERNARY NANOCATALYSTS FOR DIRECT FORMIC ACID FUEL CELLS

Tamanna Shanta, Wujian Miao
The University Of Southern Mississippi, USA

Direct formic acid fuel cells (DFAFCs) have been reported as a prominent source of greener alternative energy, but the challenge to commercialize DFAFCs is mainly the utilization of effective anodic catalyst. We report here the syntheses of palladium, nickel and cobalt based ternary nano-composite catalysts on three different carbon based support materials and their catalytic activities towards the electrochemical oxidation of formic acid (HCOOH). The nano-catalysts were synthesized using 10% (w/w) Pd^{2+} mixed with 10% (w/w) Ni^{2+} and 10% (w/w) Co^{2+}precursors using Vulcan-XC72, Ketjen black and graphite nano-particles (GNP) (~10 nm) support materials and $NaBH_4$ as reducing agent. The electrochemical oxidation of HCOOH was conducted at a glassy carbon electrode (GCE) pre-casted with the catalysts ink covered with Nafion® polymer in 0.50 M HCOOH and 0.10 M H_2SO_4. Catalytic oxidation of HCOOH of the prepared catalysts was compared with the commercial 20% (w/w) Pd/C catalyst using cyclic voltammetry. Multi-potential step chronoamperometry (CA) was utilized for stability tests. The catalytic behavior of the ternary nano-catalysts is believed to be related to the direct oxidation pathway of HCOOH oxidation. The use of Ni and Co also showed synergistic effect, as the HCOOH oxidation peak potential was shifted negatively by ~200 mV with respective to that of the commercial catalyst. Furthermore, the CA data showed that the prepared catalysts were stable up to ~4 h with low Pd metal loading of 0.025 mg/cm^2 at GCE. Finally, the prepared ternary catalysts were characterized with scanning electron microscopy and energy dispersive X-ray spectroscopy.

O3.28

9:55 COBALT POLYOXOMETALATES AS CO-CATALYSTS FOR SOLAR HYDROGEN EVOLUTION WITH COPPER SELENIDE PHOTOCATHODES

Arun Siddarth Sridhar, Wujian Miao
The University of Southern Mississippi, USA

The present contribution reports results from photoelectrochemical studies on CuxSe photocathodes for solar hydrogen production in the presence of an earth abundant homogenous molecular reduction catalyst [Co9(OH)3(H2O)6(HPO4)2(PW9O34)3]16- (Co9POM) in alkaline conditions. CuxSe thin films were prepared in-situ on F:SnO2 ("FTO") by electrodeposition and subsequent thermal annealing, and characterized by scanning electron microscopy coupled with energy-dispersive X-ray analysis. Photoelectrochemical studies were performed in a quartz cell holding the three-electrode setup containing a FTO/CuxSe as the working electrode, a Ag/AgCl (3.0 M KCl) as the reference electrode, and a Pt wire as the counter electrode, respectively. A Xe lamp solar simulator was used as the simulated solar light source. In addition to a significant positive shift in the water reduction onset potential, a maximum photocurrent of 1.4 mA/cm2 was obtained from the FTO/CuxSe photocathode in the presence of 20 micromolar Co9POM at -0.4 V vs Ag/AgCl. These results could be attributed to the effect of catalyst in decreasing electron-hole recombination and facilitation of fast charge 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 Co9POM as a functional co-catalyst for photoelectrochemical hydrogen evolution. Moreover, the high photocurrent characteristics of this system relative to a variety of previously reported POM based electrodes, especially in alkaline conditions, has provoked further studies and possible employment in tandem photoelectrochemical water splitting strategies.

10:10 Break

O3.29

10:20 ELECTROGENERATED CHEMILUMINESCENCE OF SULFONATED-9,10-DIPHENYLANTHRACENE AND RUBRENE IN AQUEOUS WITH NITRATE ENHANCING AGENT

Pradip Bastola, Wujian Miao
The University of Southern Mississippi, USA

9,10-Diphenylanthracene (DPA), rubrene (RUB), along with tris(2,2′-bipyridine) ruthenium (II) species [$Ru(bpy)_3^{2+}$] could be used as electrogenerated chemiluminescence (ECL) labels for multiplexing detection of biomolecules because of their distinctive and efficient ECL emissions in organic media. However, their use in aqueous solutions is limited as both DPA and RUB are very insoluble in water. We report herein the electrochemical and ECL studies of individual sulfonated DPA [i.e., sodium 9,10 diphenyl-2-sulfonate (SDPAS)] and sulfonated RUB or SRUB (synthesized in our lab) as well as their mixtures in aqueous media. Data obtained from ECL coreactant, i.e., 2-(dibutylamino) ethanol, at Pt working electrode in sodium phosphate buffer at pH 7.5 showed weak ECL emissions as compared with their analogues in organic media. With addition of $NaNO_3$ to the system, significant ECL enhancement was observed, which could be contributed to the electrochemical formation of strong oxidizing intermediate nitrate radicals that could chemically oxidize the ECL emitters, resulting in the increase of the excited species. Energy or electron-transfer process between different types of ECL emitters was observed in mixed ECL systems.

O3.30

10:35 THIOL-ENE POLYMER MICROBEADS PREPARED VIA SUSPENSION PHOTOPOLYMERIZATION AND USED AS HETEROGENEOUS PHOTOCATALYSTS

Emily M. Barker, J. Paige Buchanan
The University of Southern Mississippi, USA

A series of thiol-ene polymer microbeads (PMBs) were prepared via suspension photopolymerization and the thermal, mechanical, and physical properties of the PMBs were explored. Thiol and ene monomer concentrations were held constant at 1.1:1 mol equiv to yield PMBs containing residual thiols to aid in secondary functionalization of the PMBs. Particle size of the resulting PMBs was characterized using DLS, and the glass transition temperature (T_g) was determined using DSC. Furthermore, the resulting PMBs were derivatized with C_{60} to demonstrate the accessibility and reactivity of the residual thiols and overall PMB utility as a scaffold for supported singlet-oxygen generating heterogeneous photocatalysts. To assess the ability of the C_{60}-capped PMBs to produce singlet oxygen, direct and indirect solution-based assays were used. For the direct method, near-infrared (NIR) spectroscopy was used to detect the phosphorescence emission of singlet oxygen at 1270 nm. For the indirect method, time-dependent aliquots were removed from the photochemical oxidation of 2-methyl, 2-butene via singlet oxygen and analyzed immediately using NMR to monitor the photooxygenated products produced.

O3.31

10:50 EFFECT OF MULTI-WALLED CARBON NANOTUBES ON THE ELECTROGENERATED CHEMILUMINESENCE OF QUANTUM DOTS

Yiliyasi Wusimanjiang, Wujian Miao
The University of Southern Mississippi, USA

Effect of multi-walled carbon nanotubes (MWCNTs) on the electrogenerated chemiluminescence (ECL) of water soluble CdTe quantum dots was investigated for both anodic and cathodic ECL systems. At MWCNT-coated glassy carbon electrode, the oxidation current of the anodic ECL coreactant such as tri-*n*-propylamine and 2-(dibutylamino)ethanol, or the reduction current of the cathodic ECL coreactant such as persulphate, increased significantly due to predominantly the increase of the electrode surface area as compared with the bare glassy carbon electrode. This redox current increase would be beneficial to the ECL generation. Experimentally, however, ECL intensities at MWCNTs modified electrode were found to be generally much less than those obtained from non-modified electrode, suggesting that MWCNTs are ECL quencher of the present anodic and cathodic ECL systems. This ECL quenching effect became less significant when MWCNTs were wrapped with electro-conductive chitosan paste, suggesting that the quenching is closely related to thekinetic quenching mechanism. The quenching behavior was also affected by CdTe solution concentrations, where enhanced ECL signals were observed at [CdTe] around 10.0 nM.

Financial support from the NSF career award (CHE-0955878) is gratefully appreciated.

O3.32

11:05 DISSOLVED STRONTIUM AND PHOSPHORUS IN ESTUARINE WATERS OF GRAND BAY NERR

Jacqueline McComb, Fengxiang Han, Christian Rogers, Paul Tchounwou
Jackson State University, USA

Geochemical tracers are used to investigate estuaries subjected to sea water invasion and anthropogenic inputs. Sampling was conducted along a salinity gradient within the Grand Bay NERR Estuary on September 2015. All samples were collected in the

vicinity of the 4 major bayous (Cumbest, Heron, Crooked, and Bangs Lake). Forty samples were analyzed for dissolved trace elements (Sr, Ca, Mg, Fe, Mn, Cu, Zn, Ni, Pb, Cr, P, and Cd). This study examines the spatial variability, sources, and the quality of brackish water. Phosphorus has been highlighted due to a pollution event where 17.5 million gallons of waste water containing phosphates was released into Grand Bay NERR. Phosphorus in water and P speciation in sediments were investigated with sequential extraction. The isotopic ratio, distribution, and total concentrations of strontium in the bay water display salt water intrusion. The results showed that the trace elements in the brackish water could be divided into three categories: High concentrations (2000- 4000 μg/L Sr), moderate concentrations (20– 100 μg/L; Fe, Cd, Pb, Zn,), and low concentrations (0.1 -10 μg/L; P, Ni, Cu, Cd, Mn, Cu, and Cr).

O3.33

11: 20 BIOGEOCHEMISTRY OF GRAND BAY NATIONAL ESTUARINE RESERVE IN THE GULF OF MEXICO

Fengxiang Han, Jacqueline McComb, Eric Gulledge, Turquoise Perlote, Taimei Harris, Christian Rogers, Paul Tchounwou, Ranjani Kulawardhana
Jackson State University, USA

Understanding biogeochemistry of the Grand Bay is essential for better utilization and protection of national coastal ecosystems. About 17.5 millions of waste water containing P was accidently released into Bangs lake of the Grand Bay Reserve. The current biogeochemistry after 10 years of the accident is not clearly studied. The hypothesis of this study is that 1) the leaking accident caused a long-term biogeochemical changes in the reserve; 2) trace elements and heavy metals have been significantly accumulated in the reserve due to all anthropogenic sources, resulting potential concerns on the sea food safety. The aim of this study is to investigate biogeochemistry of P, trace elements, heavy metals and carbon in the Grand Bay National Estuarine Research Reserve of the northern Gulf of Mexico. The trace elements and heavy metals include As, Pb, Zn, Cu, Ni, Cr, Cd, Co, Se etc. The phosphorus as affected by earlier P containing waste water leaking and residual P chemistry will be discussed. The results show that P, Hg, Cd and to some extent, As and Pb have been significantly accumulated in soils. The strongest correlations were found between concentrations of Ni and total organic matter contents. The correlations decreased in the order: Ni > Cr > Sr > Co > Zn, Cd > Cu> Cs. Strong correlations were also observed between total P and concentrations of Ni, Co, Cr, Sr, Zn, Cu, and Cd. This may be related to the P spilling accident in 2005 in the Bangs Lake site.

Student Award Presentation

Student oral and poster awards are sponsored by the Department of Chemistry and Biochemistry, Jackson State University

Friday, February 19, 2016
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

ECOLOGY AND EVOLUTIONARY BIOLOGY

Chair: Elgenaid Hamadain,
University of Mississippi Medical Center
Vice-Chair: AHM Ali Reza,
Delta State University

Thursday, February 18, 2016

EVENING

3:00-7:00 Awards, Dodgen Lecture, Reception, and Poster Session

P4.01

SURVEY OF CENTRAL MISSISSIPPI SOILS FOR ENTOMOPATHOGENIC NEMATODE SPECIES

Tara Rickman, Elizabeth Hussa,
Millsaps College, Jackson, MS, USA

Entomopathogenic nematode species parasitize a number of agriculturally-relevant insect pest species during the larval stage of development. Increased use of genetically-modified (GM) crops may reduce the prevalence of host insects available, thereby reducing the nematode population. We surveyed a variety of home and/or commercial crop soils in central

Mississippi, some with a history of using GM crops, to determine the relative prevalence of entomopathogenic nematodes. Results thus far indicate that crops with no history of GM crop growth yield significantly more nematodes than crops where GM species had previously been grown. Our results indicate that usage of GM crops may alter the local ecology of the soil, possibly even damaging the ability of crops to survive invasion of GM-resistant pests.

P4.02

WETLAND CHANGES AND SIGNIFICANCE TO C STORAGE AT GRAND BAY NERR

Eric Gulledge, Ranjani Kulawardhana, Taimei Harris
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 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. Its significance to the local C storage will be discussed. 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.

P4.03

SPATIALPATTERNSINVEGETATIONCHARACTERISTICSANDCARBONSTORAGEABILITY OF THE GRAND BAY NATIONAL ESTUARINE RESEARCH RESERVE (NERR), MISSISSIPPI, USA

Taimei Harris, Ranjani Kulawardhana, Eric Gulledge, Fengxiang Han, Paul Tchounwou
Jackson State University, Jackson, MS, USA

Wetlands serve as important carbon sinks for the atmospheric carbon, and play an important role in the terrestrial carbon cycle. However, their role in the terrestrial carbon cycle is generally under-estimated, mainly due to the lack of reliable and timely estimates on their carbon stocks. The capacity of intact wetlands to absorb and sequester carbon varies widely depending on the site specific characteristics relating to climatic, terrain, vegetation and soil factors. Thus, depending on their site specific characteristics, wetlands may either be sources or sinks of carbon, and can even switch between being sinks and sources. Within this background, this study was implemented with the goal of evaluating carbon storage ability of the Grand Bay National Estuarine Research Reserve (NERR) of Mississippi, USA. The specific objectives of this study were to: 1) evaluate spatial patterns of vegetation characteristics; and; 2) quantify biomass and carbon stocks of *Juncus roemerianus* dominated wetland habitats. These findings will contribute to improve our understanding on the productive capacity of similar marsh communities and thereby will help decision makers to identify potential carbon sinks with varying levels of contributions for the cycling of atmospheric carbon.

P4.04

HABITAT USE AND FOOD HABITS OF COYOTE IN DAHOMEY WILDLIFE REFUGE, MISSISSIPPI

AHM Ali Reza, Shawnee Gundry, Megan Clark
Delta State University, Cleveland, MS, USA

As a nuisance species declared by Mississippi Department of Wildlife, Fisheries and Parks, coyotes (*Canis latrans*) may be hunted, trapped, taken, killed, chased, or pursued on private lands. Even though coyotes are subjected to intensive hunting pressure, their distribution ranges have expanded rapidly within the past 50 years throughout the southeast part of the USA. However, not many scientific studies are available on coyote habitat use and seasonal food habits in Mississippi. To investigate the habitat use and food habits, we collected coyote scats from different habitat types in Dahomey National Wildlife Refuge in northern Mississippi since April 2014. A total of 42 scats have been collected until November 2014. Scats were evaluated in the field and later analyzed in the laboratory to identify the food contents. Having opportunistic feeding habits, coyotes utilize whatever food items available to them, which vary with seasons and weather. Our analysis is still in progress however, we have noticed the abundance of plant materials in the scats, especially *Diospyros virginiana* (persimmon). Unlike the northern USA where coyotes have been reported to select grassland habitats, coyotes in Dahomey National Wildlife Refuge prefer to travel on gravel road and open areas close to water bodies.

P4.05

WEBSTER'S SALAMANDER (*PLETHODON WEBSTERI*) OCCURRENCE IN LEGION STATE PARK, WINSTON COUNTY, MS

Luke Mcdonald[1], Jeanne Jones[1], Tom Mann[2], Nicole Hodges[1]
[1]Mississippi State University, Mississippi State, MS, USA [2]mississippi Natural Science Museum, Dept Of Wildlife, Fisheries, And Parks, Jackson, MS, USA

Declines in amphibian diversity and populations have been linked to loss and degradation of required habitats. Species, such as Webster's salamander (*Plethodon websteri*), that require natural, mature forest conditions may be imperiled due to loss of these forest types in Mississippi. Webster's salamanders are rare salamanders indigenous to mature hardwood forests of ravines, coves, and sloped, upper stream terraces. Closed overstory canopy, abundant downed logs, deciduous leaf litter, and rocky parent materials may be important habitat characteristics for this species. Because mature deciduous forests are currently rare and fragmented in Mississippi, information on forest locations and conditions that support these salamanders is needed for conservation planning. We investigated occurrence of Webster's salamanders in hardwood forest ravines of Legion State Park, Winston County, MS. We established drift fence arrays in four locations surrounding a salamander nursery area and conducted nocturnal counts of individuals detected climbing fencing materials during March – April 2015. We detected 186 individual salamanders during 20 hours of surveys over 8 nights which resulted in a detection rate of 6.8 salamanders per sampling hour. Of the 186 salamanders detected, 56% were adults, 26% were 2nd year age class, and 18% were young-of year age class. Of the total number of adults detected, 72% were female, 23% were males, and 5% were undetermined. Data collected from this study will be analyzed to provide a better understanding of seasonal movement of Webster's salamanders and will be used in conservation planning for this salamander species in Legion State Park and statewide.

P4.06

COMPARISON OF ANTIBIOTIC RESISTANCE BETWEEN BARATARIA BAY, LA, AND SARASOTA BAY, FL

Shuo Shen, D.Jay Grimes
University of Southern Mississippi GCRL, Ocean Springs, MS, USA

Background: In the past few years, increasing numbers of marine pollution events have been reported. As a result, the habitat of marine life is under serious threat and marine mammals may be a good indicator for contaminant levels in marine waters and potential health effects on humans. In this study, we analyzed antibiotic resistance of 350 bacteria from wild bottlenose dolphins (Tursiops truncates). Widespread resistance was observed.

Methods: Samples were collected in the capture-release dolphin health assessment conducted by National Oceanic and Atmospheric Administration, National Ocean Service scientists at Barataria Bay (BB), LA and Sarasota Bay (SB), FL. We used both culture based and molecular methods to identify the bacterial isolates. Twelve clinically relevant antibiotics were tested for their resistance with the Kirby-Bauer Disk diffusion method. We also used WITEK 2 AST to test the MIC for each bacterium. Besides the culture based test, twelve genes related to resistance were also tested.

Results: After being tested with 12 clinically relevant antibiotics, widespread resistance was observed. In comparison, samples from BB exhibited a higher rate of resistance than that of SB. Also, there were more multi-resistant strains in the collections from BB.

Conclusion: This study shows widespread antibiotic resistance in the sampling sites. Isolates from BB had a higher rate of antibiotic resistance than those from SB. The results in this study support previous research that reported bottlenose dolphin health to differ between these two sampling sites. However, causes for the differences observed need to be elucidated.

P4.07

STORM DRAIN STUDY ON DELTA STATE UNIVERSITY CAMPUS, CLEVELAND, MISSISSIPPI

Britney Boles, Kendal Davis, Katie Huff, Jarrette Cooper, Regina Horne, Emily Bodin, Nina Baghai-Riding
D*elta State University, Cleveland, MS, USA*

Storm drains are an important part of an urban landscape. They work by collecting rain water or melting snow through means of gravity. Water that flows into a storm drain is not treated by a waste water treatment plant. Instead the water directly goes into a stream or river and affects the quality of fish, insects, and other wildlife. Storm drains can easily become clogged with leaves, lawn clippings, litter and other pollutants that can lead to storm backup causing flooding to streets and yards. The campus of Delta

State University is a very flat campus and is prone to flooding. In February 2015 the BIO 415 Materials and Methods of Environmental Science class, under the supervision of Debra Veeder from Adopt-a-Stream, surveyed 128 storm drains across campus. Twenty-nine of these were very clogged and unable to properly drain water; others were partially clogged with leaf litter, mud, and trash. Stickers were placed on storm drains to inform the public to keep the storm drains clean and free from contaminates. Facilities management were notified about the ineffective drains.

P4.08

CARBON DIOXIDE/LEAF PEEL STUDY FOR THREE PLANT SPECIES IN THE MISSISSIPPI DELTA

Emily Bodin, Megan Clark, Shawnee Gundry, Ashley Mrozinski, Tyler Toole, Tara Willingham, Nina Baghai-Riding, *Delta State University, Cleveland, MS, USA*

Carbon dioxide is an important greenhouse gas and is associated with global warming. Atmospheric levels of CO_2 increased over the past 200 years due to anthropogenic impacts. In the northern hemisphere, previous studies implied that leaf stomatal density decreases as the concentration of atmospheric CO_2 increases. Students in Materials and Methods in Environmental Science determined whether differences in leaf stomatal density on the adaxial surface reflected this pattern. They analyzed three woody plant species that grow in the Delta: two native species, *Acer rubrum* L., *Quercus nigra* L., and an exotic species, *Pyrus calleryana* Decne. Twenty-six Delta State University herbarium specimens, spanning in time from 1960 - 2013 were selected. Stomatal frequency for a microscopic area of 0.45 mm in diameter, stomata density per cm^2, and the length of stomata were tabulated from different peels. Results showed that *Pyrus calleryana* had the lowest stomatal frequency (13 - 40) per field of view and density (11,310 - 20,020 per cm_2). *Acer rubrum* had the highest stomata frequency (32 - 114) per microscopic field of view and highest density per cm_2 (32,890 - 69,290). Stomatal frequency for *Quercus nigra* varied from 25 - 92 per field of view and its stomatal density ranged from 30,680 - 51,480. All three species did not appear to illustrate an inverse, negative relationship between mean stomatal frequency and historical rise in CO_2. More data is required before an actual assessment can be made about the relationship of CO_2/stomatal density for these three species.

P4.09

FEMALES INFLUENCE BRAIN EVOLUTION; ARCOPALLIUM VOLUME AND DISPLAY COMPLEXITY IN MANAKINS

Wilson Helmhout, Glendin Pano, Steven R. Wilkening, Willow R. Lindsay, Lainy B. Day
University of Mississippi, University, MS, USA

Manakins are a family of birds the males of which use acrobatic, non-vocal display behaviors to attract females. Across the manakin family (Pipridae), species perform sexually selected displays that vary in complexity of display sites, acrobatics, and mechanical sounds. We have shown that brain weight, brain volume, and cerebellar volume, adjusted for the size of the bird, are positively associated with display complexity, suggesting overall intelligence and procedural capabilities evolved with complexity. The arcopallium (AP) is another brain region likely specialized for display complexity; AP has motor and limbic functions, modulating appetitive motivation and social interactions. In songbirds, the robust nucleus of the arcopallium (RA) functions in vocal displays, playing a role in song production. Manakins, suboscine passerines, do not have vocal learning or an RA. However, the arcopallium is larger in display-performing male golden-collared manakins compared to non-displaying females. Additionally, AP in this manakin contains androgen receptors as does RA of songbirds, a trait not seen in other suboscines. Thus, we hypothesized that the volume of the AP but not a specialized nucleus of the AP, nucleus taeniae (Tn), both adjusted for brain volume, would vary with display complexity across twelve different manakin species and a related flycatcher. Our results indicate sensorimotor (AP) but not olfactory functions (Tn) evolved with display complexity in manakins as did RA in songbirds. This is the first comparative study, of which we are aware, to demonstrate that neural substrates for sensorimotor functions evolve in response to sexual selection in non-songbird species.

P4.10

AN ANALYSIS OF A PALYNOLOGICAL SAMPLE FROM THE BUCATUNNA FORMATION, SOUTHWESTERN ALABAMA.

Nina Baghai-Riding[1], Kendal Davis[1], Brian AxSmith[2]
[1]*Delta State University, Cleveland, MS, USA,*
[2]*University of Southern Alabama, Mobile, Alabama, USA*

Excellent exposures of the Bucatunna Formation (early Oligocene) occur in southwest Alabama. This formation consists of dark, bentonitic, carbonaceous clay. Recently, assorted megafossils of Lauraceae and

Quercoid leaves, as well as other undescribed morphotypes of leaves, fruits and flowers have been reported from a site near Mobile, Alabama. In this study, one random palynological sample was processed from this rich plant megafossil locality. The palynomorph assemblage, however, is considerably different from the megafossil assemblage. The palynological sample yielded a large quantity of well-preserved and diverse angiosperm and conifer pollen, trilete and monolete spores, and dinoflagellate cysts. Nonmarine palynomorphs outnumbered the marine palynomorphs. In a 300 point count angiosperms represented 79.5%, conifers 5.3%, pteridophyte spores 13.6%, and dinoflagellates cysts, acritrachs and freshwater algal forms 1.7%. The palynofloral assemblage is dominated by pollen referable to *Alnus*, *Carya*, *Ilex*, *Juglans*, *Nyssa*, *Pinus*, *Quercus*, and *Tilia*. Common sporomorphs include Cyatheaceae, Lycopodiaceae, Polypodiaceae, Schizeaeceae and *Dictyophyllum* types Some of the most common dinoflagellate cysts include *Homotryblium plectilum*, *Cleistosphaeridium placacanthum*, and *Spiniferites*. The acritarch, *Ascostomocystis potana*, a marker for the early Oligocene, occurs in the sample. The palynomorph assemblage indicates that a warm temperate paleoclimate prevailed during this time interval.

P4.11

SEASONAL MIGRATION OF WEBSTER'S SALAMANDERS TO AND FROM ROCK OUTCROP REFUGIA

Thomas Mann[1], Debora Mann[0] *[1]Mississippi Museum of Natural Science, Jackson, MS, USA, [2]Millsaps College, Jackson, MS, USA*

Salamanders of the genus *Plethodon* are generally considered non-migratory because they have no aquatic stage and do not travel to ponds to breed. We document the seasonal migration of *Plethodon websteri* away from a rock outcrop upon emergence above ground in the fall and early winter, and a return to the outcrop in spring. The role of the rocks, we suggest, is to provide passageways to underground summer refugia/oviposition sites. From 2012 to 2015, we monitored a series of drift fences erected at 8 m, 70 m and 90 m from a limestone outcrop along the Natchez Trace Parkway in Hinds County, MS. Over 96% of 1652 captures during November and December 2012 were climbing the sides of the fences facing the outcrop; over 96% of 1557 captures March-May 2013 were on the opposite sides, consistent with outward migration in fall and a return in spring. A similar pattern was observed the subsequent two years. Further confirmation was obtained when an individual captured in the outcrop, marked with elastomer, and released at the point of capture on 16 November 2014 was recaptured 73 m from the release point on 23 December 2014 climbing the side facing the outcrop and again at 91 m from the release point on 19 March 2015 climbing the side of the fence facing away from the outcrop. Recognition of the requirement of rock outcrops by this species helps to explain its highly disjunct distribution and should inform strategies for conserving this rare species.

Friday, February 19, 2016
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

GEOLOGY AND GEOGRAPHY

Chair: Stan Galicki
Millsaps College
Vice-Chair: Zachary Musselman
Millsaps College

Thursday, February 18, 2016

MORNING
Room Union D

Thursday, February 18, 2016

MORNING

O5.01

8:00 *THE GEOLOGY OF MISSISSIPPI* RELEASE BY UNIVERSITY PRESS OF MISSISSIPPI AND MDEQ

David T. Dockery III[1], David E. Thompson[2]
[1]MDEQ Office of Geology, Mississippi, United States, [2]Plum Creek Timber Company, Mississippi, United States

The Geology of Mississippi, with a foreword by Governor Phil Bryant, is scheduled for release by University Press of Mississippi (UPM) and Mississippi Department of Environmental Quality (MDEQ) in February of 2016. The book consists of 10 front pages,

751 pages with 1099 figures, mostly in color, and a text of half a million words. As advertised in UPM's Books for Fall/Winter 2015-2016, "The Geology of Mississippi is an encyclopedic work by authors with extensive experience in Mississippi's surface geology mapping program. It brings together published work, unpublished work from agency files, and the authors' experience, both in personal field work and in collaboration with experts from around the world." This book, coupled with MDEQ/Office of Geology's detailed surface geologic maps, provides information on economic mineral resources, environmental protection, and the wise use of land resources. It is the first overview publication on the state's geology since Mississippi: Its Geology, Geography, Soils and Mineral Resources by E. N. Lowe in 1915, and republished with revisions in 1919 and 1925.

O5.02

8:20 VADOSE-ZONE WELLS: A POTENTIAL STRATEGY FOR ENHANCING RECHARGE IN THE MISSISSIPPI DELTA

Andrew O'Reilly
University of Mississippi, Mississippi, United States

Current and planned water conservation and irrigation best management practices are projected to not fully alleviate the long-term depletion of groundwater in the Mississippi River Valley alluvial aquifer. Artificial recharge using surface water is a potential management strategy to help provide a sustainable supply of groundwater in the Mississippi Delta. Past studies in the Delta indicate limited potential for vertical recharge due to the fine-grained, low permeability surficial sediments, with aquifer recharge generally estimated to be less than 6 in/yr. An alternative artificial recharge technique not dependent on permeable surficial soils is a vadose-zone well. A vadose-zone well is a borehole, which does not intersect the saturated zone, excavated through low permeability surficial sediments into underlying higher permeability sediments and backfilled with sand- to gravel-sized aggregate. Water flows by gravity through the aggregate and into the native sediments. A preliminary analysis based on an existing borehole infiltration equation indicates that a network of vadose-zone wells potentially could provide a recharge flux of 1 in/day over a 30-acre area. Advantages of vadose-zone wells include low cost compared to traditional saturated-zone wells and the provision of some level of soil-aquifer treatment typically promoted by surface infiltration methods. Challenges presented by vadose-wells include clogging leading to limited well life and potential water-quality impacts resulting from infiltrating water bypassing the shallow soil zone. Important factors affecting the feasibility of vadose-zone wells include a vertical distribution of hydraulic properties that allows sufficient infiltration, well construction and operation costs, and effective methods for limiting clogging.

O5.03

8:40 THE LATE CRETACEOUS TO LATE OLIGOCENE DETRITAL CHERT HIATUS OF MISSISSIPPI

James Starnes
Mississippi Office of Geology, Mississippi, United States

Chert gravel bearing deposits in Mississippi are derived chiefly from the carbonate Paleozoic rocks of the Appalachian Mountains and the upper Mississippi River Valley. These deposits are usually bimodal as they typically contain quartz pebbles and micaceous sand derived from the crystalline Appalachians. The gravels of the Tuscaloosa and (to lesser extent) Eutaw Formations are the oldest chert gravel bearing strata exposed in Mississippi. Quartz and metaquartz pebbles and granules are present sporadically throughout the chert-poor section of the Paleogene, most notably in the basal portions of Coal Bluff Member of the Naheola, Nanafalia, Tallahatta, and Cockfield formations. Chert is also absent throughout the sand fraction this section as well. The deposition of the late Oligocene Catahoula Formation marks the re-introduction of detrital chert in both sand and gravel fractions. Catahoula chert gravels are pea-size, angular, dark-colored to translucent, highly-polished. Above the Catahoula, chert gravels of the Hattiesburg and Pascagoula become more abundant, larger, better-rounded, and more deeply weathered. The increase in chert gravel size and frequency culminates with a flood of chert gravel in the Plio-Pleistocene Citronelle Formation and is associated with erosion of the Nashville Dome. The absence of detrital chert throughout most of the post-Cretaceous section in Mississippi indicates a coastal environment traversed by low-energy rivers with a bedload largely of quartz sand.

O5.04

9:00 IRON ORE PROSPECTING AND MINING IN MISSISSIPPI

Michael B. E. Bograd[1], David Ray Williamson[2]
[1]MDEQ Office of Geology, Mississippi, United States, [2]Cardno, Louisiana, United States

State Geologist Eugene Hilgard wrote in 1858 that iron ore is "widely diffused over the State," but has

"nowhere been found in quantities sufficient to justify the erection of furnaces." His observation was valid, but did not eliminate enthusiasm. Lowe (1913) recorded the early "iron booms" in Mississippi, including the first in the 1880s at Duck Hill, Montgomery County. Prospectors found specimens of limonite of good quality and notified the citizens. The excitement was statewide, and companies were formed to develop the properties, sinking shafts in Duck Hill. The shafts failed to find ore beds and that boom was over. In 1887, a similar excitement took place at Enterprise in Clarke County over iron deposits in the Winona Formation. A shipment of ore was sent to Birmingham, smelted, and returned as pig iron. In the winter of 1909-1910, parties from Birmingham prospected near Potts Camp, Marshall County; word spread that they had discovered an important iron-ore deposit. Lowe (1913) studied the prospect and published his findings. The Memphis Mining and Manufacturing Company began mining iron carbonate (siderite) at Potts Camp in 1912. According to Lowe (1915), a small charcoal furnace was erected at Winborn, Benton County. The ore was smelted and 125 tons of pig iron were produced. Ore was mined at Kilmichael, Montgomery County, in the 1950s. Iron ore investigations by the Mississippi Geological Survey continued with the work of Hughes (1958) and Kern (1963).

9:20 BREAK

O5.05

9:40 ANALYZING TEMPORAL BANK EROSION IN EUBANKS CREEK, JACKSON, MS

Theresa Woehnker, Zachary Musselman
Millsaps College, Mississippi, United States

Sedimentation negatively impacts water quality of many fluvial systems in Mississippi. Eubanks Creek is a tributary of the Pearl River, which runs through LeFleur's Bluff State Park, located in Jackson, Mississippi. Bank retreat in Eubanks Creek is threatening the trail system at LeFleur's Bluff State Park. Sediment from Eubanks Creek, as well as other tributaries, adversely affects the overall water quality in the Pearl River Basin. In order to determine the amount of sediment change along the streambank, 32 erosion pins were installed at four locations along the study reach. Changes in the bank profile were monitored by repeat measurements of exposure on individual erosion pins. Erosion >1 cm occurred on 14 pins and >1 cm of deposition occurred on 27 pins during field measurements. Approximately 30% of the total pins experienced an increase and decrease in pin exposure during the study period. This study was conducted from December 2014 to August 2015. Two cores were collected to analyze sediment grain size, percent organic matter, and soil color. Other influences such as precipitation and gage height were monitored daily to compare channel behavior in response to variable climate conditions. the Mississippi Museum of Natural Science discussed plans to mitigate streambank erosion by changing the channel roughness of Eubanks Creek by adding riprap and debris to the channel to obstruct the flow of water. This will potentially limit the amount of sediment load within Eubanks Creek and the Pearl River, which will improve overall water quality in the Pearl River Basin.

O5.06

10:00 DISTRIBUTION OF HEAVY METALS IN SEDIMENT OF THE ROSS BARNETT RESERVOIR, MISSISSIPPI

Fabio Ntagwabira, Stan Galicki
Millsaps College, Mississippi, United States

This research is a preliminary assessment on the concentration and distribution of the heavy metals in the Ross Barnett Reservoir, Mississippi. The Ross Barnett reservoir, a130 km^2 lake created by impoundment of the Pearl River in 1967, serves as a source of drinking water and recreation in the Jackson metropolitan area. The footprint of the lake lies within the outcrop area of the Eocene-age Yazoo Clay. The 7,970 km^2 Ross Barnett watershed drains predominantly rural land in central Mississippi. One 40 cm sediment core and 21 grab samples from the perimeter of the lake were analyzed using Inductively Coupled Plasma Mass Spectrometry for the occurrence of As, Ba, Cd, Cu, Cr, Ni, Zn, Se, and Pb in sediment over the past 48 years. Samples analysis included organic carbon and percent sand on all samples, and dry bulk density on core samples. Core samples contained an average of 34.7% sand and 1.55% organic carbon. Peak concentrations for Cr, Pb, and Zn were observed at 33.75 cm were 59.39, 15.73, and 67.64 ppm respectively. Grab samples ranged from 0.26 to 87.57% sand with organic carbon values between 0.35 and 9.06%. Element concentrations were variable but generally not elevated relative to surficial samples reported within the watershed. No consistent trends in element distribution around the perimeter of the lake were observed. Based on EPA guidelines element concentrations except Cr are considered to be below pollution levels, Cr concentrations are classified as moderately polluted.

O5.07

10:20 DEPOSITIONAL SYSTEMS ANALYSES OF THE SPARTA AQUIFER IN MISSISSIPPI

Robert T. Berry
Office of Geology, Mississippi Department of Environmental Quality, Mississippi, United States

The Middle Eocene Sparta aquifer is a primary water supply for much of central and northwestern Mississippi. The Sparta is the stratigraphic equivalent of the Memphis Sand in the Memphis Metropolitan area. The Sparta ranks fourth among the eleven most valuable aquifers in the state. The Sparta varies in thickness from 1,000 feet near the Mississippi River in western Claiborne County to 250 feet in Clarke County before grading to shale southward. The aquifer consists of fluvial and deltaic sand, clay, and lignite, which impart a complex geometry of the aquifer sands. Recent water-well tests at Baptist Hospital in Jackson produced two very similar Sparta wells with only moderately-thick sands along a channel margin that produced at 400 gallons of water per minute. Adjacent to these, a third well penetrated thick fluvial channel sand which produced 1,200 gallons per minute. In west-central Mississippi, the Sparta contains upper and lower aquifer sands as does the Cockfield aquifer above it. The proposed deposition systems analyses will map the net sands within the Sparta using high-quality oil well geophysical logs where possible. Sand geometries will then be compared with those of modern depositional systems to find modern analogues that best characterize the Sparta aquifer sands.

O5.08

10:40 LIDAR APPLICATIONS FOR SEDIMENT TRANSPORT ALONG THE MS-AL BARRIER ISLAND CHAIN

Eve Eisemann, Maarten Buijsman, Zachary Grimes, Davin Wallace
University of Southern Mississippi, Mississippi, United States

Barrier islands provide protection from waves and storm surge not only for coastal towns and cities, but also for important ecosystems like marshes and sea grass beds. To understand barrier island systems, we must understand their sediment dynamics. Fair-weather sediment transport primarily contributes to island growth when sediment supply is sufficient. Sediment removal from the system, however, occurs largely due to storms. The strongest recorded storm to impact the MS-AL region was Camille in 1969, which breached Ship Island and divided it into East and West Ship Islands. The cumulative area of Ship Island has decreased steadily from 1848 to 2005, losing approximately 4 square kilometers over this period. From 2005 to 2014, however, the islands grew by almost 0.5 square kilometers. Is this due to a net increase in sediment volume, or just a spreading out of sediments already in the Ship Island system? This question can be answered by examining these changes in terms of volume rather than area. Results from analysis of elevation data collected for Ship Island using Light Detection and Ranging (LiDAR) are presented here. Topographic data from 2004-2012 and shallow bathymetric data from 2007-2012 are used to determine volume changes in the subaerial and subaqueous portions of the island, respectively. If island area increased while the volume remained approximately the same, this means there is no net addition of sediment to the system. Despite a larger appearance, the islands may not be more robust when faced with a storm surge.

11:00 Business Meeting

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

HEALTH SCIENCES

Co-Chair: Olga McDaniel, MT PhD,
University of Mississippi Medical Center,
Co-Chair Jana Bagwell, MLS (ASCP)^{cm} ,
University of Mississippi Medical Center,
Vice-Chair: Amy Radican-Wald, DrPH(c),
Center for Mississippi Health Policy
Vice-Chair : George Moll, MD,
University of Mississippi Medical Center,

Thursday, February 18, 2016

MORNING

TC Room 210

Population Health Session I

Moderator, Amy Radican-Wald, DrPh(c) Center for Mississippi Health Policy

O6.01

8:15 EFFECT OF AN 11-LECTURE ELECTROCARDIOGRAPHY COURSE ON RESIDENTS' ABILITY TO INTERPRET ECGS

Owen Ulmer and Tom Milhorn
EC-Healthnet Family Medicine Residency Program, Meridian, Mississippi, United States

Purpose of the Study: The purpose of the study was to evaluate the effect of an electrocardiography course on first-year family medicine residents' ability to interpret ECGs. The results of the study were to be used to help decide if a packaged electrocardiograpy course made free of charge to Family Medicine residency programs might be beneficial.

Study Design: A pretest consisting of 68 multiple choice questions was given to six first-year EC-Healthnet Family Medicine residents on the first day of their residency program. Eleven weekly 50-minute electrocardiography lectures were then given. The textbook for the course was Electrocardiography for the Family Physician, 2nd edition, by Milhorn, H. Thomas, Universal Publishers, 2014.

The same test (posttest) was given at the end of the course. The results of the pretest and posttest were compared.

Results: The residents improved their scores in all categories, ranging from 23 percent for general concepts to 133 percent for axis determination. Other areas of high improvement were atrial enlargement and ventricular hypertrophy (69 percent), coronary artery diseases (88 percent), and pediatric electrocardiography (86 percent). Overall, the average scores increased from 55 to 82 percent, an improvement from pretest to posttest of 49 percent.

Conclusion: The results of the study lead us to believe that a packaged electrocardiography course made available to all family medicine residency programs would be beneficial.

O6.02

8:30 ETHNIC DIFFERENCE IN PREVALENCE OF DEPRESSION WITH SOCIO-DEMOGRAPHICS IN MISSISSIPPI

Ram Lakhan
Jackson State University, Jackson, Mississippi, United States

Introduction: The prevalence of depression varies between white and African Americans (AA) with their socio-demographic factors in the nation. Mississippi may be also suffering with the same pattern.

Objective: This study aimed to study the racial difference in the prevalence of depression between white and AA with their socio-demographic factors.

Method and Material: the Mississippi Behavioral Risk Factor Surveillance Survey (BRFSS) 2013 data was used for the analysis. Sample size was 7,453 for 95% of confidence interval. Phone interviews were conducted on a questionnaire designed and validated by the Center of Disease Control and Prevention (CDC), over a period of 12 months. Chi-square statistics was applied to see the difference with gender, age, education, income and employment. The association between prevalence and age in both ethnicities was observed with quadratic graph.

Results: The prevalence of depression is equal among white and AA with their gender ($X2 = 2.0$, $p = 0.15$), age ($X2 = 24.0$, $p = 0.24$), education ($X2 = 12.0$, $p = 0.21$), income ($X2 = 24.0$, $p = 0.24$) and employment ($X2 = 12.0$, $p = 0.21$). Association with age is non-liner ($P > .05$). The quadratic correlation in white ($R2 = 0.975$) and AA ($R2 = 0.960$) found in ∩ shape with their age.

Conclusion: Prevalence of depression is equal among the white and African Americans in Mississippi. Further study needed to examine factors that contribute to the higher rate of prevalence in their middle age.

O6.03

8:45 A MULTIDISCIPLINARY APPROACH TO IMPROVING PERIOPERATIVE CARE OF NEWBORNS

Gerri Wilson, Madhankumar Sathyamoorthy, Thurman Robertson, Jakayla Harrell, Penni Lowrey, Melanie Ellis, Jagdish Desai, and Sajani Tipnis
University of Mississippi Medical Center, Jackson, Mississippi, United States

The Neonatal Intensive Care Unit (NICU) at UMMC is the only level IV unit in the state of Mississippi and has over 900 annual NICU admissions and 300-350 surgical procedures. We found a high incidence of hypothermia and endotracheal tube (ET) malposition (approximately 20% incidence) in neonates when they returned to NICU from the operating room (OR) after their procedure. As a quality improvement (QI) project, a multidisciplinary team was formed to improve the perioperative care of these neonates. The team identified inadequate handoffs, inconsistent transport practices, insufficient NICU/OR staff resources, and insufficient proper equipment availability as potential areas for improvement.

Between January 1, 2014, and June 30, 2015, we began collecting data using a checklist on every NICU patient who underwent a surgical procedure in the OR. Several measures such as using additional heating sources like gel pads, transport incubators, and saran wrap were introduced. We also implemented transporting on ventilators instead of manual hand bagging. All measures were collected in real time and reviewed at monthly QI meetings.

The incidences of perioperative hypothermia and ET malposition in neonates undergoing surgical procedures were reduced from a baseline of 29% to 16% and 16% to 13%, respectively. There has been a consistent trend towards decreasing the incidence of these adverse outcomes.

We have shown that by bringing together all the practitioners involved in the care of patients and implementing a checklist of a few simple interventions, it is possible to improve the perioperative care of neonates at our institution.

O6.04

9:00 PERSPECTIVES OF ASTHMA HEALTH IN MISSISSIPPI WITH SPATIAL AND STATISTICAL APPROACH

Swatantra Kethireddy
Mississippi Valley State University, Itta Bena, Mississippi, United States

Asthma is a growing epidemic in Mississippi (MS). Data says that thousands of residents are in disease burden annually and the number is increasing steadily. For making the sound policy decisions on asthma health, need and demand must be understood for planning purposes. In this research, the data of MS asthma related populations for 2010 were geospatially exploited by composite geocoding and mapping in Geographical Information Systems (GIS). This method had brought an improved accuracy of geotagging a health event and maximized the efficiency of geocoding by using both the data of MS Street line and postal U.S. address locators. Again, the asthma data were fixed manually for geocoding errors by interactive rematching process. For 2009-2011, spatial statistical analysis and linear regression had recognized a distinguishable phenomenon in the prevalence of asthma between urban and rural areas, and about 59% of the asthma related visitations could be explained by the population size. The linear association ($r=0.75$ and $R^2= 0.57$) was stronger at smaller population range and it became weaker ($r=0.27$ and $R^2=0.07$) as the size of population increased above 15000 per zip code, which is a statistical signature about the association of urban factors in the prevalence of asthma at densely populated centers, and the risk factors were constantly simple in rural centers. Asthma exacerbations reach peak between September and November of a yearly cycle. Data for other years are being mined, and the contributions of environmental and climatic variables are explored to understand the regional differences in asthma risk.

O6.05

9:15 MOBILE DEVICE USE WHILE DRIVING AND ESTIMATED POLICY IMPACTS IN MISSISSIPPI

Amy Radican-Wald
Center for Mississippi Health Policy, Jackson, Mississippi, United States

Objective: Mobile device use while driving elevates crash risks. States have enacted laws to prevent crashes due to this common driver distraction. Mississippi had enacted some restrictions and considered others. Mobile device use while driving policies and their health impacts were assessed to further inform policy considerations.

Methods: Mixed-methods analyses of traffic/vital records data and qualitative stakeholder interviews.

Results: Motor vehicle crashes are the top cause of death for Mississippians under 45 years. In 2011, there were 18,068 crash injuries with an estimated medical

service cost of $38.6 million statewide. Distracted driving contributed to 1 out of 12 crash-related deaths.

Statewide crash death rates declined significantly (p<.01) from 2008 to 2012 for other behavioral traffic safety risks receiving policy enactment, law enforcement, and public education supports. Other states reduced crash deaths significantly over time had enacted policy provisions to prohibit mobile device use by all drivers and authorized enforcement when it is a primary traffic safety violation. Mississippi had enacted mobile device use restrictions which apply to novice and school bus drivers only. Crash death counts could have been reduced by 95 and crash injury counts by 10,260 if a primary enforced mobile device ban for all drivers had been authorized from 2008 to 2012 in Mississippi. Medical service spending costs could have been reduced by $75.01 million.

Discussion: Mobile device use by drivers caries a hefty health and economic toll. Key policy debate topics are drivers targeted and enforcement. Application of the evidence is critical to inform policy considerations.

Clinical/Science Technology Session II

Moderator, Jana Bagwell, MLS(ASCP)^{cm} University of Mississippi Medical Center

Room 218A

O6.06

8:15 MATERNAL VERTICAL SLEEVE GASTRECTOMY RESULTS IN REDUCED MATERNAL-FETAL BARRIER DURING GESTATION

Bernadette Grayson, William Lawson, Redin Spann, Austin Zamarripa, Bernice Enns, Michael Garrett, and Gene Bidwell
University of Mississippi Medical Center, Jackson, Mississippi, United States

Bariatric surgery is a durable means for long-term amelioration of the comorbidities of obesity. Our early work in rodents suggest that bariatric surgery prior to pregnancy increases the risk for intrauterine growth retardation (IUGR); IUGR results in risk for metabolic disease later in life. The reason for this reduced gestational growth following maternal weight loss surgery is unknown. The purpose of our studies is to investigate the mechanisms by which bariatric surgery, specifically vertical sleeve gastrectomy (VSG) might result IUGR offspring. We hypothesized that placental barrier function may be reduced resulting in fetal vulnerability. Female Long Evans rats were placed on a palatable high-fat diet (HFD) for 3 weeks and then received either sham operation or VSG. Following surgery, sham rats were either continued in HFD (obese), switched to normal chow (lean); VSG animals were maintained on chow (VSG). After 5 recovery weeks, females were mated. On gestational day 19, an intravenous cocktail of fluorescein and 3000 MW Texas Red labeled dextran was administered under anesthesia. One hour later, animals were euthanized and tissues weighed and fluorescence measured using the IVIS. VSG dams had litters with significantly reduced fetal and placental weight ($P < 0.05$). The percentage of fluorescein transfer from dam to fetus was significantly increased in the VSG ($P < 0.05$). In addition, placental claudin-6 mRNA was reduced by microarray. These data suggest vulnerability of the VSG fetus to blood-borne constituents. Future work will determine the role of this reduction in the body weight phenotype of these rats.

O6.07

8:30 COMPARATIVE ANTIOXIDANTS EFFECT IN TWO OVARIAN CARCINOMA CELL LINES MEASURING POTENTIAL BIOMARKERS

Jennifer Harpole, Michelle Tucci, and Hamed Benghuzzi
University of Mississippi Medical Center, Jackson, Mississippi, United States

Cell lines derived from tumours are the most frequently utilized models in cancer research and their use has advanced the understanding of cancer biology tremendously over the past decades. The average five-year survival rates of stage III and IV ovarian cancer patients is around 37% and 25%, respectively. This poor survival rate is attributed to diagnosis at advanced stage and resistance to chemotherapy. The present study investigates the measurement of conventional delivery of Thymoquinone (TQ) and Epigallocatechin-3-gallate (EGCG) when applied to the ovarian cancer cell lines Caov-3 and SK-OV-3. A total of 72 wells were plated with (10^5) Caov-3 and SK-OV-3 cells according to standard lab protocols and subdivided into 4 groups of 6 wells each. Group 1 served as control and groups 2, 3, and 4 were treated with TQ (16 μM), EGCG (3 μg/ml), and TQ + EGCG, respectively. Biomarker evaluations were performed following standard lab techniques. The results of the study revealed: (1) an increase in the SK-OV-3 cell's protein levels following treatment with TQ+EGCG which was statistically different ($p<0.05$) at 24 and 48 hours; (2) nitric oxide levels were statistically different ($p<0.05$)

following the administration of EGCG and TQ+EGCG at 24 and 48 hours for Caov-3 and TQ at 72 hours for SK-OV-3; and (3) glutathione levels were statistically different ($p<0.05$) following the administration of TQ and EGCG to the SK-OV-3 cell line at 72 hours. Our findings demonstrate the necessary and novel approach needed in the development of alternative treatment therapies for ovarian cancer.

O6.08

8:45 LNCAP PROSTATE CANCER CELL THERANOSTICS USING ANTIBODY AND APTAMER MODIFIED GOLD NANOPROBES

Santanu Banerjee
Tougaloo College, Tougaloo, Mississippi, United States

Prostate cancer continues to be the most prevalent malignancy and the second leading cause of cancer deaths among US men. To address ineffectiveness of traditional approaches, new treatment options are essential to improve the quality of life and final outcome of prostate cancer. Photo-thermal theranostics (therapy and diagnostics), using modified gold nanoprobes show substantial promise for early selective detection and therapy of LNCaP prostate cancer cells. We used colorimetric assay, Absorption spectroscopy, microscopy and Surface Enhanced Raman Spectroscopy for monitoring nanomaterial synthesis and photothermal therapy. For selective sensing and therapy, we have conjugated gold nano-popcorn by multiple Prostate Specific Membrane Antigen (PSMA) specific targets and these are (a) anti PSMA antibody and (b) Raman dye (Rh 6G) attached A9 RNA anti-PSMA aptamer. Rh 6G modified RNA aptamers covalently attached to the surface serving dual function as targeting molecules and as Raman dye carrying vehicle. We discuss our synthesis of gold nanoprobes, antibody and aptamer modification of the nanomaterials and selective attachment of the nanoprobes to LNCap cells. We treat the nanoprobe attached LNCaP cells using 785 nm Near Infrared Radiation (NIR) for hyperthermal destruction of prostate cancer cells using local surface plasmon resonance (LSPR) of gold nanomaterials. We show cancer cell viability variations before and after photothermal therapy. Additionally, cell viability was laser exposure-time dependent. 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.

O6.09

9:00 ANDROGENS INFLUENCE NEOVASCULARIZATION AND FIBROBLAST BEHAVIOR IN THE TISSUE-IMPLANT RESPONSE

Kenneth Butler[1, 2], Hamed Benghuzzi[1], Michelle Tucci[1], Aaron Puckett[1]
[1]University of Mississippi Medical Center, Jackson, Mississippi, United States, [2]Mississippi College, Clinton, Mississippi, United States

Fibroblasts and blood vessels are critical components in the biocompatibility and functionality of implantable ceramic materials used in drug delivery applications. The purpose of this study was to examine the correlation of fibroblasts and neovascularization by further defining their presence, relationship, and correlation in the fibrous tissue capsule of calcium phosphate (TCP) ceramic drug delivery systems. Sixteen animals in four experimental groups were implanted with one TCP bioceramic each. Group I animals were implanted with a TCP ceramic not containing a biologic (control group). Group II animals received the testosterone loaded TCP ceramic. Group III animals were implanted with the dihydrotestosterone loaded ceramic. Group IV animals received the androstenedione ceramic. At 90 days post-implantation, the animals were euthanized. Implants and fibrous tissue capsules were collected. Determination of fibroblast/fibrocyte populations and neovascularity was conducted microscopically following H&E staining and aided by ImagePro digital analysis software. Androgens have varying effects on vascularity and fibroblast populations. Overall, fibroblast counts were highly and significantly correlated with vascularity ($p<0.001$), particularly in T-TCP, D-TCP, and A-TCP groups. Correlations for control group was not statistically significant. Statistically significant differences were noted between D-TCP and control, T-TCP, and A-TCP groups (Bonferroni LSD, $p<0.001$). These findings suggest that presence of fibroblasts is be directly related to neovascularity and can be significantly influenced in the presence of exogenous androgens.

O6.10

9:15 HOP PLANT EXTRACT XANTHOHUMOL INHIBITS LEUKEMIA VIA P21$^{WAF1/CIP1}$ GENE

Maricica Pacurari, Nekeisha Walker
Jackson State University, Jackson, Mississippi, United States

Leukemia causes yearly approximately 250,000 deaths, and is associated with resistance to chemotherapy. In

order to overcome chemoresistance, novel therapeutic approaches, particularly, phytochemicals, are currently considered. Xanthohumol (XN) is a natural polyphenol in plant hop (*Humulus lupulus* L) which is used beer making. In this study we examined antileukemic effect of XN via $p21^{WAF1/Cip1}$ gene. HL-60 cells were exposed to XN (10 μM), Vit D (20 nM) or combination for 24 h.Total RNA was extracted using Trizol method. cDNA was generated using RT followed by real-time-qPCR. The effect of XN and Vit D was analyzed on the expression of: cell cycle gene $p21^{WAF1/Cip1}$, cathelicidin inhibitory peptide, and CYP24A. Vit D had no effect on cell viability, XN and Vit D + XN decreased cell viability by 30% and 19%. Vit D increased $p21^{WAF1/Cip1}$ by 3.53-folds, XN and VitD+XN increased $p21^{WAF1/Cip1}$ by 18- and 16-folds. Vit D increased cathelicidin mRNA by 14-folds, addition of XN diminished Vit D effect, XN alone inhibited cathelicidin. Vit D increased CYP24A gene by 20-folds, and Vit D + XN reduced the effect of Vit D on CYP24A1. XN increased CYP24A by 5-folds. These results suggest that XN inhibits leukemia via $p21^{WAF1/Cip1}$ gene thus inducing cell cycle arrest and promoting apoptosis. XN also activates CYP24A1, a drug metabolizing gene suggesting that XN metabolites may have "add-on" antileukemia effects of XN. This study also suggests that dietary supplements with XN may have anticancer preventive effects and may also potentiate chemotherapy. **Acknowledgements:** This research was supported through the NIH/NCRR-RCMI/Jackson State University Grant G12MD007581.

09:30 Break

Thursday February 18, 2016

MORNING

Room TC Ballroom II/III

10:00 Plenary Session

"Gift of Life – Organ Transplantation"

11:45 Health Science Division Business Meeting

12:00 -1:00 General Sessions

Thursday, February 18, 2016
AFTERNOON

Room TC Ballroom II/III

1:30 Population Health Symposium
"Where Science Meets Population Health"

2:45 Break

Thursday, February 18, 2016
EVENING
Room Ballroom II/III

3:30-Awards and Recognition and Dodgen Lecture

EVENING

Dodgen Poster Session

P6.01

INVESTIGATING THE EFFECT OF SELECTIVE SEROTONIN REUPTAKE INHIBITORS AND ANTIDIABETIC DRUGS ON CARDIOMYOCYTES

Shana Nelson, Gerri Wilson, Michelle Tucci, and Hamed Benghuzzi
University of Mississippi Medical Center, Jackson, Mississippi, United States

Recent reports in the literature show an increase in the risk of heart related events in patients treated with tricyclic antidepressants. There is also evidence that serotonin reuptake inhibitors (SSRIs) are negatively associated with heart failure. The objective of our study is to determine if cardiomyocytes in culture can be used as a tool to mimic clinical scenarios and to evaluate therapeutic concentrations of SSRIs (fluoxetine) and antidiabetic (troglitazone) medication. Cardiomyocytes were grown in a tissue culture environment and challenged with therapeutic concentrations of SSRIs alone or a combination of SSRIs and antidiabetic drugs. Intracellular markers for stress and cytomorphometric analysis indicated SSRIs and SSRIs in combination with antidiabetic drugs negatively impact the health of the cardiomyocytes with time in culture. 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.

P6.02

EFFECT OF COMBINATION TREATMENTS OF EPIGALLOCATECHIN-3-GALLATE, THYMOQUINONE, AND 5-FLUOROURACIL ON FADU CELLS

Sharita Williams, Michelle Tucci, and Hamed Benghuzzi
University of Mississippi Medical Center, Jackson, Mississippi, United States

Nasopharyngeal carcinoma (NPC) is a rare tumor that arises from epithelial neoplasms in the nasopharynx. It is a rare malignancy in most parts of the world, yet it is endemic in China. NPC is often misdiagnosed and mistreated due to the location of the tumor and non-specific symptoms. Diagnosis often occurs at advanced stages. The cancer is poorly controlled with current treatment modalities and the treatment modalities are accompanied by many side effects. There is a need for treatment modalities that eradicate the cancer better than current modalities with less side effects. The FaDu squamous cell carcinoma cell line was used to test combination treatments of natural (EgCg and TQ) drugs and a chemotherapeutic (5-FU) drug to determine if combining drugs with different cell cycle targets would be more effective at destroying cancer cells than one drug that only targets one phase of the cell cycle. There were a total of four different combinations. One combination consisted of all three treatments: EgCg, TQ, and 5-FU. The other three combinations were as follows: EgCg + TQ, EgCg + 5-FU, and TQ + 5-FU. The combination treatments were measured at 24, 48, and 72 hours. There were significant reductions in cell number at each time increment. Since a combination of drugs target more than one phase of the cell cycle, the cells were less likely to become resistant to two or more drugs.

P6.03

NOVEL SIGNATURES OF MICROBIOME IN CHRONIC ALCOHOL CONSUMPTION MONKEYS

Xiao Zhang[1], Koji Yasuda[2], Donna Platt[1], Eric Vallender[1]
[1]University of Mississippi Medical Center, Jackson, Mississippi, United States, [2]Harvard Medical School, Southborough, Massachusetts, United States

Gut microbiome change is related to substance abuses. Previous studies have shown that alcohol consumption caused the gut microbiome change. However, bio-statistical microbiome data for alcohol consumption is lacking. This study was trying to build up a comprehensive screening database for microbiome expression pattern in alcohol feeding rhesus monkeys. In this study, juvenile male monkeys (around 5 yrs. old with 3 mons alcohol consuming, n=12) and old male monkeys (around 14yrs old 5 years alcohol consuming, n=9) were each divided into subgroups: Control juvenile (n=5), control old (n=5), and Alcohol juvenile (n=6) and alcohol old (n=5). The alcohol concentration was 5%, 5 days alcohol abstinence followed the feeding process. Fecal samples were collected once at the end of the feeding process for Controls, and were collected twice for Alcohol ones: once at the end of the alcohol availability (wet samples), once later after abstinence (dry samples). We performed whole genome shot-gun sequencing of all samples and then used the statistical software HuMAaN to create microbiome expression database at genus level, and used statistical software MaAslin to filter out the significant expression ones for final analysis. We did not see significance differences between juvenile and old monkeys. However, significant changes in several taxa were observed in both alcohol consumption and abstinence groups compared with control groups. We set up the novel microbiome database in alcohol consumption monkeys in this study, functional studies of these microbiome changes in alcohol abuse will be interesting in the future.

P6.04

MODELLING ALCOHOL RELAPSE IN RODENTS

Cassie Chandler, Jaren Reeves-Darby, Sherman Jones, and Donna Platt
University of Mississippi Medical Center, Jackson, Mississippi, United States

Alcohol use disorders (AUDs) are a widespread health problem affecting between seven and eight percent of the population. A critical problem associated with AUDs is the high prevalence of relapse to excessive alcohol use, particularly during the early stages of recovery. The greatest predictor of success in sobriety is prolonging the initial abstinence period. It has been well substantiated in humans that both re-exposure to alcohol, as well as environmental cues associated with prior alcohol use, can trigger relapse to heavy drinking. In order to develop treatments specific to the prevention of alcohol relapse, it is first necessary to establish models of alcohol relapse using laboratory animals. To model triggers of relapse, we use a reinstatement model in which rats are trained to press a lever for the delivery of a sucrose/ethanol solution paired with an ethanol-associated cue light. Once animals have reached criteria for stable responding (consistent intake at pharmacologically-relevant doses), lever pressing behavior is extinguished by removing the ethanol and the ethanol-paired cues. Using this low baseline level of responding, we can determine the degree to which re-exposure to ethanol and/or the ethanol-paired cue reinstates extinguished ethanol-seeking behavior. To study actual relapse to excessive alcohol drinking, we use the alcohol deprivation effect model. This model requires long-

term free access to ethanol and is characterized by a transient increase in consumption following a period of abstinence. In the future, our lab will utilize these models to evaluate potential pharmacotherapies for the prevention and attenuation of relapse to alcohol use.

P6.05

TARGETED COMBINATION STRATEGY FOR PROSTATE CANCER USING PROSTATE-SPECIFIC PTEN KNOCKOUT MICE

Nasir Butt[1], Swati Dhar[1], Avinash Kumar[1], Agnes Rimando[2], Xu Zhang[1], Anait Levenson[1]
[1]University of Mississippi Medical Center, Jackson, Mississippi, United States, [2]United States Department of Agriculture, Oxford, Mississippi, United States

Metastasis-associated protein 1(MTA1) is a cancer-progression related protein, which is overexpressed in hormone-refractory and metastatic prostate cancer (PCa). MTA1/HDAC unit is a part of the multi-protein nucleosome remodeling and deacetylation (NuRD) complex. Recently, we demonstrated that pterostilbene (PTER), a potent analogue of resveratrol, exerts its anticancer and anti-metastatic effects in PCa through blocking MTA1-mediated deacetylation of key downstream tumor suppressors. SAHA (suberoylanilide hydroxamine, vorinostat) is a histone deacytalase (HDAC) inhibitor that has been shown to be an effective inhibitor of tumor cell growth. We hypothesize that targeting MTA1-signaling using PTER in combination with SAHA could act synergistically to delay, prevent, and treat metastatic growth in prostate tumors in vivo with a lower toxicity by allowing for a smaller dose of the conventional epigenetic agent. In this study, we generate a prostate-specific Pten-null mouse model to evaluate the MTA1/HDAC mediated anti-cancer and anti-metastatic efficacy of combinatorial approaches for dietary PTER and clinically approved HDAC inhibitor, SAHA. After a series of carefully designed breeding strategies and genotyping, we collected 25 prostate-specific Pten knockout (Cre4+, Pten f/f, Luc+) male mice for our experiments. Mice were randomized into four groups: DMSO control; PTER alone, SAHA alone, and PTER + SAHA. Compounds were injected daily, i.p., starting from 8-week-old. Mice were sacrificed at week 18. Histopathological (H&E, SAM, CK-8), immunohistochemical (Ki-67, cleaved caspase-3, CD31) and molecular evaluation (MTA1, pAkt, AR) of prostate tissues shows beneficial effects of treatments alone and in combination compared to the control group.

P6.06

OBESITY-RELATED GENE EXPRESSION IN THE DEVELOPING RAT PLACENTA

Danielle Porter and Bernadette Grayson
University of Mississippi Medical Center, Jackson, Mississippi, United States

Metabolic disease during pregnancy is a significant health problem today. In the U.S., more than 25% of women of childbearing-age are obese with a BMI $\geq$ 30. The "developmental origins of disease" hypothesis suggests that many diseases originate in utero and have long-term consequences for the offspring; this is true with metabolic disease. In utero growth is dependent upon the placenta, a pleiotrophic organ that facilitates nutrient, gas and waste exchange between the mother and fetus. The placenta produces hormones that have been identified as obesity-related gene transcripts but their developmental role and expression profile has not been determined. The goal of the present study is to develop an approach to interrogate the role of obesity-related placental gene expression. Placentas from female Long Evans rats were collected on gestational days 13 (g13) and 19 (g19) and quantitative PCR was performed to look at candidate obesity-related hormones (NPY, CCK, AgRP, POMC, ghrelin) and receptors (leptin receptor, LepR; insulin receptor, INS-1, melanocortin 4 receptor, MC4R, insulin growth factor 2, IGF2). Placentas at g19 showed increased expression in lepr, igf2, mc4r, agrp, cck and ins1 mRNA expression over g13. ghr showed elevated mRNA expression in g13 placentas over g19. Relatively equivalent expression of npy mRNA was measured at g13 and g19. Thus, our results show a potential difference in the developmental expression of obesity-related metabolic hormones and receptors in placental development between the two gestational time points. Future work will determine the effect of obesogenic diets on the expression of these genes.

P6.07

THE EFFECTS OF TROGLITAZONE AND EGCG ON PANC-1 CELL SURVIVAL

Victoria Doyne, Michelle Tucci, and Hamed Benghuzzi
University of Mississippi Medical Center, Jackson, Mississippi, United States

There is less than a thirty percent survival rate for patients with a localized pancreatic tumor, and less than a ten percent survival rate for patients with metastases. Troglitazone administered at doses of 10 uM have been reported in the literature to activate the peroxisome proliferator-activated receptor (PPARγ)

which can result in growth inhibition, cellular differientiation and cellular apoptosis. Epigallacto-catechan (EGCG) is a polyphenolic antioxidant that has been shown to increase the AMPK pathway that increases cellular apoptosis. The objective of this study was to investigate the effectiveness of EGCG with a clinical dose of troglitazone (10μM) in reducing the survival of a pancreatic like cell line in culture. PANC-1 cells were plated onto three 24 well plates at a density of 1 x 106 cells per well. The experimental design consisted of four equal groups: Group 1 served as the control and groups 2-4 were treated with troglitazone, (EGCG) or troglitazone and EGCG, respectively. Biochemical and morphological evaluations were conducted following standard lab protocols. Results of this study show 10μM of troglitazone was able to alter cell growth and proliferation after 24 and 72 hours, while 50μM of EGCG alone or in combination with troglitazone was capable of reducing cell density and cellular protein levels at 48 and 72 hours and 24, 48 and 72 hours respectively following treatment. The results show that troglitazone and EGCG induced changes in cellular morphology which are characteristic of apoptosis.

P6.08

THE EFFECT OF DRY NEEDLING ON PAIN: A SYSTEMATIC REVIEW

A Jones, N Buckalew, L Hood, S Lin, D Mittwede, A Shores, and F Adah
University of Mississippi Medical Center, Jackson, Mississippi, United States

Background and Significance: The purpose of this systematic review is to evaluate the effect of DN treatment of MTrPs on posterior upper quadrant pain. **Methods**: PubMed database was searched through February 2015. The study quality was evaluated using PEDro, a 10-point scale evaluating the internal validity of a study, and also with the 2011 Centre of Evidence Based Medicine (CEBM) scale (a 5-level scale that takes the study design into consideration and assigns a level of evidence). **Results**: Five of 75 total articles were accepted for this systematic review. PEDro scores ranged from 4 to 8 and the average score was 6.2. This search resulted in two CEBM level II studies, two CEBM level III studies and one CEBM level IV study. **Conclusion**: Three of the five studies demonstrated that dry needling MTrPs is more effective at reducing posterior upper quadrant pain when compared with control/sham needling, DN outside of MTrPs, and MTrP compression therapy. One study demonstrated that DN MTrPs was as effective at reducing pain as DN MTrPs in addition to DN of paraspinal muscles. In addition, another study demonstrated that DN MTrPs was not as effective as laser therapy combined with home exercise stretching at reducing pain. The studies demonstrated CEBM levels II, III and IV, rendering the evidence in this systematic review as a grade B. The overall results demonstrated that MTrP DN of the posterior upper quadrant is efficacious in pain reduction compared with the controls or the sham groups.

P6.09

DIFFUSE BULLOUS RASH IN A 13 MONTH OLD FEMALE: A CASE REPORT

Asma Butt and Robert Eubanks
University of Mississippi Medical Center, Jackson, Mississippi, United States

First described by Bowen in 1901, linear IgA bullous dermatosis (LIBD) is a rare autoimmune blistering disorder characterized by IgA antibodies targeted against antigens in the epithelial basement membrane. Presentation and pattern of distribution are variable, but lesions often manifest as tense blisters described as a "cluster of jewels." The highest reported incidence of the childhood variant of LIBD is 0.69-2.3 per million. The etiology can be drug-induced or idiopathic. This case describes a 13 month old female presenting with a 2 week history of a diffuse, intensely pruritic, bullous rash. Patient reported a history of intermittent fevers and URI symptoms, recent antibiotic use, as well as a recent history of immunizations, which included Varicella Zoster vaccine. The differential for bullous skin lesions includes bullous impetigo, eczema herpeticum, bullous pemphigoid, erythema multiforme, Stevens Johnson Syndrome, toxic epidermolyis, LIBD, herpes simplex infection, and drug eruption. Punch biopsy of lesion was obtained and diagnosis was determined by histopathology. Treatment with Dapsone was initiated with complete resolution of bullous lesions within several months of treatment. Post-inflammatory hypo-and hyper-pigmented lesions on trunk and extremities remain and are expected to resolve with time. It is important to have a high level of suspicion for primary autoimmune conditions when presented with a bullous skin rash. While the lesions themselves are not life-threatening, patients with LIBD should undergo ophthalmologic exam to rule out mucosal involvement in the eyes. The use of Dapsone requires close monitoring due to risks for hemolytic anemia, methemoglobinemia, agranulocytosis, and peripheral neuropathy.

P6.10

CELLULAR GLYCOLYSIS AND THE DIFFERENTIAL SURVIVAL OF FIBROBLAST AND LUNG CARCINOMA CELL LINES

Ibrahim Farah, Veshell Lewis, and Zikri Arslan
Jackson State University, Jackson, Mississippi, United States

In contrast to normal cells, cancer cells may lose the ability to utilize aerobic respiration due to either defective mitochondria or hypoxia within the tumor microenvironments. Glucose was shown to be the major energy source in cancer cells where it utilizes aerobic /anaerobic glycolysis with the resultant lactic acid formation. The role of energetic modulations and use of glycolytic inhibitors on cancer/normal cell survival is not clearly established in the literature. Therefore, the purpose of this study was to evaluate six potential glycolytic inhibitors namely, sodium ascorbate, oxalic acid, oxaloacetic acid, sodium citrate, fructose diphosphate (FDP) and sodium bicarbonate at mM concentrations on growing A549 (lung cancer) and MRC-5 (normal; human lung fibroblast) cell lines with the objective of determining their influence on cell survival. 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 A549 cells showed various degrees of metabolic and death impacts and failure to regrow, while MRC-5 cells were differentially unaffected by exposure to sodium ascorbate, sodium citrate, sodium bicarbonate, FDP and oxaloacxetic acid, and underwent complete recovery and remained both attached and healthy for 6 weeks upon subculture when transferred to a new complete medium. These studies show the potential for exploiting cellular metabolic differences in cancer control.

P6.11

ALTERED SEROTONIN EXPRESSING AXON LENGTH IN ORBITOFRONTAL CORTEX WITH AGE IN DEPRESSION

Gouri Mahajan[1], Beata Legutko[1], Warren May[1], David Steffens[2], Craig Stockmeier[1], Grazyna Rajkowska[1]
[1]*University of Mississippi Medical Center, Jackson, Mississippi, United States,* [2]*Department of Psychiatry, University of Connecticut, Farmington, Connecticut, United States*

In major depressive disorder (MDD), studies using neuroimaging or postmortem brain tissue report pathology in the serotonin system. In MDD, there are reductions in the length density of axons expressing the serotonin transporter (SERT) in layer VI of dorsolateral prefrontal cortex (Austin et al., 2002). We used 3-D techniques to determine whether alterations in length density of axons expressing SERT are influenced by the age of onset or the duration of depression. Orbitofrontal cortex (ORB) from 18 subjects with MDD and 18 age-matched controls was fixed and sectioned (40 µm). A SERT antibody was used to immuno-histochemically label the transporter. The total 3-D length density of SERT-IR axons in layer VI of ORB was estimated using Stereo Investigator. Age of subjects with MDD (but not controls) was negatively correlated with SERT fiber length ($r=0.609$, $p<0.001$). Using months in fixative as a covariate, there was a significant diagnosis by age interaction ($p<0.01$), such that SERT fiber length was significantly increased in younger subjects with MDD vs. age-matched controls. Neither sex, tissue pH, postmortem interval, age of onset nor duration of depression had a significant effect. This effect of age on SERT fiber length in MDD is consistent with the effect of age on density of pyramidal neurons in the ORB (Rajkowska et al., 2005). Pyramidal neurons in deep ORB project indirectly to the dorsal raphe, where there is other evidence of serotonergic pathology in MDD. P30 103328.

P6.12

INHIBITION TRPV4 TO ATTENUATE IMMUNE ACTIVATION FOLLOWING SPINAL CORD INJURY

Raymond Grill
University of Mississippi Medical Center, Jackson, Mississippi, United States

Spinal trauma elicits the activation and mobilization of systemic as well as CNS immune components that are thought to provide both beneficial as well as pathological aspects to the healing process. The Transient Receptor Potential channel, subfamily V, member 4 (TRPV4) is a calcium-permeable, non-selective cation channel expressed throughout the body that serves as a molecular and mechanical sensor to detect alterations in temperature, osmolality blood pressure, etc. Due to TRPV4's association with endothelial cells and regulation of vascular tone, we hypothesized that aberrant activation of TRPV4 via mechanical insult may worsen spinal vascular leakage produced by contusion injury. We determined that blood-spinal cord-barrier (BSCB) breakdown was reduced in TRPV4-null mice compared to wild type (WT) when assessed 48 hours post-spinal contusion

injury. We subsequently detected the expression of TRPV4 in both CNS microglia as well as splenic macrophages. This lead us to hypothesize that TRPV4 activation may contribute to pathological CNS/peripheral immune cross-talk following SCI. WT mice were treated with the selective TRPV4 inhibitor, HC-067047, once daily (10 mg/kg) for three days. We observed that HC-067047 treatment lead to a significant reduction in both microglial and astrocytic activation at the lesion site compared to vehicle-treated controls. In addition, HC-067047-treatment significantly attenuated the loss in splenic mass normally observed following CNS trauma; an early indicator of profound peripheral immune activation. Our results suggest that trpV4 inhibition may attenuate both spinal and systemic immune activation/inflammation following SCI; potentially creating a more "neuroprotective" environment. (See oral presentation session IV 9:00 am)

P6.13

THIAMINE: TREATMENT IN PYRUVATE DEHYDROGENASE DEFICIENCY

Carolyn Glendye, Mary McLeod, and David Gilliam
University of Mississippi Medical Center, Jackson, Mississippi, United States

The pyruvate dehydrogenase complex is composed of five components. A deficiency of any component, known as pyruvate dehydrogenase deficiency (PDHD), may result in lactic acidosis or neurologic dysfunction. A mainstay treatment for PDHD is a ketogenic diet. A subset of patients with PDHD respond to Thiamine.

Patient was 5 month old female who presented with increased irritability and poor feeding. At presentation, her physical exam revealed microcephaly and preserved primitive reflexes. Lab work was normal until two days into her hospitalization when she developed lactic acidosis with lactate 9. She was transferred to the PICU. Her feeds were held, and the acidosis corrected with intravenous fluids. Her feeds were restarted, and the bicarbonate level remained stable until discharge. Her lactate/pyruvate returned with elevated ratio of 40, but after discussion with Genetics, she was deemed stable for discharge. Three days later, she returned to her pediatrician where lab work again revealed lactic acidosis with lactate greater than 15. She was re-admitted with a genetics consult. A working diagnosis of PDHD was established. She was started on Thiamine 200mg daily. The following day, her lactate improved significantly with resolution to normal values after two days. She was discharged home on daily Thiamine. At Genetics follow up, she had decreased irritability and improved feeding. PDHA1 gene sequencing remains pending.

PDHD presents with lactic acidosis and neurologic dysfunction. The use of Thiamine may prevent patients with PDHD from requiring a strict ketogenic diet.

P6.14

FIBROBLAST POPULATIONS ARE INFLUENCED BY AMINO ACID COATED UHMW-PE WHEN IMPLANTED SUBCUTANEOUSLY

Kenneth Butler[1,2], Hamed Benghuzzi[1], Michelle Tucci[1], Aaron Puckett[1]
[1]University of Mississippi Medical Center, Jackson, Mississippi, United States, [2]Mississippi College, Clinton, Mississippi, USA

Polyethylene materials used in orthopedic applications are biocompatible and non-immunogenic with host tissues. The purpose of this investigation was to determine fibroblast behavior after implantation of ultra-high molecular weight polyethylene (UHMW-PE) rinsed with saline (control) or coated with poly-L-lysine (PLL), arginine-glycine-aspartic acid (RGD), or arginine-glycine-glutamic acid (RGE) into 16 adult male rats subcutaneously (S/C). 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 fibroblast counts were highest in the saline coated group (34±2 cells/high power field). There was a decrease in mean fibroblast counts per high power field for RGD (19±10) and RGE (2±3) treated groups. In the PLL coated groups, there was nothing but collagen remaining in the capsular formation. There were statistically significant differences (ANOVA, $p < 0.05$) of all three experimental groups compared to control. 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.

P6.15

NEAR INSTANT BONE DENSITY ANALYSIS OF SPINE USING UNENHANCED OR CONTRAST-ENHANCED CT-IMAGES

Andrew Smith[1], ThuyVi Nguyen[2], Xu Zhang[1]
[1]University of Mississippi Medical Center, Jackson, Mississippi, United States, [2]University of Southern Mississippi, Hattiesburg, Mississippi, United States

Background: A retrograde study was performed to assess previous CT scans for low bone density or osteoporosis. The purpose of this study was to develop methods to rapidly assess bone density on unenhanced and contrast-enhanced CT images using routine vertebral body attenuation measurements, thereby massively increasing screening for osteoporosis and low bone density.

Purpose: To establish CT colorization techniques for rapid bone density screening of the spine.

Methods: Non-enhanced CT images of the mid lumbar spine were obtained in 147 participants with a quantitative CT (QCT) imaging phantom in place. Attenuation at T12, L1, and L2 was associated with measured bone mineral density (BMD) to derive optimal cut points for colorizing osteoporosis as red, low BMD as blue, and normal BMD as green. A visual assessment of sagittal grayscale image was performed.

Results: Vertebral body bone density and CT attenuation on both unenhanced and contrast-enhanced CT images are highly correlated. Mean CT attenuation for unenhanced CT 145.8 HU and contrast enhance CT 167.5 HU for at T12, L1, and L2. The vertebral body attenuation on contrast-enhance CT images was 22 HU higher than on unenhanced CT images from the same patient. It is therefore possible to measure bone density on unenhanced and contrast-enhanced CT images by simply measuring vertebral body attenuation.

Conclusion: The study showed that it was possible to determine a patient's bone density based on scans that were used for other indications.

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

P6.16

ASSOCIATIONS BETWEEN THE SLEEP OF CHILDREN WITH ADHD AND THEIR MOTHERS

Elizabeth Thorne and Lori Staton

Mississippi State University, Mississippi State, Mississippi, United States

Due to restoration benefits of sleep and prevention of negative outcomes, a third of human life should be committed to sleep (Carter, 2003). Unfortunately, children with ADHD and their mothers are not obtaining recommended amounts of sleep (Meltzer & Westin, 2011) that are necessary to promote positive outcomes. This pilot research study examines the relation of sleep of children with ADHD and its association with three variables of mother's sleep. Specifically, we examine specific variables of child sleep including sleep duration, sleep onset, and nightwakings and its relation to mother's sleep onset, sleep duration, and sleep quality while controlling for child age. After conducting correlations and hierarchal regressions, data analysis indicated a positive association between child sleep onset and mother's sleep onset, and significant negative relation to mother's sleep duration and sleep quality. Contrary to expectations, children's sleep duration and nightwakings were not associated with any of the mother's sleep variables. After delineating associations between sleep of children with ADHD and their mothers, we provided strategies to promote sleep in this population. These implications can be used by pediatricians, physicians, teachers, and special needs instructors to development intervention and prevention programs, specifically promoting proper sleep hygiene that facilitates restful sleep. Due to the association between child and mother sleep, a multi-generational approach must be taken to improve sleep of the family as a whole.

P6.17

BUILDING THE EVIDENCE TO INFORM DENTAL PUBLIC HEALTH POLICY IN MISSISSIPPI

Elizabeth Carr, Jessica Bailey, Bettina Beech, and Denise Krause

University of Mississippi Medical Center, Jackson, Mississippi, United States

Mississippi suffers from population health problems, and poor oral health is among these problems. Policy changes allowing for increased public health interventions could prevent oral disease. However, policy change is multi-faceted, difficult, and requires many components to converge simultaneously. The aim of this project is to communicate the status of oral health in Mississippi in order to inform Mississippians of the need for increased dental public health policy. The purpose of the project was to utilize available oral health data to create an insightful, high-impact infographic for dissemination to lay audiences in Mississippi. Data was requested or collected from these surveillance systems: The National Health & Nutrition Examination Survey; the National Survey of Children's Health; the Surveillance, Epidemiology & End Results Program; the National Health Interview Survey; the Pregnancy Risk & Monitoring Survey; the Medical Expenditure Panel Survey; the National Oral Health

Surveillance System; the Behavioral Risk Factor Surveillance System; the Mississippi Board of Dental Examiners; & the Mississippi Department of Health. Geographic information systems (GIS) software by ESRI© and data visualization software by Tableau© were utilized to create an easy to understand infographic demonstrating important oral health indicators across Mississippi. The OPT-In framework of factors to consider when selecting and presenting data to lay audiences was used to guide the implementation and evaluation of the infographic. Using the OPT-In framework, researchers developed an implementation and evaluation plan to disseminate the infographic across traditional and digital manners. An additional evaluation is scheduled after dissemination to ascertain if policy changes result.

P6.18

ANALYSIS OF RESTORATIVE DENTAL MATERIALS ON THE ARCHITECTURAL INTEGRITY OF GINGIVAL FIBROBLASTS

Angelia Garner, Hamed Benghuzzi, and Michelle Tucci
University of Mississippi Medical Center, Jackson, Mississippi, United States

Dental caries is a chronic infectious disease found in the oral cavity. If left untreated, dental caries can lead to infection, pain, and tooth loss (Beltrán-Aguilar et al., 2005). The dental clinician often utilizes preventive materials such as dental sealants on the occlusal pit and fissures of posterior teeth to prevent the colonization of Streptococcus mutans, the primary pathogen associated with dental caries. If preventive measures have not either been employed or successful, it is common that a cavity will assault the dentition. Upon removing the carious lesion, the remaining tooth structure requires support in the form of a dental restoration. Common dental restorations are fillings and crowns. Acrylic, composite and porcelain materials are often used to restore function to a tooth in both anterior and posterior teeth. The purpose of this study was to comparatively assess the architectural integrity of gingival fibroblasts when exposed to universally utilized restorative dental materials. Human gingival fibroblasts were exposed to Acrylic (100µl), Composite (100µl), Porcelain (100µl), and Sealant (100µl) materials at 24, 48, and 72 hour durations. Upon Hematoxylin and Eosin staining, morphological assessment when compared to the control, at all phases, the cells appeared very similar in that they exhibited some loss of the typical spindle shape which may be attributed to the phase of proliferation at which the flasks reached confluence, small in size, hyperchromatic and prominent single nucleus with occasional multi-nuclei noted. The cytoplasm was irregular and pink with clustering in the Sealant group at 24 and 72 hour phases.

P6.19

TOUGALOO COLLEGE LET'S GET IT! PROGRAM

Sandra Hayes, Gary Anderson, Joshua Knox, Hussain Al-Fadhli, and Kristen Harris
Tougaloo College, Tougaloo, Mississippi, United States

Background: Low education levels are linked with poor health, more stress and lower self-confidence. The program's focus is to provide expanded academic enrichment opportunities for children attending low-performing schools.

Purpose: The purpose of the Let's Get It! Program is to positively impact the lives of middle and high school youth attending Capital City Alternative School (CCAS) and ensure academic success by providing a variety of high-quality services that support student learning and social development.

Methodology: The academic enrichment component consisted of numerous activities such as: homework assistance, online academic skill building, MCT2 preparation, individual academic plans, and academic projects. Data was collected using several validated surveys. Consent forms were secured from students' parents. The study protocol was approved by the Institutional Review Board (IRB) at Tougaloo College.

Evaluation: Quarterly Report Cards, Pre, and Post tests were used for evaluation.

Results: Between 2009-2014, 165 students participated in the program. Data analysis revealed that 53% of the students participating in the program showed an improvement in Math; 57% of the students participating in the program showed an improvement in Language; 55% of the students participating in the program showed an improvement in Science.

Conclusion: The program was successful in improving the academic performance of half of the students that participated in the program as evidenced by quarterly report cards.

P6.20

SOCIAL SUPPORT AMONG WOMEN ENROLLED IN TOUGALOO COLLEGE'S HEALTHY START PROGRAM

Sandra Hayes, Arletha Howard, Carol Mack, and John Bierma
Tougaloo College, Tougaloo, Mississippi, United States

Background: The Tougaloo College Delta Health Partners Program provides maternal and child support services to strengthen the existing health care delivery system in the Mississippi Delta. Emerging research suggests women who receive strong social support from their families are less likely to develop postpartum depression.

Methods: Delta Health Partners' Healthy Start utilizes community action networks to facilitate the coordination of efforts designed to 1) improve the community's health through health education and promotion, case management and shared resources; 2) promote quality services through the establishment of referral systems, translating evidence based research into practice, and advocacy; 3) strengthen family resilience through the expansion of mental health services and male outreach; 4) achieve collective impact through the development of a formal surveillance system in collaboration with stakeholders, and 5) increase accountability through quality improvement, performance monitoring, and evaluation.

Results: Three hundred eighty four clients were surveyed. Findings indicated that 67% of fathers were involved in the pregnancy and supportive of the mother; 32% of the fathers were not involved in the pregnancy; 85% of the women had someone they could count on; 70% of the women were not involved in a support group; 12% of the women polled had been treated or told that they had depression.

Evaluation: Intake Survey; Edinburgh Postnatal Depression Scale

Conclusions: Results suggest that low or absent support is a significant risk factor for postpartum depression, and that strong support is a protective factor.

P6.21

STARVATION INDUCES POLYCYSTIC OVARIAN SYNDROME (PCOS)-LIKE DISEASE IN DROSOPHILA MELANOGASTER

Kaylon Touchstone, Ashley Pickering, and Stephanie Carmicle
Mississippi College, Clinton, Mississippi, United States

Polycystic Ovarian Syndrome (PCOS), a metabolic and endocrine disorder (Barigota and Diamanti-Kandarakis, 2012), is the most common (Padmanabhan and Veiga-Lopez, 2013). PCOS is characterized by insulin resistance (IR), hyperandrogenism, anovulation, hyperinsulinemia and polycystic ovaries (Li, Youngren, et al, 2002). Drosophila melanogaster has not been used as a model for PCOS however, work by Barth and coworkers suggest that is may be a good model organism (Padmanabhan and Veiga-Lopez, 2013). Starvation inhibits ovarian growth through mutations in the IIS/TOR pathway which, theoretically, makes a metabolic disorder that exacerbates female sterility (Barth, Szabad, et al, 2011). Since the Drosophila model for PCOS has only been postulated, in this work we investigate whether starvation of D. melanogaster for up to 24 hours induces a PCOS-like disorder. In women with PCOS, androgen levels and the expression of the androgen receptor are elevated (Apparao, Lovely, et al, 2002). Drosophila ecdysone (E) and its "active" form, 20-hydroxyecdysone (20E), are homologous to the human testosterone and 20-hydroxytestosterone, respectively (Kozlova and Thummel, 2003). In this work, we examined the expression of the ecdysone receptor (EcR) upon starvation for up to 24 hours by immunofluorescence microcopy. Using qRT-PCR, we determined the levels of expression of genes associated with inflammation. Ovarian dysfunction was examined by measuring the fecundity of the females. Starvation increases the expression of the EcR and pro-inflammatory genes expression and decreases fecundity in preliminary experiments suggesting that Drosophila melanogaster is a potentially useful model organism in the study of PCOS.

Friday, February 19, 2016

MORNING
TC 210

Basic Science Section III

Moderator, Larry McDaniel, PhD Professor of Microbiology and Immunology University of Mississippi Medical Center

O6.11

8:15 TRICHOMONAS VAGINALIS VIRUS CHARACTERIZATION

Cory Toyota[1], Stephen Stray[2], John Meade[2]

[1]Millsaps College, Jackson, Mississippi, United States, [2]University of Mississippi Medical Center, Jackson, Mississippi, United States

Purpose: 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). Trichomoniais 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. Viral ribosomal frameshifting during translation has been determined for TVV1, but is not known for TVV2-4. Our work, in collaboration with researchers at UMMC, aims to further understand T. vaginalis reproduction, TVV transmittal between cells, and the relationship of TVV presence with clinical symptoms.

Methods: T. vaginalis, cultured anaerobically, was treated with varied concentrations of the anti-viral drug ribavirin. Total RNA was isolated and the presence of TVVs was determined by gel electrophoresis after end-point RT-PCR with primers specific for each of the TVVs.

Results: The presence of TVVs in ATCC strains as well as clinical isolates has been confirmed. The genome for the clinical isolate W107 has been completed. Virions were isolated by ultracentrifugation.

Conclusion: Preliminary work has demonstrated that TVV levels can be reduced in T. vaginalis by treatment with ribavirin. We have begun work on understanding ribosomal frameshifting in translation and virus transmission.

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.

O6.12

8:30 THE EMERGING PATHOGEN NONENCAPSULATED STREPTOCOCCUS PNEUMONIAE: CHRONIC ADENOIDITIS IN A YOUNG CHILD

Cheshil Dixit and Larry McDaniel
University of Mississippi Medical Center, Jackson, Mississippi, United States

Streptococcus pneumoniae is an important human pathogen. To cause disease, it must first colonize the human nasopharynx. The introduction of vaccines which target the pneumococcal capsular polysaccharide has led to decreased nasopharyngeal carriage of *S. pneumoniae* vaccine serotypes, but a concomitant increase in carriage of non-vaccine serotypes and nonencapsulated *S. pneumoniae* (NESp). Some NESp express Pneumococcal Surface Protein K (PspK), a virulence factor shown to contribute to nasopharyngeal colonization. We present the case of a child with chronic adenoiditis caused by a PspK+ NESp. We examined the strain, C144.66, isolated from an adenoid culture. The presence of *pspK* was confirmed by polymerase chain reaction (PCR). Western blotting and FACS analysis were used to examine expression of PspK. Multi-locus sequence typing was used for pneumococcal genotyping. Whole genome sequencing was performed. C144.66 was resistant to erythromycin with intermediate resistance to penicillin and trimethoprim/ sulfamethoxazole. The capsule locus of C144.66 had been replaced by *pspK*. PspK expression was confirmed. NESp are a growing concern as an emerging human pathogen, as current pneumococcal vaccines do not confer immunity against them. This inability to vaccinate against NESp may result in increased carriage and associated pathology.

O6.13

8:45 VITAMIN D ENHANCEMENT OF DIABETES MELLITUS TYPE 1 CONTROL IN PRE-PUBERTY CHILDREN

Teresa Moll and George Moll
University of Mississippi Medical Center, Jackson, Mississippi, United States

Purpose: Vitamin D is recognized to have multiple beneficial health effects beyond strong bone growth. Published research has associated low 25-hydroxy-vitamin D (25OHD) levels in adults with obesity, diabetes mellitus type 2 and immune modulation possibly associated with expression of diabetes mellitus type 1(DMT1) and DMT1 control reflected in hemoglobin A1c (HA1c) levels. We hypothesized 25OHD would inversely correlate with HA1c levels in pre-puberty children with DMT1 who would not have hormonal imbalance of puberty known to interfere with DMT1 control.

Method: We reviewed our 3-year electronic records to locate 28 children 3 to 11 years of age with DMT1 of at least 2 years duration who had at least 2 simultaneously drawn 25OHD and HA1c levels as DMT1 standard of care. Individual data from14 pre-puberty DMT1 males (6 Afro-American [DMT1BM], 8 caucasian [DMT1WM]) and 14 pre-puberty DMT1 females (8 Afro-American [DMT1BF], 6 caucasian [DMT1WF]) non-overweigth (BMI<85%tile) were deidentified to maintain healthcare security. Data were analyzed with Microsoft Excel statistical package.

Results: 20% of males (2 DMT1BM, 1 DMT1WM) and 25% of females (4 DMT1BF) were 25OHD insufficient (<20 ng/ml). DMT1WF mean HA1c was significantly lower than all DMT1 male mean HA1c ($p<0.05$). DMT1WF mean 25OHD and mean HA1c

were significantly different from DMT1BF mean 25OHD and mean HA1c ($p<0.05$). Male 25OHD vs HA1c correlation coefficients were significant only for DMTWM (-0.33)($p<0.10$). Female 25OHD vs HA1c correlation coefficient (-0.48) was significant ($p<0.01$).

Conclusions: Our results support inverse correlation 25OHD vs glycemic control related HA1c levels in pre-puberty females and DMT1WM.

O6.14

9:00 A NOVEL MATERNALLY RESTRICTED PRO-ANGIOGENIC THERAPEUTIC FOR PREECLAMPSIA

Eric George, Gene Bidwell, Heather Chapman, Fakhri Mahdi, and Omar Logue
University of Mississippi Medical Center, Jackson, Mississippi, United States

Preeclampsia is a major obstetrical complication, affecting 5-8% of all pregnancies. Hallmarked by hypertension and endothelial dysfunction the etiology remains obscure, but it is generally accepted that placental insufficiency/ischemia is a central cause. The placenta secretes pathogenic factors, in particular the protein sFlt-1. Currently, there is no effective therapy for the management of preeclampsia. We have produced a novel synthetic peptide based on placental growth factor (PlGF) which is maternally restricted by fusion to the synthetic carrier elastin like polypeptide (ELP). Here, we describe its in vivo pharmacokinetics and biodistribution and demonstrate its ability to antagonize sFlt-1 activity. Labeled ELP-PLGF was administered i.v. and blood sampled serially to determine clearance kinetics. Long-term pharmacokinetics and biodistribution was performed after subcutaneous administration of labeled peptide. Measurements were made on serially drawn blood, and in the animal by in vivo imaging. ELP-PlGF activity was assayed by endothelial tube formation and proliferation. ELP-PlGF exhibited markedly more favorable pharmacokinetics than the free PlGF. Chronic administration found highest levels accumulating in placenta, kidney, and liver. A single subcutaneous administration at 100mg/kg resulted in sustained therapeutic plasma concentrations for over 10 days. In vitro, ELP-PLGF reversed the inhibition of both tube formation and proliferation by sFlt-1. Likewise the inhibition exhibited by culturing cells in serum from rats with placental ischemia was reversed by ELP-PlGF. These data demonstrate that ELP-PlGF has favorable pharmacokinetic and biodistribution profiles. Furthermore, ELP-PlGF directly antagonizes sFlt-1 in culture, as well as the inhibitory effects of rats with placental ischemia-a model for human preeclampsia.

Friday, February 19, 2016

MORNING
TC 229

Basic/Clinical Applied Session IV:

Moderator, Olga McDaniel, MT PhD Professor of Surgery University of Mississippi Medical Center

O6.15

8:15 TIME-DEPENDENT EXPRESSION OF MOLECULAR MARKERS IN TRAUMA INDUCED CLINICAL COMPLICATIONS AS SEPSIS

Benita Williams[1], Sara Martin-Robertson[2], Kenneth Vick[1], Bashar Ghosheh[1], Laura Vick[1], Gregory Timberlack[1], and D. Olga McDaniel[1]
[1]University of Mississippi Medical Center, Jackson, Mississippi, United States, [2]University of Arkansas Medical Center, Little Rock, Arkansas, United States

Background: Severe trauma injury often leads to the development of systemic inflammatory response syndrome (SIRS), sepsis and organ failure. Most trauma patients with sepsis develop immunosuppression. This is evidenced by their inability to clear the infection. The innate immune responses mediated by Toll-like receptors (TLRs), induce early inflammatory response to the pathogen or damage associated molecular patterns (DAMPs) associated with trauma injury. Methods: A panel of molecular markers associated with TLR-signaling pathway genes were tested to evaluate trauma patients within the first week of admission. Blood was drawn at 24 hr time intervals up to one week from patients that met the inclusion criteria. Leukocytes were utilized in mRNA transcript analysis for TLR-signaling pathway genes using a gene-array. Results: TLR-1, -4, -8 and -10 were almost equally expressed day 1 in all patients. But, TLR-2 was 2.7 fold increased comparing day 1 vs. day 3 in monocytes of patients who later developed sepsis. TOLLIP, a Toll inhibitory protein, also known as Cox-2 gene was 4-fold increase in asceptic patients. The IRAK-1 (IL-1 associated kinase-1), a major mediator of the TLR-signaling pathway was 2.5-fold increase in asceptic patients and reduced in patients with sepsis. The HMGB-1 a DAMP associated molecule was increased 5.7-fold, and CD86 an HLA-Class II receptor molecule was 15.2-fold increase in patients who later developed sepsis. Conclusion: Profiling the innate immune response

signaling genes were informative and was in correlation with clinical outcomes which may help to predict the development of sepsis.

O6.16

8:30 AN ANALYSIS OF CHALLENGES AND OPPORTUNITIES FOR IMPROVING HEALTHCAREACCESS IN HATTIESBURG

LaQuandra Anderson[1], D'Angela Smith[2], Kennedy Clark[3], Antwan Nicholson[4]
[1]Alcorn State University, Lorman, Mississippi, United States, [2]Tougaloo, Jackson, Mississippi, United States,[3]University of Mississippi, Oxford, Mississippi, United States, [4]My Brother's Keeper, Inc., Ridgeland, Mississippi, United States

This literature review explores three topics that involve improving the public health dealing with sexually transmitted diseases in the Hattiesburg area. In this study we explored the topics associated with improving the public health in relation with sexually transmitted disease. A focus group was established to conduct essentials that were missing in the community to achieve the goals of this study. The study subjects mostly were young African American (AA) females and males age between 18 and 25. A questionnaire was prepared including: 1) social routines such as hangouts and hobbies; 2) knowledge of community health care services; 3) stigmas associated with certain illnesses and 4) the effectiveness of health fairs. It was observed that most participants indicated night clubs with live music, where they hangout. The participants were aware of availability of several clinics. However, they indicated that none of the clinics offered free diagnostic tests. The health fairs in black community significantly influenced in the health of individuals in the community, based on three major concepts: promotion, education and prevention. In summary, providing free health clinic, free health awareness classes, including free food, live music, and condom distribution may help improving health care access and disease prevention in Hattiesburg area. This community overall needs face-to-face communication and more public healthcare places that offer affordable treatment. All of these activities fall under promoting health, educating about health, and preventing health illnesses.

O6.17

8:45 EXPRESSION PROFILE OF INFLAMMATORY MARKERS ASSOCIATED WITH ALLOGRAFT OUTCOME AFTER KIDNEY TRANSPLANTATION

Montianah Roseburgh[1], Joel Duff[2], Corey W. Sivils[2], Akshay Bangale[2], Jack Neill[2], Fauzia Butt[2], Christopher Anderson[2], T. Mark Earl[2], and Olga McDaniel[2]
[1]Jackson State University, Jackson, Mississippi, United States, [2]University of Mississippi Medical Center, Jackson, Mississippi, United States

Background: We have recently reported cytokine gene profile in kidney allograft recipients during the first week of transplantation. The mRNA transcripts of allograft inflammatory factor-1 (AIF-1), IL-18 in association with Toll-like receptors were enhanced in patient's blood and kidney biopsy samples particularly in podocytes with rejection episodes. Our goal was to explore the significance of these markers in early rejection versus late rejection episodes.

Methods: A total of 390 patients who received kidney transplant at UMMC were investigated. Clinical data were stratified, including delayed graft function (DGF), stable graft function (SGF), rejection episodes (RE), on the basis of cellular and antibody mediated rejection and the time points (<6 months, 6-12 months, 13-36 months and >36 months) that rejection occurred. Three blood samples from each patient at different time intervals (pre-RTx, day 3 and day 6 after RTx) were tested, using PCR and primers specific for inflammatory markers.

Results: Overall rejection episode rate was 16.92% (66/390). However, on the basis of rejection time points we observed the followings: a rate of 22/66 (5.6%) for rejection episodes within <6 months; 16/66 (4.1%) within 6-12 months; 19/66 (4.8%) within 13-36 months and 9/66 (2.3%) within >36 months were observed. The DGF was observed in 13.8% and SGF in 83% of patients. IL-18 expression was significantly increased in patients who experienced DGF. AIF-1 and TLR2 expressions were less significantly increased in both DGF and RD.

Conclusion: DGF influences the outcome of allograft function. These markers may help to predict the outcome of allograft outcomes.

O6.18

9:00 INHIBITION TRPV4 TO ATTENUATE IMMUNE ACTIVATION FOLLOWING SPINAL CORD INJURY

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Spinal trauma elicits the activation and mobilization of systemic as well as CNS immune components that are thouht to provide both beneficial as well as pathological aspects to the healing process. The Transient Receptor Potential channel, subfamily V, member 4 (TRPV4) is a calcium-permeable, non-selective cation channel expressed throughout the body that serves as a molecular and mechanical sensor to detect alterations in temperature, osmolality blood pressure, etc. Due to TRPV4's association with endothelial cells and regulation of vascular tone, we hypothesized that aberrant activation of TRPV4 via mechanical insult may worsen spinal vascular leakage produced by contusion injury. We determined that blood-spinal cord-barrier (BSCB) breakdown was reduced in TRPV4-null mice compared to wild type (WT) when assessed 48 hours post-spinal contusion injury. We subsequently detected the expression of TRPV4 in both CNS microglia as well as splenic macrophages. This lead us to hypothesize that TRPV4 activation may contribute to pathological CNS/peripheral immune cross-talk following SCI. WT mice were treated with the selective TRPV4 inhibitor, HC-067047, once daily (10 mg/kg) for three days. We observed that HC-067047 treatment lead to a significant reduction in both microglial and astrocytic activation at the lesion site compared to vehicle-treated controls. In addition, HC-067047-treatment significantly attenuated the loss in splenic mass normally observed following CNS trauma; an early indicator of profound peripheral immune activation. Our results suggest that trpV4 inhibition may attenuate both spinal and systemic immune activation/inflammation following SCI; potentially creating a more "neuroprotective" environment.

9:30 Break

9:45 Poster Session II

P6.22

ADVANCED CT IMAGE ANALYSIS OF DIFFUSE LIVER DISEASE

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Chronic liver disease (CLD) from hepatitis B and C virus, alcohol, or other causes can lead to cirrhosis and death if untreated. A key element in treating CLD is staging the severity of liver fibrosis (scaring), and this is traditionally done with a liver biopsy. The liver biopsy procedure has many disadvantages such as invasiveness, high cost, life-threatening complications, sampling errors, and inter-observer variability in interpreting the pathology samples. The objective or our study was to develop noninvasive methods to stage CLD by using a combination of quantitative measures of liver surface nodularity and splenic size on routine computed tomography (CT) images and the FIB4 score (a clinical score based on serum liver lab values). We retrospectively evaluated a patient cohort with various types of CLD and available liver biopsy samples (N=100). The pathologic stage of fibrosis on the biopsy samples served as the reference standard. Our results indicate that a combination of liver surface nodularity and splenic volume measurements and the FIB4 score can be used to accurately differentiate cirrhosis (N=37) from noncirrhotic (N=63) with high accuracy (AUROC=0.90). We conclude that simple CT image measurements and serum laboratory values have high accuracy for noninvasively staging CLD, indicating that these techniques are suitable for validation in a multi-institutional prospective study. 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

P6.23

APPLICATION OF THE DIVERSITY INDEX TO EDUCATIONAL ENVIRONMENTS

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The Gini-Simpson index which predicts the probability that two individuals, randomly selected from an ecosystem, are of different species has had wide application and evaluation in the ecology literature. More recently, this index, as well as derivative metrics of diversity and entropy, have been applied in educational environments to characterize the demographic diversity of student bodies and faculties. This study created a mathematic model of a hypothetical academic health science center student body in order to examine the behavior of the Simpson Index of Diversity (SID) in this application. Modeling indicated that the SID is useful as a reflection of overall diversity only when the number of categories of race and ethnicity is less than seven. Additional experimentation indicated that in certain scenarios the SID was moderately sensitive to theoretical diversity initiatives but provided no information regarding the qualitative nature of those changes. Additional experiments based on student body size and the probability of contact with diverse faculty further

defined the behavior of the SID in this application. The SID was also compared to other diversity metrics such as the Shannon Index, True Diversity, and Renyi Entropy. These studies also allow some observations on how other ecology science concepts such as evenness, richness and abundance map onto education environments and policy making.

P6.24

CLONING AND EXPRESSION OF HtrA PROTEASE FROM STREPTOCOCCUS ORALIS

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The Viridans group of streptococci comprises multiple species, including Streptococcus oralis and S. mutans. These bacteria were recently identified as important causes of bacterial endophthalmitis following an outbreak in Florida caused by contaminated needles that were used for vitreous humor injections. Virtually nothing is known about the pathogenesis of these species in the eye, therefore, this laboratory sought to characterize their virulence. A screen of 20 clinical endophthalmitis strains of Viridans group streptococci showed that one strain, E664, possessed a putative protease. This protease was identified as being encoded by the gene htrA in the genome of S. oralis. Currently the gene htrA is being PCR-amplified from the genomic DNA of strain E664 to be expressed in E. coli as a recombinant protein. Following purification, the recombinant protein will be tested for functionality in protease assays. Recombinant HtrA will also be injected into the vitreous humor of a selected animal model to determine potential clinical effects. The long-term goal of this research is to identify the virulence factors of the Viridans group streptococci as potential targets for treatment of endophthalmitis caused by streptococcal species.

P6.25

PROTEASE ACTIVITY OF A VIRIDANS GROUP STREPTOCOCCUS CLINICAL ENDOPHTHALMITIS STRAIN

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Bacterial endophthalmitis is an infectious disease of the intraocular cavities caused by microbial organisms. Strain 14-4065 is an uncharacterized human endophthalmitis isolate belonging to the Viridans group streptococci. This strain was tested in a rabbit model of endophthalmitis along with 3 other uncharacterized strains, and was found to be one of the top two in terms of disease severity. The objective of this study was to isolate the protease activity to one or more proteases and identify them. Strain 14-4065 was isolated on blood agar, cultured overnight in Todd Hewitt broth containing 0.5% yeast extract (THY) at 37oC and 5% CO2, then subcultured in a larger quantity of THY to stationary phase. This culture was centrifuged to collect the bacteria, and the extracellular milieu was filtered to remove remaining bacteria. Then this sample was concentrated at least 100-fold, applied to an S300 gel filtration matrix (to separate proteins based on molecular mass), and 30-drop fractions collected. Concentrated supernatant and each fraction was applied to a polyacrylamide gel containing gelatin to ascertain protease activity in each fraction. Likewise, SDS-polyacrylamide gels of the fractions were done to visualize protein bands. Future plans after identification will be to clone and express protease in E. coli as a tool to purify high quantities of protease for characterization, and to test for damage to the vitreous humor.

P6.26

IDENTIFYING NOVEL VIRULENCE GENES OF NONENCAPSULATED STREPTOCOCCUS PNEUMONIAE

Aaron Blocker, Haley Pipkins, Jessica Bradshaw, and Larry McDaniel
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Streptococcus pneumoniae is a gram positive coccus that colonizes the nasopharynx and is the causative agent of numerous human diseases. Because current vaccines target the pneumococcal polysaccharide capsule, there is an apparent increase in the number of nonencapsulated *Streptococcus pneumoniae* (NESp) related infections. It is important to study these strains and identify potential drug and vaccine targets that will convey protection against both encapsulated pneumococci and NESp. We created multiple transgenic mutants in the avirulent NESp R36A by transforming it with genomic DNA from the virulent NESp LEK05. We performed biofilm assays to assess biofilm formation and biofilm viability. Hemolysis assays were performed to determine pneumolysin activity, and pneumolysin production was established via ELISA assays. We also examined epithelial cell adhesion to human nasopharyngeal cells using an adhesion assay. Biofilm production was variable in all transgenic mutants. However, all mutants remained viable after overnight growth in a biofilm environment. We saw decreased hemolytic activity, as well as

decreased pneumolysin production in all transgenic mutants. Of the thirteen transgenic mutants, three exhibited significantly increased epithelial cell adhesion. Strains to be used in an animal model were chosen based on these results. Our in vitro studies indicate that of the thirteen transgenic mutants, three mutants showed potential for increased virulence. Based on this information, these three strains will be further examined in animal models of nasopharyngeal colonization and otitis media. 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

P6.27

COLOR ENHANCED DETECTION (CED) FOR CT ANGIOGRAPHIC IMAGING IN ACUTE ISCHEMIC STROKE

Alana Kron[1], Anusha Chinthaparthi[1], Nisha Swaminathan[1], Majid Kahn[1], Patrick Farley[1], Jason Bryan[3], Amit Vasanji[3], Seth Lirette[2], Michael Griswold[2], Andrew Smith[1]
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Purpose: To create a real-time fully automated CT image processing algorithm that has equal or higher accuracy and use substantially less radiation than the routine CT angiogram (CTA) and CT perfusion (CTP) Code Gray exams.

Methods: For this single-institution single-reader retrospective study, adult patients who presented with stroke like symptoms triggering a Code Gray between 2010 and 2014 who had a confirmatory MRI were included in this study (N=231). Our cohort includes large and small vessel ischemic strokes as well as negatives. Patients were excluded if they had no confirmatory MRI within 24 hours (N=35), CTA and CTP imaging conducted >20 minutes apart (N=10), or CTA imaging conducted before CTP imaging (N=4). We had a final inclusion of 186 patients. A simulated multiphasic CTA exam derived from CTP images were processed using Color Enhanced Detection software. All images data sets (grayscale CTA, grayscale CTP and colored enhanced multiphasic CTA images) were evaluated for the presence or absence of an ischemic stroke. A single reader interpreted images, and the MRI findings were used as the reference standard. 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.

Results: The overall accuracy for reading sessions were as follows: 74% for CTP, 69% for CTA, and 70% for CED.

Conclusions: The color enhanced multiphasic CTA images had similar accuracy to routine CTA/CTP but was fully automated and had a substantially reduced radiation dose compared to CTP.

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

P6.28

EFFECTS OF ETA BLOCKADE ON RENAL INJURY ASSOCIATED WITH OBESITY

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Obesity is considered a major risk factor for chronic kidney disease (CKD) by contributing to diabetes and hypertension. Although the role of obesity in diabetic nephropathy has been extensively studied, the consequences of childhood obesity on the development of renal injury independent of diabetes have received less attention. My laboratory used Zinc Finger Nuclease technology to cause a mutation in the leptin receptor on the genetic background of the Dahl salt-sensitive (SS) rat (SSLepRmutant strain). This novel model develops early metabolic characteristics similar to obese children along with proteinuria as early as 6 weeks of age independent of diabetes. This study examined the effects of an ETA receptor antagonist, ABT627, on the development of renal disease in the obese SSLepRmutant strain. Experiments were performed on 12 week-old SSLepRmutant rats. Six rats were studied per group. Arterial pressure (via telemetry), proteinuria and podocyte injury were measured every 2 weeks until the animals reached 18 weeks of age. After 6 weeks of treatment, MAP was reduced by 20% in the treated group (215±8 vs. 173±6 mmHg, n=3-5). Chronic ETA blockade also attenuated the increase in plasma creatinine levels (1.3±0.2 vs. 0.7±0.1 mg/dL) and increased the survival rate of SSLepRmutant rats (83%, 5 of 6 vs. 50%, 3 of 6). In conclusion, these data indicate that ETA blockade increases survival rate and preserves renal function in SSLepRmutant rats.

P6.29

QUANTITATIVE CT IMAGING TUMOR RESPONSE BIOMARKER VALIDATION

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BACKGROUND: Anti-angiogenetic (AAG) agents inhibit tumor vessel growth, but not all patients respond equally to AAG therapy. eMASS is a quantitative CT imaging software platform designed to serve as a predictive biomarker in patients treated with AAG therapy. eMASS quantifies the Vascular Tumor Burden (VTB) and simultaneously allows the user to evaluate tumor response using existing imaging response criteria (RECIST, Choi Criteria, & MASS Criteria).

METHODS: IRB- approved, HIPAA- compliant retrospective study. Inclusion: Adult patients with metastatic disease treated by AAG agents (N=84). Exclusion: missing CT images (N=34), CT imaging > 4 months from the start of therapy (N=11), and non-contrast CT imaging (N=5). Final study cohort: (N=34 patients). We searched the UMMC tumor registry and formed a database that included patient demographics and survival times. Baseline and initial post-therapy CT images were processed using eMASS software, with quantification of the VTB and response evaluated by RECIST, Choi Criteria, and MASS Criteria. VTB was associated with time to progression = Progression-Free Survival (PFS).

RESULTS: The eMASS software successfully processed 100% (34/34) cases and quantified response per all imaging response criteria, calculated the VTB, and automatically output the data into a spreadsheet. Average processing time was approximately 10 minutes. There were no detectable errors in image display, processing, or data output. The VTB on the initial post-therapy CT images was associated with PFS.

CONCLUSIONS: Changes in the VTB on the initial post-therapy CT are associated with survival in patients with a variety of metastatic tumors treated with AAG agents.

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

P6.30

THE EFFECT OF THYMOQUINONE, BLACKSEED'S ACTIVE INGREDIENT, ON PANCREATIC CANCER CELL NUMBER

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Pancreatic cancer is a very aggressive cancer, with a death to incidence ratio of greater than 95%.[1] Its location in the abdominal cavity allows for quick and efficient cancer cell proliferation, invasion, and metastasis. Chemotherapy and radiation are ineffective and only cause pain to the patient. Recent work in our lab has shown that natural products can inhibit cancer cell growth, so we are seeking to understand the underlying mechanisms that interfere with growth, which is vital for improving the patients' well-being. The object of this study is to determine whether thymoquinone, the active ingredient in blackseed, reduces the number of pancreatic cancer cells, and if so, whether it reduces the count by inhibiting COX-2. In our experiment, Panc-1 cells were treated with thymoquinone for 24 hours, 48 hours, and 72 hours.. The cells were harvested by scraping. Afterward, the cells were centrifuged, washed in phosphate buffered saline (PBS), centrifuged, and washed again. The cells were then resuspended in 500 µL (microliters) of PBS. Various assays were run to evaluate the cell damage (lactase dehydrogenase assay), cell protein (BCA assay), and cell stress (reduced glutathione assay). Nuclear factor Kappa B (NFkB) was determined by Western Blot as a precursor to prostaglandin inhibition. Cellular morphology was also evaluated. Our resuls showed a decline in NFkB after 48 hours along with changes in protein and glutathione. The data suggest thyoquinone interferes with NFKB and ultimately prostaglandin synthesis.

P6.31

IS ACCESS TO HEALTHY FOOD ENOUGH TO ACHIEVE AN OVERALL WELLNESS?

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For decades, research has suggested that malnutrition leads to chronic diseases and that consuming a well-balanced diet could diminish these illnesses. Questions still remain about effective methods of reducing or preventing these conditions that have grown tremendously. If data support the correlation between malnutrition and chronic diseases, will proper nutrition

improve wellness? Will access to healthier food inevitably lead to the healthy food consumption?

To gain perspective on what prevents accessibility to fresh fruits and vegetable and lean meats, the MBK Service Scholar Community Insight Survey: Healthy Food Perceptions and Access survey was created and conducted to determine if access, education, clinical support and marketing were reasonable. Fifty surveys were distributed at two different food pantries.

The survey results were displayed healthy food education, clinical support and healthy food marketing were being used, but not together. Of the participants, 85.7% indicated a doctor told them to eat more fresh fruits and vegetables and lean meats, but only 43.8% reported having some form of nutrition education mostly due to a medical condition like diabetes. Though 60.4% of the participants indicated they saw healthy food messages daily, there was a correlation between those who saw these messages and those who were on sick or disability.

In conclusion, it is innocuous to believe that if all three components of nutrition education, clinical support and proper healthy food marketing were used simultaneously, the probability of more effective consumption outcomes would follow. Moreover, communities may achieve an overall wellness that could increase healthy food consumption. 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

P6.32

THE EFFECTS OF CUMIN BIOACTIVE THYMOQUINONE ON NASOPHARYNGEAL CARCINOMA SQUAMOUS CELL GROWTH

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Nasopharyngeal carcinoma is a squamous cell cancer occurring in the nasopharynx in the upper region of the throat where the auditory tubes and nasal passages merge into the upper respiratory track. Nasopharynx cancer often goes undetected, metastasizing rapidly into a 38% survival rate. Current treatments include chemotherapy, surgery, radiation therapy, and targeted therapy. Prior studies have found that the use of the black cumin bioactive thymoquinone can induce apoptosis in several cancer cell cycles, inhibiting the proliferation and metastasis of these diseases. The experiment used FaDu nasopharyngeal carcinoma squamous cells to determine the effects of TQ on the carcinoma cell cycle. Cells were treated with 5%, 25%, and 50% µM solutions of thymoquinone in groups of controls, 10 µL, 20 µL and 40 µL. The cell plates were harvested in groups of 24, 48, and 72 hours. Cell plates were scraped, stained on glass slides, or frozen. Lactase dehydrogenase (LDH) assaying was performed from the cellular supernatant and the frozen cells were thawed for use in BCA protein assays. Results from the LDH assay reveal that over a 24-72 hour period cells treated with a 25% µM solution of TQ experienced the lowest measured absorbance of formazan production, indicating cell plasma damage. The observed distortion and swelling of the plasma cell membrane and organelles further conclude that treatment with the natural chemotherapeutic thymoquinone affects the cell cycle in a way that inhibits the growth of nasopharyngeal carcinoma cells.

P6.33

VSG IS SUFFICIENT TO IMPROVE METABOLIC HEALTH IN SURGICAL MODEL OF MENOPAUSE

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Though collective data has shown that vertical sleeve gastrectomy (VSG), a surgical procedure that resects 80% of the stomach to improve obesity, targeted research in a model of menopause has not been reported. The purpose of this study was to investigate the impact of VSG using an ovariectomized (surgically-induced) rodent model. Female Long Evans rats underwent ovariectomy to induce menopause and then were placed on a chow (low fat) diet for 3 weeks and then were switched to a high fat diet (HFD) for 3 weeks on which they were maintained for the rest of the study. Finally animals received either a sham surgery (OVX-Obese) or the VSG procedure (OVX-VSG). In the 3 weeks following ovarietcomy, female rats increased significantly in body weight, mostly lean mass. Following HFD induction, female rats increased substantially in body weight again, this time it was mostly adipose and not lean mass. Following VSG surgery, OVX-VSG had significant weight loss compared to the OVX-Obese ($P<0.05$). OVX-Obese rats had a reduction in both total and adipose mass with no impact on lean mass. OVX-VSG had improved glucose tolerance. Fasted OVX-VSG had reduced levels of circulating triglycerides ($P<0.05$).

Furthermore, hepatic triglyceride were significantly ($P<0.05$) reduced in OVX-VSG in comparison to OVX-Obese group by assay and Oil red O staining. Taken together, VSG is sufficient to improve metabolic parameters in a model of surgical menopause. Future plans are to investigate the effects bariatric surgery after menopause to determine if it is sufficient to stave off menopause-induced weight gain.

P6.34

BARIATRIC SURGERY RESULTS IN ALTERED IMMUNE SIGNALLING DURING PREGNANCY

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Intrauterine growth restriction results in long term metabolic disease later in life. Our previous work using bariatric surgery to reduce maternal obesity resulted in the birth of small-for-gestational age offspring that develop later in life greater metabolic disease than obese controls. The mechanism driving this transmission of metabolic disease following bariatric surgery from mother to offspring is undetermined. In the present study we sought to determine if inflammation during pregnancy might be driving the phenotype in offspring. Female Long Evans rats were made obese on a palatable high fat diet and received either sham or vertical sleeve gastrectomy (VSG). RNA from gestational day 19 placenta was analyzed using Affymetrix microarrays and further bioinformatics using Genesifter and IPA software. Genes involved in "Granulocyte adhesion and diapedesis" were upregulated. Using real-time PCR we validated upregulation of mmp9 and il1rn ($P<0.05$). In order to determine if maternal immune status was altered, we measured circulating inflammatory cytokines using a 24 cytokine multiplex assay. IL-6 and TNF alpha showed some trend towards increase in VSG pregnant dams. VEGF in VSG was greatly reduced in comparison lean and obese control dams ($P < 0.05$). VEGF has been shown to also be reduced in preeclampsia which gives rise to IUGR offspring. Taken together, this data suggests VSG surgery prior to pregnancy alters immune signaling in the placenta and circulation. Future work will determine whether this inflammation results in apoptosis in the placenta.

P6.35

THE TRICHOMONAS VAGINALIS VIRUS AMONG MISSISSIPPI AND ATCC ISOLATES

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Purpose: Trichomoniasis is the most common non-viral STD worldwide. The disease is caused by the parasite Trichomonas vaginalis, which itself can be infected with a virus, known as T. vaginalis virus (TVV). Previous studies indicate that T. vaginalis strains infected with TVV are more easily treatable with the antibiotic metronidazole; however, it is also speculated that prolonged irritation can occur when TVV infected T. vaginalis is cured with the antibiotic. Four types of TVV have been identified, which are simply called TVV 1, 2, 3, and 4. The goal of this study is to characterize TVVs found in both ATCC strains (which have been used in numerous studies) and local clinical isolates.

Methods: RTPCR was used to type over 40 strains of Trichomonas vaginalis. Sanger sequencing was utilized to confirm PCR results.

Results: Eight ATCC strains of T. vaginalis were successfully confirmed through Sanger sequencing, as well as one strain local to the Jackson area. Of the 16 viruses confirmed among the nine strains, six were TVV1, three were TVV2, six were TVV3, and one was TVV4.

Conclusion: These results allow us to utilize previous experiments to speculate how each TVV may have affected T. vaginalis infection, treatability, and other behaviors.

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P6.36

RIBOSOMAL FRAMESHIFTING OF TRICHOMONAS VAGINALIS VIRUS 2,3, AND 4 ISOLATES

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Purpose: Trichomoniasis, the most common non-viral sexually transmitted disease with an estimated 2 million new infections every year in the world, caused by a flagellated protozoan parasite Trichomonas vaginalis. T. vaginalis itself harbors up to four strains of non-segmented double stranded RNA Trichomonas

vaginalis virus (TVV1-4). T. vaginalis virus encodes two genes, an upstream capsid open reading frame (CP ORF) and a downstream fusion RNA-dependent RNA polymerase (RdRp ORF). Literature studies suggest TVV2 and TVV3 might utilize -1 bp ribosomal frameshifting, while there is strong evidence that TVV1 undergoes -2 bp frameshifting during translation of RdRp in fusion with its capsid. However, there are not many available known genome sequences or many studies done on TVV4 ribosomal frameshifting. Here, we begin to investigate TVVs 2-4.

Methods: We used the only three known consensus sequence of TVV4, and designed sequencing primers. We also used cell cultivation, ultracentrifugation, mass spectrometry, RNA isolation, SDS-PAGE analysis, RT PCR, qRT PCR, gel electrophoresis, and DNA isolation and purification.

Results: The genome of a clinical isolate infected with TVV4 has been nearly completed. Virions were isolated by ultracentrifugation.

Conclusion: New samples of TVV4 genome have been sequenced in this research for future studies, including LC-MS analysis of tryptic digests that will allow elucidation of the frameshifting mechanism in TVVs 2-4.

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

P6.37

MINOCYCLINE REDUCES SYSTEMIC LIPOPOLYSACCHARIDE-INDUCED WHITE MATTER INJURY AND NEUROBEHAVIORAL DEFICITS

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Inflammation plays an important role in brain injury in neonatal human and animal models. Our previous studies have shown that systemic administration of endotoxin lipopolysaccharide (LPS) induces brain injury and behavioral deficits in the neonatal rats, which is associated with activation of microglia. The objective of the current study was to determine whether minocycline, a putative suppressor of microglial activation, ameliorates LPS-induced brain inflammation, brain damage, and neurological dysfunction. Intraperitoneal (i.p.) injection of LPS (2 mg/kg) was performed in P5 rat pups and minocycline (45 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 minocycline protected against LPS-induced neurobehavioral impairments, including reduction of mean latency times in wire hanging maneuver and hind-limb suspension. Minocycline treatment also provided protection against LPS-induced brain damage, including loss of oligodendrocytes as well as reduction of white matter size. Minocycline significantly attenuated LPS-induced increment in the number of activated microglia and concentration of IL-1beta in the neonatal rat brain and serum. These results suggest that minocycline may provide protection against systemic LPS exposure-induced brain injury and neurobehavioral disturbance, and that the protective effects are associated with its ability to attenuate LPS-induced microglial activation.

P6.38

RIBAVIRAN TREATMENT OF TRICHOMONAS VAGINALIS VIRUS

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Background: Trichomonaisis is a sexually transmitted disease caused by a flagellated parasitic protozoan, Trichomonas vaginalis. Trichomonaisis is the most common, but curable sexually transmitted disease worldwide. Most clinical isolates of T. vaginalis are infected with double-stranded RNA viruses. It is believed that these viruses not only affect the protozoan biology, but also the disease that is caused by the infection. T. vaginalis can contain up to four viruses known as TVV1-TVV4. We are interested in the mechanism of transmission of virus between cells.

Methods: Trichomonas vaginalis cells from the ATCC strain 347V+ and clinical isolates C8 and W107 were grown in the presence of ribavirin of varying concentrations (1000-4000 µg/mL). After RNA isolation, virus levels were analyzed by RT-PCR assay and gel electrophoresis.

Results: It did not appear that ribavirin had an effect on the growth of 347V+, C8, or W107. It does appear that the presence of ribavirin knocks down the viruses in these strains.

Conclusion: Preliminary studies have shown that TVV1, 2, and 4 can be knocked down by ribavirin.

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.

P6.39

CITALOPRAM PRODUCES CHANGES SIMILAR TO HUMAN AUTISM SPECTRUM DISORDER IN RAT MODELS

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Previous studies from our laboratory have demonstrated that early life exposure of rat pups to selective serotonin reuptake inhibiting antidepressants (SSRIs) such as citalopram result in marked behavioral and neurobiological abnormalities which persist into adulthood. Recent studies in humans have suggested that prenatal exposure to SSRIs results in an increased childhood risk of developing Autistic Spectrum Disorders. One limitation of previous work in this lab is that the SSRI exposure period was from postnatal day 8 (P8) to P21 which roughly corresponds to the third trimester of human pregnancy and first year of infant life. Moreover, the SSRIs have previously been administered directly to the pups rather than being introduced to them in utero via maternal circulation. In the present study, our laboratory aimed to more closely model human fetal/infant exposure to SSRIs by treating female rats throughout pregnancy and lactation with SSRIs and then following the behavioral and neurobiological development of the pups. Data from this experiment is still being processed.

P6.40

CIRCULATING CD95 IS INCREASED IN RATS WITH HELLP SYNDROME

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The CD95L system of apoptosis is part of the tumor necrosis factor family that contributes to T cell activation and inflammation. Studies have shown that women with HELLP (Hemolysis Elevated Liver enzyme Low Platelet) Syndrome have an increase in circulating CD95L and CD95. The objective of the current study was to determine if circulating and tissue levels of Fas and FasL are also increased in an animal model of HELLP syndrome. On gestational day (GD) 12, sEndoglin (7ug/kg/day) and sFlt-1 (4.7ug/kg/day) infusion began via mini-osmotic pump into normal pregnant (NP) rats. On GD18 carotid catheters were inserted, GD19 plasma and tissue were collected and CD95L was measured via western blot or enzyme linked immunosorbent assay (ELISA). CD95L was increased in placentas from HELLP rats compared to NP rats. Hepatic CD95L was undetectable via western blot, but was increased when measured via ELISA. Circulating CD95 was significantly increased in HELLP rats (179.6 +24.04 vs. 117.1+12.97pg/mL; p=0.05) in NP rats. CD95L was also increased in HELLP rats compared to NP rats (161.1+20.47 vs. 124.3+12.8 pg/ml). These data suggest that similar to women with HELLP syndrome, rats with HELLP syndrome have increased circulating CD95. Future studies will examine the effects of CD95 blockade on decreasing inflammation in rats with HELLP syndrome. 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

P6.41

ANGIOTENSIN PEPTIDE LEVELS IN A RODENT KIDNEY MODEL

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Angiotensin II is a component of the renin-angiotensin system (RAS). Angiotensin II acts a peptide hormone that regulates blood pressure and fluid balance. Human diseases, such as hypertension, diabetes, and kidney disease, are caused by excessive levels of the peptide Angiotensin II. Changes in the Angiotensin peptidome may not only reflect changes in physiological disease state such as hypertensive, diabetic, and others, but it may also be a predictor of how one responds to drug treatment therapies and other interventions. Our hypothesis is that by measuring differences in the Angiotensin Peptidome, we can predict disease state as well as responsiveness to drug treatment regimens. The objective was to try to improve our method of measuring the Angiotensin Peptidome in rodent disease models by trying two different approaches to plasma extraction to see if we could not only improve sensitivity but measure more members of the Angiotensin Peptidome. We expected to see an

improvement in recoveries and therefore better sensitivity and quantitation of Angiotensin peptides after LS/MS analysis. Our results show that the traditional protein crash method of extraction was superior to all approaches and the SPE method alone had interferences but was not significantly different from the traditional method for the major analytes of interest but may have potential benefits when other mammalian plasmas are analyzed. We will use other rat and/or human disease models as sources of plasma to look for changes in the Angiotensin Peptidome that might be important in understanding illness and disease progression. 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

P6.42

PHOTOTHERMAL THERAPY OF PROSTATE AND LIVER CANCER CELLS USING MULTIFUNCTIONAL GOLD NANOMATERIALS

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Prostate cancer and liver cancer are two of the leading causes of cancer deaths in the United States. Prostate cancer has the highest prevalence among US men and liver cancer has one of the highest cancer mortality rates. Currently available treatments are less effective at early diagnosis and for treatment in advanced stages. New diagnostic and therapeutic methods using multifunctional gold nanomaterials provide promising results without the severe side effects of traditional treatment. Gold nanomaterials (nanorod and nanostar) are functionalized by anti PSMA antibody and Raman dye attached RNA aptamers to target LNCaP human prostate cancer cells. This provides selective and sensitive detection of specific cancer cells. After attachment to the cancer cells, near infrared (NIR) 785 nm continuous laser source is used to create surface plasmon resonance (SPR) in the gold nanomaterials attached to the cancer cells. SPR causes local heating at the cancer cell site, leading to destruction of the cancer cells. A similar process is used to destroy antibody and aptamer coated HEP G2 liver cancer cells. Surface enhanced Raman spectroscopy (SERS) is used for diagnosis and monitoring progress of the cancer cell photothermal therapy. 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.

P6.43

HIV CLIENT TESTING AND COUNSELING SATISFACTION STUDY

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The government study reported that greater than 1.2 million people in the United States are living with HIV infection, and almost 1 in 8 (12.8%) are unaware of their infection (Aids.gov, 2014). The service of rapid HIV testing has been used for 23 years to combat the number of infections. The aim of the study was to determine the level of satisfaction among the HIV clients. Throughout the course of February 2015 to June 2015, Rapid HIV clients were given a survey to describe their experience of receiving HIV tests by My Brother's Keeper, INC. My Brother's Keeper is a non-profit organization that specializes in the enhancement of many different health disparities and preventions. Several statistics relating to HIV-along with the history and effects of rapid HIV testing were compared to the survey results. It was shown that out of 87 clients, 96.8 percent indicated that they received their test results in a timely manner, 97.6% of clients specified that the counselor demonstrated good clinical explanations and skills. Overall, 100% of the clients were satisfied with the services that was provided by the MBK's-Inc.

P6.44

POTENTIAL BIOMARKERS IN RAT ACUTE KIDNEY INJURY MODEL

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The goal of this study was identify novel protein biomarkers in a rodent model of Acute Kidney Injury (AKI). AKI is the unexpected or rapid decline in renal function that can be caused by a number of occurrences including limited blood flow or direct damage to the kidney, as well as ureter blockage to the kidney. AKI causes significant morbidity and mortality to those stricken with it. Diabetics and people with other kidney maladies are at high risk. Hypothesis: Important protein biomarkers of interest in an AKI rodent model can be identified and quantified by Mass Spectrometry

methods. We used microsomal fractions prepared from tissue homogenates of rat kidney medulla and cortex in our studies. Liquid Chromatography/Mass Spectrometry (LC/MS) methods were developed and utilized to perform Discovery and Targeted Proteomics experiments on the samples. This data was analyzed using the software Protein Pilot to produce a "hit list" of potential biomarkers and to identify the proteins that might be important in the disease state in a rat AKI model. The proteomics approach taken in this study identified several proteins that might be of interest as biomarkers. Several of the differentially expressed candidates were previously observed in a proteomics study. Of the interesting protein candidatesidentified, L-dehydrogenase is thought to be a potential ''hot spot ''for glaciation events. 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

P6.45

NEAR INSTANT BONE DENSITY ANALYSIS OF SPINE USING UNENHANCED OR CONTRAST-ENHANCED CT-IMAGES

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Background: A retrograde study was performed to assess previous CT scans for low bone density or osteoporosis. The purpose of this study was to develop methods to rapidly assess bone density on unenhanced and contrast-enhanced CT images using routine vertebral body attenuation measurements, thereby massively increasing screening for osteoporosis and low bone density.

Purpose: To establish CT colorization techniques for rapid bone density screening of the spine.

Methods: Non-enhanced CT images of the mid lumbar spine were obtained in 147 participants with a quantitative CT (QCT) imaging phantom in place. Attenuation at T12, L1, and L2 was associated with measured bone mineral density (BMD) to derive optimal cut points for colorizing osteoporosis as red, low BMD as blue, and normal BMD as green. A visual assessment of sagittal grayscale image was performed.

Results: Vertebral body bone density and CT attenuation on both unenhanced and contrast-enhanced CT images are highly correlated. Mean CT attenuation for unenhanced CT 145.8 HU and contrast enhance CT 167.5 HU for at T12, L1, and L2. The vertebral body attenuation on contrast-enhance CT images was 22 HU higher than on unenhanced CT images from the same patient. It is therefore possible to measure bone density on unenhanced and contrast-enhanced CT images by simply measuring vertebral body attenuation.

Conclusion: The study showed that it was possible to determine a patient's bone density based on scans that were used for other indications.

P6.46

THREE DIMENSIONAL ARTERIAL MODEL TO SIMULATE AND CHARACTERIZE VASCULAR CACILFICATION IN VITRO

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There are many causes if cardiovascular disease, but calcification is one of the most reoccurring causes. Vascular calcification can ultimately lead to heart disease and even death. Calcification takes place when smooth muscle cells in the arteries undergo a mutation. This mutation causes them to become osteoblasts. After they become osteoblasts they begin to deposit bone minerals in the arteries. This is problematic because this mineralization decreases the elasticity in the artery. In addition to degradation of elasticity, calcification affects blood flow in the artery. A decrease in elasticity can lead to hypertension. We are currently in the process of creating a 3D model of the vascular artery. There will be two models, one will display the endothelial cells and collagen. The other will contain the endothelial cells, smooth muscle cells, and collagen. We will use 2D schematics of each model in order to guide the process. Controls will be given DMEM with 10% FBS and 1% Pen/Strep (1-2 weeks). After calcification is evident both models will be soaked for 24- hours in 0.6% N HCL for decalcification. They will then be solubilized in 0.1% N NaOH/ 1% SDS. The models will be analyzed for calcium, using an atomic absorption spectroscopy. Calcium content will be normalized into protein content using the BCA Protein Assay. These models will hopefully give us a better idea of how and why smooth muscle cells mutate into osteoblasts and how that mutation might be suppressed. 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

P6.47

INFLUENCE OF SOCIAL MEDIA ON SEXUAL RISK BEHAVIOR AMONG MISSISSIPPI COLLEGE STUDENTS

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It is believed that high rates of social media use among college students create the likelihood of engagement in risky sexual behavior. The use of the internet to facilitate communication and connection between users via computer or mobile device is defined as online social networking. Social networking sites (SNS) are used for numerous reasons including but not limited to: maintaining existing social ties to forming new social ties. At 2014, the University of California Los Angeles (UCLA) conducted a study from 2005 to 2013 that discovered online networking grew by 64% among adults 18 and older. A survey was conducted at local colleges and universities in Jackson, MS and surrounding areas to collect the opinions of college students. Additional studies by the University of Montana found that SNS may facilitate sexual partnering and negatively influence sexual behavior especially among college students. The study also suggested that various topics and photos shared among SNS participants also influence individual's sexual behaviors. 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

P6.48

EXAMINING THE KNOWLEDGE, ATTITUDES, & BELIEFS OF THE AFFORDABLE CARE ACT

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We have studied the impact of the Affordable Care Act (ACA) that was proposed by president, Barack Obama, and signed into law in March of 2010. The ACA is a combination of the Affordable Health Care for America Act, the Patient Protection Act, and the health care related sections of the Health Care and Education Reconciliation Act. The bill offers a reduction for health care fees by capping out of pocket expenses and requiring all preventative care to be fully covered and without cost to the individual. The bill potentially will decrease the budget by $100 billion over the next ten years and could improve the economy. In this study we questioned the population awareness, attitudes and beliefs about the ACA. Based on the results 79.2 percent of the people knew what the Affordable Care Act was; 66.3 percent of the people knew the requirements to be eligible for the Affordable Care Act; 62.4 percent of the people were familiar with the benefits of the ACA; 92.1 percent of the people have heard of the ACA; 87.1 percent support the Affordable Care Act; 36.6 percent of the people disagree that low income families take advantage of the ACA. The study outcome indicated that the ACA may greatly improve the healthcare status for individuals that currently cannot afford insurance. Additionally, minimum standards of what health insurance must cover 44 million Americans who currently do not have health insurance are projected to be covered under new healthcare law. 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

P6.49

WHAT IS THE RELATIONSHIP BETWEEN OBESITY AND SOCIAL-ECOLOGICAL FACTORS IN MISSISSIPPI?

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Obesity has been a public health priority in Mississippi for over a decade; the association between obesity and socio ecological factors in Mississippi with adults has not been explored. The objective is to purposefully identify some socio ecological factors and link them to obesity with adults in Mississippi. A cross sectional community health survey was conducted in 2013 by Project Change. The participants were a community-based sample of adult's ≥†18 residing in Mississippi. The keywords used are obesity, socio ecological, Mississippi and adults. Descriptive statistics, including Chi-square tests and analysis of variance (ANOVA) were used to examine the distribution of variables by race. Of 4438 participants, the majority had never smoked, dieting was average, and physical activity was "somewhat active". Most families were mostly eating at fast food restaurants sometimes and their health status were good. In conclusion, the overall health

status of Mississippians can be linked to some socio ecological factors. 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

P6.50

THE EFFECTS OF SEX EDUCATION ON COLLEGE AGE FEMALES

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With the growing number of pregnancies, STIs/STDs, and HIV/AIDs infections in Mississippi, education systems, clinics, and community-based programs are cracking down and educating our youth, especially females, about the risky behaviors that could lead to unplanned pregnancies and unwanted infections/diseases. Existing data shows that there is a need to further examine the impact of current sex education and teen pregnancy efforts within the state. According to the Mississippi State Department of Health, in 2012, Mississippi had the highest rates of Chlamydia and Gonorrhea in the U.S. with and more than half the cases being among adolescents and young adults aged 15-24 years old. The data for this study was collected through survey distributed at local colleges and universities in and around Jackson, MS. While the number of teen pregnancies has seen a decline from 64.1 in 2009 to 42.6% in 2013 Mississippi is still among the top five U.S. states for teen pregnancies. This study concluded that none of the current forms of sex education seemed to have a significant effect on the teen pregnancy/STD/HIV rate among the participants. Females who engaged in unprotected sexual behavior, were likely to continue the same behavior after the intervention. The study also found that participants, who used protection, did not have any STD/pregnancy history. Based on the results of this study, it is imperative that innovative approaches be used to reduce rates of teen pregnancies and STD diagnoses among college age females. 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

P6.51

IMPACT OF COMPREHENSIVE VS. ABSTINENCE ONLY SEX-EDUCATION ON YOUNG-PEOPLE SEXUAL RISK BEHAVIORS

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Teen pregnancy prevention is of great concern in Mississippi, which has the highest teen pregnancy rate in the US. The consequences of high risk adolescent sexual behaviors, particularly pregnancy and sexually transmitted infections (STIs), have a profound, long term impact on the lives of Mississippi teens and adults. The objective of this research was to see if young people, age 10-22 who received comprehensive sex education are more knowledgeable regarding safe sex practices and as a result make better decisions regarding their sexual behaviors. Data was analyzed from the Sexual Risk Behavior Survey that was disseminated at local community colleges, universities and high schools to gauge the sexual risk behaviors of young people, age 10-22 who received comprehensive and or abstinence only sex education. The Sexual Risk Behavior Survey was disseminated and collected amongst 47 participants, 23 males and 24 females. Based on the results of the Sexual Risk Behavior Survey, 45.8 percent of people think that others learn sex education from friends. 66.7 percent of them have received either comprehensive sex education or abstinence only sex education. 35.4 percent of them think people receive their information about sex from school. 31.3 percent are taught sex education by their parents. 70.8 percent have been taught sex education in middle school. The only significance was feel comfortable with sharing information with others based on sex education he or she have received. 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

P6.52

IS PHYSICAL ACCESS TO HEALTHY FOOD ENOUGH TO INCREASE THE PROBABILITY-OF CONSUMPTION?

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For decades, research has suggested that malnutrition leads to chronic diseases and that consuming a well-

balanced diet could reduce or prevent illnesses such as type 2 diabetes, cardiovascular disease, obesity, cancer, dementia and many other diseases. With this bouquet of chronic diseases being so prevalent, questions still remain about effective methods of addressing, reducing or eliminating health related conditions that have swelled to epidemic proportions. Specifically, if data supports the correlation between malnutrition and chronic diseases, will proper nutrition automatically improve wellness? More importantly, will access to healthier, fresh, quality food inevitably result in the consumption of that food? Organizations like Healthy Food Financing Initiative (HFFI) aim to increase access to healthy food for low-to-no income communities that the HFFI indicated as food deserts, which is defined by the USDA as urban neighbourhood and rural towns without ready access to fresh, healthy and affordable food. The solution supplied is to give the town and neighbourhoods classified as food deserts physical access to a supermarket or grocery store so there is a place to purchase and receive healthy food like fresh fruits and vegetables and lean meats. However, providing supermarkets and grocery stores is not enough. If access is defined as the ability to obtain healthy food, then there are several factors that depend on if something is accessible. Our study results indicated that in such communities where individuals have easier access to fast food restaurants and convenience stores it appears less time consuming to choose fast food restaurants.

P6.53

IMPACT OF BELIEFS-REGARDING CVD ON CVD RISK-BEHAVIORS AMONG AFRICAN-AMERICAN WOMEN IN CENTRAL-MISSISSIPPI

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The southern half of the U.S., especially in Mississippi, African American women are strongly linked with poor cardiovascular disease (CVD). It has been reported that about half of women are unaware of cardiovascular disease being a major killer in women. Although campaigns are working to advance the awareness and knowledge of CVD, there is a stagnation in the recognition of CVD in women of ethnic minorities. The aim of this study was to evaluate participant's awareness and perception of CVD. The results show that 53% of the participants believe the false statement that men and women show the same symptoms; 52% believe that they would have warning signs of high blood pressure/hypertension; 7% always eat at least 5 fruits and vegetables a day; and only 24% of the participants exercise regularly while most of them rarely or no exercise. With the exception of the belief that one can having warning signs of high blood pressure and that men and women have the same symptoms for CVD, the participants mostly have the right perception about CVD. A limitation of the study is that the sample may not be representative of the African American female population in Central Mississippi. This study suggest that other factors including socioeconomic status, the proximity of one to healthy food, and inaccessibility to an exercising facility may contribute to CVD risk behavior. 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

P6.54

THE IMPACT OF EDUCATION LEVEL ON HIV/STI RATES AMONG AFRICAN AMERICAN MSM

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Education levels has been widely regarded as a significant factor that has impacted sexual risk behavior and sexually transmitted infections (STIs). Research has been conducted to evaluate the correlation between individuals' education levels and their sexual behavior history. The purpose of this research is to determine if there is evidence that suggests a correlation among literacy levels and rates of exposure to HIV/STIs for African American MSM. Data for this research analyzed from by My Brother's Keeper. Inc's MARI Study, an ecological study of sexual behavior and HIV/STI. Participants of the MARI Study consist of Black men who have sex with men ages 18 and older. In order to be eligible for the study, participants must have been born and identify as a male, live in Jackson, MS, Atlanta, GA or surrounding areas of these two cities, and been sexually active, either oral or anal sex, in the past six months. Pearson's Product Movement and Spearman's Rank Order correlation tests were utilized to examine research variables. The total sample size for the study was 387. Contrary to the hypothesis, results of this study indicate that there is no correlation or a small positive correlation between participant's education

level and whether they were diagnosed with STI's in the last 12 months. However, based on the Significant 2-tailed value, there is not enough evidence to determine if this is a true correlation, which suggests a more in- depth analysis be conducted using a larger sample size. 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

P6.55

KNOWLEDGE-AWARENESS OF HIV-FACTS, INFECTION ROUTES AND MYTHS AMONG GENERAL-POPULATION JACKSON, MS MSA

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The purpose of our research project is to find out if a lack of HIV knowledge and awareness is a factor which contributes to the high prevalence of HIV infections in Mississippi. Studies similar to ours have been conducted in Africa which demonstrate that a population's overall knowledge of HIV helps to reduce the rate of new infections per year. However, to the best of our knowledge the current study is the first conducted in Mississippi. We decided the best way to conduct research of peoples knowledge of HIV was to survey them pertaining to their knowledge and awareness of HIV. The data were collected using a questionnaire which was distributed via hand to the study participants in Jackson, and the surrounding metro statistical area (MSA). In a global analysis, our results showed that 77.2% of the participants were knowledgeable of HIV. However, when we grouped the participants by age, male □24 and ≥ years of age, the results showed a discernible gap in the knowledge. Males under the age of 24 scored a mean of 70.0% while the rest of the population scored a mean score of 82.3%. We concluded that this difference of 12.3% may indicate that younger participants had less knowledge of HIV facts and such deficiency in awareness may contribute to the increased rate of new infections observed in male age 13-24 years of age. 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

P6.56

THE IMPORTANCE OF PROPER MEDICAL INTERPRETATION

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Although medical interpreting is a federally mandated service, it suffers from chronic underfunding and understaffing. This creates the need to exhaust all other strategies before scheduling a professional interpreter. Without the proper reinforcements, these national standards are regrettably regarded as voluntary by a majority of healthcare providers. Thu, the aim was to investigate the importance of proper medical interpretation in patient care settings. We observed that 31% of respondents in a recent survey were unaware of the laws concerning the right for interpreter use. This lack of awareness is what leads to either acceptance of lower quality interpreting or none at all. Past findings consistently favored professional interpreters over adhoc interpreters in areas concerning communication, utilization of clinical services, clinical outcomes, and satisfaction with clinical care. In addition, professional interpretation services meet legal requirements but they also ensure a skill and vocabulary level superior to that of the average adhoc interpreter. Furthermore, it was supplementary to the healthcare provider benefits since the use of such serviced was associated with shorter hospital stay; reduced readmission rates; reduced malpractice risk; increased patient satisfaction and improving adherence and outcomes. It has been determined that professional interpreter use leads to an experience that most closely resembles that of a non-LEP client. In conclusion the need for medical interpreters was proven effective, and needed to improve patient care outcomes. 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

P6.57

KEY FACTORS THAT IMPACT THE KNOWLEDGE-PERCEPTIONS AMONGST COLLEGE-STUDENTS INVOLVING-ABSTIENCE VS COMPREHENSIVE-SEX-REGARDING SEXUAL-RISK-BEHAVIORS

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The objective of this study was to examine the knowledge and/or perceptions amongst college students sexual-behavior influences and determine if there was a difference in sexual behavior outcomes in college students who received comprehensive sex education versus those who only received abstinence only sex education. This research study for this subject included taking a small sample of various college students from the area of Jackson, MS along with the students participating in a short survey. The survey was disseminated at local community colleges and universities in the Jackson, MS area then input later on analyzed for frequencies or correlations which ever was found applicable to the data that input. In addition to the surveys that were disseminated other forms of research about the subject was conducted to better understand the subject for the importance yet value in the research itself. The results of the study were to certain degree of shock considering the studies that were conducted prior. The results showed that currently more students are being informed about abstinence or comprehensive-sex from their parent's rather than peers-friends. While analyzing the data it also displayed that in the past students received most of the information containing sexual education from their friends not parents. Another result showed that college males typically had a more negative thought or perception about abstinence or comprehensive sex while the females were more positive. The data reflected in the sample that were surveyed to be most of the students were African-American, twenty-years of age, student at JSU. 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

P6.58

THE IMPORTANCE OF RAPID HIV TESTING AND CLIENT-SATISFACTION SURVEYS IN ASSESSING TESTING-SERVICES

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Rapid HIV testing (RAT) is commonly been used in many countries and is more convenient than the conventional classic HIV test. However, one of the major issues dealing with rapid HIV testing is that most clients may not return for their test results. The goal of this study was to investigate why individuals are not interested to return for their test results and to provide a reliable service to the clients. From January 2015 to June 2015, MY Brother's Keeper (MBK's) services surveyed 87 rapid HIV testing clients in order to gain knowledge of how the organization could deliver proper services to clients in the near future. Our research has shown that client satisfaction surveys were a beneficial to both rapid HIV testing clients and healthcare providers. According to the data, almost 100% of the clients tested were satisfied with MBK's services. Survey was confidential, thus, the Clients felt easier to be honest about their experiences. In addition, the Clients wanted access to additional tests and they favored the fact that the tests could be free. We concluded that RAT and the confidential survey will help healthcare providers to offer the best patient care service as possible and it will ultimately aid in eradicating HIV. 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

P6.59

EVALUATION OF SEX EDUCATION AMONG MISSISSIPPI STUDENTS

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Sex education is not as effective in schools as it is with a real in depth seminar of sex education in its entirety. Mississippi ranked high for teen pregnancy rate, low birth rate, gonorrhea and chlamydia rate, and HIV rate. The purpose of this study is to evaluate student's feedback of the sex education in schools compared to sex education seminar given by Delta Region AIDS Education Training Center. House Bill 999 that was issued by Governor Barbour required every school in the state of Mississippi had to adopt a method of sex education by June 2012. Whether the method was Abstinence-only or Abstinence-plus, it was required to be implemented in the school curriculum. The research outcome indicated that sex education was fulfilling its purpose.

This was supported by the facts that health disparities rates was slowly decreased. In addition, the Delta Region Aids Education Training Center (DRAETC) has conducted a sex education seminar at Tougaloo College. The target population was 16 -18 year olds.

This study was conducted during the Summer Bridge program at the Tougaloo College. The DRAETC provided a curriculum fit for the target population. After the seminar an evaluation was provided, through survey monkey an online survey site, to analyze their feedback and compare demographic information to the information studied in our research. Questions asked were demographic information, prior sex education experience, knowledge level before and after seminar, effectiveness of sex education seminar, and if available resources are available to them. 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

P6.60

PLANT RHIZOSPHERE BACTERIA WITH ANTAGONISTIC ACTIVITY AGAINST DRUG RESISTANT PATHOGENS

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Soil- and plant-associated environments host bacterial species that produce diverse types of antibiotics. It has long been assumed that the primary function of these metabolites is to directly suppress competitors and yield a survival advantage to the producing bacteria in highly competitive environments. Recent studies suggest that antibiotics play several other important ecological roles. They may suppress plant pathogens, promote virulence on host plants, and protect bacteria from predation by protozoa and nematodes. In this study, we screened over 200 strains of rhizosphere bacteria of various geographic origins for the capacity to antagonize Gram-positive and Gram-negative pathogens. Our screening revealed several strains of Pseudomonas chlororaphis, Paenibacillus polymyxa, and Pectobacterium betavasculorum that secrete antimicrobial metabolite(s), which effectively inhibit the growth of Escherichia coli and Burkholderia cenocepacia, as well as the growth and biofilm formation in Staphylococcus aureus. We are currently working on the identification of pathways involved in the production of novel antimicrobial compounds. In the long run, our results may aid in the development of strategies to control pathogens with resistance to commonly used antibiotics. 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

P6.61

NITRIC OXIDE SYNTHASE EXPRESSION IN WOMEN WITH PREECLAMPSIA

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Preeclampsia, a hypertensive disorder in pregnancy, is characterized byproteinuria, vasospasm, and endothelial cell damage.These symptoms may be due to an imbalance of endothelin-1, a potent vasoconstrictor, and nitric oxide, a vasodilator of placental arteries. Studies indicate that endothelin-1 production is indicative of endothelium dysfunction and that it is most common among African-Americans. Given that African American women are at a higher risk of developing preeclampsia, these women might have a decrease in nitric oxide bioavailability compared to women of other ethnic backgrounds. This study was designed to measure the gene expression for endothelin receptor A, endothelin receptor B, and nitric oxide synthase 2A from placental mitochondria RNA extracted from women with and without preeclampsia. This study will also compare nitric oxide synthase production and endothelial cell reactivity between Caucasian and African-American women. First,mitochondriaRNA from placental explants was extracted via guanidine isothiocyante and phenol, chloroform method to measure the relative expression of genes of interest. The mitochondria RNA transcript for nitric oxide synthase 2A expression is increased in preeclampsia women when compared to normal pregnant women. For the placental explants that were cultured for 48 hours and co- cultured with human umbilical vein endothelial cells for 24 hours, Caucasian women with preeclampsia secreted more nitric oxide synthase compared to the other groups. Placental explants from African-American women with preeclampsia do not stimulate nitric oxide synthase from vascular endothelial cells, as seen in Caucasian women. These results suggest that African American women with preeclampsia are at a higher risk for endothelial damage. 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

P6.62

ACCUMULATION OF CHOLESTERYL ESTERS IS ASSOCIATED WITH THE PROGRESSION OF PROSTATE CANCER

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Background: To date, specific predictive biomarkers in differentiation of indolent from aggressive prostate cancer (PCa) are lacking. This study is aimed to demonstrate cholesteryl esters are racially specific biomarkers in diagnosis and prediction of outcomes of PCa.

Methods: We performed global lipid profiling by ESI/MS-MS on 47 fresh-frozen prostatic tissues, Real-time PCR for the expression level of genes related to the pathogenesis of prostate cancer and metabolism of cholesteryl esters on 16 fresh-frozen prostatic tissues, and immunohistochemistry for the expression level of ACAT1 and LAL on 165 formalin-fixed and paraffin embedded prostatic tissues

Results: We found that total lipids, total neutral lipids, cholesteryl esters are most sensitive to differentiate PCa from benign prostatic tissues (5.8-fold, p=0.004)) among lipid groups. The expression level of genes Pten, LIPA (gene for lysosomal acid lipase, LAL) and ABCA1 are obviously lower in high grade than in low grade prostate cancer. It is interesting that the proteins of ACAT1 and LAL reversely correlate with progression of PCa: In PCa, ACAT1 is highly expressed, but LAL is not expressed. In contrary, in benign prostatic tissues, ACAT1 is not expressed, but LAL is highly expressed.

Conclusion and Significance: Accumulation of cholesterol esters correlates with the progression of prostate cancer. Depressed expression of LAL could play major role in accumulation of cholesterol esters in PCa. These results suggest that cholesteryl esters could be biomarkers in diagnosis of PCa, and are also of potential prognostic biomarkers and therapeutic targets for PCa.

P6.63

EVALUATION OF FEMUR FOLLOWING DELIVERY OF ESTROGEN IN OSTEOPOROTIC RAT MODEL

Meisha Ross, Fa'Jada Bobo, Michelle Tucci, Zelma Cason, and Hamed Benghuzzi
University of Mississippi Medical Center, Jackson, Mississippi, United States

Loss of estrogen is known to precipitate menopause and loss of bone. Estrogen replacement therapy is a treatment for osteoporosis, but its use is limited due to the estrogenic effects that can occur on the reproductive and breast tissue. The objective of the study was to explore the use of tricalcium phosphate (TCP) delivery system to continuously deliver a physiological dose of estrogen in an osteoporotic condition and to evaluate changes in bone density and bone architecture. Ovariectomized Sprague Dawley rats were divided into three equal groups (n=8 per group). Animals in group I served as control, animals in groups II and III were surgically implanted with either empty (SHAM) or estrogen filled TCP implants. Eight animals from each group were euthanized at 8 weeks post implantation. Femurs were evaluated for changes in density, and evaluated for changes in the bone architecture. Results of this study revealed (1) TCP implants were capable of delivering estrogen for long duration, (2) use of sustained delivery of estrogen did not induce untoward effects in the vital organ, and showed estrogenic changes in the uterus, fallopian tubes, and vaginal tissues, and (e) Estrogen increased bone density in osteoporotic female rats.

P6.64

EVALUATION OF BONE NODULE FORMATION AFTER STIMULATION USING A PULSED MAGNETIC FIELD

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Lumbar spinal fusion is one of the more common spinal surgeries, and its use is on the rise. If the bone fails to fuse properly, then a pseudarthrosis or “false joint” develops and results in pain, instability, and disability. Inductive coupling is a technology which includes combined magnetic fields (CMFs). The purpose of this study was to evaluate the effects of a CMF device known as the Zavation Lumbar Bone Growth Stimulator (Zavation, Brandon, MS) on MG-63 (ATCC® CRL1427TM) human osteosarcoma cells at treatment depths ranging from 0.5” to 6.0”. The cells were grown on 4-well chamber slides that were kept in a nickel-alloy chamber within an incubator. During treatment, an apparatus held both the treatment device and the chamber slide. Briefly, the chamber slide was placed inside an acrylic tube at a specific distance from the transducer housing, and the device was turned on for 30 minutes. The chamber slides were then returned

to the incubator to be assayed and stained. The alamarBlueTM cell viability assay and Alirizin red staining were used to demonstrate cell viability and morphology at various time points including 3 days post-treatment (PT), 7 days PT, 14 days PT, and 21 days PT. Our results showed that compared to control cells, the cells located at 3" had the greatest increase in viability whereas those located from 0.5" to 1.5" had decreased viability and those from 4.5" to 6" showed no change. These data suggest that 3" is the ideal treatment depth for the Zavation device.

P6.65

SUSTAINED RELEASE OF ESTROGEN ON SPINE PRESERVATION IN AN OSTEOPOROTIC RATS

Keteria Jones, Laneisha Jackson, Michelle Tucci, Zelma Cason, and Ham Benghuzzi
University of Mississippi Medical Center, Jackson, Mississippi, United States

Osteoporosis leads to degenerative disc disease. The current modalities of treating symptomatic degenerative disc disease are non-surgical or surgical. Non-surgical modalities include improving body posture and back muscle strengthening through physical therapy. Surgical treatment includes removal of the disc material and intervertebral fusion, or artificial disc replacement, which is still in experimental phases in the United States. However, there is not a cure for osteoporotic degenerative process. Ideally, treatment would prevent the degeneration. An understanding of the role of estrogen in intervertebral disc disease is crucial in order to develop new methods to preserve the disc. The objective was to explore the use of tricalcium phosphate (TCP) delivery system to continuously deliver physiological level of estrogen in an osteoporotic model and evaluate changes in the spine endplate and preservation of disc height. Ovariectomized Sprague Dawley rats were divided into three groups (n=8 per group). Animals in group I served as control, animals in groups II and III were surgically implanted with empty (SHAM) or estrogen filled TCP implants adjacent to L4/L5. Eight animals from each group were euthanized at 8 weeks post implantation. The lumbar spine was evaluated for endplate associated changes. Results of this study revealed (1) TCP implants were capable of delivering Estrogen for long duration, (2) use of sustained delivery of estrogen preserved the uterus, fallopian tubes, or vaginal tissues, (3) Estrogen stimulated chondrocyte differentiation in the spine, and (4) Estrogen administration resulted in preservation of disc height in osteoporotic female rats.

P6.66

THE PREVALENCE OF CERVICAL CANCER IN MISSISSIPPI CAUSED BY HPV

Tameka Jones and Hamed Benghuzzi
University of Mississippi Medical Center, Jackson, Mississippi, United States

According to recent statistics from the Centers for Disease Control and Prevention (CDC), Mississippi has some of the highest rates of sexually transmitted diseases (STDs) in the United States. Mississippi also has an alarming rate of cervical cancer with a rate of 8.04-9.54 per 100,000. Cervical cancer is caused by the sexually transmitted infection HPV, which is also associated with several cancers. There are many factors that play a part in the large rates of cervical cancer in Mississippi and the following research project was undertaken to explore the contributing factors. A review of cervical cancer rates in Mississippi by county, assessment of the economic status of each county, the number of insured and uninsured residents by county, a review of the types of sexual education programs that are being offered in our state, and rate of HPV vaccinations were evaluated using public databases. Our results show Mississippi has lowest vaccination rate in the nation with only 12% of girl's ages 13-17 years old actually complete the vaccine. Hinds, Jackson and Harrison Counties had the highest rates of cervical cancer, and Quitman County had the highest rate of cervical cancer death. Quitman County also had one of the largest percentages of people living below the poverty level. Hinds, Jackson, and Harrison Counties have the largest number of uninsured residents in the state. Without changes in education regarding HPV vaccination and increasing awareness and access to care Mississippi will remain having the highest cervical cancer rates in the nation. 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

P6.67

REPLICATIVE ROBUSTNESS AS A DRIVER OF INFLUENZA EVOLUTION

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Influenza viruses remain an important human pathogen, infecting a significant proportion of the human population on an annual basis. Influenza vaccines must be reformulated every year to account for the evolution of viruses in the human population, where it is typically

seen that a new virus strain emerges and rapidly displaces those previously circulating. Although this has been thought to be associated with escape from antibody neutralization, very little is understood about what drives evolutionary success in an outbred, polyclonal population. We have previously shown that increasing the robustness of viral replication can enhance evolutionary fitness in the presence of polyclonal antibody, even in the absence of antibody escape (Thangavel et al, Virol J 8:180, 2011). We wish to determine whether this enhanced fitness in the presence of polyclonal antibody translates to a general enhancement of fitness to other challenges, such as the presence of antiviral drug. This will be determined by determining the relative sensitivities to antiviral drug such as ribavirin of viruses which demonstrate different degrees of replicative robustness. Preliminary data suggest enhanced resistance to ribavirin, an inhibitor of RNA virus replication, in virus resistance to polyclonal antibody. We shall also test whether differences in replicative robustness translates to differences in the ability to select mutant viruses with heightened antiviral resistance.

P6.68

PROTEOLYTIC AND CYTOTOXIC ACTIVITY OF *STREPTOCOCCUS PNEUMONIAE* STRAIN K1263deltaPLY.

Elizia Thomas[1] and Mary Marquart[2]
[1]Alcorn University, Lorman, MS and [2]University of Mississippi Medical Center, Jackson, Mississippi, USA

Streptococcus pneumoniae is a bacterium that normally resides in the human nasopharynx, but causes opportunistic infections such as pneumonia, septicemia, otitis media, and ocular infections. The focus was on an infection called keratitis, inflammation of the cornea. Streptococcus pneumoniae has a protein toxin, pneumolysin,that forms pores in host cells membranes and causes an inflammatory response. The goal of the current study was to test the roles of other virulence factors within the bacteria when pnemolysin, also known as K1263ΔPLY, was deleted.

The objective was to prepare an environment from K1263ΔPLY and fractionate the proteins contained therein to separate and test them for protease activity and cytotoxicity. If protease or cytotoxic activity was present, the objective was be to create mutant strains of Streptococcus pneumoniae deficient in the gene encoding the relevant proteins. Eventuallys each mutant strain will then be used in an animal model to test whether the protein is important in pathogenesis. Proteins were fractionated and separated on an SDS-PAGE gel to visualize. Gelatin zymoography was also performed to determine protease activity, and finally a cytotoxicity assay using human corneal epithelial cells was done. Two of the Zymograms showed visible protease activity and cytotoxicity. Therefore, the strain K1263ΔPLY does secrete toxins.

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

P6.69

ISOFLURANE INDUCED CYTOTOXIC CHANGES IN A549 CELLS

Genesis Johnson[1,2], Temarria Hunter[1,2], Dejah Carter[1,2], Michelle Tucci[1], Hamed Benghuzzi[1], and Joseph A. Cameron[2]
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Genotoxicity and cytotoxicity are among the known detrimental effects of the volatile anesthetics. The aim of the present work was to study the effects on the proliferative activity of alveolar A549 cells to after *in vitro* exposure to isoflurane at 2 and 5% concentrations. Our data indicated significant reduction of viability, suppression of mitotic activity more than 60%, and that these alterations were accompanied by increased lactate dehydrogenase after 1 and 2 hours of exposure. This data is important since the A549 cells are characteristic of type II pneumocytes which play a central role in lung functions as main surfactant producers. In addition they are also the progenitor cells in the normal tissue turnover. In conclusion, isoflurane applied at clinically relevant concentrations exerts cytotoxic effect on the alveolar cells *in vitro*, which could modulate respiratory function. Acknowledgement: The work was supported in part by the US Army REAP program.

P6.70

ISOFLURANE INDUCED CHANGES IN CELLULAR MORPHOLOGY OF A549 CELLS

Temarria Hunter[1,2], Genesis Johnson[1,2], Dejah Carter[1,2], Michelle Tucci[1], Hamed Benghuzzi[1], and Joseph A. Cameron[2]
[1]University of Mississippi Medical Center, Jackson, MS, USA and [2]Jackson State University, Jackson, MS, USA

A549 cells have a well-developed intracellular

membrane network, which supports the assumption of faster and easier anesthetic penetration. The aim of the present work was to determine the morphological effects associated with delivery of clinically relevant anesthetic doses of isoflurane for 1 to 2 hours. The cells were then evaluated for morphological changes 24 and 48 hours later. The results showed nuclear abnormalities such as fragmentation along with the bi- and tri-nucleated cells. Hydrophic swelling was evident suggesting a disruption of cytoskeleton integrity. Treated cells also had increased vacuoles compared to the untreated control cells. Increased number of morphologically impaired cells was detected in all treated cells during the post-treatment period. Initial analysis after 24 hours revealed the presence of nuclear halos. The 48 hour time period showed evidence of nuclear and cellular fragmentation. The nuclear and cytoplasmic changes are hallmarks for cellular impairment which ultimately trigger activation of cell death pathways. In conclusion, isoflurane administered for short periods of time can exerts cytotoxic effect on the alveolar which may lead to of stress-induced apoptosis. Acknowledgement: The work was supported in part by the US Army REAP program

P6.71

EPIDEMIOLOGICAL ANALYSIS OF A METHICLLIN- RESISTANT *Staphylococcus aureus* OUTBREAK IN THE NICU

Michayla Hunter, Kelli Gutter, Regina Galloway, and Donna Sullivan
University of Mississippi Medical Center, Jackson, MS USA

During the spring and summer, the Infection Prevention Office noted an increase in the number of MRSA infections among patients in the Newborn Intensive Care Unit of a large teaching hospital. In response, infection control measures were implemented and surveillance screening of hospital facilities and personnel were implemented to determine whether there was an active outbreak and, if so, identify the source. The objectives of the study were to collect all clinically relevant MRSA isolates from the NICU, screen all health care workers in the NICU by nasal swab for MRSA carriage, and to collect environmental swabs from common areas within the NICU. These isolates were then evaluated using molecular epidemiological methods. These methods are designed to determine whether isolates are genetically identical, closely related, or evolutionary separate. MRSA isolates identified by the Clinical Microbiology Laboratory were obtained in pure culture and single colonies were selected for analysis. Both organisms and extracted DNA were cataloged and stored. Patches of MRSA grown on purity plates were washed in PBS, treated with lysostaphin, and subjected to protease digestion. DNA was purified in an automated system employing a spin column protocol. Concentrations were determined on a Nanodrop spectrophotometer. MRSA DNA was analyzed for specific genes, including the Panton Valentine leucocidin toxin, mecA, gamma, mecA types A and B, as well as the staphylococcal chromosome cassette (SCC) type and the spa gene. Reactions used Ready-to-Go PCR beads in a total volume of 25 µl and cycling parameters of 95ºC/10m, 95º 30 s-55ºC 30 s - 72ºC 1m (35 cycles), 72ºC 10 min. Loading buffer (2.5 µl per 25 µl reaction) was added to completed PCR reactions. Amplicons were electrophoresed in 2% agarose/TAE buffer at 100 mA constant current. For Spa reactions, only 5 µl of the total reaction was employed in gel analysis. The remaining 20 µl was used for purification of DNA and subsequent sequencing reactions. The spa amplicons from each isolate were purified by polyethylene glycol (PEG) precipitation and resuspended in water. Chromatograms and sequence data was analyzed using the Lasergene SeqMan program. Spa sequences were submitted to the Ridom Spa server to determine type. An increased number of MRSA infections were noted in the NICU, with a total of 30 patients identified as converting to MRSA positive in a six month period. Healthcare workers in the NICU were screened for carriage of MRSA and 17 of 213 (7.8%) tested positive, a rate much lower than expected. Environmental samples were obtained from a common area of the NICU and MRSA isolates were identified on equipment and countertops. Analysis of isolates by PCR for PVL, mecA, Gamma, mec type A or B, and SCC type as well as sequencing of the Spa gene was employed to characterize isolates. Review of electronic records and genotypic analysis of MRSA isolates indicated epidemiological links between at least 4 healthcare workers and individual patients. Infection Prevention Protocols for decolonization of workers as well as increased training in hand hygiene were implemented with a subsequent dramatic reduction in infection rates among patients. 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

P6.72

UNDERSTANDING PAIN AND OPIOID USE IN MISSISSIPPI

Anna Adorno, Michelle Tucci, Denise Krause, and Hamed Benghuzzi
University of Mississippi Medical Center

Estimates of geographic variation among states and counties in the prevalence of opioid prescribing were

developed using data from a large (135M) representative national sample of opioid prescriptions dispensed during 2008 by 37,000 retail pharmacies and reported in J Pain. 2012 Oct; 13(10): 988–996. The data obtained from that study revealed the following: (1) Geographic variation in prevalence of prescribed opioids was greater than variation observed for other healthcare services. (2) Counties having the highest prescribing rates for opioids were disproportionately located in Appalachia and in Southern and Western states. One study of opioid prescribing by primary care physicians during 1992–2001 reported that physicians in the Northeast and Midwest were significantly less likely to prescribe opioids than those working in the South and West, which was consistent with findings of other studies of using opioids for back pain. Wide geographic variation may reflect differences in the prevalence of injuries, surgeries, or conditions requiring analgesics. In addition, low prescription rates may indicate under-treatment, while high rates may indicate overprescribing and increase the risks of misuse. The objectives of the study were: (1) To determine the number of qualified pain centers in the our state.(2) To compare the counties with increased opioid use in MS. (3)To determine if the need is related to injuries/illness. Our results show dispensed opioid in Mississippi was seven times higher than mean for all other states. Interestingly, the pain centers in Mississippi were found primarily in counties having higher socioeconomic profiles. The data also showed that injury or illness rates did not correlate with location of pain centers. Geographical Information System (GIS) graphing of the data per county revealed counties with higher than 25% poverty rates had no pain centers within a 50 mile radius, while counties with under 19% poverty ranged between 6 to10 pain clinics within a 50 mile radius. Most of the pain centers did not accept Medicate and Medicare. Our data shows the use of opioid prescribed does not reflect the areas reporting significant illness or injury and locations tend to be centered in counties with higher incomes. Additional studies are needed to address the reason for the higher opioid administration in Mississippi compared with the other states. 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

11:00 - 11:50

Room TC 216

Population Health Hands On Workshop

Michael Ryan and Eric George

Friday, February 19, 2016

AFTERNOON

12:00-1:00- Plenary Speaker

1:00-3:00- Millsaps HHMI Undergraduate

HISTORY AND PHILOSOPHY OF SCIENCE

Chair: Mike Schmidt,
University of Mississippi Medical Center

Vice-Chair: Nedah Nemati,
Mississippi State University

Vice-Chair: Trey Suttle,
Independent Scholar

Thursday, February 18, 2016

MORNING
Room Union A

O7.01

8:10 EMERGENTISM GOES BEYOND SEEING THE FOREST FOR THE TREES

Mike Schmidt
University of Mississippi Medical Center, Jackson, MS, United States

Methodological reductionism has a long and successful history of facilitating scientific discovery. The success of reductionism, however, has resulted in a vast pool of facts and findings with insufficient understanding about not only their relationships to each other, but their roles in higher-level entities. While the power of reductionism is undiminished, current questions in philosophy and psychiatry require an additional approach. Emergentism is often viewed as reductionism's opposite, but emergentism and reductionism are complementary. A pleasant salty taste is an emergent property of combining the reactive metal, sodium, with the poison gas, chlorine. Reductionism allows us to pull table salt into its component parts, but it lacks the power to predict many of their characteristics when reassembled. The components do not sum, nor do they often multiply. More is simply different, acting within a new context. I here extend the common atom-to-molecule and ant-to-colony examples of emergence by presenting circuit and network properties. Circuits appearing identical in terms of reduced components can exhibit vastly different properties in higher-level contexts. These further support emergentism as a necessary philosophy

for making sense of reductionism's many poorly understood findings.

O7.02

8:40 LAW & ORDER: ECOLOGY

Georgia Rae Rainer
Florida State University, Tallahassee, FL, United States

A continuous debate in the philosophy of science concerns whether or not there are scientific laws in ecology. It has been difficult to demarcate the exact criteria that would be needed to establish a law, as well as to distinguish between accidental regularities and proper laws. While these factors complicate matters, hope is not lost for potential ecological laws. In this paper, I will briefly consider some features and common misconceptions about laws in general, but my focus will be on the account given by Marc Lange (2005) to define laws and then apply that concept to ecology. Next, I will argue against Lange's account of ecological laws and demonstrate the inability to constrict laws to their individual fields based on his definition. This move fails because the stability of the set of laws is dependent upon the delimitation of counterfactuals that are logically consistent with the other laws in the set. Once the set is restricted to a particular discipline, namely ecology in this case, then it is vulnerable to counterfactuals that would have otherwise been ruled out by laws that fall into other disciplines. In other words, the laws are dependent upon one another in regards to counterfactual analysis and this dependence is compromised when the field is restricted to a single discipline, resulting in a loss of stability for the set. Finally, I will conclude that ecology is not reducible to more fundamental fields, but is also not autonomous in the sense of Lange's usage.

O7.03

9:10 A LANGE-MAHER RAPPROCHEMENT

Aaron Brooks
Florida State University, Tallahassee, FL, United States

Patrick Maher has argued for the predictivist thesis, which asserts "evidence which was used in formulating a hypothesis does not confirm the hypothesis as strongly as it otherwise would" (p327). The basic idea is that evidence E which is predicted and confirms the hypothesis H in question gives H a higher probability of being true than E which is accommodated and confirms H. But in his essay, "The Apparent Superiority of Prediction to Accommodation as a Side Effect," Marc Lange replies to Maher by arguing that what really matters is whether or not H is judged to be an arbitrary conjunction. That is, the fact that E is predicted or accommodated does not, by itself, "make [E] better evidence for the hypothesis" (p577). Rather, Lange argues for what I shall call the conjunction thesis: if a prediction is taken as evidence for the truth of H, it is only taken as such when H is judged to be a non-arbitrary conjunction; its conjuncts are taken to have a physical basis/connection. I will argue that we can show Lange's construal of the issue to be insufficient. There are two ways I do this. First, I argue that predictions are sometimes given special weight even though scientists judge them to be arbitrary conjunctions. Second, I argue that the only relevant way scientists can judge predictions to be non-arbitrary is by recourse to method. Thus, method is inextricably bound up with the conjunction thesis.

O7.04

9:40 DEBUNKING MORAL REALISM: THE SCIENTIFIC AND THE MORAL-AGENT APPROACHES

Jorge Oseguera Gamba
Florida State University, Tallahassee, FL, United States

There are two ways of approaching moral phenomena: as a scientist or as a moral agent. On the first approach—call it the external approach—we take morality as an empirical phenomenon that can be explained using scientific methods. On the second approach—call it the internal approach—we try to answer questions such as how should we act and how our moral beliefs justified. Debunking arguments intend to arrive to metaethical conclusions from scientific explanations of moral phenomena. More specifically, they aim to conclude that our moral beliefs are not justified because their genealogical explanation does not imply their truth. It has been argued that debunking arguments illegitimately conflate the two approaches. I will agree with that criticism in that as moral agents we do have to start with the internal approach, but I will argue that insights from the external approach are extremely relevant. The important question to answer is what is the best explanation for our moral beliefs. If moral realism is assumed, then the genealogical explanation of our moral beliefs is not satisfying; but if moral anti-realism is assumed, then the genealogical explanation is satisfying and the debunking conclusions follow. My argument will be that we should not assume any of those positions; we have to evaluate each explanation based on their theoretical virtues. Because the genealogical explanation has more explanatory power and more clarity than the one proposed by the

moral realist, then we can conclude that our moral beliefs are not justified.

10:10 Break

O7.05

10:20 PUBLIC INTELLECTUALS AT THE SMITHSONIAN: REPRESENTATIVES OF SCIENCE IN THE NINETEENTH CENTURY

Lance Burch
Florida State University, Tallahassee, FL, United States

This project examines prominent nineteenth century scientists who operated from—and alongside—the Smithsonian Institution. By examining archival correspondence, reports, and financial records, as well as contemporary news sources and secondary books and journals, I found that these individuals operated beyond the scientific community as public intellectuals. It is my assertion that these individuals functioned as "representatives of science" to the American public, while harnessing their status to establish America's place on the international scientific scene. Of specific interest is the process by which famed ichthyologist and curator Spencer Fullerton Baird, and his successor George Brown Goode, utilized their dual positions at the Smithsonian and as heads of the U.S. Fish Commission to establish themselves as scientific emissaries to the domestic and international publics. Ichthyology projects and collections at the Smithsonian became internationally coveted under their supervision, and the exhibits these men constructed at various International Exhibitions—which won numerous awards—were direct vectors for global public outreach. This study also reveals the crucial importance of Solomon G. Brown, first black employee at the Smithsonian and assistant to three Secretaries, as well as a public intellectual himself. Beyond his duties at the Institution, Brown was extremely active in the black community of D.C., giving scientific talks and playing an active role in many of the exhibitions. Also of note was the ornithologist Robert Ridgeway, who was an active public scientific figure in the capital during the late nineteenth century, concurrent with much of Goode's time as Assistant Secretary of the Smithsonian.

O7.06

10:50 THE CUVIER-GEOFFROY DEBATE OF 1830: EXPLAINING ANIMAL STRUCTURE

Kenneth Curry
University of Southern Mississippi, Hattiesburg, MS, United States

Georges Cuvier (1769-1832) and Étienne Geoffroy Saint-Hillaire (1772-1844) were noted zoologists and comparative anatomists in France's Muséum Nationale d'Histoire Naturelle in the early nineteenth century. Their opposing views to studying animal anatomy, first aired in the early 1820's, culminated in a public debate in 1830. The debate brought to a focus significant aspects of biological ideas, scientific methodology, and cultural and institutional politics that reverberated through the nineteenth century. Cuvier's approach to animal anatomy, captured in his phrase "conditions of existence", was characterized by Aristotelian teleology dominated by empirical attention to details of integration that allowed animals to function as wholes. Geoffroy's approach, captured in his phrase "unity of composition", was characterized by Platonic idealism and German Naturphilosophie seeking unity of structure across animal groups, what later came to be called homology. Cuvier was thoroughly empirical in his methodology whilst Geoffroy found strict adherence to empirical data too restrictive for the free play of creative ideas. Complicating the issues at stake was the fact the France at that time had the only state-sponsored scientific establishment, bringing science under bureaucratic control, embraced by Cuvier but discomforting to the idealist Geoffroy. Both men occupied extreme, untenable positions with respect to animal anatomy that captured the attention of the scientific community and strongly influenced directions biological research assumed in the decades that followed.

O7.07

11:20 THE ROLE OF THEORIES OF PERSISTENCE FOR MODELING BIOLOGICAL SPECIES

Paula Smithka and Kenneth Curry
University of Southern Mississippi, Hattiesburg, MS, United States

Science provides models which best reflect the empirical data which scientists have. In considering what constitutes the best model for biological species, the nature and persistence of a species must be considered. Three theories regarding the persistence of objects currently debated in philosophical literature are endurantism, perdurantism, and exdurantism (or stage theory). Endurantism is considered to be the "common sense" view of persistence because it captures our notion that an object considered yesterday is the same object considered today. For example, the book on the

desk today is the same book that was there yesterday. Objects are "wholly present" at each time they exist. Perdurantism considers objects to be four-dimensional, temporally extended things. The "book on the desk" considered yesterday and again today, are temporal parts of the time-worm that is the book. Exdurantism accepts that objects are four-dimensional, temporally extended things. The "book" considered yesterday and again today are instantaneous stages of the four-dimensional object, the book. Theories of persistence are frequently associated with current theories about time: eternalism (all times, past, present, and future equally exist) and presentism (only the present exists). Endurantism is typically associated with presentism while perdurantism and exdurantism are typically associated with eternalism. What theory of persistence and of time best models biological species? One might think that perdurantism or exdurantism are better suited. We argue that despite the currency gained by four-dimensional models in physics and the species-as-individuals hypothesis in biology, endurantism may be the most effective model for biological species.

12:00 -1:00 General Sessions

Thursday, February 18, 2016

AFTERNOON

Room Union A

O7.08

1:00 THE LOST ART OF MEDICINE: ARCHIVING AS A NOVEL LEARNING EXPERIENCE

Jedd Audry, Lauren Williamson, Mary Ball Markow, Rachel Sharp, and Ralph Didlake
University of Mississippi Medical Center, Jackson, MS, United States

While many agree that art and humanities have important roles in medicine, their place is not easily defined especially in an increasingly technological environment. Given this, the arts and humanities are not often incorporated into formal medical curricula. However, a team of four medical students had the opportunity to archive and catalogue biomedical illustrations spanning the 35 year career of a single medical illustrator. Over the course of two summer sessions, this team applied their knowledge of gross anatomy and access to the medical library to contextualize and catalogue 3137 illustrations. Working through tracings, transparency sheets, preliminary sketches, and final illustrations required the team to consider the entire graphic production process including the artist's view, the surgeon's, scientist's or physician's view, and finally their own views regarding what each image represents.

Experiencing the archiving process and the secondary research necessary to contextualize the procedures, topics, and purposes of each image compelled the team to consider the collection as a historical narrative informed by art and the humanities, while retaining appreciation of the technical detail and content of individual illustrations. Thereby, the group not only augmented their medical education in a novel way but also chronicled a history of biomedical illustration as a science education resource. This presentation describes the technological, educational, and philosophical features of this experience.

O7.09

1:30 TWO MEDIEVAL LOGICAL MODELS: THE NOVEL PARAPHRASE VS. SEMANTIC INNOVATION

Michael J Fitzgerald
Independent Scholar, Hattiesburg, MS, United States

There are two medieval logical models for handling oblique terms in basic categorical propositions, e.g. possessive constructions like "Buridan's ass." One model gives an account of a 'semantic logical model' (S-L) for complex subject terms in basic categorical propositions which allows for them to have 'two subject terms', i.e. a grammatical and logical subject term. The other is a 'determinable/determinate grammatical model' which forbids two subject terms. The first strategy is favored by the 14th century logician Albert of Saxony and the English logicians of the period, and the second by his critic, John Buridan and the French logicians. I maintain that the two medieval logical models foreshadow the important modern debate in the philosophy of logic between the 'novel paraphrase' strategy and the 'semantic innovation' strategy to revise the modern 'classical' logical system.

2:00 Business Meeting

Friday, February 19, 2016
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. Francis Tuluri,
Jackson State University

Vice-Chair: Dr. Loren White,
Jackson State University

Vice-Chair: Dr. Duanjun Lu,
Jackson State University

Co-Chair: Dr. Remata Reddy,
Jackson State University

Thursday, February 18, 2016

MORNING
Room TC 227

O8.01

9:00 KERNEL DENSITY ESTIMATION FOR IDENTIFYING THE ASSOCIATION BETWEEN AIR POLLUTANTS AND ASTHMA

Francis Tuluri[1], Darius Miller[1], Amit Gorai[2]
[1]Jackson State University, Jackson, Mississippi, USA,
[2]National Institute of Technology, Rourkela, Odisha, India

Estimating air pollutants densities (hot spots) is very important in taking remedial measures to improve human health and hence protecting the local people from health disorders. The present study examines the use of Kernel Density Estimation (KDE) to find association between air pollutants concentrations and Asthma prevelance in New York State, U.S.A. Besides county-wise Asthma discharge rate, three air pollutants ($PM_{2.5}$, SO_2, and O_3) were considered in the region for the period of 2005 to 2007. KDE technique was used for hotspot analysis of air pollution from annual average air pollutants concentrations. KDE technique is used for understanding the effect of exposure of high air pollutants to asthma discharge rate. The minimum annual average concentrations of PM2.5 for 2005, 2006, and 2007 were 6.7 µg/m3, 5.5 µg/m3, and 5.6 µg/m3, respectively. The maximum average concentrations of PM2.5 for 2005, 2006 and 2007 were 17 µg/m3, 14.4 µg/m3, and 16.1 µg/m3, respectively. The maximum values of annual average of maximum 8 hours daily average concentration of O3 in 2005, 2006, and 2007 were found to be 46.38 ppb, 45.03 ppb, and 47.93 ppb respectively. The minimum values of annual average of maximum 8 hours daily average concentrations of O3 in 2005, 2006, and 2007 were found to be 26.84 ppb, 26.41 ppb, and 16.78 ppb respectively. The major hotspots for asthma discharge rate are observed in the same counties as that of PM2.5, SO2, and O3. KDE technique enables capturing hot spots without requiring exhaustive sampling to identify risk prone areas.

O8.02

9:30 MODELING ANALYSIS OF EMISSION SOURCES FOR OZONE CONCENTRATION OVER EL PASO, TX

Duanjun Lu[1], Rosa Fitzgerald[2], William Stockwell[3]
[1]Jackson State University, Jackson, MS, USA,
[2]University of Texas at El Paso, El Paso, TX, USA,
[3]Howard University, Washington DC, USA

Currently, 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

9:45 OCEAN-ATMOSPHERIC INTERACTIONS AND INTENSITY CHANGE ASSOCIATED WITH HURRICANE KATRINA

Remata Reddy, Duanjun Lu, Francis Tuluri, Mehri Fadavi
Jackson State University, Jackson, MS, USA

The NCAR Weather Research Forecast Model (WRF) was used to study the role of surface fluxes including heat, momentum, and latent heat, which play a dominant role in the formation and Intensity change of hurricane Katrina, 2005. Katrina became a category 1 hurricane and made landfall on the Miami-Dade/Broward county line. After crossing South Florida and entering the Gulf of Mexico, Katrina began to strengthen reaching Category 5 on 28th August about 250 miles Southeast of the mouth of Mississippi river.

Later Katrina turned to Northwest and north, making landfall in Plaque mines Parish, Louisiana just South of Buras with 140 mph winds as category 4 hurricane on 29th August. Mesoscale model simulations are used for forecasting and to receive better understanding the structure and dynamics of hurricane activity. The model was run on a doubly nested domain cantered over the central Gulf of Mexico, with grid spacing of 90 km and 30 km. WRF was run for 6 hr. periods, from August 28th to August 30th. The model is capable of simulating the surface features associated with hurricane Katrina including strong heat and latent heat fluxes, intensity change. High sea surface temperatures around 34 degree Celsius were observed over the surrounding region of Gulf of Mexico. Sea level pressure (930 mb), wind speed (59 ms^{-1}) and precipitation (253 mm) data output were in agreement with the observations of NOAA National Hurricane Center.

10:00 Break

O8.04

10:15 VARIATIONS IN ATMOSPHERIC FRONTS AT THE SURFACE FROM MULTI-PLATFORM MEASUREMENTS

Loren White
Jackson State University, Jackson, MS, USA

A vehicular observing platform is used to make transects of cold and stationary fronts in and near Mississippi. Measurements were made of temperature and humidity at 10-second intervals. Time series from mesonet and ASOS/AWOS fixed observing sites during frontal passages are also compared. Results show substantial variations in character of the air mass changes in the vicinity of fronts, in relation particularly to precipitation systems and wind flow. The study will also discuss the possibility of coincidence of discontinuities in different meteorological parameters.

O8.05

10:30 LARGE SCALE FLUXES, PROCESSES AND HEAVY PRECIPITATION ASSOCIATED WITH TROPICAL STORM LEE

Warith Abdullah, Remata Reddy, Ezat Heydari, Wilbur Walters
Jackson State University, Jackson, Mississippi, USA

Tropical Storm (TS) Lee formed September 2nd, 2011 from a broad but disorganized tropical wave that entered Western Caribbean in late August. While the storm's core meandered inland on September 4 roughly 50 miles (80 km) southwest of Lafayette, LA, squalls impacted Gulf Coast the day prior. On September 4th, Lee's pressure dropped to 986 mb and made landfall on Louisiana-Mississippi coast on September 5th. Lee's high moisture content and slow movement promoted 24 hour rainfall totals in excess of 5 inches (127 mm) to 11 inches (281 mm) in most locations over the Gulf States. We further investigated possible relationships between large-scale heat fluxes and intensity changes associated with landfall of Lee, and examined vertical motions associated with intensity change of Lee. Data on Convective Available Potential Energy (CAPE), sea level pressure and wind speed were obtained from Atmospheric Soundings and NOAA National Hurricane Center (NHC), respectively for the period of August 25 to September 10, 2011. We developed an empirical model and C++ program to calculate surface potential temperatures and heat fluxes using above data. Vertical motions were computed using CAPE values. Studies showed large-scale heat fluxes reached maximum (4500W/m2) with central pressure 988 mb. Convective Available Potential Energy (CAPE) and vertical motions peaked during landfall. Large vertical atmospheric motions associated with land falling Tropical Storm Lee produced severe weather including thunderstorms, tornadoes, heavy precipitation, and large-scale floods.

O8.06

10:45 WETLAND LAND-USE/ LAND-COVER CHANGES AS AFFECTED BY NATURAL AND HUMAN INDUCED DISTURBANCE REGIMES

Ranjani Kulawardhana, Taimei Harris, Eric Gulledge, Paul Tchounwou
Jackson State University, Jackson State University, USA

Estuarine wetland ecosystems serve many ecosystem products and services including provisioning of unique habitat linkages between marine, aquatic and terrestrial ecosystems. Their ecological health is closely tied to surrounding watersheds and is strongly affected by increasing levels of anthropogenic activities and climate change impacts. This study aims to understand impacts of natural and human-induced disturbances on wetland Land-Use/ Land-Cover (LULC) changes of the Grand Bay NERR, Mississippi, USA. Specific objectives were to: 1) evaluate and quantify LULC changes within estuarine wetland extent and its immediate surrounding from 2001 to 2015; 2) understand if the changes observed were due to the errors associated with classification algorithms and/ data rather than actual change on ground; and 3) to evaluate the impacts of shoreline change (as affected by rising sea levels and shoreline erosion), and increased human disturbances (as reflected in upland

LULC conversions) on the changes in wetland LULC. We applied a remote sensing based LULC change modelling approach using medium- to very high-resolution remote sensing data. Our findings indicate significant changes in both estuarine wetland and upland landscapes. Thus, using historical remote sensing data our study will further evaluate the potential impacts of human disturbances and shoreline changes on these observed changes in wetland LULC.

11:00 Session Discussions

11:30 Business Meeting

AFTERNOON
Poster Session
1:30 – 3:00

P8.01

STUDIES ON WILDFIRES, AEROSOLS, CLIMATE IMPACTS and HEALTH EFFECTS

Lenetta Mallory, Jordan Darensbourg, Remata Reddy, Mehri Fadavi
Jackson State University, Jackson, MS, USA

This study has been undertaken for the NOAA Centre for Atmospheric Sciences (NCAS) Project at Jackson State University (JSU) to investigate the interactions of PM 2.5 µm and the Rim Fire of August 17, 2013. The Rim Fire is the third largest wildfire that California has ever seen before. The fire started miles away from Yosemite National Park in the county of Tuolumne on August 17, 2013 and continued until September 6, 2013. The fire spread through the forests and parts of Nevada with 257,314 acres burned. The Rim Fire burned down acres in only a matter of days and this caused the temperature to increase with the burning fire and smoke. The PM 2.5 µm and the ozone concentration data for the aforementioned event, and over several closest cities to the fire were taken from EPA's Air Quality System (AQS). The study showed that there is an increasing aerosol levels in the atmosphere and decreasing ozone concentration. Based on the temperature data of Almanac, the effects of the fire were found to increase the temperatures of the surrounding cities like Groveland, California and Yosemite National Park. The study predicts that there may be health effects caused by California's Rim Fire that may lead to chronic lung, heart issues and irritation to eyes.

P8.02

ADCIRC ANALYSIS OF HURRICANE ISAAC (2012) STORM SURGE

Tony Hurt
Jackson State University, Jackson, MS, USA

According to the National Hurricane Center (NHC), the single greatest threat posed to life and property from tropical cyclones is storm surge. Despite numerous cases throughout history which have illustrated its devastating impact worldwide, storm surge remains a very complex phenomenon, involving the interaction of many intricately woven attributes, which all too often have combined to inflict multitudinous amounts of human casualties and physical destruction. According to the National Oceanic and Atmospheric Administration (NOAA) National Ocean Service (NOS), the state of Mississippi has 359 miles of tidal coastline, which represent the shorelines of outer coast, offshore islands, sounds, bays, rivers and creeks vulnerable to the impact of storm surge. For the purpose of this study, a simulation of the landfall of Hurricane Isaac (2012) along the northern coast of the Gulf of Mexico is analyzed. The ADvanced CIRCulation (ADCIRC) hydrodynamic circulation model is used to provide storm surge elevation at selected locations along coastal Mississippi occurring during the lead up to, and landfall, of Hurricane Isaac. A relationship is then established between modelled data and observed storm surge values which were obtained from NOS and U.S. Geological Survey (USGS). Although Isaac was of minimal hurricane strength at landfall in south eastern Louisiana, reported storm surge heights along the Mississippi coastline generally ranged between five and nine feet.

P8.03

WEATHER OBSERVATIONS CONSISTENCY BETWEEN MOBILE PLATFORM AND FIXED STATIONS

Jaylond Harvey, Loren White
Jackson State University, Jackson, MS, USA

The purpose of this study is 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 measurements that will be observed and compared are 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. The local conditions of prevailing weather such as rainy and cloudy factors are also important during observations. The results will be discussed to explain the exploration of how the potential for

consistency between the mobile platform and fixed stations could be used together.

P8.04

ANALYSIS OF METEOROLOGICAL VARIABLES INFLUENCING AIR QUALITY IN NEW MEXICO & TEXAS

Kara McCaskill, Duajuan Lu
Jackson State University, Jackson, MS, USA

Ground ozone causes damage to human health and environment. Understanding the contributing factors and the positive correlation between ground-level ozone and temperature is essential. Ozone cases were selected from an air quality database during the period of June-August, 2011, in New Mexico and Texas. Meteorological variables including pressure, humidity, temperature, and wind will be examined to see the reason why ozone cases happened and how could it be prevented.

P8.05

DIAGNOSING AND MODELING A SEA BREEZE CASE OVER GULF COASTS

Geselle Coleman, Duanjun Lu, Pao-Chiang Yuan, Hui-Ru Shih
Jackson State University, Jackson, Mississippi, USA

In this investigation, a sea breeze was diagnosed and reported for Sept 16, 2014. A sea breeze circulation is a mesoscale phenomenon that is driven by daytime heating contrasts between land and water surfaces. Satellite, radar, 3-hr interval surface analyses were obtained from Weather Prediction Center (WPC) Surface Analysis Archive to identify it's existence. A Weather Research and Forecast (WRF) Model Version 3.4 was also conducted to perform a simulation over a four-nested domains configuration at 36-, 12-, 4-, and 1-km spatial resolutions respectively and 35 sigma vertical levels. The model was simulated in order to improve our understanding of the formation, development and dissipation of sea breezes occurring along the Gulf Coasts

Friday, February 19, 2016
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: Warren May
University of Mississippi Medical Center
ViceCo-Chair: Jamil Ibrahim
University of Mississippi Medical Center

Thursday, February 18, 2016
MORNING
ROOM TC 210

O9.01

10:00 THE EDUCATIONAL INTERFACE BETWEEN MATHEMATICS, STATISTICS AND COMPUTER SCIENCE

Warren L. May
University of Mississippi Medical Center, Jackson MS, USA

Objective: To discuss the integrative role of Math, Statistics and Computer Science in preparing students. Discussion: The STEM disciplines, of which Mathematics, Statistics and Computer Science are major elements, have received considerable attention recently. The ever-changing technological challenges rise and fall so that simply adopting these technologies does not always prepare students well for the problems they will face. One of the areas most affected by these changing technologies is the field of Statistics. Newer techniques, software and methodologies are constantly being developed and many are intrinsically computer dependent. For example, Bayesian and Maximum Likelihood approaches that were not available a few decades ago have become ubiquitous and businesses collect Big Data that is being used to develop Predictive Models that improve performance and increase profits. Preparing our students requires a shift in paradigm but in what direction? Predicting the next big thing is always impossible. Small tweaks in the curriculum may be all that is necessary to meet the challenges.

O9.02

10:15 DATA SCIENCE AND ITS APPLICATIONS IN COURSE DESIGN

Pradeep Kumar Pittala, Ping Zhang, Babu Patlolla
Alcorn State University, Alcorn State, USA

Data Science is the extraction of knowledge from data. It employs techniques and theories including mathematics, information theory and technology,

machine learning, computer programming, data engineering, pattern recognition, visualization, and data warehousing as a whole. One branch of data science is machine learning- an adaptive process that enables computers to learn from experience, example, and analogy. These can be used to enhance the growth and importance of biological data science by uncovering patterns in data from which predictive models can be developed.

In this research paper, one graduate course using data science to its applications in biological science is proposed. The application of well-established concepts and techniques like protein data analysis, genome analysis and sequence databases is proposed. The chapters of this proposed course can be delivered independently or combined. The following contents will be addressed: Introduction to Data Science and Bioinformatics, Image Processing and Feature Extraction, Machine Learning in Bioinformatics, Database Warehousing and Data Mining for Bioinformatics, Overview of Structural Bioinformatics, Systems Biotechnology and the Modeling for Bioinformatics. In this project, the computer programs on visualization will be designed and implemented in this project.

Keywords: Data Science, Machine Intelligence, Pattern Recognition

This project is sponsored by US DHHS/NIH/NIGMS, Mississippi INBRE research project. Award Number: USM-GR05306-23

O9.03

10:30 SMART TRANSPORTATION ON THE SAFETY OF SCHOOL BUS RIDERSHIP

Zsalicia Jones, Yufeng Zheng, Sam Nwaneri
Alcorn State University, Lorman, MS, USA

The kids' backpacks are packed and they are ready for school. Majority of the parents trust and depend on the school bus as a safe means of transportation, not only for taking them back and forth to school, but to take them on the road for field trips. "How safe are school buses?" is a big concern to be studied. In this paper we will study how safe school buses are and introduce a way of transporting our precious ‘cargo' from one location to another. Though school buses are made to be safe, a lot safer than automobiles, many deaths can be prevented with the proper expansion of knowledge and equipment. Most of the school bus accidents happen inside the bus, due to the impact. This brings up another question, "Why don't school buses come with seatbelts?" We will discuss the safest way to ride and provide innovative solutions that can be implemented in a school bus design in order to reduce its weakness.

O9.04

10:45 BIOMETRIC IDENTIFICATION EXAMPLE- FINGERPRINT USED FOR STUDENTS' IDENTIFICATION

Pavan Kumar Gorthi, Calvin Forte, Ping Zhang, Babu Patlolla, Lixin Yu
Alcorn State University, Lorman, MS, USA

Biometric refers to the automatic identification of a person based on his physiological or behavioral characteristics. Identification based on biometrics is preferred over traditional methods. The advantage is that biometrics identification techniques obviate the need to remember a PIN or password which may be forgotten or to carry the passports or driver's license which may be forged, stolen, or lost.

One of the most successful applications in biometric is fingerprint identification. In this paper, an example of fingerprint system is used in the Math Center at Alcorn State University will be introduced. A student's identification can be divided into two steps. In step one, a student inputs his/her name, student ID and registers his/her fingerprints three times in different angles and positions. The feature extraction is carried out. In step two, the student only needs to press his same finger onto the biometric device once. The extracted fingerprint feature set is compared with all the fingerprint features saved in the database. Then the minimum distance between the enrolling finger and one in the database is calculated and the student is identified. The student can input his/her fingerprint again while he/she leaves, so the student's time in the Math Center is automatically recorded.

In this paper, a novel online distributed fingerprint verification scheme is proposed. Clients can remotely use the internet to link their workstations to verify the enrolling fingerprints and manipulate fingerprint feature database on the server.

O9.05

11:00 TIMED INDICATORS TO PREDICT A STUDENT'S SUCCESS IN COLLEGE ALGEBRA

Lixin Yu, Elizabeth Udemgba
Alcorn State University, Alcorn State, MS, USA

Raising success rate of College Algebra classes is a challenge for many colleges. It is helpful for students facing problems to receive an early warning about their chance to succeed in this course. This study tries to establish a model to predict the chance of a student's

success in College Algebra class based on class attendance, lab attendance, homework, and midterm exam scores with consideration of the student performance at different time of the semester. Three years of student performance data from randomly selected classes are analyzed to establish the model. Randomly selected student data from other classes are used to test the accuracy of the model. The result is helpful for instructors to give detailed advice to students with unsatisfactory performance to catch up with the progress of the class or to drop the class.

11:15 Divisional Business Meeting

12:00 General Symposium

Thursday, February 18, 2016

AFTERNOON
Rom TC 210

O9.06

1:15 WHY STATISTICAL SIGNIFICANCE MATTERS: REVISITING POWER, EFFECT SIZE, SAMPLE SIZE P-VALUES

Elgenaid Hamadain, Warren May
University of Mississippi Medical Center, Jackson, MS, USA

Power and sample size Analysis is used to justify appropriate sample size for testing hypothesis. Power is the probability of the test to reject a false null hypothesis. Power analysis can be done before or after data collection. Before analysis, an appropriate sample size is determined to achieve certain power based on an a priori value of the desired effect size. Post-hoc analysis is to use the obtained sample size and observed effect size to determine power and help guide future studies. Power depends on three factors: the significance level αlpha; size of the difference; and sensitivity of the data. Power increases when the significance level increases. The greater the effect size, the greater the power. Sensitivity can be increased using statistical controls and increasing sample size. P-value is used to decide whether we have enough evidence to reject the null hypothesis and, unlike alpha, is determined after data are collected. As such, power is the probability of obtaining a p-value less than 0.05 in repeated sampling. Adequate sample size ensures that the study yields reliable information. Many studies were conducted with inadequate sample sizes, making interpretation of negative results difficult. Learning techniques of sample size and power analysis has been difficult, because of complex mathematical considerations and the subtly of power, error and effect size are often difficult at first. This presentation describes the concepts underlying effect size, sample size and power analysis as well as use of sample-size determination software for a wide variety of statistical methods.

O9.07

1:30 POWER, SAMPLE SIZE, EFFECT SIZE, AND THEIR RELATIONS TO STUDY DESIGN

Jamil Ibrahim
University of Mississippi Medical Center, Jackson, MS, USA

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 presentation 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. The presenter will demonstrate these concepts using different tools such as SAS, SPSS, and free on line applications.

O9.08

1:45 THE ESSENTIALS OF POWER ANALYSIS

Seth Lirette, Chad Blackshear
Blackshear & Lirette, Madison, MS, USA

Power analysis is one of the most misunderstood aspects of applied statistical analysis. Most researchers who do not have formal statistical training either seek to run a power analysis without enough prior information or attempt a power analysis because it is expected, but not necessarily warranted. In this talk, the various aspects of power analysis (or sample size calculation) will be discussed including, but not limited to: vital a priori information, when a power analysis

should be done (or not done), what power actually tells you, considering cost and timeline more than power, and practical hands-on examples of good power analyses.

O9.09

2:00 THE DIFFERENCE BETWEEN COMPUTER SIMULATIONS AND THEORETICAL RESULTS

Zhenbu Zhang
Jackson State University, Jackson, MS, USA

It is well known that, for some complicated mathematical models, computer simulations can do a lot that analytical methods cannot do. In this talk, I will demonstrate that, even if for some simple models, computer simulations can do more than theoretical results. We consider two biological mathematical models. In one model, computer simulations show us the results that we cannot derive from theoretical results. In another model, computer simulations can tell us more than theoretical results can tell us.

O9.10

2:15 DEVELOP NETWORK MANAGEMENT SYSTEM USING SMNP

Yong Wang
Alcorn State University, Lorman/MS, USA

In the talk, I will review my previous development experience in Computer and Information Service at Texas A&M University. In the network systems at Texas A&M University we have more than two thousands and five hundres of switches and routers on the campus. First, we configured all network devices with SNMP agents. Then we used SNMP agents to pull out performance matrix and store the data into MYSQL database every two hours. Then we use gnue plot to visualize traffic and performance data for large scale network management.

O9.11

2:30 CREATION OF A MOBILE WEB APPLICATION FOR SCIENTIFIC DATA ENTRY

Joshua Bailey
Mississippi Valley State University, Itta Bena, MS, USA

The Coral Reef Ecosystem Division (CRED) provides high-quality information about the status and trends of coral reef ecosystems. The collected data and data products are distributed to resource managers, policymakers, and the public. My mentor, Jesse Abdul, a former member of CRED, developed a web-based data management application to allow CRED's scientific staff to enter survey data directly into a local database while in the field. This flexible application allows the scientist to manage a variety of data sets. When scientists must handwrite their data on paper forms before entering it into a database system it presents numerous potential data problems because there are no constraints on paper forms; data loss or corruption can occur in these situations. To mitigate these data collection/data entry issues, the data management web application was developed to help streamline the data entry process. This improvement will increase data quality/accuracy because the application informs the user when given data elements look abnormal or are outside a defined acceptable range of values. This application prevents common data errors and trains scientists to avoid these problems. The data management application was never designed for use on mobile devices and there are situations in the field where using a desktop or laptop is infeasible; the development of the mobile web application allows scientists the flexibility to utilize the application in more situations. Providing the mobile application to scientists will reduce the need for handwritten survey data and ensure the integrity and quality of the collected data.

Thursday, February 18, 2016

3:15- Dodgen Lecture and Awards Ceremony

Thursday, February 18, 2016

EVENING

Poster Session –Immediately following the Dodgen Lecture

P9.01

A CORRESPONDING STUDY OF WATER EVAULATION IN THE PASQUOTANK WATERSHED

Jamal Stevenson[1], Raveen McKenzie[1], Steffi Walthall[2], Ricky Dixon[1]
[1]Mississippi Valley State University, Itta Bena, Mississippi, USA, [2]Savannah College of Arts and Design, Savannah, Georgia, USA, [3]Elizabeth City State University, Elizabeth City, North Carolina, USA

The Pasquotank River Watershed covers over 450 square miles and is located in the Coastal Plain of northeastern North Carolina. 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 test points were derived during the 2011 Summer Watershed Team research project with four points added during the 2014 summer project. 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 from these readings were placed into an online database where they are correlated to the location of the sample using Google Maps®.

Analysis tools were developed in order to compare the data from all years for any variations or similarities. Excel spreadsheets were developed to look more closely at individual points and tests for each point. Steps were also made to research the development of an online graphing tool for analyzing the data at individual points over several years. Test results collected were added to a database developed during the 2014-2015 academic year at Elizabeth City State University. This database was connected to a data visualization page utilizing Google Maps®. The results show that there were variations for the individual water quality scores, but the overall water quality score for all the tested water sources remained at a comparable level from previous years.

P9.02

THE EFFECT OF CALCULATORS USE ON STUDENTS' PERFORMANCE AND ATTITUDE IN MATH: A META-ANALYSIS

Johnny Gary, Abraham Ayebo
Mississippi Valley State University, Itta Bena, MS, 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

ENHANCING PARENT INVOLVEMENT IN NC-CCSS FOR K-2 MATHEMATICS

Nyjah Grant, Tayla Frizell, Deanna Mallard
Mississippi Valley State University, Itta Bena, MS, USA

In this study, the 2014 REU math team developed and provided a workshop that assisted parents in understanding the North Carolina Common Core State Standards for K-2 Mathematics to assist with student homework assignments. Parent involvement is defined as parent participating in the educational processes and experiences of their children. A chi-square analysis was used to analyze data collected from the pre survey and the post survey administered to participants in the workshop. The study revealed all of the individual components of parent involvement were positively and significantly related to educational goals. The study identified various aspects of parent involvement that yielded statistically significant results in affirming that parent involvement attributed to urban student achievement. These findings were particularly helpful for indicating which kinds of parent involvement influenced academic success. Most notably, parent expectations and styles demonstrated a strong relationship with scholastic outcomes. Parent expectations and styles created an educationally oriented ambience that established an understanding of the certain level of support the child needed to succeed academically. The REU mathematics team focused on three essential questions in this study: (1) What practices will increase parent awareness of K-2 NC-CCSS for mathematics at P. W. Moore Elementary School? (2) What methods can be used to strengthen parent skills in assisting with mathematics homework assignments at P. W. Moore Elementary School? (3) What actions can be taken to motivate parent involvement in the school improvement process focusing on mathematics at P. W. Moore Elementary School?

P9.04

MAPPING POVERTY RATE IN MISSISSIPPI USING ARCGIS

Dominique Marshall, Bryana Ward, Duanjun Lu
Jackson State University, Jackson, MS, USA

Technology has a new innovation that links practically all disciplines with common core purposes known as spatial humanities. Geographic Information Systems (GIS) is a system designed to capture, store, manipulate, analyze, and interpret data to understand relationships, patterns, and trends. There is a growing awareness of and interest in the economic and strategic

value of GIS. Relative interests have brought attention on state and local levels with poverty rates in the U.S. Poverty is an eternal economic category and has a geographic dimension. Taking advantage of the analytical capability of GIS, the study incorporates spatial variables in the multiple regression analysis. The objective is to map poverty incidence and its indicators at district level to compare the similarities and differences. The system can provide annual poverty information for higher level department and help policy makers establish poverty alleviation policies and provide the reference basis for anti-poverty. The United States determines the official poverty rate using poverty thresholds that are issued each year by the Census Bureau. The thresholds represent the annual cash income minimally required to support families of various sizes. The state of Mississippi is easily the poorest state in the nation, Mississippi is home to some of the most tragically and severely impoverished families anywhere in the country. These high poverty rates trap children and families in a grave cycle that can persist for generations. Maximizing the opportunities of GIS, this project maps on a county by county level over a ten year span from 2000 to 2010.

P9.05

A VISUAL APPROACH TO TEACHING ANOVA

Chad Blackshear, Seth Lirette
Blackshear & Lirette, Madison, MS, USA

Analysis of variance (ANOVA) is approached in many statistical curricula. While simple in application, an understanding of the underlying calculations driving the results eludes many students when first introduced in the classroom. To elucidate the functionality of the automation program we will generate sample data and, using a one-way ANOVA model, create a four panel plot, yielding visualizations for the relevant decompositions of the variance present in the data as well as a raw plot of the data, color coded by treatment group with each accompanying mean. Specifically, using droplines we will emphasize the total sums of squares (SST), and its decomposition into sum of squares treatment (SST) and sum of squares error (SSE). Our intention is to provide a data driven discussion of the results, rather than a focus of the overall p-value indicating some treatment-specific effect between at least two of the groups of experimental units.

Friday, February 19, 2016
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

Friday, February 19, 2016
AFTERNOON

Room 210

O9.12

1:15 ENEMY AT THE GATE: THREATS TO CLOUD COMPUTING SECURITY

Bilal Abu Bakr, Devontrae Williams
Alcorn State University, Alcorn State, MS 39096, USA

Cloud computing is revolutionizing the technology. This enables us to use internet servers to store and access pools of data and applications remotely. Around 1970, virtual machines permitted many distinct computing environments to be run in one physical environment. The cloud was somewhat fore fathered in 2002 by Amazon Web Services: a service to access apps and storage through the internet. In 2006, developers were allowed to rent space in the Elastic Compute cloud and use it to run their own apps.

Based on user needs, three types of clouds are available: (i) public cloud, fairly inexpensive and regular customers use it; (ii) private cloud, used by large corporations that have direct control over their data; (iii) hybrid cloud, adopted by big companies enabling private data control while maintaining public cloud interaction with clients.

There are a few underlying security issues which serve detrimental to the cloud family. Our main concern is an internal security breach. What if data is breached by an inside attacker? There has to be a system to check each person attempting to access data.

We propose there should be a non-editable log that records all activity pertaining to user data. This database will serve as a security camera. To the best of our knowledge, such a database does not exist in cloud computing. This automated log would record every action and enable a customer to check against suspicious activity. A security log in the cloud will keep data secure while earning the user's trust.

O9.13

1:45 2D AND 3D FRUIT BRUISE IMAGE DISPLAY USING MATLAB AND C++

Jathin Padmaiah, Ping Zhang, Babu Patlolla
Alcorn State University

In this paper, the late improvement and utilization of picture examination and computer vision framework in the quality assessment of agribusiness is investigated. Computer vision is a predictable and target investigation procedure, which has ventured into numerous assorted commercial enterprises. Its velocity and exactness fulfill steadily expanding generation and quality necessities, thus supporting in the advancement of completely robotized forms. The necessities and late advancements of programming for machine vision frameworks are discussed in the paper. It is vital to toss light on fundamental ideas and advancements connected with computer vision framework, an apparatus utilized as a part of picture examination of organic product portrayal. Various difficulties are also addressed in order to empower the framework for performing bruise detection on the natural products or organic products by utilizing the pictures from the camera. A few sorts of organic products are liable to huge variety in shading and composition, contingent upon how ready they are. There are numerous procedures in agribusiness where choices are shown up of the item. Applications for evaluating the organic product by its quality, size or readiness depend on its appearance, and in addition a choice on whether it is sound or infected. The goal of this paper is to give inside and out prologue to the organic product wound picture showcase utilizing MATLAB and C++. Future patterns of machine vision innovation applications are examined.

This project is sponsored by USDA/NIFA research grant. Award Number: 2014-38821-22394.

O9.14

2:00 3-D IMAGE BRUISED FRUIT DETECTION ALGORITHM USING A DISTRIBUTED CLOUD-COMPUTING MULTIPROCESSING ENVIRONMENT

Calvin Forte', Ping Zhang, Babu Patlolla, Pavan Gorthi
Alcorn State University, Lorman, MS, USA

3-D images contain STL metafile information used in triangulation and matrix representation using Open Asset Import Libraries in C code. Light sensing techniques capture luminosity and color depth through mesh analysis compiled from the STL file information and yield high throughput gains to mathematical models. In this research, we aim to collect and build our algorithm to extract intrinsic features of bruised fruit images in a 3-D model. Using core-out designs in our analysis helps us to model light propagation and retention to detect fitness patterns in a model knowledge base. "N-query" objects in a distributed cloud-computing platform virtual parallelization to model mesh behavior in our system. We can use this model to train our dataset to a defined schema of "what is the bruised fruit?"

We are using the .NET framework to evaluate 3-D modelling interpolation so that we target a high-performance computing environment to facilitate concurrent processes. This integration model features a catch-model in a distributed system and improves scalability for large volumes of data. By networking these system models in various component-object libraries, we can compute the efficiency of our algorithm in time-constraint dependencies to a given specification to commit to a pattern match. We also aim to stream the detection process by using the .NET framework cloud caching and reusable product.

Keywords: SECURE:, .NET Framework, Three-Dimensional Imaging Process, Programming Language, Cloud-Architecture Framework (CAF), Slip-stream Data.

Sponsored by USDA/NIFA research grant: An automatic system for bruise detection on tomatoes and apples using 3-D near infrared imaging technology.

O9.15

2:15 FAST METHOD OF APPROXIMATE PARTICULAR SOLUTION

Anup Raja Lamichhane[1], D.L. Young[2], C.S. Chen[1]
[1]University of Southern Mississippi, Hattiesburg, Mississippi, USA, [2]National Taiwan University, Taipei, Taiwan, Taiwan

The Fast method of approximate particular solutions (FMAPS) is based on the global version of the method of approximate particular solutions (MAPS). In this method, given partial differential equations are discretized by the usual MAPS and the determination of the unknown coefficients is accelerated using a fast technique. Numerical results confirm the efficiency of the proposed technique for the PDEs with a large number of computational points.

O9.16

2:30 NUMERICAL SOLUTIONS OF ELLIPTIC PARTIAL DIFFERENTIAL EQUATIONS USING CHEBYSHEV POLYNOMIALS

Balaram Khatri Ghimire, Haiyan Tian, Anup Lamichhane

The University of Southern Mississippi, Hattiesburg, MS, USA

We present a simple and effective Chebyshev polynomial scheme (CPS) combined with the method of fundamental solutions (MFS) and the equilibrated collocation Trefftz method for the numerical solutions of inhomogeneous elliptic partial deferential equations (PDEs). In this paper, CPS is applied in a two-step approach. First, Chebyshev polynomials are used to approximate a particular solution of a PDE. Chebyshev nodes which are the roots of Chebyshev polynomials are used in the polynomial interpolation due to its spectral convergence. Then the resulting homogeneous equation is solved by boundary type methods including MFS and the equilibrated collocation Tretz method. Numerical results for problems on various irregular domains show that our proposed scheme is highly accurate and efficient.

2:45 Closing Remarks

PHYSICS AND ENGINEERING
Chair: Partha Biswas
Tougaloo College
Vice-Chairs: James Stephens
Southwest Mississippi Community College
Vice-Chairs: Alakabha Datta
University of Mississippi

Thursday, February 18, 2016

MORNING

Room TC 228

O10.01

8:30 Searching for a Charged Higgs in $H \rightarrow \tau^- \nu^*_\tau \tau^+ \nu_\tau$

Shanmuka Shivashankara, Alakabha Datta
The University of Mississippi, Oxford, USA

In 2012, the standard model Higgs boson was found. Finding other Higgs-like scalars would not only mean physics beyond the standard model, but also possible resolutions of outstanding problems such as the hierarchy problem. Possible sources for the Higgs-like scalars are the 2HDM's. Through recent experiments such as at Atlas and CMS, the window for a charged Higgs, H±, in 2HDM's has been closing. A channel that can further probe the possibility of a charged Higgs is $H \rightarrow \tau^- \nu^*_\tau \tau^+ \nu_\tau$. Herein the four-fold distribution for the latter process is calculated including lepton mass. Current uncertainty in the standard model Higgs couplings along with recent searches provide constraints on the new physics parameters. Plots are provided of the ratios of differential distributions between new physics and the standard model. Also, a MadGraph analysis is provided.

O10.02

9:00 A LOW-LATENCY GLITCH CLASSIFICATION ALGORITHM BASED IN WAVEFORM MORPHOLOGY

Hunter Gabbard[1], Soma Mukherjee[2], Robert Stone[2]
[1]*University of Mississippi, Oxford, MS, USA,*
[2]*University of Texas Rio Grande Valley, Brownsville, TX, USA*

We present a novel and efficient algorithm for classification of signals that arise in gravitational wave channels of the Laser Interferometer Gravitational Wave Observatory (LIGO). Using data from LIGO's sixth science run (S6), we developed a new glitch classification algorithm based mainly on the morphology of the waveform as well as several other parameters (signal-to-noise ratio (SNR), duration, bandwidth, etc.). We did this using two novel methods, Kohonen Self Organizing Feature Maps (SOM), and discrete wavelet transform coefficients. This study will show the feasibility of utilizing SOMs in order to display a multidimensional trigger set in a low-latency two dimensional format.

O10.03

9:15 SEARCH FOR NEUTRINOS

Amin Haque
Alcorn State University, Alcorn State, USA

Neutrinos can be created in different ways, for example radioactive decay, nuclear fusion reactions in the Sun, and in nuclear reactors, cosmic rays, and in supernovas. About 65 billion 70106500000000000000♠ solar neutrinos per second pass through every square centimeter from the Sun travelling with the speed of light. They oscillate between three different flavors in flight. They are electrically neutral and have mass less than one millionth that of the electron, and pass through normal matter without interactions and undetected. In 1956 Frederick Reines and Clyde Cowan made the Nobel Prize-winning first observation of neutrinos at the Savannah River reactor. A number of experiments in the US, Europe, and Japan have studied the properties of neutrinos. Detectors are installed deep underground, in gold and nickel mines, in tunnels beneath mountains, in the ocean and in

Antarctic ice. Neutrino telescopes like Super-Kamiokande in Japan use huge vats of water to detect neutrinos. Super-Kamiokande began operating in 1996. The detector consists of 50,000 tons of water in a domed tank whose walls are covered with 13,000 light sensors. The sensors detect the occasional blue flash made when a neutrino collides with an atom in the water and creates an electron. The measurements were sufficiently sensitive that Super-K could track the sun's path from nearly a mile below the surface of the earth. In 2002 a US-Japan collaboration discovered that neutrinos can account for as much as 3% of the mass of the Universe.

9:30 BREAK

Session-II Chair: James Stephen

O10.04

9:45 COULOMB ENHANCED SUPERCONDUCTING PAIR CORRELATIONS IN THE FRUSTRATED QUARTER-FILLED BAND

W.Wasanthi De Silva[1], Niladri Gomes[2], Tirthankar Dutta[2], R.Torsten Clay[1], S Mazumdar[2]
[1]Mississippi State University, Starkville,MS39762, USA, [2]University of Arizona, Tucson,AZ85721, USA

A necessary condition for superconductivity(SC) driven by electron correlation is that electron-electron(e-e) interactions enhance superconducting pair-pair correlations relative to the noninteracting limit. We present high-precision numerical calculations within the two dimensional(2D) Hubbard model on up to 100 sites showing that long range superconducting pair correlations are enhanced only for electron density $\rho \approx 0.5$. At all other fillings e-e interactions suppress pair correlations. We argue that the enhancement of pairing is due to a tendency to form local singlets when $\rho \approx 0.5$. Our work provides a key ingredient to the mechanism of SC in the 2D organic-charge-transfer solid superconductors, as well as in many other unconventional superconductors with frustrated crystal lattices and $\rho \approx 0.5$.

O10.05

10:00 NANOSCALE STRUCTURE OF VOIDS IN HYDROGENATED AMORPHOUS SILICON

Parthapratim Biswas[1], Stephen R. Elliott[1]
[1]The University of Southern Mississippi, Hattiesburg, MS, USA, [2]University of Cambridge, Cambridge, UK

In this work, we have studied the shape, size, and number density of atomic microvoids in hydrogenated amorphous silicon. By jointly employing experimental infrared data and ab initio simulations, we propose a simple and effective hydrogenation scheme, which is capable of producing large atomistic models of a-Si:H for studying microvoids. Our results suggest that hydrogen atoms in the networks are distributed in sparse (or isolated) and clustered environments. For a-Si:H models with 9-14 at. % hydrogen, we find approximately 3-4 at. % of total hydrogen atoms are distributed in the isolated phase. The density of the clustered phase is found to be between 6-12 at. %, which appears to depend on the amount of hydrogen in the network. The calculation of radii of gyration of atomic microvoids shows that the diameter of the microvoids is distributed from 6 Angstroms o 12 Angstroms. A few hydrogen molecules have also been observed to form inside the microvoids in our study, the concentration of which is about 1 at. % relative to silicon atoms. A comparison of our results with those from small-angle X-ray scattering (SAXS), infrared (IR) absorption, nuclear magnetic resonance (NMR) and alorimetric studies are presented.

O10.06

10:15 DISTRIBUTED OPTICAL SENSING IN COMPOSITE LAMINATE ADHESIVE BONDS

Leeanna Meadows[1], Rani Sullivan[1], Keith Vehorn[2]
[1]Mississippi State University, Mississippi State, MS, USA, [2]University of Dayton Research Institute, Dayton, OH, USA

As the use of polymer matrix composites for primary structures increases, there is a growing need for monitoring the adhesive bonds that are used in the assembly of these structures. Distributed sensing using optical fibers shows promise for monitoring these bonds due to their small size, light weight, and ability to obtain continuously distributed strain data. Therefore, the objective of this study is to investigate the feasibility of using embedded optical fibers to characterize the adhesive layer in composite joint specimens. Double lap shear specimens with embedded optical fibers were tensile tested to obtain the strain response of the adhesive layer and to determine the impact of the optical fibers on the bond strength. The manufacturing techniques for embedding the fibers are presented. The measured strain distribution from the optical fibers compares well with data obtained from finite element analysis. Additionally, the embedded the fibers do not seem to impact the strength of the adhesive bond.

O10.07

10:30 FRACTAL GEOMETRY FOR ANALYSIS OF CERAMIC FRACTURE SURFACES

T. Brice McMurphy[1], Gaurav Joshi[2], Christopher Harris[3], Jason Griggs[4]
[1]Louisiana State University Health Science Center, New Orleans, LA, USA, [2]Glidewell Dental Labs, Newport Beach, CA, USA, [3]Sealy Dental Center, Sealy, TX, USA, [4]University of Mississippi Medical Center, Jackson, MS, USA

Objective: Fractal geometry is used in a wide variety of fields, including the analysis of fracture surfaces. The purpose of this study was to develop a precise, accurate, automated method of measuring the fractal dimension of a fracture surface. Methods: Six algorithms for calculating fractal dimensional increment (D*) were compared using computer-generated Brownian interpolation surfaces (n=10) with known D* values (D*=0.1, 0.2, 0.3, and 0.4), and a linear equation was fit to correct the bias of each algorithm. The algorithm having greatest precision (lowest CV) after bias correction was used to test physical specimens by scanning their fracture surfaces using an atomic force microscope (AFM). Specimens (n=10) were fabricated from Y-TZP ceramic and fractured in a servohydraulic load frame in four-point flexure (10 MPa/s). Since it is not feasible to fit some types of specimens under AFM, the accuracy of scanning replicas was validated by making polyvinyl siloxane impressions of the fracture surfaces and casting epoxy in the impressions. Epoxy replicas were analyzed and the results compared to those for the original surfaces (paired t-test). Results: The Minkowski Cover algorithm was the most precise after bias correction using D*unbiased = 0.9756D*measured + 0.2318 (R^2=0.9994). The D* values and standard deviations for fracture surfaces and their epoxy replicas were 0.246±0.007 and 0.245±0.003, respectively. There was no significant difference (p=0.539). Conclusion: The epoxy replicas of the fracture surfaces of Y-TZP specimens can be accurately and precisely used for fractal analysis. NIH grant 1R01 DE024333 and UMMC Intramural Research Support Program.

10:45 BREAK

Session-III Chair: Alakabha Datta

O10.08

11:00 SERS ACTIVE GRAPHENE OXIDE PLATFORM FOR IDENTIFICATION OF SKBR3 CELLS

Anant Singh[1], P.C. RAY[2]
[1]alcorn State University, Alcorn State, Mississippi, Usa, [2]jackson State University, Jackson, Mississippi, 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 to be 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 graphen 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."

O10.09

11:15 COMPARATIVE STUDY OF ELEMENTAL NUTRIENTS IN ORGANIC AND CONVENTIONAL VEGETABLES BY LIBS.

CR Bhatt, Charles Ghany, Bader Alfarraj, Ayed Binzowaimil
Mississippi State University, Starkville, MS, USA

In this study, LIBS technique is used to compare the presence of major nutrient elements (Ca, Na, K, and Mg) in organic and conventional vegetables. Different parts of Cauliflower and Broccoli were used as working samples. Optimum values of laser energy, gate delay, and gate width were used to acquire the LIBS spectra from those samples. The intensity ratios of different elemental lines present on the organic Cauliflower and Broccoli samples were compared with those of conventional ones. The intensity ratio of

elemental lines between different parts of the Cauliflower and Broccoli are also compared. The detailed analysis of the elemental nutrients in Cauliflower and Broccoli will be presented.

O10.10

11:30 TURBULENT FLOW SIMULATIONS OF AORTIC THROMBOEMBOLISM IN FELINE HYPERTROPIC CARDIOMYOPATHY (HCM).

Manish Borse, Shanti Bhushan, Keith Walters
Mississippi State University, Starkville, MS, USA

This study is performed to develop a simulation tool to understand the relation between thromboembolism (particle deposition) in the aorta and the cardiac output for Hypertrophic Cardiomyopathy (HCM) conditions. This will help in making better decisions regarding treatment and management of thrombosis and associated risks in HCM. Simulations were performed for blood and thrombus transport in feline aorta using pulsatile normal and HCM heart cardiac output as inlet boundary conditions, which consisted of single and dual peak pattern, respectively. Study identified that the primary challenges for such simulations are: (a) specification of truncated artery outlet boundary condition; and (b) prediction of turbulence in the lower abdominal aorta. For (a), several different outlet boundary conditions were tested, and targeted mass flow rate was identified to be the most appropriate. However, the method showed deficiencies for both normal and HCM conditions. An iterative boundary condition was developed to address these issues. For (b), simulations are being performed and using URANS, DES and LES turbulence models using up to 11M grid. Preliminary results suggest that LES models, which have the capability to predict resolved turbulence, perform better than other models for the prediction of vortical statures and particle deposition. For the normal heart flow, iliac artery flow rate and the infra-renal shear stress profile compared reasonably well with the experimental data; thereby validating the CFD predictions. The HCM flow predictions showed that the particle deposition is correlated with vortical and turbulent structures, and occurs mostly between the renal artery and iliac trifurcation.

O10.11

11:45 ACOUSTIC NOISE FLOOR ANALYSIS FOR LADC-GEMM 2015 GULF OF MEXICO EXPERIMENT

James Stephens
Southwest Mississippi Community College, Summit, Mississippi, USA

The LADC-GEMM experiment was conducted to combine visual observation and acoustic surveillance of marine mammal populations in the rough vicinity of the 2010 oil spill in the Gulf of Mexico. This presentation discusses the noise floor characterization of the Environmental Acoustic Recording System (EARS) employed in the experiment.

12:00 Divisional Business Meeting and Lunch

THURSDAY AFTERNOON

Room 228

Session-IV Chair: Anant Singh

O10.12

1:00 VERIFICATION AND VALIDATION OF HYDRO-TURBINE TURBULENT WAKE

Sanchit Salunkhe, Shanti Bhushan
Mississippi State University, Starkville, Mississippi, USA

One of the primary parameter for the design of wind/hydro turbine farms is the optimum positioning of the turbines, to reduce the effect of wake from the turbines upstream. CFD can help in estimating the wake of the turbines, thereby assisting in improving farm design. Previous research by Bhushan et al (2015) concluded that accurate prediction of turbine wake characteristics are significantly affected by the turbulence modeling. The high fidelity DES/LES models perform better than low-fidelity URANS models. However, concrete conclusions could not be obtained due to lack of experimental data for validation. In addition, turbine support structure was not included in the research, so its effect on the wake could not be studied.

Objective of this study is to perform verification and validation of hydro-turbine wake prediction using recent experimental data (Tedd et al. 2014), including study of the effect of turbulence modeling, grid size, and support structure on wake. Simulations will be performed using URANS, DES and LES models. The validation will focus on prediction of velocity components, normal stresses and turbulent kinetic energy in the wake, including analysis of the wake turbulence isotropy and decay characteristics. Results will also be compared with Bhushan et al. (2015) results to understand the effect of blade profile and Reynolds number on the wake. The research will help validated the conclusions drawn by Bhushan et al. (2015) regarding the effect of turbulence modeling on

wake prediction, and provide insight into the growth and decay of support structure wake.

O10.13

1:15 UNDERSTANDING PIPELINES AND EMERGENCY RESPONSE

Pao-Chiang Yuan, Richterica T. Ford
Jackson State University, Jackson, MS, USA

We understand crude oil and natural gas are from wells on land or from offshore drilling platforms. Either they are in liquid form or in gas form; they have to go through treatment facilities to remove impurities and refinery processes to produce different petrochemical products. Finally, they will go through pipeline or different transport methods to consumer. Pipeline considers being the one of the safest transportation method compare to tank car, barge and railroad, especially in volume. In wake of 2014's propylene explosion at City of Kaohsiung at Taiwan cause several fire fighters death, serious injuries of responders and economic losses and also several explosions in Texas. The people start notice how important of pipeline management. We have to think again, proper planning, training to reduce casualties, properties losses and restore community confidence of industries and government's management. This paper will describe the pipeline transportation and distribution in United States and emergency response by federal, local government and private enterprises. And also present my individual opinions to this matter.

O10.14

1:30 VIRTUAL SIMULATION OF NUCLEAR EMERGENCY

HuiRu Shih, Ebony Davis, Jeremiah Burns, Lashayla Gilbert, Michael Stevenson, Curtis Frazier
Jackson State University, Jackson, MS 39217, USA

Emergency situations may occur in a broad range of scenarios. The greatest challenge facing emergency response personnel is the ability to train effectively. An interactive and virtual training paradigm shows promise towards achieving training goals. Virtual environments (like Second Life) can provide users with the opportunity to create an emergency situation that could not otherwise be experienced due to safety, cost, and environmental factors. This can provide students with an experience that is more realistic and immersive than any classroom scenario can provide. Thus, students have the opportunity to become better equipped to handle real life situations. Students can make appropriate decisions on urgent matters because virtual environments have given them a tool through which they have developed skills in a safe yet virtually real environment.

Responding to a nuclear or radiation accident is one of the most difficult aspects of a disaster response. This study uses Second Life to develop computer-based training materials and exercises. The training materials offer a variety of environments with customized buildings, objects, and scripting tailored to various scenarios of nuclear emergencies. By using Second Life, instructors can involve a group of students to conduct a virtual live exercise. This study showed the feasibility of using virtual reality for the development of a tool for teaching students the basics of nuclear emergency preparedness and response. Virtual reality is also being studied and used in different ways in emergency management.

1:45 BREAK

Session-V Chair: James Lee Tracy Jr

2:00 – 3:00 CAREER WORKSHOP

3:00 **Plenary Session & Dodgen Lecture**

THURSDAY EVENING

Session-VI

DIVISION POSTER PRESENTATIONS (Following the Dodgen Lecture)

P10.01

A VERSATILE SMARTPHONE-BASED ONLINE MONITORING FOR DETECTING STRONG RADIATION IN THE ENVIRONMENT

Joshua Butler, Jarrett McElroy, Darius Miller, Curtis Frazier, Francis Tuluri
Jackson State University, Jackson, Mississippi, USA

To increase interest in learning among students of science and engineering, we advocate a physical system-based approach for developing interactive, novel, and inexpensive learning tools. In the present study, we demonstrated building a versatile smartphone-based online monitoring for detecting strong radiation in the environment. The methodology consists of integrating sensors, microcontroller, lap top, and a smartphone. The radiation signals from the environment are detected

by a radiation sensor and the number of pulses is determined by a microcontroller for estimating the strength of radiation. The microcontroller facilitates easy integration to the internet through Ethernet adaptor. The measured radiation will be forwarded over the internet for remote monitoring. A smartphone will also be used to visualize the data remotely. The measured data will be analyzed using standard analytical tools such as Excel. In a preliminary testing and study of the technique, we observed the radiation levels are very low of the order of 10 microSieverts per hour showing no radiative sources nearby in the environment. While approaching radiation sources, the system detected higher levels of the order of 100 microSieverts per hour. The physical system-based technique can be extended to several other areas of science and engineering to create interest in learning and to increase student retention and graduation.

P10.02

MANAGING CONGESTION IN A MULTI-MODAL TRANSPORTATION NETWORK UNDER BIOMASS SUPPLY UNCERTAINITY

Sushil Poudel, Md Abdul Quddus, Mohammad Marufuzzaman, Linkan Bian
Industrial and Systems Engineering, MSU, Mississippi State University, MS, USA

This research presents a two-stage stochastic programming model that is used to design and manage a biomass co-firing supply chain network under feedstock supply uncertainty. The model we propose extends current models by taking congestion effects into account. The non-linear cost term is added in the objective function representing the congestion factor which increase exponentially as flow approaches the capacity. We first linearize the model and then use a nested decomposition algorithm to obtain a feasible solution in a reasonable amount of time. The nested decomposition algorithm that we propose combine Constraint Generation (CG), Sample Average Approximation (SAA), and Progressive Hedging (PH) algorithm. We applied some heuristics such as Rolling Horizon (RH) algorithm, variable fixing technique to enhance the PH algorithm. We develop a case study using data from the state of Mississippi and Alabama and use those regions to test and validate the performance of the proposed algorithm. The numerical experiments show that the proposed algorithm can solve large-scale problem with larger number of scenarios and time periods to a near optimal solution in a reasonable amount of time. Results obtained from the experiments revealed that the delivery cost increases and less hubs with higher capacity are selected if we take congestion cost into account.

P10.03

A FEASIBILITY ASSESSMENT VIA SUPPLY-CHAIN COST ANALYSIS OF ADDITIVELY MANUFACTURED BIOMEDICAL IMPLANTS

Adindu Emelogu, Linkan Bian, Mohammad Marufuzzaman, Nima Shamsaei, Scott Thompson
Mississippi State University, Mississippi State, MS, USA

In contrast with procuring traditionally manufactured (TM) biomedical implants from outside the state of Mississippi (MS), the adoption of additive manufacturing (AM) in fabricating such implants at Mississippi hospitals has the potential of providing a more patient-specific, customized parts with faster response, a lower inventory level, and reduced delivery costs. Despite the promising features of AM technologies, the make-or-buy decisions are not straightforward but require careful investigation due to the relatively high AM machine and production costs. Most of the existing studies focus on the analysis of process-level costs which usually involve only the machine and material costs in AM, and have not considered supply chain costs. In this study, we propose a two-stage stochastic programming model which captures the supply-chain level costs associated with the production and distribution of biomedical implants using AM techniques and determines the number of AM facilities to be opened and volume of product flow between manufacturing facilities and hospitals. A customized algorithm that implements Sample Average Approximation (SAA) is developed to obtain fast solutions. We investigate the economic feasibility of using such technologies to fabricate biomedical implants in Mississippi and identify the conditions and cost parameters that significantly affect decision. We find that the ratio of the production costs of AM to the production cost of TM (ATR) is a key cost parameter, and notice that when ATR < 3.5, hospitals may benefit from the use of AM technologies to fabricate biomedical implants, instead of ordering them from TM suppliers out of the state.

P10.04

ELUCIDATING LIGAND RESPONSES OF ANDROGEN RECEPTOR THROUGH PROTEIN LIGAND HYDROGEN BONDING CONTACTS

Pradip Biswas, Raquema Williams
Tougaloo College, Tougaloo,Ms, USA

De-novo and acquired resistances of hormone therapy are of major concerns in combating prostate cancer. Dietary supplements containing flavonoids, in particular, resveratrol and its analogues are being suggested to inhibit the progression of prostate cancers. Using in-silico techniques, we study the hydrogen bonding contacts of six different ligands to understand their ability to act as an agonist or antagonist. In particular, employing the crystal structures of Androgen Receptor, molecular modeling (VMD, Swiss PDB-Viewer), and molecular dynamics simulation (GROMACS) we analyze the hydrogen bonding pattern of the ligands. From the hydrogen bonding pattern of DHT (a known AR agonist) and Flutamide (a known AR antagonist), we first identify the non-overlaping contacts and then analyze the properties of resveratrol analogues based on their contacts. In addition to the hydrogen-bonding contacts, ligand binding energies to the protein also provides us a clue of which ligand can be a potent antagonist. Accordingly, we conclude that the ligand binding energy and ligand hydrogen bonding contacts to the protein, can supplement existing the drug designing effort in a major way.

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.

P10.05

ALIZARIN DYE BASED SERS PROBE FOR TRACE LEVEL CADMIUM DETECTION

Afua A. Antwi-Boasiako, Whitney J. Jackson, Yolanda K. Jones, Anant K. Singh
Alcorn State University, Alcorn State, MS-39096, 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. The present article reports 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-mercaptopropionic 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."

P10.06

COMPUTATIONAL SIMULATION OF MICRO- AND NANO-PARTICLE DEPOSITION INSIDE HUMAN LUNG MODEL

Anupria Davenport, Mohammed Ali
Jackson State University, Jackson, USA

Aerosol science and technology is the study of mechanical, electrical and aerodynamic properties of aerosols and the application of principles and methods to their measurement, control and application. Aerosol is a collection of solid or liquid particles suspended in a gas or air. Therapeutic drug aerosol, also known as medicinal aerosol, is a gaseous mist substance used as the medicine in treatment of respiratory diseases. The purpose of this study is to understand the aerosol properties effects on lung deposition of inhaled particles. Mathematical expressions based computational model on aerosol particles flow and suspension may provide important insight in this endeavor. The asymmetric multiple-path particle dosimetry (MPPD) model was adopted in this study to determine aerosolized nanoparticle transport and calculate deposition in the whole lung or its specific regions. The MPPD simulation was used to focus on both monodisperse and polydisperse aerosols, and multiple breathing patterns specific to the human species. The simulation of depositions gave different particle intensities and visualizations for each section of the lung. The visualizations and the values showed how they effected each and every part of the lung differently. The model compared the regional deposition from the mass per volume perspective to the central and peripheral tissues perspectives. The study results were compared with other related work published references, and found in a good agreement. This work was supported by the Mississippi INBRE, funded by an Institutional Development Award (IDeA) from the National Institute of General Medical Sciences of the National Institutes of Health under grant number P20GM103476

P10.07

A TWO-STAGE CHANCE-CONSTRAINED STOCHASTIC PROGRAMMING MODEL FOR A BIOFUEL SUPPLY CHAIN NETWORK

Md Abdul Quddus, Sudipta Chowdhury, Mohammad Marufuzzaman, Fei Yu, Linkan Bian
Mississippi State University, Starkville, MS, USA

This study presents a two-stage chance-constrained stochastic programming model formulation that captures the impact of feedstock uncertainty in biofuel supply chain network. The chance constraint is formulated to restrict the probability of one of the three supplies, i.e. municipal solid waste. Sample Average Approximation (SAA) method is used to approximate the distribution of random variables with an empirical distribution by Monte Carlo sampling technique. The computation of the SAA problem which is basically a mixed integer linear programming model has been made faster by using star-inequalities. We used data from Mississippi and Alabama as a case study to test and validate the performance of the algorithm. The proposed algorithm is capable of producing a near optimal solution in a reasonable amount of time for a large number of scenarios. We use python/Gurobi to solve the optimization model and use ArcGIS to visualize and validate the modeling results

P10.08

DECAY STUDY OF NEUTRON-RICH 74ZN→74GA NUCLEI USING STATISTICALLY SIGNIGICANT GAMMA-GAMMA COINCIDENCE METHOD

Durga Siwakoti, Umesh Silwal, James Tracy Jr, Jeff A Winger
Mississippi State University, Starkville, MS, USA

The Zn-74 decay scheme previously developed was limited due to low production rates for the parent nuclei and low detection efficiencies, so that low intensity ϒ-rays could not be clearly assigned. In the current experiment, a nearly pure beam of Cu-74 provided by the HRIBF was used to study the Cu-74→Zn-74→Ga-74→Ge-74 β-decay chain using the LeRIBSS setup. The high efficiency of the detector system along with the pure primary beam allowed a detailed study of the ϒ-ray emission from the decay chain. Decay schemes were developed from the ϒ-ϒ & β-ϒ coincidence data obtained. The ϒ-ϒ coincidence data were gated on each ϒ-ray line associated with a decay and the gated ϒ ray energy spectra were analyzed by fitting a Gaussian function peak to each probable peak in both a peak gate and a background gate. This allowed quantitative determination of the statistical significance for each observed coincidence peak. Presented here are readjustments and new found energy levels of Zn-74→Ga-74 decay based on this statistically significant coincidence method.

P10.09

MODEL-DEPENDENCE AND SYSTEMATIC UNCERTAINTIES IN SIMULATIONS OF A PROTON RADIUS MEASUREMENT EXPERIEMENT

Benjamin Emmich
Mississippi State University, Starkville, MS, USA

Despite the proton's discovery nearly one hundred years ago, much still remains unknown about its properties. Among the most important characteristics of the proton is its RMS charge radius, which has been called into question in recent years following atomic spectroscopy measurements utilizing muonic hydrogen. A novel experiment that allows for tight control of systematic errors by measuring electron-proton and electron-electron scattering simultaneously, uses a windowless hydrogen gas target for low beam background, and uses a very low momentum-transfer range that allows for model-independent extraction of the proton radius has been designed. We are studying the model independence/dependence and impact of systematic uncertainties on the proton radius extraction. Using data sets from a simulation of the experiment and various fitting methods, it is possible to show variance of different models on the extraction of the proton radius

February 19, 2016

FRIDAY MORNING
TC 228

O10.15

8:30 POLARIZATION PROPERTIES OF PHOTOLUMINESCENCE FROM IMPURITIES IN LITHIUM NIOBATE

Chandrima Chatterjee, Igor Ostrovskii
University of Mississippi, Oxford, Mississippi, USA

Lithium niobate is an important ferroelectric material with a composition of 48.45 mol% of Li_2O. This deviation from the ideal composition results in the presence of intrinsic defects in the crystal. The purpose of this research is to find the preferable orientations of the polarization sensitivities of different impurity centers in lithium niobate. Photoluminescence spectra are measured along the crystallographic z-axis. The impurities are identified by their characteristic peaks in the photoluminescence spectra. The green part of the spectra shows defects like Ar, Ba, Cr, Cs, F-center, Ne,

Nb_{Li}^{4+}, Sn, Xe etc. The red part of the spectra shows defects like Fe, K, Kr, Li, Mo, Na, O, etc. Spectra are recorded using polarizers at the position of the input or output, and both. The direction of polarization is either perpendicular to the crystallographic z-axis, also called the optical axis c , or parallel to c. It is observed that the defects like the F-center and Ba are polarized in a direction parallel to the c axis, while Cr is polarized perpendicular to the c axis. In the red part of the spectrum, FeO shows a polarization which is parallel to the c axis , while Ne shows a polarization perpendicular to the c axis. Hence, the impurity centers are sensitive to two polarization directions : one is along the z-axis and the other one is perpendicular to the z-axis.

O10.16

8:45 THREE-DIMENSIONAL HOLOGRAPHY RECONSTRUCTION OF AEROSOL PARTICLES

Jing Wen, Nava Subedi, Matthew Berg
Mississippi State University, Mississippi State, USA

This study covers generation of holograms and the three dimensional reconstruction of spherical aerosol particles. Mie solution is used to solve the scattering of electromagnetic waves by a sphere and obtain the hologram. Both computational and experimental results of three-dimensional reconstruction are represented. We identify how the particle size and index of refraction affects the reconstruction and describe a method to correct the reconstruction.

O10.17

9:00 TEMPERATURE AND PRESSURE EFFECTS ON ELASTIC PROPERTIES OF LEAD MAGNESIUM NIOBATE-LEAD TITANATE

Sumudu Tennakoon[1], Joseph Gladden[1]
[1]Department of Physics and Astronomy, University of Mississippi, University, MS, USA, [2]National Center for Physics Acoustics, University of Mississippi, University, MS, USA

Relaxor ferroelectric lead magnesium niobate - lead titanate (PMN-PT) exhibits exceptional electromechanical properties, considered as a highly efficient transduction material for vibration energy harvesting and acoustic sensing applications. It is reported in the literature that, the PMN-PT undergoes structural phase transitions with changes in temperature and the chemical composition. We seek to gain insight into the phase diagram of PMN-PT using temperature and pressure dependence of the elastic properties. Single crystal PMN-PT with chemical composition close to the morphotropic phase boundary (MPB) was used in a resonant ultrasound spectroscopy (RUS) study performed in the temperature range from 233 K to 773 K and the pressure range from near vacuum to 3.4 MPa. At atmospheric pressure, significantly high acoustic attenuation of the PMN-PT material is observed at the temperatures below 400 K. Strong stiffening is observed in the temperature range of 400 K - 673 K, followed by a gradual softening at higher temperatures. With the varying pressure, we observed an increased pressure sensitivity of elastic properties of the PMN-PT material that can be localized to the temperature regime where the strong stiffening is observed. Up to date results of this study will be discussed in this talk.

O10.18

9:15 TEMPERATURE DEPENDENCE OF SHEAR WAVE SPEED IN A WORMLIKE MICELLAR FLUID

E.G Sunethra Dayavansha, Cecille Labuda, Joseph Gladden
University of Mississippi, University,MS, USA

Wormlike micellar fluids are viscoelastic and can support shear waves. In this work, the behavior of shear waves in a 200mM CTAB/NaSal micellar fluid in a 5:3 ratio was studied. In earlier work, concentration dependent distinct regimes in shear wave speed has been investigated. In this work, distinct regimes of shear wave speed as a function of temperature is determined by measuring the shear wave speed over a wide temperature range. Shear wave propagation through the fluid was observed as a time varying birefringence pattern by using a high speed camera and crossed polarizers. The shear wave speed was calculated by an edge tracking technique. Three distinct regimes of shear wave speed could be observed in the 20-45^{o}C temperature range. The implications of the shear wave speed variation over a wide temperature range will be discussed.

O10.19

9:30 DECAY SCHEME DEVELOPMENT OF ^{74}GA→^{74}GE DECAY BASED ON STASTICALLY SIGNIFICANT *gg* COINCIDENCE

Umesh Silwal, Durga Siwakoti, James Tracy, Jeff Winger
Mississippi State University, Mississippi State University, MS 39762, USA

Data on g–ray emission following b-decay in the energy range 20-5200 keV along with gg and bg coincidences for $^{74}Ga \rightarrow ^{74}Ge$ have been collected and analyzed. For energy-gated gg spectra, possible coincidence peaks were fitted to a standard Gaussian function to determine the relevant peak area. The fitting was performed on both a peak gate and an adjacent background gate to enable us to identify the statistically significant peaks. After careful analysis, we established the decay scheme for $^{74}Ga \rightarrow ^{74}Ge$ b-decay and compared it to existing data at the National Nuclear Database Center (NNDC). We identified 17 new energy levels and removed 10 energy levels from the existing data for ^{74}Ga b-decay in the NNDC ENSDEF Database. Included in this is readjusting some previously placed transitions due to better understanding of the gg coincidence relationship thereby removing a number of double placements for g–ray transitions. We have also identified several cases of unresolved g–ray doublets which would lead to double placements. By analysis of gated coincidence spectra, we have resolved the doublets and properly allocated the g–ray intensity to each g–ray in the pair.

This work is supported by the office of Science of the Department of Energy and Grand number is DE-FG02-96ER41006.

9:45 BREAK

Session-VIII Chair: Alakabha Datta

O10.20

10:00 POWER-LAW PATTERN IN ELECTROMAGNETIC SCATTERING

Jehan Seneviratne, Matthew Berg
Mississippi State University, Mississippi State, MS, USA

When a particle is hit by an incoming plane wave it produces a scattered field. For spherical particles, the scattered field shows an angular dependent pattern in the far field region that can be used to reveal the radius of the particle. When far field intensity is plotted against the product of magnitude of scattering wave vector (q) and radius of the sphere (R), the log-log scale plot gives a pattern called "power-law patterns". One nice thing about the patterns is, even if the radius of the sphere was not known, the patterns can be used to reveal the radius of the sphere using the relationship between qR and intensity at the Guinier crossover. Guinier crossover can be seen in non-spherical particle scattering as well. Here, the studies have been extended towards non spherical particles to see whether the properties at the Guinier crossover could be used to derive the particle size. Furthermore, studies are done to see the connection between the power-law patterns and the internal fields of the particle: hence, how the scattering intensity pattern could be used to predict the internal field of the particle.

O10.21

10:15 MECHANICAL PROPERTY IMPROVEMENT OF CARBON FIBER REINFORCED POLYMERIC COMPOSITES BY FILLER DISPERSION

Jamel Alexander
Mississippi State University, Starkville,MS, USA

Fiber reinforced composites are vital to the development of low cost, strong lightweight materials. Due to widespread usage and safety impacts on the automotive and aerospace industries, it is important to understand how these materials age and perform over time. Despite the advantages, there are concerns regarding the cost and long-term durability of these composites especially when it comes to performances under critical and varying conditions. With the implementation of magnetostrictive particles to the system, internal flaws can be sensed while the net strength of the composite is increased. This paper will provide a preliminary study on how particles affect the overall mechanical properties of the polymeric composite with embedded particles.

Keywords: *CFRP, CFHRP, Hybridization, mechanical property, filler dispersion, SHM*

O10.22

10:30 ULTRASONIC PROPAGATION IN A BAND GAP OF A TWO DIMENSIONAL PHONONIC CRYSTAL

Ukesh Koju[1], Joel Mobley[1]
[1]Department of Physics and Astronomy, University of Mississippi, University, MS, USA, [2]National Center for Physical Acoustics, University of Mississippi, University, MS, USA

A band gap in the transmission spectrum of a finite two dimensional phononic crystal is examined in the time domain using pulsed ultrasonic fields. The phononic crystal consists of a hexagonal array of copper cylinders (r=1.19 mm) in an aqueous matrix with a lattice constant of 2.9 mm. Measurements of the transmission properties of the sample are performed using ultrasonic wave groups of various center frequencies and bandwidths. Among the band gaps in the low-MHz range, we concentrate on the gap from

1.48 MHz – 1.70 MHz. The phase velocity, group velocity and attenuation coefficient spectra are determined and compared with expectations

O10.23

10:45 COMPUTATION OF ULTRASONIC PRESSURE FIELDS IN FELINE BRAIN

Nazanin Omidi, Charles. C Church, Cecille Labuda
The University of Mississippi, Oxford, USA

This project is involved with calculation of the acoustic pressure waveforms produced in the brains of anesthetized felines by a spherically focused, nominally f1-transducer with the focal length = 13 cm and diameter = 12.7 cm at increasing values of the source pressure amplitude at frequencies of 1, 3, and 9 MHz. The overall goal of this study is to determine the actual acoustic pressures present in vivo during experiments rather than estimating the pressure using linear theory as is currently the case.

The plane wave approximation is assumed to be correct within the focal zone of the acoustic field to compute the focal pressures. The time varying pressure waveforms determined for a water path are integrated over one complete cycle to estimate the focal intensities at the real focus for correlation with published experimental data at each frequency. The computed waveforms are determined using the FDTD technique for nonlinear propagation for a series of source pressure amplitude.

In order to get a reasonable agreement between the calculations and physical measurement in this study, a 1.21 MHz transducer featured by a Fresnel lens with a focal length of 5.5 cm is used to measure the pressure fields and compare with calculations in water.

O10.24

11:00 DETECTION OF ACOUSTIC SOURCES IN SHALLOW WATER USING TIME-REVERSAL METHODS

Grant Tingstrom
The University Of Southern Mississippi, Hattiesburg, MS, USA

The goal of this research is to characterize the impact of using an equivalent-fluid method for a solid seabed on the use of time reversal procedures for detecting the origin location of an emitted sound. There are two different ways of modeling how sound propagates through water: modeling sound as a ray and modeling sound as a wave. It is easier to model the propagation of sound through water with a ray model; using a ray model allows for the collection of grazing angles with respect to the bottom. These will be important when determining bottom intensity loss of the sound when taking the equivalent fluids into account. When a sound wave interacts with the bottom of the ocean it is hard to estimate how much energy is lost to the bottom; the equivalent-fluid method is a way to simulate the ocean floor's density as a complex density so that it can be easily manipulated and affect how much intensity is lost to the bottom. The equivalent-fluid method will introduce errors when calculating the bottom loss from the ray grazing angles; this research will hinge on finding how much these errors will affect time reversal simulations. The results were rendered inconclusive, but will be confirmed with future research. This research could be applicable in the field of wildlife detection as well as long range vessel detection.

Friday, February 19, 2016

AFTERNOON

12:00-1:00- Plenary Speaker

1:00-3:00- Millsaps HHMI Undergraduate

PSYCHOLOGY AND SOCIAL SCIENCES

Chair: Shaila Khan,
Tougaloo Collge
Co-Chair: Gary Chong,
Tougaloo Collge

Thursday, February 18, 2016

MORNING
Room 229

O11.01

11:00 FUNCTION, LIFE HISTORIES, RESOURCE STRESS: A NETWORK MODEL FOR STONE TOOL EVOLUTION

Jason Ervin
Mississippi State University, USA

Explanations are sought for the surprising scarcity of stone tools and stone tool-making debris at an archaeological site in Oktibbeha County, MS. Radiocarbon dates and other data have suggested that the Lyon's Bluff Mound-Village Complex on the banks of Line Creek marks the site of continuous occupation by a sizable group of people spanning the period ca. 1200 - 1650 A.D., a time when people are known to have been using stone tools. It is hypothesized that

certain critical tools might have, for a variety of unknown reasons, dropped out of the tool kit, precipitating its partial collapse. To explore this hypothesis, the tool kit is conceptualized as a network in which tools are represented by nodes, and edges are placed between two tools if they are closely related in terms of a small number of morphological characteristics. In this network, paths might be interpreted as stone-tool use-life trajectories. Systematic deletion of highly central nodes allows one to explore the impact that the loss of such nodes could have had on the ability to transition from one tool type to another. By disrupting inter-tool connectivity, such losses could ramp up competition among different parts of the tool kit for scarce raw material, leading to full/partial collapse. Tool kits from small, nearby farmsteads contemporaneous with Lyon's Bluff, when analyzed in this novel way, help elucidate how the meager Lyon's Bluff tool kit may have come into being.

O11.02

11:15 STRESS AND COPING MECHANISM AMOUNG AFRICAN AMERICAN COLLEGE MEN AND WOMEN

Jazmine Anderson and Shaila Khan
Tougaloo College, USA

Stress is a factor in many people lives, especially those of vulnerable college students. Vulnerability to stress is increased in college students with the transition from adolescence into adulthood. That transition can be a very difficult journey filled with challenges, risk, and an endless amount of changes. Adjusting to university life, academic requirements, moving away from family and friends, and social pressure may elevate stress. It is essential to investigate how these college students are coping with their stress. The purpose of the present study was to measure stress and coping mechanisms among African American men and women. It was hypothesized that women in a 'stress' group use different types of coping mechanism than men in a 'non-stress' group. A total of 80 participants were given the Ways of Coping Questionnaire with some demographical information. Results showed that females only used 'seeking social support' coping significantly more than males, t (79) = 2.05, p = .043, the stress group used 'confronting' coping significantly more than the non-stress group, t (78) =-2.62. p=.01, those who endorsed 'seeking social support' coped significantly more than those in the non- stress group, t (78) =3.29, p=.001) and those who used 'escape avoidance' coped more than the non-stress group, t (78) = 2.20, p= .031. From these results we can conclude that such coping mechanisms are essential and may help college students deal with their stress and become self-reliant, navigate through obstacles, make decisions, and promote their psychological and physical wellbeing.

O11.03

11:30 RELATIONSHIP SATISFACTION AND SELF ESTEEM AMONG MALE AND FEMALE COLLEGE STUDENTS

Taralyn Rowell and Shaila Khan
[1]*Tougaloo College, USA,*

Low self-esteem prospectively predicts antisocial behavior, eating disturbances, depression, and suicidal ideation. The development of self-esteem may have significant consequences for life outcomes. Self-esteem gradually increases during young adulthood. Although daily self-esteem co-varies with daily affect and with constructs such as self-concept clarity, little is known about within-person relationships between self-esteem and intra-psychic variables such as satisfaction of psychological needs and felt authenticity. This study's purpose is to measure self-esteem based on satisfaction in relationships. It is hypothesized that there will a positive relationship between relationship satisfaction and self-esteem A total of 80 participants were be given a Relationship Assessment Scale and a Self-Esteem Scale, which focuses on performance, social, and appearance self-esteem. The independent variable in this study was the individual's self-esteem and the dependent variable was relationship satisfaction. The correlation results indicated that there was a positive correlation between overall self-esteem score and relationship satisfaction, r=.298, n=80, p=.01. The correlation result also found positive correlation between relationship satisfaction and performance self-esteem, r=.273, n=80, p=.02, social self-esteem, r=.245, n=80, p=.04 and appearance self-esteem, r=.251, n=80, p=.03. The results suggest that self-esteem may play an important role for maintaining positive, satisfactory relationships among college students.

O11.04

11:45 STRESS INDICATORS OF COLLEGE STUDENTS FROM SINGLE PARENT VERSUS DUAL PARENT HOMES

Antonio Lowell, and Shaila Khan
Tougaloo College, USA,

The journey from adolescence into young adulthood is marked with many obstacles. By the time an individual reaches college age or early adulthood, they can be encompassed by many stressors. The stressors associated with this developmental process may affect

students differently depending on whether they are from single parented homes versus dual parented homes. This study explores possible stress differences between college students from single parent homes versus dual parent homes as well as possible stress differences between males and females. It was hypothesized that students from single parent homes and women will have higher stress indicators than students from a dual parented home and males. 80 participants were given a demographics form and the Stress Indicators questionnaire which had five sub scales. Results showed that participants from single parent homes had 'personal habits' stress scores significantly higher than those of participants from dual parents homes, t (78) = 1.78, p=.05. Females showed 'physical' stress scores higher than those of males, t (78) =-2.15, p=.03, as well as 'sleep' stress indicator's higher than those of males, t (78) =-1.86, p=.05. Investigating this problem can provide useful information for programs designed to better manage levels of stress as students move from lower to higher educational levels. This improvement could provide students with the necessary tools to promote optimal educational performance.

BREAK 12:00 -1:20

O11.06

1:15 DRUG USE, PERCEIVED PARENTAL ACCEPTANCE, AND PSYCHOLOGICAL ADJUSTMENT OF AFRICAN AMERICAN STUDENTS

Shaila Khan
Tougaloo College, USA

Relationships among self-reported drug use, perceptions of parental acceptance/rejection, and psychological adjustment of African American college students in Mississippi were investigated. Short form of adult versions of Parental Acceptance-Rejection Questionnaire (PARQ), Personality Assessment Questionnaire (PAQ), Drug Use Questionnaire, and the Personal Information Form (PIF) (Rohner, 2005), were administered to 127 (24 males and 103 females) college female students who ranged in age from 18 through 43 years (mean=20.96, SD=3.09 years). Drug use was calculated as the frequency of use of various common drugs. No significant difference was found in psychological adjustment, perceived parental rejection between males and females. Results of simple bivariate correlations suggested that frequency of drug use was associated with psychological adjustment (r=.215, p=.017), their perception of rejection by father (r=.196, p=.031) by not by mother. Also, psychological adjustment was found to be associated with perception of rejection by father (r=.315, p<.001) and by mother (r=.404, p<.001). Simple multiple linear regression analysis found that rejection by father (b=.171, t=1.81, p=.07) contributed to drug use, but rejection by mother (b=.077, t=.818, p=.415) did not. When considered separately, psychological adjustment was found to contribute significantly (b=.215, t=2.42, p=.017). However, when the effect of perceived parental rejection were removed, psychological adjustment was found to have no significant contribution. It may be concluded that the perceived parental acceptance/rejection significantly impact psychological adjustments which in turn contributes to frequency of drug use in African American students.

O11.06

1:30 SOCIAL MEDIA, COMMUNICATION PATTERNS, SELF CONCEPT AND SHYNESS: AMONG COLLEGE STUDENTS

Shandell Lewis Lewis, and Shaila Khan Khan
Tougaloo College, USA

Social media is a very fast growing phenomenon among today's generation. It influences individuals' lives in ways that are not often acknowledged. Social network sites are public web-based services that allow users to develop a personal profile, identify other users ("friends") with whom they have a connection, read and react to postings made by other users on the site, and send and receive messages either privately or publicly. The purpose of this study is to investigate possible gender differences in social media use, communication patterns, self concept and shyness among college students. It is hypothesized that males and females will differ in regards to the types of social media used, the social media being used for communication patterns, their self-concept, and shyness. Result showed that there was no significant gender difference among number of different types of social network being used, *chi square* = .580, p= .446. Regarding reasons for using social media it was found that that among all participants 32.5% reported using social networking to 'impress other users' whereas 67.5% reported not using social networking to 'impress other users'. Within this percentage males were higher (22.5%) in reporting the use of social networking to' impress other users' compared to females (10%). Females were higher (42.5%) in not using social networking to 'impress other users' compared to males (25%). Such differences between genders were found to be statistically significant, *chi-square*= 7.294, p= .007.

O11.07

1:45 PARENTAL AUTHORITY AND ITS AFFECTS ON INTIMATE RELATIONSHIPS AMONG ADULT WOMEN

Laurin Mitchell and Shaila Khan
Tougaloo College, USA

Adult intimate relationships are shaped by early patterns of attachment and experiences with closeness, separation, and love. The quality and type of childhood attachments that individuals may have with their mothers may strongly influence the quality of attachments in future intimate relationships. Parental authority has a huge impact on adult women's personalities and can play a major role in the success of their intimate relationships. The purpose of this study was to measure how parental authority relates to intimate relationships among adult women. It was hypothesize that parenting styles would be significantly related to different aspects of intimate relationships. The independent variable for this study was parental authority and the dependent variable was intimate relationships. Eighty participants each completed a demographics form, the Parental Authority Questionnaire, which had three subscales: permissive, authoritarian and authoritative, and the Relational Assessment Questionnaire (RAQ), which also had three subscales: relational esteem, relational depression and relational preoccupation. Correlation results showed that permissive parenting was positively correlated with relational depression, r= .328, p=.003 and negatively correlated with relational esteem, r= -.267, p=.018. Authoritarian and authoritative parental authority did not show any significant correlation with any of the subscales of intimate relationship. From the results we can conclude that a permissive parenting style seems to be positively related to depression in a relationship and negatively related to higher self-esteem in a relationship among adult women.

O11.08

2:00 EMOTIONAL REGULATION AND WELL BEING AMONG AFRICAN-AMERICAN COLLEGE STUDENTS

Victoria Handy[1], Shaila Khan[2]

[1]*Tougaloo College, USA,* [2]*Tougaloo College, USA*

Well-Being is an essential part of growing up and dealing with normal life changes. The capacity to manage emotion is important for human adaption. Two factors identified for controlling emotions are controlling attention to, and cognitively changing the meaning of, emotionally evocative stimuli. Possibility of training in emotional regulation abilities might help people to interact effectively with others and increase their wellbeing. The purpose of this study is to investigate emotional regulation and wellbeing among African-American college students. Eighty participants completed two questionnaires, the Well Being Questionnaire (WBQ) which included "Mind Aspect' and 'Social Aspect' portions, and the Emotional Regulation Questionnaire (ERQ) which had two subscales measuring 'Cognitive Reappraisal' and 'Expressive Suppression' facets. It was hypothesized that emotional regulation and well being will vary according to academic classification, gender, and exercise status. Results from an analysis of variance (ANOVA) showed that there was no significant difference between fresh persons, sophomores, juniors and seniors in emotional regulation and wellbeing. Analyses with the t tests indicated that females had no higher score on 'Mind Aspect' of wellbeing compared to males, t (78) = -1.87, p=.06, and that the "exercise" group had higher scores on the 'Social Aspect' of wellbeing compared to the "no exercise" group, t (78) = 1.93 with p=0.05. From these results we can conclude that women showed no better adjustment in their "Mind Aspect" of wellbeing, but that exercise is significantly related to the "Social Aspect" of wellbeing.

O11:09

2:15 ATTITUDES AND PERCEPTIONS OF RAP MUSIC, RACIAL IDENTITY, AND SELF-ESTEEM

Alexis Davis, Cheryl Moreland
Jackson State University, Jackson, MS, USA

This study aimed to investigate if there is a relationship between racial identity, attitudes and perceptions of rap music, and self-esteem. Racial identity was assessed using the Ideology scale of the Multidimensional Inventory of Black Identity, whereas the Rosenberg Self-Esteem Scale was used to assess self-esteem and the Rap Attitudes and Perception Scale (RAP) was used to assess attitudes and perceptions of rap music. A demographic questionnaire was used to obtain participants background information. Data analysis was achieved through multiple regression and Pearson r-correlation coefficient techniques. It was expected that (a) participants who listen to a lot of rap music, have higher self-esteem, and have a higher violent misogynistic perception of rap music, will have higher nationalist ideology scores; (b) participants who listen to a lot of rap music, have lower self-esteem, and have a higher violent misogynistic perception of rap music will have lower oppressed minority ideology scores;

and (c) participants who have an increased nationalist ideology will have an increased empowerment perception of rap music. It was found that there was no association between racial identity (nationalist), a violent misogynistic attitude or perception of rap music, and self-esteem. Additionally, it was found that there was no association between an oppressed minority racial identity, self-esteem, and a violent-misogynistic perception towards rap music. Finally, it was found that there was not a positive correlation between an empowerment attitude and perception of rap music and a nationalist racial identity. Findings are discussed along with suggestions for future research.

2:30-3:00 P.M. BUSINESS MEETING

Thursday, February 18, 2016
AFTERNOON

3:15-Dodgen Lecture and Awards Ceremony

Ballroom

Thursday, February 18, 2016
EVENING

5:00-7:00

POSTER SESSION

P11.01
NEW ONSET MANIA IN LATE LIFE: CASE REPORT AND LITERATURE REVIEW

Chasity Torrence, Jon Jackson
University of Mississippi Medical Center, USA

Bipolar I Disorder is an affective or mood disorder defined as a manic episode, which is a distinct period of abnormally and persistently elevated, expansive, or irritable mood and abnormally increased goal-directed activity or energy, lasting at least one week or any duration if hospitalization is required. In addition, at least three to four other symptoms are required depending on whether the mood is elevated or irritable. These symptoms include grandiosity, decreased need for sleep, pressured speech, flight of ideas, distractibility, increased goal-directed activity or psychomotor agitation, and excessive activities with painful consequences (DSM-V). Strictly, the manic episode is not attributable to another medical condition. Classically, depressive episodes may also occur but are not a requirement for diagnosis. Although the mean age of onset for the first episode, either depressive or manic, is eighteen years, onset can occur throughout the life cycle including the seventh and eighth decades of life representing a bi-modal distribution. Late onset manic episodes generally prompt medical and neurologic workup; however, several cases appear to be of purely psychiatric genesis without identifiable medical precipitating factors. This case report exemplifies Bipolar 1 Disorder and reviews possible explanations for late-life manifestation of the illness. In addition, the case provided provocation for a literature review of geriatric onset of mania and examination of its statistical deviation from the proposed norm. The evidence suggests that this uncharacteristic geriatric presentation of mania may be considered a subtype of Bipolar illness.

P11.02

POPULATION CHARACTERIZATION OF THE BEHAVIORAL EFFECTS OF CHRONIC UNPREDICTABLE STRESS IN RATS

Devin Guillory, Carley Hydrick, Jasmeka Foster, Natalie Booker, Anna Roller, Ian Paul
University of Mississippi Medical Center, USA

A core symptom of major depressive disorder (MDD) is a loss of interest in activities once found to be rewarding, known as anhedonia. Because of the close relationship of stress with MDD, chronic unpredictable stress (CUS) in rats is used as a model of MDD. The effects of CUS are tested most commonly by a reduction in preference for a sweetened water solution. However, multiple laboratories have found this to be an extremely variable measure. Recently, data has appeared that suggests this variability may result from different populations of stress-responsive and unresponsive animals. In addition, our laboratory has recently demonstrated that CUS profoundly reduces the emission of high frequency (~55 kHz), ultrasonic vocalizations (USVs) that are typically associated with positively valenced situations. We attempted to replicate the population findings on the effects of CUS to sucrose preference and to extend that observation to the emission of 55 kHz USVs. Sucrose preference and separation-induced emission of USVs was monitored during CUS in male, Sprague-Dawley rats. Our findings did not replicate the earlier findings on sucrose preference. However, the effects of CUS on emission of 55 kHz USVs suggests populations of responders and non-responders, similar to those observed previously on sucrose preference. We conclude that: 1) 55 kHz USV emission is a more reliable behavioral index of the effects of stress than sucrose preference and; 2) that CUS should further studied for the presence of responsive and non-responsive animals which would closely parallel the appearance of stress-responsive and non-responsive humans with MDD. 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.

P11.03

UNDERSTANDING ZEBRAFISH SHOALING PATTERNS

Courtney Hyter, Kanza Khan, David Echevarria
University of Southern Mississippi, USA

Zebrafish are a relatively new translational model in neurobehavioral sciences. Despite the novelty, their translational potential is well established, and they have provided great insight into the areas of addiction, stress and cognition. Recently, the study of sleep in zebrafish has gained traction. Adult zebrafish sleep in relatively short bouts (generally lasting between 6-30 seconds). As a shoaling species, zebrafish also tend to remain with their cohort. In the present study we evaluate the average interfish distance in a group of 3 animals over the course of a 24 hour period. Animals were exposed to one of three experimental conditions: (1) constant light over a 24-hour period, (2) constant darkness over a 24-hour period, and (3) constant light (24 hrs) paired with caffeine exposure. To evaluate any potential stress effects due to sleep rhythm disruption, animals were transferred to a novel tank in which the relative distance from the cohort was measured. These data further our understanding of sleep rhythms and the effect of sleep disruption on shoaling patterns over a 24 hour period. 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

P11.04

ASSOCIATIONS BETWEEN MATERNAL DAYTIME SLEEPINESS AND MULTIPLE DOMAINS OF PARENTING

Lori Staton, Julie Parker
Mississippi State University, USA

The last decade of research has highlighted the important influence of non-clinical sleep disruptions on physical health (Knutson, 2012), cognitive processing (Alhola & Polo-Kantola, 2007), and social-emotional health (Walker, 2009). However, scant information is available regarding non-clinical sleep of adults and even less knowledge of associations between adult sleep and family processes. Given the significant role of sleep on health and well-being, it is imperative to understand its associations with parenting, as sleep takes place in the context of the family. Researchers aimed to examine the association between maternal daytime sleepiness and three mother-reported parenting variables (i.e., co-parenting quality, parenting efficacy, and parenting behaviors). The sample was 58 mothers of preschool children (African American = 98%; M age =29.73 years; SD = 8.88) participating in a six week program focused on enhancing children's school readiness through family conflict management and sleep hygiene education (SHAPE CARE program). Data stem from well validated questionnaires completed at the first session of the education program. Results indicated that greater maternal daytime sleepiness was significantly associated with poor co-parenting quality and lower parenting efficacy; no significant associations were found for the use of negative parenting behaviors. Understanding rates of daytime sleepiness in mothers, as well as how sleepiness may impact parenting, particularly as it relates to at-risk populations (e.g., single mothers, low income families), is essential for family researchers. Sleep is malleable and reflects both biological and sociocultural influences. Thus, it lends itself to be incorporated into interventions focused on improving parenting and family functioning.

P11.05

LONELINESS, STRESS, AND CORTISOL

Chandler Lee and John Young
University of Mississippi, USA

Loneliness is defined as a perceived lack of intimacy or lack of companionship, and it has been associated with impaired immune function, higher blood pressure, and depression. Researchers have begun to examine the effects of loneliness on the HPA axis mediated by cortisol. The present study examines the correlations between loneliness, depression, anxiety, sleep, and changes in cortisol facilitated by a stressful task. The current data are the first of a broader study to examine these constructs in a larger group, which is ongoing. Participants (n=16) completed the UCLA Loneliness Scale, the DASS-21, and the Pittsburg Sleep Quality Index. Salivary cortisol samples were collected before and after participating in the stressful task. The participants had 10 minutes to research and prepare for a 5-minute speech. They were told that the speech would be video recorded and evaluated by a professor. The value for sleep suggested a strong correlation between overall sleep quality and change in cortisol as a function of exposure to the stressful task. Separating the sample using a median split for loneliness also afforded additional insight into the nature of this relationship. The group above the median for loneliness exuded a stronger correlation than the overall average (r = .60) and the group below a smaller correlation (r = .39). The conclusions of this initial

effort suggested that cortisol changes as the result of a stressful experience may be related to emotional states and/or health behaviors.

The following abstracts will appear in the April issue of the journal.

P11.06

CURRENT MINDFULNESS STRESS REDUCTION TECHNIQUES FOR COLLEGE STUDENTS

Joanne (Siew) Kwoh amd Juliette Schweitzer
Jackson State University, USA

P11.07

ELEMENTARY SCHOOL PARENTS' AWARENESS OF CHILDHOOD OBESITY

Kira Seaton Seaton and Meherun Laiju
Tougaloo College, USA

P11.08

GENDER, ETHNICITY, MARITAL STATUS, EMPLOYMENT, AND VICTIMIZATION AMONG RESIDENTS OF JACKSON, MS

Khadijra Britton,and Meherun Laiju
Tougaloo College, USA

P11.09

COMPARATIVE STUDY: FACTORS INFLUENCE AFRICAN AMERICAN STUDENTS TO ATTEND HBCU VS PWI

Ineshia Coleman and Meherun Laiju

Tougaloo College, USA, [2]Tougaloo College, USA

P11.10

GENDER, CLASSIFICATION, FAMILY STRUCTURE, AND AWARENESS OF PLANNED PARENTHOOD AMONG COLLEGE STUDENTS'

Dione James [and] Meherun Laiju
Tougaloo College, USA

P11.11

GENDER, ETHNICITY, COLLEGE CLASSFICATION AND THE GRIEVING PROCESS

Brandon Catchings and Meherun Laiju
Tougaloo College

P11.12

PERSONALITY FACTORS AND ATTITUDES TOWARD MENTAL ILLNESS AMONG COLLEGE STUDENTS

Desiree Reed, and Gary Chong
Tougaloo College, USA

P11.13

DRINKING, SMOKING, PEER PRESSURE, GENDER AND ACADEMIC PERFORMANCE

Treasure Coleman and Gary Chong
Tougaloo College, USA

P11.14

RELATIONSHIPS BETWEEN PERSONALITY, ASSERTIVENESS, AND GENDER AMONG AFRICAN-AMERICAN COLLEGE STUDENTS

Wynisha Collins and Gary Chong
Tougaloo College, USA

P11.15

COMPARING RELATIONSHIP AND SELF-ESTEEM EFFECTS AMONG DOMESIC VIOLENCE VICTIMS

Dionnca Tubby and Gary Chong
Tougaloo College, USA

P11.16

EMOTIONAL I.Q. AND ITS RELATIONSHIP TO ACADEMIC PERFORMACE

Ebony Barnes and Gary Chong
Tougaloo College, USA

P11.17

THE RELATIONSHIP BETWEEN PERSONALITY, BIRTH ORDER, AND SEXUAL PROMISCUITY AMONG COLLEGE STUDENTS

Dominique King and Shaila Khan
Tougaloo College, USA

P11.18

SPORTS PSYCHOLOGICAL SKILL AND ACADEMIC ANXIETY AMONG COLLEGE ATHLETES AND NON-ATHLETES.

Mariah Prince and Shaila Khan
Tougaloo College, USA

P11.19

SUBSTANCE USE AMONG COLLEGE STUDENTS: A COMPARISON OF ATHLETES AND NON-ATHLETES.

Ashley Franklin and Shaila Khan
Tougaloo College, USA

Friday, February 19, 2016
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: Ryan Walker
Mississippi State University

Vice-Chair: Christine McDaniel
Mississippi State University

Thursday, February 18, 2016

MORNING

TC 218A

9:50 WELCOME AND INTRODUCTION

O12.01

10:00 USING CO-TEACHING COLLABORATIONS TO UNITE SCIENTISTS, SCIENCE TEACHERS, AND MIDDLE SCHOOL STUDENTS

Renee Clary[1], Anastasia Elder[1], James Dunne[1], Deborah Tucker[2], Debbie Beard[1], Svein Saebo[1], Charles Wax[1], Joshua Winter[1] *[1]Mississippi State University, USA, [2]Independent Science Education Consultant, USA*

From 2010 through 2013, the Teacher Academy in the Natural Sciences (TANS) provided content instruction and inquiry investigations to middle school teachers in three natural science disciplines: chemistry, geosciences, and physics. Six university scientists led TANS instruction, which also included hands-on performance tasks. A unique component of the TANS project facilitated direct interaction between the university scientists and participating TANS teachers' middle school students. Co-teaching, with lesson implementation by both the middle school teacher and a university scientist, resulted in a unique collaborative experience. Throughout the 3-year program, 162 classrooms were impacted (year 1 = 57; year 2 = 57; year 3 = 48), with topic instruction that included plate tectonics, weather and climate, energy and motion, and acids and bases. University scientists gained greater understanding of classroom and time restraints faced by middle school teachers, and middle school teachers directly observed scientists' teaching styles. Middle school students learned from both scientist and teacher, and had some misconceptions of university scientists (e.g., aloof, boring) challenged and overturned during the experience. Although time and teachers' geographic locations presented some challenges, co-teaching offered unique opportunities for university faculty to interact and connect with the students of teachers participating in professional development programs.

O12.02

10:15 EFFECTS OF ANTIBIOTICS AND INCREASED RESISTANCE OF STAPHYLOCOCCUS EPIDERMIDIS IN COLLEGE STUDENTS

Steffani Belisle
Northwest Mississippi Community College, USA

This study was conducted to evaluate the increasing antibiotic resistance of Staphylococcus epidermidis. Samples of bacteria were swabbed from 50 students and cultured on Mannitol Salt Agar. These specimens were incubated for 24 hours at 37 degrees Celsius and stored six days at 21 degrees Celsius. This was done to eliminate Staphylococcus aureus and mannitol-fermenting S. epidermidis. Interestingly, 28% of those surveyed were positive for S. aureus. Each non-fermenting culture was then transferred onto a plate of Mueller-Hinton agar to conduct a Kirby-Bauer Test. Antibiotics used in this test were Chloramphenicol (C), Neomycin (N), Streptomycin (S), Erythromycin (E), Penicillin (P10), and Tetracycline (T30). Gram stains were conducted for further identification of the S. epidermidis. The study concluded that the majority of college students had non-fermenting S. epidermidis. While most antibiotics were effective, an increasing number of S. epidermidis is becoming resistant to Penicillin and Erythromycin. Since a study published by S. Schaefler in 1971, penicillin resistance has increased by almost 4%, while Erythromycin resistance has increased by about 20%. This study indicates that S. epidermidis may be developing increased resistance to these specific antibiotics. While not a definitive inquiry, the evidence supports further investigation into

antibiotic resistance in the common species.

O12.03

10:30 TEACHERS' PERCEPTIONS OF FOSSIL REPLICAS IN SCIENCE CLASSROOMS

Renee Clary
Mississippi State University, USA

When fossils are investigated in science classrooms, often the specimens are incomplete or broken, and students struggle with identifying the distinguishing features of the fossil organisms. With the increased use of 3D printing, teachers may be offered an option of scientifically accurate 3D printed models instead of authentic fossil specimens. An anonymous survey probed in-service teachers' opinions (N = 38) to assess the value of 3D classroom models. Two major themes emerged through content analysis: 1) Printed replicas provide consistency and a common instructional platform; and 2) Fossil specimens illustrate natural variations, and their authenticity engages students. While more than 25% (n =10) of teachers identified fossils as the best aspect of laboratory investigations, 3 teachers (8%) found fossil activities in most need of improvement. Ten teachers thought replicas were a better educational tool, 4 were undecided, but the majority (n = 24, 63%) stated they would still prefer authentic fossils. Therefore, changes in teachers' and students' perceptions may be necessary before 3D printed replicas become a viable alternative to authentic fossil specimens in science classrooms.

O12.04

10:45 REDESIGNING COLLEGE BIOLOGY COURSES FOR ENHANCEMENT OF STUDENT INVOLVEMENT AND COGNITIVE GAINS

Johnny Mattox[1], Elizabeth Prewitt[2]
[1]Blue Mountain, USA, [2]Blue Mountain, USA

Courses in the Blue Mountain College Department of Natural Sciences including General Biology for Majors and Systematic Botany are being redesigned in order to increase student active involvement in the course and, as a result, increase cognitive gains. Students are now being required to participate in study groups and discussion groups to enhance peer learning. Other assignments to increase student involvement include projects such as wild flower collections, interactive PowerPoint presentations, botany journal writing, case studies and group debates. It is projected that these assignments will also improve student dispositions in these classes.

O12.05

11:00 RELATIONSHIPS AMONG ACADEMIC PERFORMANCE, SCIENCE FAIR PARTICIPATION LEVEL, TEACHING METHODOLOGIES: PILOT STUDY

Christina McDaniel, Ryan M. Walker
Mississippi State University, USA

As educational reforms in science education engage in the inclusion of advanced scientific inquiry in the K-12 classroom, the relevance for a guideline of successful teaching strategies that advanced scientific processes within the current curriculum is crucial. In this grounded theory or constant comparative qualitative pilot study, Mississippi teacher participants who had the greatest number of International Science and Engineering Fair finalists since 2010 were interviewed and observed, supporting documents were obtained, and follow up interviews were conducted. Triangulation of data including marginal and descriptive notes, axial and selective coding of transcriptions and documents, and categorization revealed 5 emerging themes. The themes indicate relationships of: 1.) extensive use of science process skills through; 2.) engaging activities; 3.) incorporation of science fair in alignment with science curriculum standards; and 4.) support of administration, community and parents were evident in academically successful science fair teachers. The previous four themes indicated a direct relationship with a fifth theme of preparing students for the technologically advanced global workforce. Therefore, this pilot study provided key themes for additional study on science fair alignment with state science standards, establishment of support systems, effective teaching strategies for incorporation of science process skills, and the use of STEM programs such as science and engineering fairs for summative assessment of science process skills.

O12.06

11:15 USING REFLECTIVE WRITING TO ADDRESS RELIGIOUS AND PHILOSOPHICAL CONFLICTS IN SCIENCE CLASSROOMS

Renee Clary
Mississippi State University, USA

Sometimes discussions on evolutionary theory and primate evolution invoke uncomfortable student reactions in science classrooms. However, few science teachers utilize classroom time to incorporate alternative philosophical or religious opinions. As part of a writing-to-learn initiative, a paleontology course

included written analyses of fossils, as well as "Paleo-Entry" responses on assigned reading topics. Immediately before hominid evolution, the instructor assigned a private journal reflection, Consider your philosophical and/or religious views on hominid evolution, and discuss how this integrates with scientific consensus. Students (N=12) were assured that their responses would be scored only as complete/incomplete, and no sharing of reflections would occur. Students produced mature, reflective statements, some conformable with scientific theory, and others in conflict. The instructor acknowledged a diversity of opinions before the classroom hominid discussion. The instructor noted that students participated in an unusually scientific, respectful conversation with little sign of uneasiness. Similar results were also noted in an online classroom (N = 41), when private journal assignments probed students' opinions on evolutionary theory. Preliminary results indicate that offering students the opportunity to examine and express a philosophical or religious opinion before challenging topics are discussed may defuse uncomfortable topics, and provide students with an outlet for their beliefs.

O12.07

11:30 BACKGROUND FACTORS AFFECTING STUDENT SUCCESS IN AEROSPACE ENGINEERING

Rachel McFalls-Brown, Jean Mohammadi-Aragh, Rani Sullivan, Danielle Grimes
Mississippi State University, MsState, MS, USA

There are numerous opportunities for K-12 students to participate in pre-college engineering experiences, such as university sponsored summer engineering programs, high school engineering courses, extra-curricular activities, and summer internships. Program administrators often report that these pre-collegiate engineering experiences are successful in increasing students' motivation to pursue an engineering degree. This is consistent with self-efficacy theories, which tell us that when a student perceives an experience as positive, that experience can encourage the student to continue participating in that subject area. While we do know that these programs can encourage students to enroll in engineering, the lasting impact of these programs on engineering students is less clear. We provide some clarity by examining background factors of retained aerospace engineering students. The goal of this investigation is to identify the factors that increase student success in engineering to inform future programs and curricula. Research questions guiding this study include: 1) How do retained aerospace engineers describe the impact of participation in a pre-engineering program on university major choice? and 2) Which background factors affect student retention and success in Aerospace Engineering students? We surveyed sophomore and senior aerospace engineering students and analyzed the students' self-reported background factors, engineering identity, and engineering self-efficacy. Student information such as GPA, retention information, demographics, SAT/ACT scores, and initial major of study were acquired from the university and analyzed with the self-reported data to determine significant measures of success. The results of our investigation can inform the design and implementation of pre-college engineering programs.

11:45 Divisional Business Meeting

12:00-1:00 General Session

Thursday, February 18, 2016

AFTERNOON

WORKSHOP

1:00-2:30

Drs. Walker and McDainel on Sci Ed Training Advances in Teaching Methodologies

Division Business Meeting

3:15- Dodgen Lecture and Awards Ceremony

Thursday, February 18, 2016

EVENINGN

Poster Session

Following Dodgen Lecture

P12.01

FEMALE MOTIVATIONS AND OBSTRUCTIONS INTO ENGINEERING

Carla Grimes, Rachel McFalls-Brown, Jean Mohammadi-Aragh
Mississippi State University, USA

Women obtain 52% of baccalaureate degrees, yet engineering is only 20% female. This disparity between the genders in engineering has been acknowledged since the 1960s, and while there has been an increase in female enrollment since that time, more recent years have shown a slight decrease. Researchers have examined how females react to being

in engineering, but very little research has asked female engineers to reflect on what influenced their major choice.

Our work investigates female engineering students' perspectives on why they entered engineering. We explored how these females chose engineering through motivational theories in interviews. The research question driving our investigation was: What do female engineers assert influenced their major choice? Examples of the interview questions we used are: 1) When did you first hear of engineering? 2) Why do you think you chose engineering? 3) What attracted you to your major? 4) Why do you think engineering has so few females in general? 5) What do you think is the hardest part of being a female engineer? All interviews were transcribed and coded using thematic analysis.

Our work is a first step into understanding how female engineers decide to major in engineering and what they perceive as the most influential factors their major choice. We also provide insight into the barriers female students perceive to be obstructions for themselves and other females that prevents them from enrolling in engineering. Our data can be used to design and implement more effective recruitment programs for women in engineering.

Friday, February 19, 2016

MORNING
TC 218A
Symposium on STEM Education and Broadening Participation

8:00 WELCOME AND INTRODUCTION

Dr. Ashton Hamme,
Director, Louis Stokes Mississippi Alliance for Minority Participation
Professor of Chemistry, Department of Chemistry and Biochemistry, Jackson State University, Jackson, MS

O12.08

8:15 IMPACT OF ACT COMPOSITE AND ACT SUBSCALE SCORES ON UNDERREPRESENTED MINORITY STUDENT PERSISTENCE IN STEM

V. M. White[1,2], J. H. Alexander[2,3], Debra L. Prince[4]
[1]Instructional Systems and Workforce Development, [2]Bagley College of Engineering, [3] Department of Mechanical Engineering, [4]Educational Leadership and Foundation, Mississippi State University, Mississippi State, MS 39762

The growth and persistence of underrepresented minorities pursuing STEM degrees continue to remain stagnant in the United States. Such an issue keeps the United States STEM workforce at a dismal 5%, with underrepresented minority students representing approximately 1/20th of the total STEM workforce population. Key factors must be identified in the persistence of underrepresented minority students both before and in-situ of their college experiences in order to diversify and strengthen the STEM workforce which accounts for approximately 50% of the United States economic development. A one-way ANOVA statistical analysis was performed on a sample of 161 underrepresented minority students to examine whether or not a variance existed between the ACT composite and ACT subscale scores of students who persisted versus those that did not in STEM fields. Using the .05 alpha level, student persistence as a result of ACT composite score was found to be statistically significant with a reported *p* value of .004. ACT subscale scores math, English and science were also statistically significant with p values of .004, .000 and .007, respectively. Reading on the other hand had a *p* value of .09 which illustrates that there is no statistically significant difference. Underrepresented minority students with higher ACT composite scores and high ACT math, English and science scores persisted more in STEM curricula compared to those who did not.

O12.09

8:35 MISSISSIPPI ACADEMY FOR SCIENCE TEACHING, QUALITY PROFESSIONAL DEVELOPMENT FOR 9-12 GRADE TEACHERS

Mehri Fadavi, Nisaa Kirtman
Jackson State University, College of Science, Engineering, and Technology, Jackson, MS, USA

The Mississippi Academy for Science Teaching (MAST), funded by the National Science Foundation (NSF), is a professional development, and undergraduate teacher scholarship program, that prepares teachers from under-performing high-schools to teach physical sciences. This program initially was funded by Mississippi Department of Education for 4-8 grade teachers and then evolved to a program for 9-12 grade teachers. Our primary goal is to improve teacher content knowledge, teaching efficacy, and, ultimately, improve student content knowledge and attitudes toward science. Rockman et al, a research and evaluation firm specializing in STEM teacher professional development programs, served as the

program's external evaluator for 7 years and designed a comprehensive framework to evaluate this program after determining the program's logic and underlying program theory of change.

O12.10

8:55 INSTITUTIONAL CHANGE THROUGH FACULTY ADVANCEMENT IN INSTRUCTION AND MENTORING, QUALTY PROFESSIONAL DEVELOPMENT

Mehri Fadavi, Abu Khan, Nisaa Kirtman
Jackson State University, College of Science, Engineering, and Technology, Jackson, MS, USA

Launched in January of 2014, the Institutional Change through Faculty Advancement in Instruction and Mentoring (ICFAIM) program is designed to: a) create sustainable institutional change by establishing a supportive infrastructure for improved faculty pedagogy, mentoring, and research opportunities for undergraduate STEM students; b) improve student learning and critical thinking skills, and c) increase the enrollment, retention and graduation rate of participating students. The purpose of the evaluations is to provide outcome and implementation data from ICFAIM's professional development program by summarizing evidence of the effect of program participation on faculty and students.

O12.11

9:15 CENTER OF EXCELLENCE IN SCIENCE, TECHNOLOGY, ENGINEERING AND MATHEMATICS EDUCATION (CESTEME)

Constance Martin[1], Preston Robinson[2], Jason Webb[3], Paul Tchounwou[1] *[1]Jackson State University, USA, [2]Jackson Public School District, USA, [3]Hinds Community College, USA*

During the past century, the United States has witnessed a tremendous growth as a result of her global leadership in science, technology, engineering and mathematics (STEM). However, a recent review of international trends in global education indicates that the U.S. is lagging behind many other countries, in terms of the number and percentage of college students earning degrees in STEM fields. The current educational system is failing to produce the technical workforce needed to meet the future demand in human resource and to sustain America's leadership in the global economy. The overarching goal of Jackson State University (JSU)'s Center of Excellence in Science, Technology, Engineering, and Mathematics Education (CESTEME) is to significantly prepare students to develop an understanding of the basic principles, concepts, theories, and skills related to STEM education, as they fully participate in designed lectures and enrichment activities, and engage in multi- and inter-disciplinary research in relevant STEM areas of importance to the Department of Defense's mission. JSU has partnered with Hinds Community College and Jackson Public Schools District to strengthen STEM programs at their respective institutions, and to recruit, train and mentor K-12 and undergraduate students in specific multidisciplinary STEM areas. Overall, 270 participants including 25 DoD high school fellows (K-12 students), 200 high school seniors, 20 science and mathematics teachers, and 25 DoD scholars (undergraduate students) have been trained. The Center has significantly contributed to addressing the nation's and DoD needs for a skilled and globally competitive STEM workforce.

O12.12

9:35 PERCEPTION OF MINORITY FACULTY ON UNDERREPRESENTATION IN STEM IN HIGHER EDUCATION

Martha Tchounwou
Jackson State University, College of Science, Engineering, and Technology, Jackson, MS, USA

Newly published NSF data on Science and Engineering Indicators reveals that the U.S. is the global leader in knowledge-intensive services, providing over one-third of world revenue for the past 24 years, and 60% of the entire world's biotechnological patents. However, the U.S. lags behind in the number of minority faculty in STEM fields. This study aims to explore the critical issues of underrepresentation in STEM fields in higher education, by examining experiences that affect their academic development, using the grounded theory. The goal of using the qualitative methodology was to present a deeper understanding of the underlining issue of underrepresentation on minority faculty in STEM. Primary data was collected through interviews from four research universities in Mississippi. The key elements from the interviews were identified and categorized. A total of 25 participants were included in the study. Findings indicated: (a) early exposure and curiosity, (b) mentoring and sustainability, and (c) bridging students in to faculty positions, rank among the specific themes identified by the participants as having a positive impact on underrepresentation in STEM. The findings suggest that in order to increase the STEM pipeline, students should be exposed to STEM at middle and high schools and institutions of higher learning must focus on minority faculty development. Hence, this research provided an insight

into the experiences and opinions of minorities in STEM. The implications on policy and practice for higher learning are to consider how institutions can strategically address the needs of minority faculty members in STEM.

9:55 BREAK

Friday, February 19, 2016

MORNING

Simulation-based Education in Mississippi: A Statewide Organizational Meeting

Room: TC Ballroom II/III

Agenda

10:15 Call to Order and Introductions
Rob Rockhold, PhD;,
LaNelle Weems, MSN, RN

10:20 The Back Story: Mississippi Simulation Alliance
LaNelle Weems, MSN, RN

10:35 Overview - Institutional Goals and Priorities
Rob Rockhold. PhD

10:40 View from the Community Colleges
Alaina Herrington, MSN, RN

10:50 View from IHL campuses
Rebecca Newton, DNP, RN

11:00 View from William Carey
Cal Hisley, PhD

11:10 View from UMMC
Michael Holder, MD

11:20 Wrap up and Next Steps?
Rob Rockhold, PhD;
LaNelle Weems, MSN, RN

11:30 General Discussion and Poster Viewing

P12.02

AUTOMATED EXTERNAL DEFIBRILLATOR (AED) TRAINING IN THE WORKPLACE: A COMPREHENSIVE TEACHING MODEL

Danielle Parker, Chad Mayes, Patrick Parker, Michael Holder, Michelle Schweinfurth, Robin Rockhold, Anna Lerant, W. Bosseau Murray
University of Mississippi Medical Center, Jackson, MS, USA

Objective: Recommend successful teaching models for cardiopulmonary resuscitation (CPR) and AED training to overcome educational gaps present in non-medical employee populations.

Background: Less than 8% of people survive cardiac arrest outside the hospital. Victims' chances of survival are reduced by 10% with every minute passing without CPR and defibrillation. After 10 minutes, few attempts of resuscitation succeed. This has prompted the implementation of widespread CPR and AED training classes outside of hospital settings. Despite the push for more training, survival rates remain low. Co-workers or bystanders may be intimidated by complicated CPR and AED guidelines. Others may fear liability. Online and on-site courses are commercially available for institutions wishing to provide CPR and AED training for their employees. However, such general and non-targeted training might lead to knowledge gaps, lack of confidence in training, and ultimate misuse of skills.

Results: We developed and introduced uncomplicated but comprehensive models for teaching CPR and AED at UMMC for lay employees. Instruction included step-by-step explanations, demonstrations, scenarios, and debriefings. Appropriate instruction was specific to each locality, emphasizing proper activation of emergency medical services (EMS) from each location and where the nearest AED can be found. Participants were informed of the federal Cardiac Arrest Survival Act, providing protection for laypersons who use an AED as well as informed of our state's Good Samaritan laws. On testing the adequacy of our teaching model, the participants indicated an increased confidence in the ability to perform adequately. Supported by the Robert E. Hearin Support Foundation.

P12.03

THE CLINICAL VALUE OF UNDERSTANDING THE PHYSICS OF UPSLOPING CAPNOGRAPHY WAVEFORM TRACINGS

Chadwick Mayes, Patrick Parker, Driscoll DeVaul, Gary Roebuck, Jeffrey Orledge, Anna Lerant, W. Bosseau Murray
University of Mississippi Medical Center, Jackson, MS, USA

Objective: Based on an understanding of the physics, help trainees to recognize and manage upsloping capnography seen in patients with obstructive airway diseases, such as asthma or COPD. Background: Waveform capnography is a relatively new technology in many health care disciplines, therefore, training in waveform capnography is still mostly elementary or even lacking. While numbers (end-tidal CO2 concentrations) are noticed and acted upon, acute changes in the wave forms of the capnography tracing often go unnoticed. Furthermore, currently available high-fidelity simulators have modeled waveform capnography wave forms that are unable to be modified to model various medical events.

Many healthcare providers are thus not taught how to recognize acute changes in capnography wave forms. The normal capnography trace is essentially horizontal, as all the lung units (respiratory bronchioles and alveoli) have similar resistances and compliances, leading to similar time constants. Even small changes in resistance (asthma) and/or compliance (fluid overload) will lead to an upsloping capnograph trace, without necessarily a change in the end-tidal CO2 concentration. Early recognition of the wave form change may lead to earlier intervention, which might be live-saving.

Results: We have created a inexpensive, interactive physical simulation model that enables trainees to experience the basic physics governing the phenomenon of a sloping capnography tracing. This model allows the trainees to connect the physics of the model to the physiology of a patient. In an interactive mode, the trainees can learn by creating the abnormal pathophysiology, and experiment with various treatment modalities. Supported by the Robert E. Hearin Support Foundation.

P12.04

CARDIOPULMONARY RESUSCITATION (CPR) AND AUTOMATED EXTERNAL DEFIBRILLATOR (AED) TRAINING WITH PERFORMANCE FEEDBACK

Robin Rockhold, Patrick Parker, Joyce Shelby, Anna Lerant, Jeffrey Orledge, Michael Holder
University of Mississippi Medical Center, Jackson, MS, USA

Objective: Provide audience participation demonstration of an effective teaching model for CPR and AED training which is aided by performance feedback on the quality of CPR.

Background: Both the 2010 and 2015 American Heart Association (AHA) guidelines emphasize early defibrillation and providing high quality of CPR to improve chances of survival for sudden cardiac death. There are five critical components to high-quality CPR: (1) minimizing interruptions in chest compressions, providing compressions of (2) adequate rate and (3) adequate depth, (4) avoiding leaning on the chest between compressions and (5) avoiding excessive ventilation. According to the AHA consensus statement, in order to improve the quality of resuscitation, it is necessary to have objective measurements of CPR performance.

In real patient care situation end-tidal CO2 larger than 10 mmHg indicates that adequate cardiac output was generated by CPR. In training setting, relatively inexpensive simulators can measure the rate and depth of compressions, chest recoil, hand placement, interruptions and volume of breath delivered

Presentation: Volunteer audience members will be coached though proper set-up and implementation of feedback-aided CPR and AED use according to the 2015 AHA CPR performance standards. This hands-on demonstration will provide a uniquely informative experience for audience members and increase general awareness of appropriate life-saving techniques for lay persons. Supported by the Robert E. Hearin Support Foundation.

P12.05

THEORY DRIVEN EXPERIENTIAL LEARNING AND INTERPROFESSIONAL TEAM

Paul Chastain, John Stephens, Elizabeth McClain
William Carey University College of Osteopathic Medicine, Hattiesburg, MS, USA

Theory driven educational simulation models provide a needed framework from which to structure value driven learning. Kolb's model of experiential learning has been established as a conceptual framework for simulation training. Recently, we embedded 3 theoretical approaches with the goal of establishing an effective model to expose our students to adaptive mastery learning principles. The 3 part simulation based learning activity was founded on Knowles 5 assumptions for androgyny in adult learning. In addition Kolb's 4 step model and Bandura's Self-Efficacy Model were integrated in key steps of the focused learning in the development of the activity to target team communication. The activity was developed and delivered through interprofessional team collaboration. **Component-1** included lecture and small group learning to provide foundation knowledge of key concepts. **Component-2** included active independent and collaborative learning in a unique realistic crime scene setting to grasp the procedures associated with establishing a secure crime scene, evidence collection, witness/suspect questioning and the processing of biological samples for forensic analysis. **Component-3** included student grouped active participation in a simulated CSI lab where groups of students worked through a unique crime scene investigation with complete analysis. Student groups' problem solved, applying learning from components 1-2, to investigate clues, obtain samples from the victim, interview witnesses and suspects, and finally concluded the active simulation with the processing of the biological samples at the CSI lab. Debriefing and self-reflection included subjective oral and written student feedback of learning and the application of knowledge to active problem solving in the simulation.

P12.06

DANCING WITH COURSE CONCEPTS: WHICH ONE SHOULD GO WHERE WHEN USING SIMULATION?

Alaina Herrington
Hinds Community College, Jackson, MS, USA

In order to produce effective simulation experiences and positive learner outcomes, faculty need to understand when to best incorporate which concept with which learner level (Ravert, 2012). In October 2015, the NCSBN released new Simulation Guidelines for Prelicensure Nursing Programs (Alexander, et al., 2015) promoting successful integration of simulation. Some of which include recommending faculty members use a needs assessment to determine what scenarios to use, have a process for identifying what technologies are needed for meeting objectives, and to set clear objectives and expected outcomes for each simulation-based experience. As part of the NLN Leadership Development Program for Simulation Educators, we sought to identify common concepts throughout associate, baccalaureate, and graduate programs. Using each programs' core concepts identified by their accrediting bodies, we conducted an international survey assessing where common concepts should be leveled throughout the curriculum. Based on our findings, we identified initial concepts for curriculum integration throughout the nursing curriculum. This presentation will identify these leveled concepts and provide a core concept instrument to guide faculty to successful integrate simulation into their curriculum. The purpose of this presentation is to address the following questions: What are the first curricular concepts that should be integrated into the curriculum using simulation? Are there concepts that are better introduced toward the end of the curriculum? Are there concepts that are more appropriately threaded throughout the curriculum? What are the best ways to deliver feedback to the learner? Is it necessary to have a concept based curriculum to integrate this properly?

P12.07

PATIENT-CENTERED BIOCHEMISTRY

Paul Chastain, R. C. Bateman, Jr.
William Carey University College of Osteopathic Medicine, Hattiesburg, MS, USA

PURPOSE: Historically, WCUCOM students have found Medical Biochemistry to be a challenging course and have performed weaker in this sub-discipline as compared to other preclinical sub-discipline on the NBOME- COMLEX I exam. Course assessments commonly noted a recurring challenge of the student's ability to understand the most clinically relevant biochemical pathways for case based questions. Recently WCUCOM revised its Medical Biochemistry Course with the overall goal to improve the students' ability to understand clinically relevant biochemical pathways and concepts.

METHODS: WCUCOM Medical Biochemistry Course revised its instructional delivery from traditional lecture based format to include a significant shift to a team based learning approach where students are paired up with relevant clinical cases and present oral case studies on the relevant findings, and to include more active learning components, such as self-directed clinical vignette examinations, clicker based formative assessments/competitions, and patient simulations using SimMan 3G.

CONCLUSIONS: As a result of this curriculum change, students are more active in the class and are asking more in depth, probing questions. They are more realistic in their assessment of what they know/do not know and many change their study habits accordingly. This has translated into students averaging ~6% better on their biochemistry integrated exams and improving significantly on their COMLEX board exams (both overall and within the Biochemistry sub-discipline). In addition, with the simulations, the students are learning to actively utilize their biochemistry knowledge to generate a differential diagnosis that leads them to determine what the patient most likely has.

P12.08

SIMULATION IN INFECTION CONTROL PREPARDNESS WITH NURSING STUDENTS

Mary Coyne, Elizabeth Holman
University of Southern Mississippi, Long Beach, MS, USA

Purpose: The purpose of this project was to develop, implement and evaluate the effectiveness of an 'Infection Control (IC) Boot Camp' using medium and high fidelity simulation with BSN nursing students.

Methodology:

1. IC learning objectives and resources were established
2. Four IC Scenarios based on Standard, Droplet, Airborne, and Contact Precautions were developed.
3. The scenarios were programmed into medium and high fidelity simulators, GloGerm was applied

prior to and tested post-scenario and 2 isolation areas with video conveyance to debriefing room were set-up.

4. Each scenario was 30 minutes long with a 60-minute debriefing session.

6. Students and faculty evaluated learning effectiveness.

Analysis of findings:

1. Each group had 1 student who served as primary nurse, 1 who provided IC information, and the remainder were observers identifying IC adherences or breaches. Approximately 30 BSN students (1 pediatric scenario and 3 adult scenarios) participated in IC Boot Camp.

2. Each BSN student participant was able to:

   a. Operationalize IC standards that must be in place before, during and after direct patient contact;

   b. Translate IC knowledge into practice;

   c. Utilize the correct procedure for obtaining/transporting specimens and correctly interpreting IC-related reports.

P12.09

APPLICATION OF VIDEO LARYNGOSCOPY TO IMPROVEMENT OF INTUBATION METHODS REAL-TIME ANATOMICAL QUIZZING

Sarah McClure[1], Steven Piper[2], Kenneth (Cal) Hisley[3]
[1]William Carey University College of Osteopathic Medicine, Hattiesburg, Mississippi, USA, [2]William Carey University College of Osteopathic Medicine, Hattiesburg, Mississippi, USA, [3]William Carey University College of Osteopathic Medicine, Hattiesburg, Mississippi, USA

BACKGROUND:

Video laryngoscopy is a potential training solution to historically low first-pass success rates among inexperienced medical students. Because this technology offers user point-of-view visualization of oral cavity, pharyngeal, laryngeal and tracheal internal anatomy, we are assessing the effects of anatomical knowledge levels of the perceived airway on intubation training success. Adding real-time anatomical quizzes during initial training sessions may improve student navigation of this complex luminal volume. This effort will measure the effects of anatomical knowledge to learning intubation during exercises on dummies and cadavers.

METHODS:

During intubation training trials using the video laryngoscopic approach, first-order anatomical identification questions from the video displays during intubation attempts involving the internal surfaces of the oral cavity and tongue, oropharynx, laryngopharynx, larynx and trachea will be posed to the student observing that anatomy on video displays in real-time.

Measurements include first pass success, time to first pass success, overall success, and time per attempt in manikins as well as in cadavers. These parameters will allow us to determine the success of video laryngoscopy paired with anatomical quizzing in our simulation center.

EXPECTED RESULTS:

We hypothesize that students who have a better command of anatomical identification, will perform better on sets of intubation trials than those who do not.

Immediate correction of the student's actions based on airway anatomical knowledge should form a stronger muscle memory for this technique and eliminate training scars. The students will require fewer attempts to first success when learning via video laryngoscopy than when learning via direct laryngoscopy.

P12.10

A VISUAL MAPPING METHOD USING DECISION TREES PROMOTES IMPROVED STUDENT SIMULATION PERFORMANCE

Kenneth (Cal) Hisley[1], Paul Chastain[2], Italo Subbarao[3]
[1]William Carey University College of Osteopathic Medicine, Hattiesburg, Mississippi, USA, [2]William Carey University College of Osteopathic Medicine, Hattiesburg, Mississippi, USA, [3]William Carey University College of Osteopathic Medicine, Hattiesburg, Mississippi, USA

INTRODUCTION

Where within the first-year curriculum should basic and functional anatomy supporting specific simulation scenarios be covered? The hypothesis of this effort is that by delivering a pre-clinical anatomy curricular topical sequence covering the abdomen's URQ using a decision tree format created by working backwards from a specific simulation's requirements maximizes student simulation performance decision point successes and minimizes mistakes.

METHODS

Since decision tree templates were initially created

using simulation requirements as a starting point, the VINDICATE tabular method was used to select a specific simulation topic. Basic anatomy objectives representing nodes in these templates ultimately supported practical procedural FAST execution for an abdominal pain simulation scenario. This resulted in the development of a single tree structure that optimizes correct decisions based on the anatomy and leads to choosing the best succeeding decision graph pathway representing the correct simulation diagnosis.

The chosen experimental curricular topic for this effort is a patient experiencing abdominal pain being evaluated with the ultrasound FAST exam protocol, focusing on the URQ. The causality is cholecystitus.

The software package NEO4J is being used to create graph structures reflecting the outcomes of these design discussions. This application is also used to visualize the decision tree maps in real-time.

EXPECTED RESULTS

It is expected that a comparison between students using this method and those not will show a significant increase in simulation success based on the number of correct diagnostic pathways chosen compared with the number of incorrect pathways occurring with decreased completion time periods over three trials.

P12.11

A PERFORMANCE IMPROVEMENT PROGRAM USING IN-SITU SIMULATION WITHIN A PEDIATRIC EMERGENCY DEPARTMENT

Justin Davis, Michael Holder, Melissa Frascogna
University of Mississippi Medical Center, Jackson, MS, USA

BACKGROUND: Although high acuity clinical scenarios are rare in clinical practice in the pediatric emergency department(1), the care team must be prepared to deliver safe, high-quality, and effective care. In-situ simulation may be an effective way to improve team performance in this setting.

OBJECTIVE: To improve team performance, communication and quality of care in low frequency, high acuity clinical scenarios within the pediatric emergency department, we sought to create a sustainable, multi-disciplinary in-situ simulation training program.

METHODS: An interdisciplinary project team was formed among stakeholders with knowledge in medical simulation, trainee education requirements, study design and department workflow. Program content is directed by the project team based on previous departmental clinical experience, American Board of Pediatrics content specifications for pediatric emergency medicine, and an existing national consensus(2).

DISCUSSION: The curriculum will be introduced beginning in December 2015 with monthly in-situ simulation scenarios. Survey data from real and simulated scenarios will be used to evaluate the curriculum using a continuous quality improvement process. Further research is planned to identify and validate outcome measures and determine optimum integration into departmental workflow.

REFERENCES:

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2. Bank I; Cheng A; McLeod P and Bhanji F. Determining content for a simulation-based curriculum in pediatric emergency medicine from a National Delphi Process. CJEM 2015; 17(6): 662-669

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P12.12

ENHANCING PEDIATRIC RESIDENCY WITH HI-FIDELITY SIMULATION: TRAINING FOR PEDIATRIC ACUTE CARE EVENTS

Jennifer Hong, Kasey Davis, Fernado Gomez, Michael Holder, Jr
University of Mississippi Medical Center, Jackson, MS, USA

BACKGROUND
Residents' ability to manage pediatric acute care events is an important goal of their training. Current accreditation guidelines and supervisory standards pose significant challenges to developing the skillset to manage acutely ill children during and after residency. We submit that hi-fidelity patient simulation can be utilized to provide educational experiences that reinforce key management points in pediatric acute care scenarios and decrease associated trainee anxiety without risk to actual patients.
METHODS
Our study will take place at a busy 230 bed tertiary care children's hospital. Over the next 12 months, 60

trainees from a general pediatrics and combined internal medicine/ pediatrics residency program will participate in hi-fidelity simulations of commonly occurring acute care scenarios. Each simulation scenario will be followed by a bedside debriefing session and review of pediatric board questions. Pre/Post-session assessments will be completed by the residents to assess for satisfaction, self-efficacy and care quality. There will also be an end-of-year survey for assessment of long term skill retention.

EXPECTED RESULTS:

Given the time constraints of a three-year pediatric residency and the variability of exposure by each individual to actual patient scenarios, scheduled simulation training may be a valuable tool to increase exposure and provide hands-on experience, ultimately leading to well-trained and more confident healthcare providers.

P12.13

HI-FIDELITY SIMULATION CAN HELP MAINTAIN AND AUGMENT CASE MANAGEMENT AND PROCEDURAL SKILLS

Benjamin Dillard, Melissa Frascogna, Michael Holder, Jr
University of Mississippi Medical Center, Jackson, MS, USA

INTRODUCTION

Pediatric emergency medicine providers are infrequently required to perform critical procedures due to the rarity with which they are necessary. Despite a census over 45,000 patients per year, opportunities for pediatric emergency medicine providers to maintain or enhance their procedural and patient care competencies are also limited at our institution. We propose a standardized 2-year curriculum that links hospital credentialing at our institution to satisfactory completion of a set of standardized, pediatric acute care scenarios and procedural skills training sessions.

METHODS

We have developed standardized 2-year procedural skills training and pediatric emergency care curriculum for our pediatric emergency medicine providers that assess critical thinking skills, procedural proficiency and patient care management. Each of our providers will participate in i*n-situ* simulations of commonly occurring pediatric emergencies. Ultrasound-guided central vascular access, advanced airway techniques, and trauma stabilization skills serve as the core of the procedural skills curriculum. After each session, providers will be assessed by independent raters using standardized checklists and video review to measure provider proficiency.

EXPECTED RESULTS:

Diagnostic and therapeutic procedures are an integral part of the practice of pediatric emergency medicine. Considering the low frequency with which most of these procedures occur, it can be very difficult to maintain these skills without augmentation of clinical experience. We anticipate that by using a standardized simulation curriculum and procedural skills training program we can fill both our credentialing and competency needs while contributing to the lifelong learning process of each provider.

Friday, February 19, 2016

AFTERNOON

12:00-1:00- Plenary Speaker

1:00-3:00- Millsaps HHMI Undergraduate

ZOOLOGY

Chair: M.D. Zaman
Alcorn State University
Vice-Chair: Julius Ikenga
Mississippi Valley State University

Thursday, February 18, 2016
MORNING
Room TC 226

O13.01

9:00 PUSHING AND PULLING OUR WAY TO A COMPREHENSIVE AMBROSIA BEETLE MANAGEMENT STRATEGY

Chris Werle[1], Blair Sampson[2], John Adamczyk[2]
[1]Louisiana State University, Baton Rouge, LA, USA,
[2]Thad Cochran Southern Horticultural Lab, Poplarville, MS, USA

Invasive ambrosia beetles (Coleoptera: Curculionidae) are an important problem at ornamental tree nurseries. Available chemical measures are not entirely effective, and repeated treatments can become expensive. Development of a push-pull management strategy may offer the best chance for cost-effective management. In the first experiment, mean beetle captures from 13 colors of baited sticky traps were significantly higher on opaque, red and black traps than from yellow or white traps, but were not significantly different from eight other colors. In the second experiment, baited traps were placed at varying distances from a nursery-forest interface, ranging from -25m within the forest to 200m within the nursery. While mean beetle captures were significantly higher at traps within the forest, edge traps had greater

ease of access and captured significantly more beetles than those located within the nursery. In the third experiment, applications of kaolin clay, alone and in combination with bifenthrin, were made to baited trees and compared with positive (bifenthrin-only) and negative (untreated) control trees. While kaolin trees had nearly 45% fewer beetle attacks than untreated trees, kaolin + bifenthrin trees had significantly fewer attacks, 94% less than untreated trees. These results have lead to our current proposal for a push-pull ambrosia beetle management strategy: susceptible nursery stock will be located at least 50m from the nursery edge and treated with kaolin + bifenthrin applications (push), while baited traps placed at the nursery edge will intercept ambrosia beetles before they can reach host trees (pull).

O13.02

9:15 PAN-*TRYPANOSOMA* MOLECULAR DIAGNOSIS OF SOUTHERN NIGERIAN CATTLE

Eze Ideozu, T Lepore, G Hide, Alex Acholonu
Alcorn State University, Lorman, MS, USA

Molecular-based PCR techniques have been shown in many studies to offer an effective and highly sensitive approach for diagnosing trypanosomes in several mammalian species. However, most studies have shown their techniques to be species-specific, limiting the possibility of detecting other species of trypanosomes from the host and this may result in a poor estimate of the true prevalence. Hence, this study was aimed at investigating the prevalence of trypanosomes in southern Nigerian cattle using a robust ITS-Nested PCR method, which amplifies the ribosomal RNA gene locus of trypanosomes producing unique band sizes for each species of *Trypanosoma*. A total of 80 *Bos indicus* cattle, collected from Ahoada, Southern Nigerian, were used for the study. Seventeen of the samples were found to be positive for trypanosomes, resulting in a prevalence of 21.3% (13.6% - 31.5%; 95% CI). Three species of trypanosomes (*T. vivax, T. theileri and T. simiae*), an unknown species and mixed infections were detected using the ITS-Nested PCR. The majority of samples were infected with *T. vivax* (12.5%) and *T. theileri* (8.75%). A prevalence of (6.25%) was recorded for infection with *T. simiae* while 5% prevalence was seen in both unknown and mixed infections. In conclusion, the results of this study show that the ITS-Nested PCR method works as an effective pan-*Trypanosoma* diagnostic tool. *T. simiae* detected in the cattle suggests less sensitive or species-specific methods may be underestimating the true prevalence of trypanosome species in mammalian hosts. Future work is aimed at publishing the final report.

O13.03

9:30 *MACROPHOMINA PHASEOLINA* AS A POTENTIAL FUNGAL PATHOGEN OF FLOWERING DOGWOOD (*CORNUS FLORIDA*)

Frank Mrema[1], Lucas Mackasmiel[2], Margareth Mmbaga[2], Alex Acholonu[1]
[1]Alcorn State University, Lorman, MS, USA, [2]Tennesse State University, Nashviville, TN, USA

A fungal pathogen associated with the roots of flowering dogwood (*Cornus florida* L.) was isolated, characterized and identified as *Macrophomina phaseolina*, the causative agent of root rot in ca. 500 plants, across several plant genera. In vitro evaluation of the pathogen's ability to cause disease in dogwood was shown by the capability of *M. phaseolina* to produce extracellular enzymes mainly the lignocellulolytic group. Comparative pathogenicity tests were done using juvenile *C. florida* seedlings taken from growing vernalized seeds in sterilized vermiculite and grown on large water agar petri plates overlaid with sterile moisten paper tissues. The seedlings were challenged with extracted spores of *M. phaseolina* 10 days old cultures, while control seedlings were mocked inoculated with sterile deionized water. The study was repeated on 21 day-young dogwood seedlings grown in sterile soil in greenhouse and inoculated on wounded stems. The extent of fungal growth in millimeter (mm) was used as index to evaluate the extent of host response. The results showed high percentage of necrotic tissue in the first 10 mm root tips of juvenile seedlings with many fungal structures developed that were not observed in the controls seedlings. Inoculations of *M. phaseolina* on the stems produced high decay and canker-like lesions on challenged seedlings that were not observed in the control plants. Results of this study showed variability in necrotic tissues of challenged seedlings, an indication of weak plant pathogen in dogwood. The results of the study are discussed.

O13.04

9:45 SHIITAKE LOG MUSHROOM CULTIVATION AND CONSUMPTION IN SOUTH-WEST MISSISSIPPI

Frank Mrema, Magid Dagher, Alex Acholonu
Alcorn State University, Lorman; MS, USA

Mushrooms are considered as a health food with high nutritional, medicinal properties and economic values

among many small-scale farmers and woodland owners (SFWOs) in Mississippi. Mushroom cultivation in the U.S. has been increasing annually and, in 2013-2014, mushroom crop sales totaled $1.12 billion. However, very little is known about cultivation of specialty mushrooms on lignocellulosic wood waste in Mississippi communities. A mushroom need assessment was conducted by posting two hundred questionnaires to SFWOs listed in our database. A returning postage paid envelopes were included. Another separate study was conducted in three mushroom demonstration sites to evaluate suitability of three shiitake spawn strains and identify one which could be adopted by the SFWOs in southwest MS. The survey showed that only 10% of the respondents were growing mushrooms and 86% had not attempted to pick wild edible mushrooms. Nearly 40% are willing to adopt mushroom cultivation however; the major constraint was lack of knowledge of mushroom identification and cultivation. There is a significant mushroom knowledge disparity and lack of awareness health benefits of mushroom consumption among Mississippi's SFWOs. The analysis of three shiitake spawns revealed that one strain colonized lignocellulosic waste substrates within three to four months as indicated by the percentage of white mycelium at the end of the logs. The observed variations in fungal colonization were more related to site location and spawn strains. More community based participatory studies and advocacy is needed to promote mushroom consumption as a preventive strategy for chronic diseases among SFWOs

O13.05

10:00 MOLECULAR COMPLEMENTATION ANALYSIS: AN ESSENTIAL PROCEDURE IN THE POST-GENOMIC ERA

J. Ignacio Moreno, Marta Piva
Alcorn State University, Alcorn State, MS, USA

Automatization achieved the sequencing of the genome of innumerable organisms in the last 20 years. Today, second-generation instruments claim to sequence 18,000 human genomes per year. Such speed has made a real revolution in the biomedical and biotechnology fields. Powerful computer programs can identify and map all putative genes; many were previously described, while others were unknown. However, genome sequencing and computational analysis are only the beginning. Knowing the full sequence, genes, regulatory elements and transcription factors cannot explain by itself how a genome works. The next challenge is to find out how the gene products work in concert. Always the first approach is to mutate the unknown gene and obtain the corresponding mutant phenotype. Many biotech companies have failed in this particular point. Even though there is technology to map mutations in superior eukaryotes like mice, conclusions are often wrong due to the lack of scientific rigor. Molecular Complementation Analysis is the *sine qua non* step to validate a gene that when mutated produces its corresponding phenotype. The most popular analysis resembles the Koch's postulates formulated in 1884. Basically, once the gene is knocked out and generates a particular phenotype, the gene product must be introduced into the mutant organism and recover (at least partially) the wild-type phenotype. Such goal is oftentimes quite difficult to achieve. This presentation describes an in-house method developed to validate a gene that when deleted, causes loss of mitochondrial DNA thus resulting in irreversible organelle dysfunction.
This work was supported by DoD/W911NF-13-1-0174.

O13.06

10:15 POLLUTION STUDIES ON GROUNDWATER FROM ALCORN STATE UNIVERSITY, MISSISSIPPI, USA

Sagar Pasham, Alexander Acholonu
Alcorn State University, Lorman, MS, USA

There is a growing concern about groundwater pollution in different parts of the world especially in industrialized countries like the U.S, where many landfills and some nuclear wastes are buried in the ground and where gasoline station tanks may rust, leak, and contaminate ground water. While Alcorn State University (ASU) is in the proximity of the Mississippi River, water used on the campus comes from ground water. The purpose of this study is to assess the quality of ground water being used at Alcorn State University, and to find out the extent to which it meets the Mississippi Water Quality criteria (MSWQC). During the months of September and October 2015, ground water samples were collected from two wells used at Alcorn State University and taken to the laboratory for pollution analysis. The physical, chemical, and biological profiles were examined following the guidelines of LaMotte pollution detection kits supplied by the Carolina Biological Supply Company. Tests for coliform bacteria were conducted as indicated by Carolina Bacterial Pollution of Water Kits. A total of ten chemical parameters were tested and analyzed. The physical result showed that the water was colorless, odorless, and transparent. All of the chemical parameters tested met the MSWQC with the exception of **water hardness**. With respect to coliform bacteria,

little or no colonies were seen except in the case of nutrient agar cultures. This shows that the ground water from ASU wells is potable and all that needs to be done is to reduce the water hardness.

O13.07

10:30 SPATIAL STUDY ON POLLUTION STATUS OF THE LOWER MISSISSIPPI RIVER, MS USA

Rachael Duffin, Alexander Acholonu
Alcorn State University, Lorman, MS, USA

The Mississippi River is the third longest river in North America flowing from Lake Itasca, Minnesota to the Gulf of Mexico. It is one of the world's major rivers. The objectives of this study were to conduct a spatial pollution studies on the Lower Mississippi River covering two locations, Port Gibson, and Natchez, MS, to compare the distribution of contaminants in the two areas and to assess the seasonal distribution of pollutants. During September and October 2015, water samples were collected from the Mississippi River in the areas of Port Gibson, and Natchez. They were taken to Alcorn State University Laboratory and tested according to the methods indicated in the LaMotte pollution detection kits. The physical, chemical, and biological aspects were examined. Tests for coliform bacteria were conducted as indicated by Carolina Bacterial Pollution of Water Kits. A total of twelve chemical parameters were tested and analysed. For both locations the physical aspects were colorless, smelly, and partially transparent. The chemical parameters tested met the Mississippi Water Quality Criteria with the exception of alkalinity, hardness, and phosphate. The study showed that coliform bacteria were present in both locations. In the summer, hardness was higher but lower than in the fall in Port Gibson. It was also the same in Natchez. Phosphate was higher in both seasons in Port Gibson and lower in both seasons in Natchez. This study shows that the pollution status did not differ much from the two spatial locations even though they are seventy miles apart.

O13.08

10:45 COMPARATIVE POLLUTION STUDY ON MISSISSIPPI RIVER AND POND AT ALCORN STATE UNIVERSITY.

Alex Acholonu
Alcorn State University, Lorman, USA

A river is a lotic freshwater body while a pond is lentic. Mississippi River is one of the longest rivers in the world and the principal River of the USA. The freshwater on the campus of Alcorn State University (ASU) is a pond located near the University front gate. The purpose of this study was to compare the pollution status of the Mississippi River of Port Gibson area, MS and the ASU pond during the summer and fall of 2014. Water samples were collected at two different locations in both bodies of water. The samples were taken to the laboratory and tested according to the methods indicated in the LaMotte water pollution detection kits supplied by Carolina Biological Supply Co. The Physical, Chemical and biological characteristics were examined. The results were recorded and analyzed. The chemical parameters tested met the Mississippi Water Quality Criteria (MSWQC) in both bodies of water with the exception of alkalinity, hardness, phosphate and carbon dioxide (summer and fall) for the Mississippi River and alkalinity and phosphate (summer) and alkalinity, phosphate and carbon dioxide (fall) for the ASU pond. Of the two bodies of water, alkalinity and hardness were higher in the river than in the pond in both seasons and phosphate, in the summer. But carbon dioxide was higher in the pond than in the river during the fall. From the biological tests, coliform bacteria were found to be present in both bodies of water, showing that they were contaminated and therefore unsanitary.

O13.09

11:00 POLLUTION STUDIES ON WATER FROM ALCORN STATE UNIVERSITY WASTE WATER TREATMENT FACILITY

Alex Acholonu, Hannah Vesper, Krystain Coleman, Shanteria Crockett
Alcorn State University, Lorman, MS, USA

Water is one of the most essential factors in sustaining life. Considering the small amount of water we have here on earth, only a small portion of it is potable, which means that it is suitable for drinking. In some areas around the world, water is so scarce that treated water is being reused and consumed. The purpose of this study was to determine the quality of water being released back into the environment after it has been properly treated at the Alcorn State University Waste Water Treatment Facility and also to compare it with the Mississippi Water Quality Criteria (MSWQC). During the months of October and November 2015, water samples were obtained at 3 different times from the Alcorn State University Waste Water Treatment Facility. The samples were then taken to the laboratory and tested according to the methods indicated in the LaMotte water pollution kits. These tests included alkalinity, ammonia-nitrogen, carbon dioxide, copper, dissolved oxygen, hardness, iron, nitrate, pH,

phosphate, and salinity. Based on the results, the water from the Waste Water Treatment Facility met the MSWQC. The biological tests showed bacterial growth too numerous to count in nutrient agar plate but none in the MacConkey agar plate showing that there were no coliform bacteria and that the water was not sanitary.

O13.10

11:15 POLLUTION STUDIES ON WATER FROM LIBERTY CREEK

Alex Acholonu, Frank Mrema, Marquita Jones
Alcorn State University, Lorman, MS, USA

Water is a transparent fluid which forms the world's streams, lakes, oceans and rain, and is the major constituent of the fluids of organisms. Traditionally, management of water resources has focused on surface water or ground water as if they are separate entities. As development of land and water resources increases, it is apparent that development of either of these resources affects the quantity and quality of the other. Nearly all surface-water features interact with ground water. Both ground and surface water are important. Water samples were collected at the Liberty Creek in Liberty, MS. During the month of October 2015, water samples were collected 3 consecutive times from the Liberty Creek in Liberty, MS. The sample were taken to the laboratory and tested according to the methods indicated in the LaMotte water pollution detection kits. My group and I had to preform 12 different tests on each of our five bottles of water samples. These tests included alkalinity, phosphate, salinity, dissolved oxygen, nitrate, copper, pH, carbon dioxide, hardness, calcium, ammonia, and iron. Based on the results, the water from the creek met the Mississippi Water Quality Criteria. The biological tests showed that coliform bacteria were present in the water and that the water is not unsanitary.

O13.11

11:30 A POLLUTION STUDIES ON GROUNDWATER FROM FAYETTE, MS.

Alex Acholonu, Jivarre Hunt
Alcorn State Univerisity, Lorman, MS, USA

While there is plenty of surface water many communities and cities in the U.S use groundwater. This is because it is felt that groundwater is purer and practically devoid of pollution. But recently there have been growing concerns about the possibility of ground water contamination from oil producing areas, leakage of buried gasoline tanks, landfills not properly constructed etc. The well in Fayette studied is owned by a private family and used for many years. So this study was conducted to find out if the water is polluted and compare it with the Mississippi Water Quality Criteria (MSWQC). During the month of July 2015 water samples from the well were collected for three consecutive times and taken to the laboratory, and tested according to the methods indicated in the LaMotte water pollution detection kits supplied by Carolina Biological Supply Co. The following chemical parameters were tested: Alkalinity, Ammonia Nitrogen, Carbon Dioxide, Dissolved oxygen, water hardness, Nitrate, Phosphate, pH, and Iron. The results were recorded and analysed. All the parameters tested met MSWQC with the exception of water hardness and phosphate. The biological profile showed that the water had coliform bacteria thus showing that it was contaminated and not potable.

11:45 Business Meeting

Thursday, February 18, 2016

EVENING

Poster Session

Immediately Following Dodgen Lecture

P13.01

AQUAPONICS: A COMBINED AQUACULTURE AND HYDROPONICS TECHNOLOGY

Md Zaman
Alcorn State University, Alcorn State, USA

Aquaponics is an integrated technology that combines aquaculture and hydroponic technology to grow fish and plants together. It is a closed-loop, recirculating fresh water system in which plants and fish live symbiotically. There are different forms of aquaponics based on size and structure ranging from small indoor or outdoor units to large commercial units. According to a 2013 United Nation's report, the world human population is growing at a fast pace. The estimated human population for 2015 is about 7.3 billion and will reach about 8.5 billion by 2030. This rapid population growth will put stress on the accessibility to healthy and affordable food. Additional food production through increased agricultural activities will not a viable option. It will cause significant environmental damages, such as loss of habitat, loss of water resources, leaching of nitrogen and other chemicals, eutrophication, etc. Therefore, alternative and sustainable food production methods are to be explored. Studies indicate that aquaponics is a versatile, cost effective and reliable food technology in the simultaneous production of vegetables and fish. It shows the potential to be a viable method for sustainable food production and play a vital role in securing food security for the future world.

P13.02

ROLE OF PENTATRICOPEPTIDE REPEAT MOTIFS IN RNA METABOLISM

Tamikka Coleman, J. Ignacio Moreno, Marta Piva
Alcorn State University, Alcorn State, MS, USA

Aerobic respiration is the only mechanism used by most animal tissues to produce metabolic energy. The electron transport chain is composed by numerous proteins, a few of which are coded by the mitochondrial genome. Translation in mitochondria takes place in mitoribosomes which consist of ribosomal RNA molecules and several nuclear-coded proteins. Previous experiments using baker's yeast as the model organism showed that accumulation of 15S rRNA specifically depends on the pentatricopeptide repeat (PPR) motifs of Ccm1p. In this study, we quantitated the amount of 15S rRNA that interacted with either Ccm1p (wild-type) or Ccm1ΔPPR2p (mutant) *in vivo*. Mutant or wild-type clones expressing either recombinant wild-type or mutant protein respectively were incubated in medium with galactose to induce the production of the target protein, and then switched to medium with glycerol to induce the production of mitochondria. Molecules contained in crude mitochondrial fractions were extracted and stored until analysis or mixed with an affinity material that specifically interacts with Ccm1p. The affinity material was extensively washed and eluted. Relative levels of 15S rRNA and *CCM1* mRNA were determined by reverse-transcription qPCR. Interaction between the wild-type protein and the affinity material increased 15S rRNA eluted levels almost 8-fold ($p < 0.05$), while no significant increase was detected for the mutant protein, even though both groups produced similar amounts of recombinant *CCM1* mRNA and 15S rRNA, and both proteins were imported into mitochondria. These results indicate that the second PPR motif directs the protein-RNA interaction *in vivo*.

This work was supported by DoD/W911NF-13-1-0174.

P13.03

REGULATION OF MITOCHONDRIAL DNA LEVELS IN BAKER'S YEAST

Ariel Walker, J. Ignacio Moreno, Marta Piva
Alcorn State University, Alcorn State, MS, USA

Mitochondrial DNA (mtDNA) codes for a few essential components of the oxidative phosphorylation system. The loss of mitochondrial DNA may be experienced by humans and has been induced in animal models of mtDNA depletion syndromes (MDS). This heterogeneous group of autosomal recessive disorders is characterized by a severe reduction in mtDNA content which impairs energy production in several tissues and organs. This work has studied the role of the Ccm1p protein in the maintenance of mtDNA levels. Ccm1p is a pentatricopeptide repeat motif protein, coded in the nuclear genome of *Saccharomyces cerevisiae* and imported into mitochondria. Levels of mtDNA were assessed by qPCR in wild-type and *CCM1* deletion mutant nascent segregants that were cultured in the presence of dextrose, a substrate that suppresses mitochondrial function in baker's yeast. Recombinant Ccm1p was detected by immunoblot. Wild-type strains with steady Ccm1p levels showed a progressive loss of mtDNA over time, reaching less than 50% of the initial amount by 72 hours. Interestingly, deletion mutants with very low levels of endogenous Ccm1p experienced an increase of 47% over the same time frame. mtDNA levels of segregants in which Ccm1p levels were regulated, showed a biphasic curve: first a dip at high Ccm1p concentrations and then a rise when the protein levels were reduced. These observations led us to hypothesize that Ccm1p may act in mtDNA replication, probably as a negative regulator that helps coordinate the nuclear and mitochondrial compartments in different physiological conditions.

This work was supported by DoD/W911NF-13-1-0174.

P13.04

INTRAMITOCHONDRIAL MOLAR QUANTITATION OF CCM1P: AN ESSENTIAL MOONLIGHTING PROTEIN FOR MITOCHONDRIA BIOGENESIS

Classie Johnson, Marta Piva, J. Ignacio Moreno
Alcorn State University, Alcorn State, MS, USA

The remarkable diversity and complexity in the eukaryotic kingdom from Protozoa and Plantae to Animalia are supported by an intracellular highly efficient-energy supplier system called mitochondrion. In spite of vast differences among organisms within the kingdom, many mechanisms by which this organelle is generated, it functions, and is maintained have been conserved during evolution. *Saccharomyces cerevisiae*, a simple unicellular fungus has been a long standing model to study mitochondria biogenesis *in vivo* due to its ability to live without the functional organelle. Ccm1p is a nuclear-coded protein, essential to maintain the mitochondrion operational. To understand the mechanistic action of this protein, a *CCM1* gene controllable expression system has been developed.

CCM1 mRNA levels are routinely monitored as regulation progresses by RT-qPCR. However, intramitochondrial protein molar concentration measurements by ELISA present difficulties due to the chemical instability of this protein *in vitro* when used as standard. Computational analysis revealed three dominant antigenic regions in Ccm1p. One is located at the C-termini (Ep3) of the protein. Taking advantage of it, a genetic construct was generated by *Nco*I-*Nco*I deletion. The corresponding protein consisting of Ep3 fused to ZZ was successfully expressed in *E.coli* and purified by IgG-Sepharose. The purified engineered protein with the expected molecular weight was visualized by Coomassie blue-stained SDS-polyacrylamide gel electrophoresis and its identity was confirmed by immunoblot. This protein is stable and suitable to use as calibrator in a sandwich ELISA that uses capture and detection antibodies raised in two animal species.

This work was supported by DoD/W911NF-13-1-0174.

P13.05

A NOVEL CELLULAR SYSTEM TO REGULATE A RESPIRATORY CHAIN TRANSIENT MUTANT PHENOTYPE

Jivarre Hunt, Classie Johnson, Marta Piva, J. Ignacio Moreno
Alcorn State University, Alcorn State, MS, USA

Mitochondrion a universal organelle in the eukaryotic kingdom is the intracellular compartment where the energy from many carbon-based substrates is converted to useful and immediate energy: ATP. The respiratory chain (RC) is the functional core where such energy conversion takes place. Non-fermentable substrates (like glycerol) are organic compounds that require the fully functional RC to be utilized as sole source of carbon and energy. To enter in the metabolic pathway, glycerol is phosphorylated and oxidizes to yield dihydroxyacetone phosphate, a metabolic intermediate used by the cell. When the RC fails in *Saccharomyces cerevisiae*, glycerol 3-phosphate is accumulated in toxic concentrations which inhibit cell division. Thus, growth of *S. cerevisiae* in the presence of glycerol is a simple assay to assess mitochondria functionality (i.e. operational RC). Hundreds of nuclear-coded proteins are imported into mitochondria to assemble and maintain RC. Ccm1p is one of the proteins involved in these crucial tasks. However, little is known about the mechanistic role of Ccm1p. This presentation describes a *S. cerevisiae* system in which Ccm1p expression is exogenously regulated. Suppression of Ccm1p expression caused mitochondrial failure as assessed by growth in the presence of glycerol. Interestingly, even though translation in mitochondria was dramatically decreased, mitochondrial DNA levels held relatively steady. Conversely, when Ccm1p expression was turned back on in the same cell population, mitochondrial function fully recovered, thus indicating that the failure was transient. These results indicate that this is an excellent system to study mechanistic aspects of mitochondrial biogenesis.

This work was supported by DoD/W911NF-13-1-0174.

P13.06

NOVEL ASPECTS OF SPOTTED WING DROSOPHILA BIOLOGY AND IMPROVED METHODS OF REARING

Blair Sampson[1], Trevor Mallette[1], Karla Addesso[2], Oscar Liburd[3], Lindsy Iglesias[3], Stephen Stringer[1], Christopher Werle[1], Donna Marshall-Shaw[1], John Adamczyk Jr.[1]
[1]USDA-ARS, Poplarville, MS, USA, [2]Tennessee State University, McMinnville, TN, USA, [3]University of Florida, Gainesville, FL, USA

Drosophila suzukii (Mats.) or the spotted wing Drosophila (SWD), is a global pest of soft fruits that can now be reared on a standard Drosophila diet containing the fly's own natural food: soft-skinned berries. The techniques tested here can thwart bacterial and fungal disease that can destroy more than 40% of cultures when artificial food sources (e.g., standard Drosophila media) are combined with unsterilized host plant material (berries). The optimal ratio for mixing dietary ingredients for a vial- or test-tube rearing system includes, by weight, 1 part berry tissue for oviposition, 1.5 parts dry diet media for carbohydrate, 7 parts clean water for moisture, and ~5 grains (0.8 mg) of dry yeast for protein. One or two blackberry or blueberry fruits used as edible oviposition substrates doubled or tripled SWD pupal and adult production within standard 68 mL vials. To prevent mold from spoiling the diet, the exocarp of berries was sterilized in an 80% or 90% ethanol bath at room temperature for ~5 min, followed by a thorough rinsing with deionized water to remove any residual alcohol that could poison D. suzukii, a highly ethanol-intolerant species. Sterilized fruit disrupts the growth of biofilm-producing bacteria capable of suffocating flies. Identical body size in reared SWD adults and wild-caught D. suzukii substantiates nutritional similarity between the fruit/media-based diet and the fly's own natural food (i.e., whole berries). Maintaining cultures for 2 to 4 wks at 5^{o}C yielded the darker, winter morph of D. suzukii.

P13.07

THE PREVALENCE OF ASTHMA IN MISSISSIPPI DELTA- A GEOSPATIAL RESEARCH

Grace Ikenga, Iramencia Cox, Tracy Hall, Swatantra Kethireddy
Mississippi Valley State University, Itta Bena, MS., USA

This study has investigated the prevalence of asthma in the Mississippi delta using Geographical Information Systems (GIS) applications. Asthma is a chronic respiratory condition marked by spasms in the bronchi of the lungs, causing difficulty in breathing. It is a growing health problem in the delta region. The data related to inpatient, outpatient, and emergency department visitations were collected for 2008-2011 on the five counties, Bolivar, Sunflower, Leflore, Washington, and Holmes. Centers for Disease Control and Prevention and Mississippi State Department of Health were the data sources. Quantitative choropleth mapping in GIS was applied to visualize the prevalence rates. Sunflower County had the highest hospital rate. Sunflower and Leflore tied for the highest emergency department rate. Statistical modeling, multivariate regression analysis are being applied on the dependent asthma variable and other independent variables (environmental, and socio economic factors) to explore and identify the potential risk factors. Time series analysis had identified the seasonal rise of asthma related visitations between late September and November for all the analyzed years, which shows its continuous severity in the delta.The study will help in recommendations to prevent future asthma hospitalizations, also help to promote education and management of asthma in risk populations. Further research is being conducted to identify the potential risk factors that are causing the seasonal behaviors in asthma prevalence, research also may result in quantifying and modeling the risk, which may help the decision makers to take optimal actions for the future.

P13.08

THE EFFECTS OF ADRENERGIC RECEPTOR ANTAGONISTS ON AVIAN MEMORY

Nathaniel Webb, Amy Hribar, J'Undra Pegues, Taylor Williams, Lainy Day
University Of Mississippi, University, MS, USA

The adrenergic system appears to be involved in the consolidation and reconsolidation of limbic system-dependent spatial and fear memories in mammals. Based on connectivity, cell types, ontogeny and receptor distribution, the avian hippocampus and amygdala are thought to be homologs to the mammalian hippocampus and amygdala. The adrenergic system appears to be fairly conserved but may show some species specializations. To determine if the adrenergic system plays a role in spatial learning and fear conditioning memory in birds, we used a series of experiments to investigating the effects of α and β adrenergic receptors antagonists, phentolamine and propranolol, on spatial navigation and fear conditioning memory in the zebra finch using the Day Escape Maze, a dry maze analog of the Morris water maze, and a standard fear condition chamber adapted for birds. Collectively our studies suggest that, in contrast to mammals, adrenergic receptors antagonists do not impair spatial or fear conditioning memory in the zebra finch. Thus, across vertebrate taxa, the effects of norepinephrine on spatial and fear conditioning memory reconsolidation or the distribution of adrenergic receptors in the limbic system may not be conserved.

P13.09

STATUS OF TOXOPLASMOSIS IN MISSISSIPPI

Tracey Williams, Jacqueline Powell, Tekoa Williams, Lavester White, Julius Ikenga
Mississippi Valley State University, Itta Bena, MS, USA

This research investigated the current status of toxoplasmosis in MS. A review of MS Dept. of Health, Center for Disease Control, and online related documents showed that toxoplasmosis is still a potential food-borne disease of humans, livestock, pets and wildlife in MS.. 73 randomly selected and tested white-tail deer showed a 47% infection with T. gondii, the protozoan parasite that causes toxoplasmosis. T. gondii is acquired through eating undercooked contaminated meat or drinking contaminated water. 3916 cases of toxoplasmosis are documented in MS with highest incidence in Tate County. About 72% of recorded cases of toxoplasmosis in MS are females with most of the incidences occurring at ages 50 years and older. At high risk are pregnant women and people with weak immune systems. Infected newborns are susceptible to serious eye or brain damage at birth. Lower levels of education are associated with an increased risk for toxoplasmosis. Infected livestock produce stillbirths and abortions amounting to huge economic loses for farmers and ranchers

Friday, February 19, 2016
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

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