

MISSISSIPPI ACADEMY OF SCIENCES



SEVENTY-EIGHTH ANNUAL MEETING

March 6-7, 2014

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Hattiesburg, MS**

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GENERAL SCHEDULE
MISSISSIPPI ACADEMY OF SCIENCES
Seventy-Eighth Annual Meeting
March 6-7, 2014

WEDNESDAY, MARCH 5, 2014

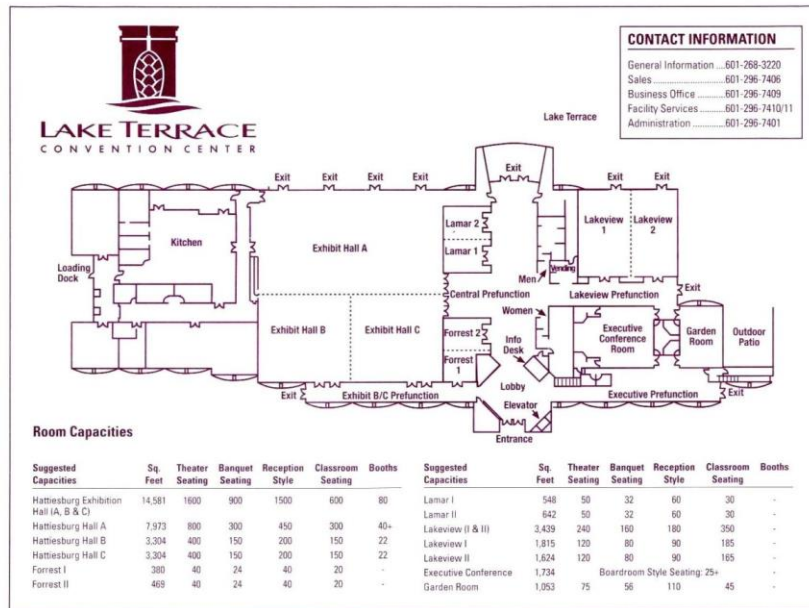
TIME	EVENT	LOCATION
5:00 PM to 7:00 PM	Board of Directors Meeting	TBA

THURSDAY, MARCH 6, 2014

TIME	EVENT	LOCATION
7:30 AM to 2:00 PM	Registration	Lobby
8:00 AM to 3:00 PM	Exhibits	Lobby
8:00 AM to 3:15 PM	Divisional Programs	See Specific Division Info
10:00 AM to 11:50 AM	Careers in Pharmacology and Biotechnology	Exhibit Hall A
Noon to 1:00 PM	Ethical Challenges in Biomedical Research	Exhibit Hall A
3:30 PM to 6:00 PM	Presentation of Awards, and 2014 Dodgen Lecture "Reconsidering the Scientific Method in the Information Age"	Exhibit Hall A
6:00 PM to 7:30 PM	Reception and Graduate Poster Session	Exhibit Hall C

FRIDAY, MARCH 7, 2014

TIME	EVENT	LOCATION
7:15 AM to 8:15 AM	Past-Presidents' Breakfast	TBA
8:00 AM to 2:00 PM	Registration	Lobby
8:00 AM to 2:00 PM	Exhibits	Lobby
8:00 AM to 5:00 PM	Divisional Programs	See Specific Division Info
10:00 AM to Noon	Symposium on Silva, Landreth, and Bickle's Engineering the New Revolution in Neuroscience (Oxford Press)	Garden Room
Noon to 2:00 PM	Millsaps-HHMI Undergraduate Symposium	Exhibit Hall A
2:00 PM	MAS Buisness Meeting	Exhibit Hall A



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2014 Dodgen Lecture

Thursday
March 6, 2014
3:30 PM

"RECONSIDERING THE SCIENTIFIC METHOD IN THE INFORMATION AGE"
given by

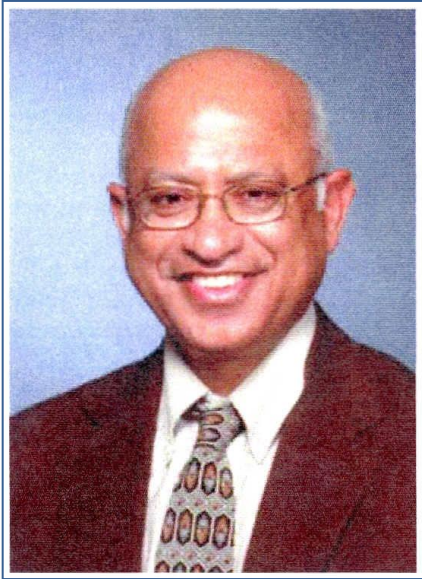


Richard L. Summers, MD, FACEP
Associate Vice Chancellor for Research
Professor and Chair Emeritus of Emergency Medicine
Department of Emergency Medicine
University of Mississippi Medical Center

Richard L. Summers, MD is an attending physician and Professor and Chair Emeritus of Emergency Medicine at the University of Mississippi Medical Center. Dr. Summers, a native of Gulfport Mississippi, graduated from the University of Southern Mississippi magna cum laude in mathematics in 1977. He received his medical degree from the University of Mississippi Medical Center in 1981 after which he entered their residency program in internal medicine. Summers then began graduate studies in physiology and completed a post-doctoral research fellowship under the preeminent cardiovascular physiologists, Drs. Arthur C. Guyton and Thomas G. Coleman. Since 1988, he has been a full-time faculty member at the University of Mississippi and currently holds joint appointments in the Department of Emergency Medicine and the Department of Physiology and Biophysics.

Dr. Summers' primary research interests include both basic science and clinical investigations in the area of cardiovascular disease as it relates to the practice of emergency medicine. He has authored or coauthored over 300 publications, abstracts, and book chapters and has presented at numerous international scientific association meetings, hospitals, and medical schools. Dr. Summers currently reviews manuscripts for 10 different medical journals and is an active member of the Society of Academic Emergency Medicine and the American College of Emergency Physicians where he has been a member on the National Research Committee and Councilor for the Research Section of the College. He has established a national reputation for his work on quantitative models of human physiology on behalf of NASA's Digital Astronaut Program, particularly in regard to measuring the effects of microgravity on space travelers. Dr. Summers is also a member of the Integrated Product Team for the NASA Cardiovascular Laboratory.

Plenary Speaker
Thursday, March 6, 2014
12:00 PM



Ethical Challenges in Biomedical Research

Given by

Subrata Saha, Ph.D.

**Editor-in-Chief, Journal of Long Term Effects of Medical Implants;
Ethics in Biology; Engineering & Medicine
Director, Biomedical Engineering Program, School of Graduate Studies
Research Professor and Director of Musculoskeletal Research.
Department of Orthopaedic Surgery and Rehabilitation Medicine.
Professor, Dept. Physiology & Pharmacology
SUNY Downstate Medical Center**

Dr. Subrata Saha is the Director of Musculoskeletal Research and Research Professor in the Department of Orthopaedic Surgery & Rehabilitation Medicine at SUNY Downstate Medical Center in Brooklyn, New York. Dr. Saha received a BS in Civil Engineering from Calcutta University in 1963, an MS in Engineering Mechanics from Tennessee Technological University in 1969, and Engineering and PhD degrees in Applied Mechanics from Stanford University in 1972 and 1974, respectively. He has been a faculty member at Yale University, Louisiana State University Medical Center, Loma Linda University, Clemson University, and Alfred University. Dr. Saha has received many awards from professional societies, including Orthopedic Implant Award, Dr. C. P. Sharma Award, Researcher of the Year Award, C. William Hall Research Award in Biomedical Engineering, Award for Faculty Excellence, Research Career Development Award from NIH, and Engineering Achievement Award. He is a Fellow of the Biomedical Engineering Society (BMES), The American Society of Mechanical Engineers (ASME), and the American Institute for Medical and Biological Engineering (AIMBE). He currently chairs the Bioethics Committee of the International Federation of Medical and Biological Engineering (IFMBE) and the Development Committee of Sigma Xi, and is Co-Chair of the International Committee of AIMBE. He is the immediate past chair of the Ethics Committee of the American Association of Dental Research (AADR).

He has received numerous research grants from federal agencies (NIH and NSF), foundations, and industry. Dr. Saha is the founder of the Southern Biomedical Engineering Conference Series, and he also started the International Conference on Ethical Issues in Biomedical Engineering. Dr. Saha has published over 118 papers in journals, 45 book chapters and edited volumes, 382 papers in conference proceedings, and 151 abstracts. His research interests are bone mechanics, biomaterials, orthopedic and dental implants, drug delivery systems, rehabilitation engineering, and bioethics.

Abstract:

During the last fifty years, the field of biomedical engineering has been largely responsible for the dramatic advances in modern medicine. These include advanced therapeutic and diagnostic techniques (e.g., total joint replacements, heart-lung machines, artificial heart, computed tomography and magnetic resonance imaging) and that in turn has significantly improved the life span and quality of life of our patients. However, biomedical technology has also contributed to new ethical dilemmas and has challenged some of our moral values. Some of the areas that have shown immense promise but also raised public concern are nanobiotechnology, stem cell research, cloning, genetic engineering and synthetic biology. Other topics that also often face ethical scrutiny are animal research, clinical trials and conflicts-of-interest. A discussion of ethical issues associated with these topics will be presented.



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

Friday, March 7, 2014

Exhibit Hall A

Noon to 2:00 PM

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.

Symposium Program

12:00 PM Welcome Remarks by Dr. Stan Smith

12:10 PM Lead Speaker, Dr. Timothy Ward

12:45 PM Poster Competition

1:30 PM James D. Hardy Award Honoring Excellence in Science in
Mississippi Ceremony

Presentation of Awards - Dr. Marc Mitchell, James D. Hardy Professor
and chairman of the Department of Surgery and Closing



Symposium

**Sponsored by the Health Sciences Division
Thursday, March 6, 2014**

**Exhibit Hall A
10:00-11:50 AM**

“Careers in Pharmacology and Biotechnology”

This session will consist of 3 seminars targeting Mississippi’s STEM undergraduate students. It will provide direction, insight and guidance to students interested in graduate training for careers in academic and industrial research.

Session Chair: Dr. Richard Roman, Chair of Pharmacology Department,
University of Mississippi Medical Center, Jackson, MS

Seminars:

1. **Graduate Studies in Pharmacology at UMMC**
Dr. Sean Didion
2. **Drug Development: From Preclinical Research to the Clinical Trials**
Dr. Richard Roman
3. **Genomics Approaches to Research and Medicine**
Dr. Michael Garrett

Sponsored by the Dr. Richard J. Roman, Chair of Pharmacology Department, University of
Mississippi Medical Center



Symposium
(Co-Sponsored by the History and Philosophy and Psychology and Social Sciences Divisions)
Friday, March 7, 2014
Garden Room, 10:00 AM

**A SYMPOSIUM ON SILVA, LANDRETH, AND BICKLE'S ENGINEERING THE NEW REVOLUTION IN
NEUROSCIENCE (Oxford University Press, 2013)**

This interdisciplinary symposium will bring together a neuroscientist and a philosopher of science for a 2 hour author meets critics' session on Alcino Silva, Anthony Landreth, and John Bickle's recent book, with Bickle commenting on both presentations. Possible topics for discussion include the empirical adequacy of Silva, Landreth, and Bickle's Framework for scientific experiments, derived from state-of-the-art research in the field of 'molecular and cellular cognition' (MCC); the varieties and specific roles of distinct Integration procedures they articulate for relating distinct experimental results; the potential and plausibility of automated "research maps" to indicate what has been accomplished experimentally and the data still missing for establishing causal hypotheses linking cognitive functions to specific cellular and molecular mechanisms, and the authors' speculations on the future of a science of experiment planning. Each talk will be 20 minutes, followed by 10 minutes of discussion, leaving 30 minutes at the end of the three presentations for audience discussion. Given the book's distinctive interdisciplinary focus, this symposium will be of interest to practicing research scientists interested in the representation of knowledge in their fields, and to philosophers interested in the rationality of short-term and long-term experimental research programs in science.

Panelists

Michael Bishop, Ph.D. is Professor of Philosophy and Director of Graduate Studies at Florida State University. His primary research interests include philosophy of science, epistemology, and philosophy of psychology/mind. He received his Ph.D. in Philosophy from the University of California, San Diego, in 1990. He is the author of *Epistemology and the Psychology of Human Judgment* (co-author J.D. Trout, Oxford University Press) and more than 30 professional articles, book chapters, and reviews, including in *Nous*, *Philosophy of Science*, *Synthese*, and *Studies in the History and Philosophy of Science*. His work has been supported by a grant from the National Science Foundation.

Diane Lebesgue, Ph.D., is Assistant Professor of Neurobiology and Anatomical Sciences at the University of Mississippi Medical Center. Her primary research interests include the neural circuitry and molecular machinery that underlies sex differences in neuropsychiatric diseases and addiction. She received her Ph.D. in life sciences at the Universite de Tours in 1997 and did postdoctoral training at the Biotechnology Research Institute at the Universite de Montreal, Canada and in the Department of Neuroscience at the Albert Einstein College of Medicine, where she also served as an instructor in neuroscience. She has published 14 research articles. Her research is supported by a Mentored Scientist Career Development Award from the National Institute of Drug Abuse.

Discussant

John Bickle, Ph.D. is Professor of Philosophy, Adjunct Professor of Psychology, Head of the Department of Philosophy and Religion, and Fellow of the Institute for Imaging and Analytical Technologies (I2AT) at Mississippi State University. His primary research interests include philosophy of neuroscience, scientific reductionism, and cellular/molecular mechanistic explanations in neuroscience. He received his Ph.D. in Philosophy from the University of California, Irvine, in 1989. He is the author of four books (*Psychoneural Reduction: The new Wave*, MIT Press, 1998; *Philosophy and Neuroscience: A Ruthlessly Reductive Account* (Kluwer, now Springer, 1992; *Understanding Scientific Reasoning*, 5th Ed. (co-authors Ronald Giere and Robert Mauldin, Thompson 2006; and *Engineering the Next Revolution in Neuroscience* (co-authors Alcino J. Silva and Anthony Landreth, Oxford University Press, 2013), editor of the Oxford handbook of *Philosophy and Neuroscience* (Oxford University Press, 2009), and more than 75 articles, book chapters, and reviews. His work has been supported by grants from the National Science Foundation and the National Institutes of Health.



OVERVIEW OF DIVISIONAL PROGRAMS

General Symposiums

Thursday, March 6

Location: Exhibit Hall A

10:00 CAREERS IN PHARMACOLOGY AND BIOTECHNOLOGY

12:00 ETHICAL CHALLENGES IN BIOMEDICAL RESEARCH

THURSDAY EVENING

Location: Exhibit Hall A

3:30 AWARDS and DODGEN LECTURE

"RECONSIDERING THE SCIENTIFIC METHOD IN THE INFORMATION AGE"

5:30-7:30 DODGEN RECEPTION AND DIVISIONAL POSTER SESSIONS

Posters should not be removed until 7:30 PM to allow judges and attendees ample time to review each poster.

General Symposiums

Friday, March 7

Location: Garden Center

10:00 A SYMPOSIUM ON SILVA, LANDRETH, AND BICKLE'S ENGINEERING THE NEW REVOLUTION IN NEUROSCIENCE (Oxford University Press, 2013)

Location: Exhibit Hall A

12:00 Millsaps-HHMI Undergraduate Symposium

AGRICULTURE AND PLANT SCIENCE

Thursday, March 6

DIVISION POSTER PRESENTATIONS

Following the Dodgen Lecture

Location: Exhibit Hall C

1. EFFECT OF CADMIUM ON THE PRODUCTION OF PHYTOCHELATIN BY TRITICUM AESTIVUM DURING PHYTOEXTRACTION
2. EFFECTS OF HEAT AND ACID PRETREATMENTS ON SUGAR PRODUCTION FROM THE DEGRADATION OF PINE SAWDUST BY AN UNKNOWN FUNGAL ISOLATE AND TRICHODERMA REESEI
3. SUGAR PRODUCTION FROM DEGRADATION OF LIGNOCELLULOSIC MATERIAL BY PYCNOPORUS CINNABARINUS UNDER AEROBIC AND ANAEROBIC CONDITIONS
4. PHYTOEXTRACTION OF CADMIUM-CONTAMINATED SOIL BY IPOMOEIA LACUNOSA: EFFECTS OF CADMIUM, CHELATES AND PLANT GROWTH STAGE
5. PHENOLIC AND ANTHOCYANIN COMPOUND CONCENTRATIONS IN BLUEBERRY (VACCINIUM CORYMBOSUM) CULTIVARS
6. EFFECT OF SUN AND SHADE ON SOYBEAN PLANT GROWTH AND PHYSIOLOGY UNDER POTASSIUM FERTILIZED AND NON FERTILIZED CONDITIONS



7. CHROMOSOME SUBSTITUTION LINES: VALUABLE GENETIC RESOURCES TO INTROGRESS USEFUL GENES FROM WILD SPECIES INTO UPLAND COTTON

AGRICULTURE AND PLANT SCIENCE

Friday, March 7

Location: Forrest 1

- 8:45 OPENING REMARKS**
- 9:00 EFFECT OF LONG-TERM ORGANIC FARMING ON BIOMASS DEVELOPMENT AND SOIL PHYSICO-CHEMICAL CHANGES IN A MUSCADINE VINEYARD**
- 9:15 EFFECT OF TEMPERATURE ON INFECTION OF BOTRYOSPHERA STEM BLIGHT IN SOUTHERN BLUEBERRIES**
- 9:30 RHIZOBACTERIAL COMMUNITY STRUCTURE AND FUNCTION IN A DRYLAND AGROECOSYSTEM**
- 9:45 BUSINESS MEETING**

CELLULAR, MOLECULAR AND DEVELOPMENTAL BIOLOGY

Thursday, March 6

THURSDAY MORNING

Location: Lakeview I

- 8:15 OPENING REMARKS**
- 8:30 T CELL CO-RECEPTOR FUNCTION IN CHANNEL CATFISH, *ICTALURUS PUNCTATUS***
- 8:45 MICRORNA-200 REGULATES CELL MIGRATION/INVASION GENES IN A LUNG METASTATIC CELL MODEL**
- 9:00 FORMATION OF FOUR-WAY DNA JUNCTION FACILITATED BY A SMALL MOLECULE**
- 9:15 EFFECTS OF MICROGRAVITY ON IMMUNE FUNCTION: BENZOFURAN-2-CARBOXYLIC ACID DERIVATIVE AS A COUNTERMEASURE**
- 9:30 EXPRESSION OF THE *pcd* GENE FROM HALOTHIOBACILLUS NEAPOLITANUS**
- 9:45 MOLECULAR DETECTION OF SPOTTED FEVER GROUP RICKETTSIA IN IXODID TICKS FROM PAKISTAN**
- 10:00 BREAK**
- 10:15 ROLE OF MSA IN VANCOMYCIN RESISTANCE IN STAPHYLOCOCCUS AUREUS**
- 10:30 ARE PEPTIDE NUCLEIC ACIDS (PNAS) CAPABLE OF TRANSFERRING GENETIC INFORMATION VIA AMINOACYL-TRNA SYNTHETASES?**
- 10:45 CORRELATION BETWEEN FIBRONECTIN MATRIX AND EXPRESSION OF MYOFIBROBLASTIC FEATURES IN HUMAN ADIPOSE-DERIVED STEM CELLS**
- 11:00 ANALYSIS OF AMBLYOMMA CEMENT CONE PROTEINS**
- 11:15 INHIBITION OF PROTEASOME AND LYSOSOMAL ENZYMES CAN PARTIALLY RESCUE CFTR DEGRADATION**
- 11:30 EXPANDING THE REPERTOIRE OF AMINO ACID ANALOGUES FOR USE IN THE SYNTHESIS OF NOVEL PEPTIDES**
- 11:45 LUNCH BREAK**

THURSDAY AFTERNOON

Location: Lakeview I



- 1:15 DETERMINING THE ROLE OF THE NITROGEN REGULATORY PROTEIN AREA IN THE DIMORPHIC FUNGUS *HISTOPLASMA CAPSULATUM*
- 1:30 ENDOGENOUS CFTR EXPRESSION IN HUMAN PANCREATIC DUCT CELLS
- 1:45 ENHANCEMENT OF RADICAL QUENCHING ABILITY OF CHEDDAR WHEY: MUTUAL SUPPLEMENTATION WITH THERMALLY GENERATED MAILLARD REACTION PRODUCTS
- 2:00 BETULINIC ACID DOES NOT AFFECT RATES OF IN VIVO SPONTANEOUS FORMATION OF THE [URE3] PRION IN *SACCHAROMYCES CEREVISIAE*
- 2:15 DECIPHERING THE PHYSIOLOGICAL ROLE OF CORAZONIN IN THE BLACK-LEGGED TICK (*IXODES SCAPULARIS*)
- 2:30 BUSINESS MEETING

THURSDAY EVENING

DIVISION POSTER PRESENTATIONS

Following the Dodgen Lecture

Location: Exhibit Hall C

1. CHARACTERIZATION OF GENE SAUSA300_1295 IN THE *MSA* OPERON OF *STAPHYLOCOCCUS AUREUS*
2. ROLE OF *MSA* IN REGULATION OF CELL MORPHOLOGY AND TELLURITE RESISTANCE IN *STAPHYLOCOCCUS AUREUS*
3. THE EFFECTS OF HIGH ENERGY RADIATION ON THE VESTIBULAR AND IMMUNE FUNCTION IN RATS
4. ASYMMETRIC LEAVES1 ESTABLISHES ORGAN BOUNDARIES IN *ARABIDOPSIS* FLOWERS
5. BIOCHEMICAL ANALYSIS OF TWO *ASPERGILLUS NIDULANS* SUPPRESSOR MUTATIONS
6. SEX DIFFERENCES IN THE PROGRESSION OF RENAL INJURY LEPTIN RECEPTOR KNOCKOUT DAHL SALT-SENSITIVE (SS) RATS
7. TRACKING PLASTID (AND MITOCHONDRIAL) GENE MIGRATION IN *K. BREVIS*
8. ENHANCEMENT OF TOTAL RADICAL TRAPPING POTENTIALS OF SWEET WHEY: MUTUAL SUPPLEMENTATION WITH GREEN TEA EXTRACT
9. MECHANISM OF *repo* REGULATION IN GLIAL CELLS OF *DROSOPHILA MELANOGASTER*
10. RECONSTITUTION OF MUNC18-DEPENDENT MAST CELL EXOCYTOSIS
11. CHARACTERIZATION OF A NOVEL RING-TYPE UBIQUITIN E3 LIGASE GHRING2 INVOLVED IN COTTON FIBER DEVELOPMENT
12. DESIGN OF A MULTIFUNCTIONAL POLYPEPTIDE FOR APPLICATION IN CANCER DIAGNOSIS AND TREATMENT
13. HEME OXYGENASE REGULATION OF TROPHOBLAST ENAC MEDIATED MIGRATION
14. SUBCLONING AND EXPRESSION OF RAT SYPNATOTAGMIN II FOR THE EXPRESSION RECONSTITUTION OF MAST CELL EXOCYTOSIS
15. RECONSTITUTION OF MAST CELL EXOCYTOSIS
16. DETERMINING THE PROTEIN EXPRESSION OF THE NITROGEN REGULATORY PROTEIN AREA IN THE DIMORPHIC FUNGUS *HISTOPLASMA CAPSULATUM*



17. IL-17 PROTECTS WEST NILE VIRUS INFECTION BY ENHANCING CD8+ T CELL MEDIATED CYTOTOXICITY
18. NOVEL ANTIBODY CONJUGATED NANOPARTICLES BLOCK CMV INFECTION
19. OSTEOPONTIN SIGNALING FACILITATES WEST NILE VIRUS ENCEPHALITIS
20. HISTONE H2B DIFFERENTIAL EXPRESSION IN YEAST AND MOLD MORPHOTYPES OF A DIMORPHIC PATHOGENIC FUNGUS HISTOPLASMA CAPSULATUM
21. EXPRESSION OF STRESS-RELATED GENES IN THE RED BLOOD CELLS OF THE ATLANTIC STINGRAY(*Dasyatis sabina*)
22. THE POSSIBLE ROLE OF ABSCISIC ACID SIGNALING IN NITROGEN ASSIMILATION
23. ROLE OF AN ABSCISIC ACID-ACTIVATED PROTEIN KINASE IN DROUGHT TOLERANCE

CELLULAR, MOLECULAR AND DEVELOPMENTAL BIOLOGY

March 7, 2014

FRIDAY MORNING

Location: Lakeview I

- 8:20 WELCOME AND OPENING REMARKS
- 8:30 FIVE TRACE ELEMENTS RESPONSIBLE FOR ALTERING THE SOYBEAN SEED PROTEIN, OIL AND FATTY ACIDS COMPOSITION
- 8:45 CYSTATINS PLAY ROLE IN TICK BLOOD FEEDING AND PATHOGEN INFECTION
- 9:00 AN ALLOSTERIC GAIN OF FUNCTION MUTATION CANNOT COUNTERACT A LOSS-OF-FUNCTION MUTATION AT THE GPIB-A BINDING SITE OF VWF A1 DOMAIN
- 9:15 MOSQUITO CELL MODULATES CHIKUNGUNYA VIRUS INFECTIVITY
- 9:30 GOLD-NANOPARTICLES DELIVER ANTI-DENGUE SMALL INTERFERING RNA
- 9:45 STUDY OF THE ROLE OF THE MOLD-SPECIFIC MS95 GENE IN DNA REPAIR IN THE PATHOGENIC, DIMORPHIC FUNGUS HISTOPLASMA CAPSULATUM
- 10:00 BREAK
- 10:15 CHARACTERIZING A NEW OPERON, *msa*, AND ITS ROLE IN BIOFILM DEVELOPMENT AND VIRULENCE
- 10:30 THE ROLE OF GenF IN THE ASYMMETRIC DISTRIBUTION OF THE VIRULENCE PROTEIN, IcsA IN SHIGELLA FLEXNERI
- 10:45 ENHANCEMENT OF RADICAL QUENCHING ABILITY OF CHEDDAR AND EDAM WHEY: MUTUAL SUPPLEMENTATION WITH BLACK TEA EXTRACT
- 11:00 THE REGULATORY RELATIONSHIP BETWEEN MSA AND SARA IN STAPHYLOCOCCUS AUREUS
- 11:15 EVALUATION OF SMALL MOLECULES AS A METHOD TO STABILIZE THE FORMATION OF A STABLE FOUR WAY JUNCTION (4WJ)

CHEMISTRY AND CHEMICAL ENGINEERING

March 6, 2014

THURSDAY MORNING

Room: Exhibit Hall B

- 7:55 INTRODUCTION AND WELCOME



Plenary Session I – Analytical Chemistry/Applied Spectroscopy

- 8:00 SELECTIVE EXTRACTION OF COPPER IONS FROM WATER SAMPLES USING ION-IMPRINTED POLYMER**
- 8:15 ENVIRONMENTAL FATES AND TRANSFORMATION OF Cs, Co, AND Sr IN THE SOILS OF US COASTAL ECOSYSTEM**
- 8:30 SORPTIVE REMOVAL OF ORGANIC COMPOUNDS AND METALS FROM AQUEOUS SOLUTION USING BIOMASS CHAR**
- 8:45 MERCURY GAS EXCHANGES OVER BARE SOILS AND OTHER LANDFORMS IN MISSISSIPPI**
- 9:00 STABILITY AND ANALYSIS USING THIN LAYER CHROMATOGRAPHY OF CURCUMIN & CURCUMIN IN TURMERIC AFTER HEATING IN EDIBLE OILS**
- 9:15 COLORIMETRIC AND OPTICAL SENSING OF ANIONS BY SYNTHETIC RECEPTORS IN WATER**
- 9:30 BREAK**

Plenary Session II – Organic and Biochemistry

- 9:45 METHODOLOGY DEVELOPMENT USING OXYALLYL SILANES AS HOMOENOLATE EQUIVALENTS**
- 10:00 (E)-1-(2-HYDROXYPHENYL)-3-(PIPERIDIN-1-YL)-PROP-2-EN-1-ONE: STRUCTURAL CHARACTERIZATION BY X-RAY AND V-T NMR**
- 10:15 THE PHOTOCHEMISTRY OF N-SUBSTITUTED HETEROAROMATIC SALTS**
- 10:30 OXALATE OXIDASE ACTIVITY IN *E. COLI***
- 10:45 SYNTHETIC STUDIES TOWARD SPIRO-ISOXAZOLINE DERIVED MCF-7, MDA-MB-231, PC-3, AND DU-145 ANTI-CANCER AGENTS**
- 11:00 CELLULAR AND MOLECULAR STUDIES ON PLANT FLAVONOIDS AGAINST OXIDATIVE STRESS**
- 11:15 SYNTHESIS, CHARACTERIZATION AND STRUCTURAL STUDIES OF COPPER(II) LEVULINATE CONTAINING NITROGEN AND OXYGEN DONORS**
- 11:30 BUSINESS MEETING AND LUNCH BREAK**

THURSDAY AFTERNOON

Plenary Session III – Physical Chemistry and Material Science

- 12:30 STUDIES OF CHARGE RETENTION AND DISSIPATION IN ORGANIC THIN FILMS**
- 12:45 SUPERAMPHIPHOBIC INORGANIC-ORGANIC THIOL-ENE SURFACES VIA SPRAY-DEPOSITION AND PHOTOPOLYMERIZATION**
- 1:00 SELF-ASSEMBLY AND RESPONSIVENESS IN POLYPEPTIDE-BASED STAR AND TRIBLOCK COPOLYMERS: FROM DESIGN TO FUNCTION**
- 1:15 ZERO TO THREE DIMENSIONAL NANO ARCHITECTURE FOR LABEL-FREE SENSING AND WATER PURIFICATION**
- 1:30 EVALUATION OF CARBON NANOTUBES AS A POTENTIAL ADSORBER OF ORGANIC POLLUTANTS FROM WATER MATRIX**
- 1:45 BREAK**

Plenary Session IV – Computational Chemistry and Nanotechnology



- 2:00 NANOPARTICLES PROPERTIES PREDICTION: PHYSICO-CHEMICAL, TOXICOLOGICAL AND PHARMACOLOGICAL ASSESSMENT
- 2:15 COMPUTATIONAL STUDIES ON SELECTED NANOMATERIALS: PROPERTIES AND INTERACTIONS
- 2:30 QUANTUM CALCULATIONS USING SPREAD SHEET
- 2:45 ARE CONVENTIONAL STRAIN ENERGIES ADDITIVE?
- 3:00 ACCURATE THEORETICAL CALCULATIONS ON SILVER CLUSTERS: AVOIDING EMPIRICAL CORRECTIONS
- 3:15 UNDERSTANDING ELECTRON INTERACTIONS WITH DNA BASES, BASE PAIRS, AND STACKS

THURSDAY EVENING

DIVISION POSTER PRESENTATIONS

Following the Dodgen Lecture

Location: Exhibit Hall C

1. THEORETICAL STUDIES OF PERMEABILITY PROPERTIES OF POPC LIPID BILAYER
2. CHEMOENZYMATIC SYNTHESIS OF BOTH ENANTIOMERS OF 3-AMINOALCOHOLS FROM A COMMON SYNTHETIC INTERMEDIATE
3. STUDY OF VARIOUS CARBON NANOTUBES AS ALTERNATIVE EXTRACTORS OF SULPHONAMIDES FROM WATER
4. APPLICATION OF CARBON NANOTUBES AS A SOLID PHASE EXTRACTION SORBENT FOR ISOLATION OF VITAMINS FROM BIOLOGICAL SAMPLES
5. IMMOBILIZATION OF SALEN ON CHROMOSORB 106 POLYMER AND APPLICATION TO SOLID PHASE EXTRACTION OF TRACE ELEMENTS FOR ICP-MS ANALYSIS
6. A COMPARISON OF THE BRADFORD ASSAY WITH THE BICINCHONINIC ACID ASSAY FOR MEASURING PROTEIN IN SOIL EXTRACTS
7. ENCAPSULATION AND SELECTIVITY OF SULFATE WITH A FURAN-BASED HEXAAZA MACROCYCLIC RECEPTOR IN WATER
8. CHARACTERIZATION OF NIR EMISSIVE SILVER NANOCCLUSERS ON SINGLE STRANDED DNA TEMPLATE
9. A THIOPHENE LINKED TRIPODAL POLYAMINE RECEPTOR FOR ANION SENSING
10. STUDIES OF A MACROCYCLE-BASED RECEPTOR FOR ANION SENSING
11. POLYPHENOLIC COMPOUNDS AGAINST OXIDATIVE STRESS IN HEPG2 CELLS
12. INFLUENCE OF FLAVONOIDS IN REDUCING OXIDATIVE STRESS IN HUMAN SERUM ALBUMIN: A CRITICAL STUDY USING OPTICAL SPECTROSCOPY AND MOLECULAR MODELING
13. CONVENTIONAL STRAIN ENERGIES OF THE DIAZETIDINES AND THE DIPHOSPHETANES
14. CALCULATING ENTHALPIES OF FORMATION FOR AMINO DERIVATIVES OF TRINITROTOLUENE
15. COMPUTATIONAL ANALYSIS OF GOLD CLUSTERS WITH DNA BASES
16. MOLECULAR MODELLING OF MOLECULARLY IMPRINTED POLYMERS
17. AN AFM ANALYSIS ON PVP/PMMA BLEND



18. HIGH TEMPERATURE SOLVENT ANNEALING OF DH6T ON HOPG: AN ATOMIC FORCE MICROSCOPY STUDY
19. AMPHIPHILIC COPOLYMER-GRAFTED SILICA NANOPARTICLES AS A TEMPLATE FOR NOVEL OIL DISPERSANTS
20. INTERACTION OF RECOMBINANT CBBO AND CBBQ, OF *HALOTHIOBACILLUS NEAPOLITANUS*, WITH RUBISCO
21. SYNTHESIS AND BINDING STUDIES OF HEXAUREA-BASED TRIPODAL RECEPTORS
22. CATALYTIC EFFECTS OF Al(III), Sc(III), Y(III) ON GENERATION OF CADMIUM VAPOR IN THE PRESENCE OF KCN
23. A NEW DIPODAL UREA-BASED RECEPTOR FOR SELECTIVE BINDING OF FLUORIDE
24. DECONTAMINATION OF TOXIC FLUORIDE FROM WATER BY A NOVEL CLASS OF SYNTHETIC RECEPTOR
25. SELECTIVE DETECTION AND PHOTOTHERMAL THERAPY OF CANCER CELLS USING IRON CORE GOLD SHELL NANOPARTICLE-SWCNT HYBRID NANOSTRUCTURES
26. DESIGN OF A SOLAR PHOTOREACTOR: GREEN CHEMISTRY APPLICATIONS AT MILLSAPS COLLEGE
27. PHOTOCHEMISTRY OF N-ALKOXY HETEROAROMATIC TETRAFLUOROBORATES: ANALYSIS OF THE REACTION PATHWAYS BY pH MONITORING
28. BIFUNCTIONAL 1,8-NAPHTHALIMIDES AS FLUORESCENCE SENSORS
29. ANALYSIS OF THE DNA-CLEAVING EFFICIENCIES OF BIFUNCTIONAL DNA-CLEAVING REAGENTS
30. GOLD NANOPOPCORN ATTACHED SINGLE-WALLED CARBON NANOTUBE HYBRID FOR RAPID DETECTION AND EFFECTIVE KILLING OF BACTERIA
31. SWCNT-CONJUGATED IRON-CORN GOLD-SHELL NANOPOPCORN FOR TARGETED MAGNETIC SEPARATION & ENRICHMENT AND PHOTOTHERMAL DESTRUCTION OF MULTI DRUG RESISTANCE SALMONELLA
32. ADSORPTION OF HERBICIDES ON THE SURFACE OF NANO-PARTICLES OF IRON OXIDE AND IRON OXIDE
33. PHOTO-ENHANCED TOXICITIES OF SULFUR-DOPED TiO₂ NANOPARTICLES TO ZEBRAFISH EMBRYOS (*DANIO RERIO*): AN *IN VIVO* INVESTIGATION

CHEMISTRY AND CHEMICAL ENGINEERING

March 7, 2014

FRIDAY MORNING

Location: Exhibit Hall B

Plenary Session V

- 8:00 WELCOME AND OPENING REMARKS**
- 8:15 SOLUBILITY AND ION RELEASE PROPERTIES OF SILVER NANOPARTICLES: EFFECTS OF pH AND SURFACE COATINGS**
- 8:30 A NOVEL ROUTE TOWARDS THE SYNTHESIS OF BROMOTYROSINE DERIVED SPIROISOXAZOLINE NATURAL PRODUCTS AND ANALOGOUS CORE STRUCTURES**
- 8:45 INVESTIGATION OF THE CO-SOLVENT-SUBSTRATE INTERACTION IN PLE HYDROLYSIS**



REACTIONS

- 9:00 ELECTROCHEMICAL STUDY OF PALLADIUM BASED NANOCATALYSTS FOR DIRECT FORMIC ACID FUEL CELLS
- 9:15 CHEMOENZYMATIC PREPARATION OF α -METHYL- β -PROLINE ANALOGUES: EFFICIENT TEMPLATE BASED DEVELOPMENT OF ORGANOCATALYSTS FOR ASYMMETRIC ANTI-MANNICH REACTIONS
- 9:30 TRACE METALS AND CHLOROPHYL *a* CONCENTRATIONS IN THE MISSISSIPPI RIVER AND SIX MAJOR TRIBUTARIES DURING 2012 AND 2013
- 9:45 FROM RADIOISOTOPE SYNTHESIS AT JOHNSON & JOHNSON TO ORGANIC RESEARCH AT SOUTHERN MISS
- 10:00 BREAK

PLENARY SESSION – VI

- 10:15 PHOTOELECTROCHEMICAL STUDIES ON LAYERED ORGANIC-INORGANIC HYBRID PEROVSKITE PHOTOELECTRODES FOR WATER SPLITTING
- 10:30 ANION BINDING AND SELECTIVITY OF THIOUREA-BASED RECEPTORS: A COMPARATIVE STUDY
- 10:45 FATTY ACID SYNTHESIS IS INHIBITED BY INEFFICIENT UTILIZATION OF UNUSUAL FATTY ACIDS FOR GLYCEROLIPID ASSEMBLY
- 11:00 INTERACTIONS OF ANTIPARASITIC ALKALOIDS WITH *LEISHMANIA* PROTEIN TARGETS: A MOLECULAR DOCKING ANALYSIS
- 11:15 HIGH-THROUGHPUT VIRTUAL SCREENING OF FULLERENE NANOPARTICLES FOR BIOLOGICAL TARGETS: LIGAND-PROTEIN INVERSE DOCKING
- 11:30 ELECTROGENERATED CHEMILUMINESCENT STUDIES OF CHARGE TRANSFER BETWEEN CdSe/ZnS and CdTe/CdS QUANTUM DOTS AND THEIR APPLICATIONS TOWARDS THE DEVELOPMENT OF HIGHLY SENSITIVE ECL IMMUNOSENSORS
- 11:45 SYNTHESIS OF ENANTIOMERIC ENRICHED C ^{α} - METHYL-GAMMA AND DELTA- SERINE AND OTHER UNNATURAL AMINO ACIDS THROUGH A LACTAM INTERMEDIATE
- 12:00 SYNTHESIS OF AN UNSYMMETRICAL GLUTATHIONE DISULFIDE ANALOGUE AS A POTENTIAL GLUTATHIONE REDUCTASE INHIBITOR
- 12:30 ANNOUNCEMENT OF STUDENT PRESENTATION AWARDS

(Student awards sponsored by JSU Department of Chemistry & Biochemistry)

ECOLOGY AND EVOLUTIONARY BIOLOGY

March 6, 2014

THURSDAY AFTERNOON

Location: Executive Conference Room

- 1:00 AN INTEGRATIVE APPROACH TO DELIMITING SPECIES BOUNDARIES IN TARANTULAS FROM A NORTH AMERICAN BIODIVERSITY HOTSPOT
- 1:15 THE EVOLUTIONARY HISTORY OF TWO LARGELY SYMPATRIC FRESHWATER CATFISH SPECIES (HEPTAPTERIDAE: *RHAMDIA*) REVEALS CONGRUENT PHYLOGEOGRAPHIC PATTERNS IN A COMPLEX MIDDLE AMERICAN LANDSCAPE
- 1:30 ANALYSIS OF FISHING HOOKS REMOVED FROM IMMATURE SEA TURTLES INCIDENTALLY CAPTURED BY RECREATIONAL FISHERMEN IN THE NORTHERN GULF OF MEXICO



**1:45 VEGETATION AND FLORA ON LOWLANDS IN THE CENTRAL BLACK BELT OF MISSISSIPPI—
HOW LOW DID THE ORIGINAL PRAIRIE GO?**

**2:00 VARIABILITY OF METHANE AND NITROUS OXIDE EMISSIONS FROM AN AGRICULTURAL
LANDSCAPE IN THE MISSISSIPPI DELTA**

2:15 BUSINESS MEETING

THURSDAY EVENING

DIVISION POSTER PRESENTATIONS

Following the Dodgen Lecture

Location: Exhibit Hall C

- 1. RESPONSE OF THE GUT MICROFLORA TO THE ENERGETIC DEMANDS OF LONG-DISTANCE
PASSERINE MIGRATION**
- 2. A FLORA OF THE JOHN C. STENNIS SPACE CENTER IN HANCOCK COUNTY, MISSISSIPPI,
USING SPECIFY 6 SOFTWARE AND DIGITALLY IMAGED COLLECTIONS FROM THE USM
HERBARIUM (USMS)**
- 3. PLETHODON WEBSTERI PHYLOGENY IN MISSISSIPPI**
- 4. DEPARTURE DECISION OF RUBY-THROATED HUMMINGBIRDS (ARCHILOCHUS COLUBRIS)
DURING AUTUMN MIGRATION**

GEOLOGY AND GEOGRAPHY

Thursday, March 6

THURSDAY MORNING

Location: Forrest 2

9:00 NATURAL HISTORY AND THE MISSISSIPPI GEOLOGICAL SURVEY

**9:15 NEWLY RECORDED PREHISTORIC TALLAHATTA QUARTZITE QUARRY SITE DISCOVERED
DURING GEOLOGICAL MAPPING PROJECT IN NESHOPA COUNTY, MISSISSIPPI**

9:30 NATIVE AMERICAN EFFIGY PIPES MADE FROM THE GLENDON LIMESTONE OF MISSISSIPPI

9:45 GLACIALLY FACETED STONE FROM THE PRE-LOESS TERRACE DEPOSITS IN MISSISSIPPI

10:00 LATE OLIGOCENE MAMMALS AND HERPTILES FROM WAYNESBORO, MISSISSIPPI

10:15 BREAK

**10:30 DINOSAURS NESTING NEAR A LOWER COFFEE FORMATION (UPPER CRETACEOUS) MUD
FLAT?**

**10:45 LATE PLEISTOCENE TO HOLOCENE MEANDERING AND LATERAL MIGRATION WITHIN THE
BIG BLACK RIVER, MISSISSIPPI**

11:00 LUNCH

THURSDAY AFTERNOON

Location: Forrest 2

**1:00 TEMPORAL AND STRATIGRAPHIC ANALYSIS OF THE SHTOJ ALLUVIAL FAN, SHKODRA,
ALBANIA**

**1:15 HISTORICAL CHANNEL ADJUSTMENT IN THE PASCAGOULA RIVER BASIN AND ADJACENT
SYSTEMS, SOUTHEAST MISSISSIPPI**



- 1:30 SPATIAL DISTRIBUTION OF SOCIAL VULNERABILITY AND VULNERABLE POPULATIONS IN COASTAL HAZARD INDUCED AT-RISK ZONES
- 1:45 PHOTOOXIDATION OF PYROGENIC ORGANIC CARBON AND CONSEQUENCES FOR CO₂ AND NUTRIENT LOADING TO THE GULF OF MEXICO
- 2:00 REACTIONS IN RIPARIAN SOILS AND THEIR IMPACT ON PHOSPHATE AND NITRATE RETENTION
- 2:15 BUSINESS MEETING

HEALTH SCIENCES

March 6, 2014

THURSDAY MORNING

Location: Lamar 1

- 9:00 SCOLIOSIS AND OTHER LONG-TERM COMPLICATIONS OF RADIATION THERAPY IN PEDIATRIC CANCER PATIENTS WITH CHEST WALL SARCOMAS
- 9:15 COMPARISON OF CONVENTIONAL AND SUSTAINED DELIVERY OF ANTIOXIDANTS TO SUPPRESS THE SK-OV-3 CELL LINE IN OVARIAN CANCER
- 9:30 MEDICATION MEASUREMENTS OF FRED'S PHARMACY CLIENTS
- 9:45 TRAUMA INDUCED INFLAMMATION, SEPSIS AND AGING
- 10:00-12:00 Career Symposium Sponsored by Health Sciences
- 12:00-1:00 PLENARY SPEAKER

THURSDAY EVENING

DIVISION POSTER SESSION 1

Following the Dodgen Lecture

Location: Exhibit Hall C

1. DATA MINING AND VISUALIZATION TECHNIQUES TO SUPPORT EPIDEMIOLOGIC RESEARCH IN ORAL HEALTH
2. COMPARATIVE ANALYSIS OF FLUORESCENT AND NON-FLUORESCENT IMMUNOSTAINING FOR LASER CAPTURE MICRODISSECTION (LCM) OF SINGLE CELLS FROM FROZEN TISSUE SAMPLES
3. ASSESSING THE ROLE OF SUPRA-PHYSIOLOGIC LEVELS OF RETINOIC ACID (ATRA) IN OVALBUMIN AND MOLD-SENSITIZED F344 RAT LUNG TISSUES AND IMPROVEMENT OF RELATED PATHOLOGY BY CITRAL
4. TRICHOMONAS VAGINALIS VIRUS IN TRICHOMONIASIS
5. THE EFFECTS OF LOW LEVEL LASER THERAPY ON ADULT PATIENTS WITH CARPAL TUNNEL SYNDROME: A SYTEMATIC REVIEW
6. RESEARCH STUDY: CANCER PATIENTS' MOTIVATORS
7. TOXICITY OF VIBRIO CHOLERA IN MISSISSIPPI COASTAL WATERS
8. LINKAGE TO CARE AND MEDICATION ADHERENCE IN PERSONS LIVING WITH HIV/AIDS
9. ROLE OF HEPATOMA UP-REGULATED PROTEIN (HURP) IN PROSTATE CANCER RESISTANCE TO CHEMOTHERAPEUTIC DRUGS



10. CONFIRMATION OF SOUTHERN BLOT GENOTYPING IN HBV USING THE POLYMERASE CHAIN REACTION
11. DESIGNER DRUG BATH SALTS: FOR MORE THAN JUST HOT WATER
12. ASSESSING THE PSYCHOMETRIC PROPERTIES OF THE CHRONIC STRESS INVENTORY
13. CONTRASTING DIFFERENCES OF CHRONIC ENDOTHELIN A RECEPTOR (ETA) BLOCKADE DURING THE PROGRESSION OF RENAL INJURY IN TYPE-1 AND TYPE-2 DIABETIC NEPHROPATHY
14. THE USE OF ANTIOXIDANTS TO SUPPRESS THE 3 CELL LINE IN OVARIAN CANCER
15. USEFULNESS OF HEALTH FAIR URINE SCREENING
16. SYNERGISM BETWEEN ESSENTIAL OILS AND AMPICILLIN AGAINST VANCOMYCIN-RESISTANT *ENTEROCOCCUS FAECIUM*
17. THE EFFECTS OF GENISTEIN AND 5-FU ON OVARIAN CANCER CELLS
18. THE EFFECTS OF GENISTEIN AND 5-FU ON CANCER CELLS
19. THE EVALUATION OF THE ANTIMICROBIAL PROPERTIES OF TEA TREE OIL
20. THE EFFECT OF GARLIC ON FADU CELLS
21. MORPHOLOGICAL EFFECTS OF GENISTEIN, THYMOQUINONE, FLUOROURACIL, AND LASER THERAPY ON LARYNGEAL CARCINOMA CELLS
22. THE EFFECTS OF FLAXSEED OIL AND 5-FU ON CAO-V-3
23. THE EFFECTS OF DEMINERALIZED BONE MATRIX PROTEIN AND ESTROGEN ON SERUM MARKERS OF BONE FORMATION IN OSTEOPOROTIC FEMALE RATS
24. THE EFFECTS OF SUSTAINED DELIVERY OF ESTROGEN ON THE GLOMERULI PATHOLOGY
25. EVALUATING EFFECTIVENESS OF LABORATORY TRAINING OF CYTOTECHNOLOGY STUDENTS USING TURNINGPOINT, A PRODUCT OFFERING OF TURNING TECHNOLOGIES, INC.
26. COMPARISON BETWEEN SUSTAINED DELIVERY OF DANAZOL AND ANDROGENS ON THE MORPHOLOGICAL STATUS OF VENTRAL PROSTATE IN ADULT RATS
27. COMPARISON OF THE HEMOCYTOMETER AND THE COUNTLESS AUTOMATED CELL COUNTER
28. MORPHOLOGICAL EVALUATION OF A549 CELLS FOLLOWING THE EXPOSURE TO OMEGA FATTY ACIDS IN CULTURE

HEALTH SCIENCES

March 7, 2014

FRIDAY MORNING

Location: Forrest 2

9:00 BUSINESS MEETING

DIVISION POSTER SESSION II – Base Pair Students

Location: Exhibit Hall C

10:00-11:50

29. SOCIAL BEHAVIORAL PHENOTYPING OF THE C57BL/6 MOUSE



30. THE EFFECTS OF MYCOPHENOLATE MOFETIL ON THE PROGRESSION OF DIABETIC NEPHROPATHY
31. NORMAL PREGNANT T REGS INHIBIT PATHOPHYSIOLOGY ASSOCIATED WITH HYPERTENSION IN RESPONSE TO REDUCED UTERINE PERFUSION PRESSURE (RUPP) IN PREGNANT RATS
32. INHIBITION OF AT1-AAS BY INTERRUPTING LYMPHOCYTE COMMUNICATION OR BY DIRECT BINDING REDUCES BLOOD PRESSURE IN RESPONSE TO PLACENTAL ISCHEMIA OF PREGNANCY; EMPHASIZING THE IMPORTANCE OF NOVEL DRUG DEVELOPMENT IN THE TREATMENT OF PREECLAMPSIA
33. ROLE OF TNF-ALPHA IN THE PROGRESSION OF DIABETIC NEPHROPATHY
34. PROLONG COLD/WARM PRESERVATION TIME MAY HAVE IMPACT ON KIDNEY ALLOGRAFT FUNCTION IN ASSOCIATION WITH EXPRESSION OF ALLOGRAFT INFLAMMATORY FACTOR-1 AFTER TRANSPLANTATION
35. THE EFFECTS OF IGF-1 ON MESENCHYMAL STEM CELLS
36. THE EFFECTS OF LOW LEVEL LASER LIGHT THERAPY ON LPS STIMULATED MACROPHAGE CELLS
37. THE EVALUATION OF CHONDROCYTES ON PCL SCAFFOLDS
38. UNDERSTANDING THE LINK BETWEEN REWARD AND OBESITY
39. THE GEOGRAPHIC DISTRIBUTION OF MAMMOGRAPHY RESOURCES IN MISSISSIPPI
40. MAPPING AND IDENTIFICATION OF A GENETIC MUTATION THAT CAUSES CATARACTS

FRIDAY AFTERNOON

Location: Exhibit Hall A

12:00-2:00 Millsaps-HHMI Undergraduate Scholas Symposium

HISTORY AND PHILOSOPHY OF SCIENCE

March 6, 2014

THURSDAY MORNING

Room: Forrest I

- 9:00 THE UTILITY OF ARISTOTLE'S BIOLOGY IN CURRENT TAXONOMIC PRACTICE**
- 9:30 COMTE DE BUFFON AND CONCEPTS OF BIOLOGICAL SPECIES IN THE EIGHTEENTH CENTURY**
- 10:00 BUSINESS MEETING**
- 10:15 THE METAPHYSICAL INCOMPATIBILITY OF SPECIES AS NATURAL KINDS**
- 10:45 HOMEOSTASIS AND THE COHESION OF BIOLOGICAL SPECIES**

THURSDAY AFTERNOON

Room: Forrest I

- 1:00 BIOLOGICAL ENTITIES AND PERSISTENCE OVER TIME: PERDURING LINEAGES OF ENDURING ORGANISMS**
- 1:30 ALTRUISM AS AN EVOLUTIONARY TOOL**
- 2:00 BREAK**
- 2:15 THEORETICALLY SPEAKING: HUME, SCIENCE, & THE CHARACTER OF THEORETICAL**



TERMS

- 2:45 GLOBAL NAVIGATION SATELLITE SYSTEMS AND REMOTE SENSING LAW: DOES SCIENTIFIC PROGRESS AUGMENT OR THREATEN CONSTITUTIONAL RIGHTS?
- 3:15 AGAINST A GLOBAL RESOURCES TAX

HISTORY AND PHILOSOPHY OF SCIENCE

March 7, 2014

FRIDAY MORNING

Location: Garden Room

- 8:45 JUMPING THE GUN: ELUCIDATING THE EVIDENTIAL GULF BETWEEN CLAIMS OF AUTOMATICITY IN THE BRAIN AND THE ILLUSORY FUNCTION OF CONSCIOUSNESS
- 9:15 CONSCIOUSNESS: A PHYSICAL PROCESS
- 9:45 BREAK

10:00 Sponsored Symposium

A SYMPOSIUM ON SILVA, LANDRETH, AND BICKLE'S ENGINEERING THE NEW REVOLUTION IN NEUROSCIENCE (Oxford University Press, 2013)

MARINE AND ATMOSPHERIC SCIENCES

March 6, 2014

THURSDAY MORNING

Location: Lamar 1

- 10:15 A VIROMIC STUDY ON SERUM COLLECTED FROM WILD *TURSIOPS TRUNCATUS* (BOTTLENOSE DOLPHIN)
- 10:30 THE EFFECTS OF OCEAN ACIDIFICATION ON COASTAL MARINE NON-CALCAREOUS PHYTOPLANKTON
- 10:45 STUDIES OF LARGE-SCALE SURFACE FLUXES, VERTICAL MOTIONS, INTENSITY CHANGE AND TRACK PREDICTION ASSOCIATED WITH LAND FALLING HURRICANE KATRINA
- 11:00 STUDIES OF ATLANTIC TROPICAL STORM/HURRICANE DEVELOPMENT AND RESPONSES TO CONDITIONS IN EQUATORIAL PACIFIC OCEAN
- 11:15 VARIATIONS OF TROPICAL CYCLOGENESIS FACTORS OVER THE PAST 10,000 YEARS
- 11:30 A STUDY OF LARGE-SCALE VERTICAL MOTIONS, PROCESSES AND INTENSITY CHANGE ASSOCIATED WITH LAND FALLING TROPICAL STORM LEE OVER THE GULF OF MEXICO USING REMOTE SENSING AND SATELLITE DATA
- 11:45 CAN THEY BE HEARD? A SPATIAL STATISTIC ANALYSIS OF TORNADO SIRENS ACROSS THE STATE OF MISSISSIPPI
- 12:00 BUSINESS MEETING AND LUNCH BREAK
- 1:00 INFLUENCES ON THE DEVELOPMENT OF HYPOXIA IN MISSISSIPPI BIGHT WATERS
- 1:15 NUMERICAL SIMULATION OF ATMOSPHERIC MERCURY IN MISSISSIPPI
- 1:30 DISSOLVED METHANE CONCENTRATIONS IN MISSISSIPPI AND LOUISIANA COASTAL AND ESTUARINE WATERS



- 1:45 ASSEMBLAGE COMPARISONS OF LIVING BENTHIC FORAMINIFERA WITHIN BATHYAL OILED AND UN-OILED SITES OF THE NORTHEASTERN GULF OF MEXICO
- 2:00 A MARINE INFECTIOUS DISEASE MODEL
- 2:15 A STUDY OF REGIONAL AIR QUALITY TRENDS OVER GULFPORT REGION FOR ASSOCIATION WITH METEOROLOGICAL PARAMETERS, AND HEALTH IMPACTS

MATHEMATICS, COMPUTER SCIENCE AND STATISTICS

March 6, 2014

THURSDAY EVENING

DIVISION POSTER PRESENTATIONS

Following the Dodgen Lecture

Location: Exhibit Hall C

1. ADDING FUNCTIONALITY TO FREEMAT: IMPLEMENTING *fzero* FUNCTION TO FIND ROOTS OF NONLINEAR FUNCTIONS
2. ADDING FUNCTIONALITY TO FREEMAT: IMPLEMENTING *compan* FUNCTION TO GENERATE CPMPANION MATRX OF A GIVEN POLYNOMIAL

MATHEMATICS, COMPUTER SCIENCE AND STATISTICS

March 7, 2014

FRIDAY MORNING

Location: Lamar 2

- 8:30 WELCOME
- 8:35 COBWEB AND BIFURCATION DIAGRAMS
- 9:00 FRACTAL DIMENSION BASED DETECTION OF ARCHITECTURAL DISTORTION ANOMALIES IN MAMMOGRAPHY
- 9:15 TESTING STATISTICAL HYPOTHESIS RELEVANT TO PARAMETERS OF INVERSE HYPERGEOMETRIC DISTRIBUTION
- 9:30 IMPACT OF HEARING AID USE ON SPEECH PERCEPTION- IN- NOISE AND SELF- PERCEIVED OUTCOMES IN INDIVIDUALS WITH UNILATERAL SENSORY HEARING IMPAIRMENTS
- 9:45 AN AUTOMATED MEDICATION COMPLIANCE ASSISTANT
- 10:00 BIG DATA FOR DEFENSE AND HOMELAND SECURITY: DEFINITION, APPLICATIONS, CHALLENGES AND OPPORTUNITIES
- 10:15 BUSINESS MEETING
- 10:30 BREAK
- 10:45 ESTABLISHING A STUDENT-CENTERED OPEN SOURCE SOFTWARE COMMUNITY
- 11:00 ANTIGENBRIDGES: AN ONLINE RESOURCE TO QUANTIFY AND VISUALIZE INFLUENZA ANTIGENIC DISTANCE USING SEQUENCE INFORMATION
- 11:15 BIGDATA X-INFORMATICS MOOC: RESEARCH INTO INCREASING ITS EFFICACY
- 11:30 USING EXCEL IN THE HEALTH SCIENCES DISCIPLINES EFFICIENTLY AND EFFECTIVELY
- 11:45 COMPUTATIONAL STUDIES ON SELECTED NANOMATERIALS: PROPERTIES AND INTERACTIONS



- 12:00 USING GEOMETER'S SKETCHPAD TO DRAW 2D FRACTALS
12:15 ITERATING A LOGARITHM
12:30 APPROXIMATION OF SOLUTIONS TO DIFFERENTIAL EQUATIONS: 1D TO 2D PROBLEMS
12:45 CREATING EMERGENCY MANAGEMENT MOBILE APPS USING MIT APP INVENTOR
1:00 TOWARD A FRAMEWORK FOR DIVERSE, DISTRIBUTED INTERACTIVE SYSTEMS

PHYSICS AND ENGINEERING

March 6, 2014

THURSDAY MORNING

Location: Lamar 2

- 8:30 STUDY OF HYDROGEN MICROSTRUCTURE IN AMORPHOUS SILICON: AN AUGMENTED SPACE APPROACH
8:45 DUAL FUNCTION SERS ACTIVE NANOPARTICLE PLATFORM FOR MELAMINE SENSING
9:00 DIGITAL HOLOGRAPHIC MICROSCOPY TECHNIQUE FOR PARTICLE IMAGING AND CHARACTERIZATION
9:15 ADSORPTION OF NITROGEN ON GRAPHENE: A FIRST-PRINCIPLES STUDY
9:30 BREAK
9:45 EXPERIMENTAL VERIFICATION OF SIMULATED TEMPERATURE-TIME PROFILES ASSOCIATED WITH ACOUSTIC RADIATION FORCE IMPULSE IMAGING PUSH PULSES IN TISSUE-MIMICKING PHANTOMS
10:00 THEORETICAL INVESTIGATION OF ACOUSTIC-GROUND AND WIND-GROUND COUPLING
10:15 ACOUSTO-ELECTRIC IMPEDANCE OF PERIODICALLY POLED LiNbO₃ WAFER
10:30 LAMB WAVE PROPAGATION IN ELECTRONIC MATERIAL PLATES
10:45 BREAK
11:00 A SIMPLIFIED METHOD TO ESTIMATE FLOOD DEPTH FOR YAZOO RIVER
11:15 EMERGENCY MANAGEMENT: SHELTER-IN-PLACE
11:30 EARTHQUAKE PREPAREDNESS AT MISSISSIPPI HBCU (HISTORICALLY BLACK COLLEGES AND UNIVERSITIES) CAMPUSES
11:45 FINDING THE ELASTIC BOTTOM PARAMETERS OF AN ELASTIC SEAFLOOR USING EQUIVALENT FLUIDS
12:00 BUSINESS MEETING AND LUNCH BREAK

THURSDAY AFTERNOON

Location: Garden Room

- 1:00 EXPLORING NEW PHYSICS IN FLAVOR EXPERIMENTS
1:30 TAU NEUTRINO AS A PROBE OF NONSTANDARD INTERACTION
1:45 CP VIOLATION PREDICTED AT LHC FOR BSM
2:00 COSMOLOGICAL TEST OF THE UNIMODULAR GRAVITY
2:15 EFFECTS OF GENIPIN ON DECELLULARIZED PORCINE CARTILAGE



- 2:30 USE OF FIBER LOOP RINGDOWN (FLRD) SENSOR FOR HEAVY ELEMENTS DETECTION IN WATER
- 2:45 FIRST-PRINCIPLES CALCULATIONS OF MAGNETIC PROPERTIES OF MnBi DOPED WITH Co
- 3:00 EXPERIMENTAL INVESTIGATION OF STARTUP BEHAVIOR OF FLAT-PLATE OSCILLATING HEAT PIPES

THURSDAY EVENING

DIVISION POSTER PRESENTATIONS

Following the Dodgen Lecture

Location: Exhibit Hall C

1. SURFACE PREPARATION FOR IMPROVED MOLYBDENUM DISULFIDE NANOELECTRONICS
2. LORENTZ COVARIANCE OF THE ORDERED QUANTUM VACUUM
3. DETERMINING THE PHOTOMETRIC PRECISION OF THE 0.9M CTIO SMARTS TELESCOPE
4. MISSISSIPPI STATE AXION SEARCH
5. MEASUREMENT OF PARTICLE SIZE AND CHARGE DISTRIBUTIONS OF ASTHMA DRY POWDER INHALER AEROSOLS
6. STUDY OF MASS DISTRIBUTION OF MATTER IN GRAVITATIONAL LENSING
7. NEW PRODUCT DEVELOPMENT CHALLENGES FOR HOMELAND SECURITY PROJECTS

PHYSICS AND ENGINEERING

Friday, March 7

FRIDAY MORNING

Location: Lamar 2

- 8:30 STRUCTURES OF PROTEINS AND PEPTIDES ASSEMBLY VIA HIERARCHICAL COARSE-GRAINED MODEL
- 9:00 NUCLEAR LANDSCAPE AND DRIP LINES IN COVARIANT DENSITY FUNCTIONAL THEORY
- 9:15 REPORTING ON THE A=74 CHAIN IN THE BETA DECAY OF Z=29-31
- 9:30 NUCLEAR THERMAL PROPULSION SYSTEMS: EVALUATING PAST AND PRESENT EFFLUENT TREATMENT PROCESSES IN TEST FACILITIES
- 9:45 A REVIEW OF MARINE ACOUSTICS PROJECTS UNDERTAKEN BY THE LITTORAL ACOUSTIC DEMONSTRATION CENTER
- 10:00 BREAK
- 10:15 SEARCH FOR THE MYSTERIOUS DARK MATTER
- 10:30 SEARCH FOR THE MYSTERIOUS DARK ENERGY
- 10:45 EFFECT OF GLOBAL EXPANSION ON GRAVITATIONAL LENSING

PSYCHOLOGY AND SOCIAL SCIENCES

March 6, 2014

THURSDAY MORNING

Location: Garden Room

- 9:00 OBESITY IN HIGH SCHOOL STUDENTS IN MISSISSIPPI



- 9:15 **WEIGHT GAIN AND TRAIT ANGER: IS THERE A LINK?**
- 9:30 **EXAMINING RELATIONSHIPS BETWEEN HEALTH-PROMOTING BEHAVIORAL LIFESTYLES AND PSYCHOSOCIAL FACTORS AMONG COLLEGE STUDENTS**
- 9:45 **BREAK**
- 10:15 **RATES OF TWIN BIRTHS IN A CAPTIVE BUSHBABY COLONY**
- 10:30 **RELATIONSHIP BETWEEN SEASONAL CORTISOL AND BEHAVIOR IN CHIMPANZEES**
- 10:45 **EFFECTS OF QUESTION ORDER ON EXAM PERFORMANCE**
- 11:00 **BREAK**
- 11:15 **STUDY-HABITS AMONG AFRICAN AMERICAN COLLEGE STUDENTS**
- 11:30 **KNOWLEDGE OF GOVERNMENTAL CONSPIRACY AND ITS EFFECTS ON BELIEF**
- 11:45 **LUNCH BREAK**

THURSDAY AFTERNOON

Location: Garden Room

- 1:00 **THE EFFECTIVENESS OF COPING WITH SCHOOL-FAMILY CONFLICTS AMONG AFRICAN-AMERICAN COLLEGE STUDENTS**
- 1:15 **ATHLETIC COPING SKILLS AND PERSONALITY DIFFERENCE AMONG COLLEGE STUDENTS**
- 1:30 **GENDER DIFFERENCES IN EMPATHY AMONG AFRICAN AMERICAN COLLEGE STUDENTS**
- 1:45 **RELATIONSHIP BETWEEN POSTTRAUMATIC STRESS DISORDER SYMPTOMATOLOGY AND ALCOHOL USE IN A CIVILIAN AND MILITARY POPULATION AT AN HISTORICALLY BLACK UNIVERSITY**
- 2:00 **PERCEPTION OF RESILIENCE TO DISASTER OF THE COASTAL COMMUNITIES OF MISSISSIPPI**
- 2:15 **BUSINESS MEETING**

THURSDAY EVENING

DIVISION POSTER PRESENTATIONS

Following the Dodgen Lecture

Location: Exhibit Hall C

1. **EFFECTS OF A SHORT-TERM RECEPTIVE MUSIC-BASED INTERVENTION ON ADULT PARALYZED PATIENTS**
2. **SOCIO-PSYCHOLOGICAL FACTORS ASSOCIATED WITH OBESITY AMONGST AFRICAN AMERICAN WOMEN**

PSYCHOLOGY AND SOCIAL SCIENCES

March 7, 2014

FRIDAY MORNING

Location: Garden Room

- 10:00 **A SYMPOSIUM ON SILVA, LANDRETH, AND BICKLE'S ENGINEERING THE NEW REVOLUTION IN NEUROSCIENCE (Oxford University Press, 2013)**



*This symposium is co-sponsored with **History and Philosophy of Science** (Kenneth Curry is chairman).*

SCIENCE EDUCATION

March 6, 2014

THURSDAY MORNING

Location: Lakeview 2

- 9:00 INTRODUCTION AND OVERVIEW OF SESSION**
- 9:15 EXPERIMENTATION OF THE IMPACT ON SOCIAL MEDIA ON THE COAST**
- 9:30 A PUBLIC INFORMATION ON VIBRIO CHOLERA, A PATHOGENIC BACTERIA IN OYSTERS**
- 9:45 UNDERSTANDING THE DELIVERED CURRICULUM AT A RESIDENTIAL ENVIRONMENTAL LEARNING CENTER**
- 10:00 REDEFINING THE ROLE OF THE SCIENCE EDUCATOR IN ENVIRONMENTAL EDUCATION**
- 10:15 AN ALIGNMENT OF THE NEXT GENERATION SCIENCE STANDARDS TO A HISTORICALLY SIGNIFICANT CURRICULUM**
- 10:30 BREAK**
- 10:45 CRITICAL THINKING IN INTELLECTUALLY GIFTED STUDENTS**
- 11:00 THE DEMAND FOR ENGINEERS AND WHY IT SHOULD BE ADDRESSED**
- 11:15 CHEMISTRY SAFETY PROTOCOL: A VIDEO PRESENTATION**
- 11:30 PASCAGOULA WATERSHED PROJECT**
- 11:45 ARGUING SCIENCE: USING LEGITIMATE SCIENTIFIC CONTROVERSIES TO ENGAGE STUDENTS IN DISCOURSE AND THE NATURE OF SCIENCE**
- 12:00 BUSINESS MEETING**

THURSDAY AFTERNOON

Location: Lakeview 2

- 1:00 HUMAN POPULATION GROWTH AND EXTINCTION OF LIVING SPECIES**
- 1:15 COLLECTING GLOBE DATA IN THE PASCAGOULA WATERSHED**
- 1:30 COLLEGE STUDENTS' PERCEPTIONS OF THE RELATIVE IMPORTANCE OF EIGHT OF THE EARTH'S KEY NATURAL RESOURCE CATEGORIES**
- 1:45 EFFECT OF THE FLIPPED CLASSROOM ON ACHIEVEMENT IN AN INTRODUCTORY COLLEGE PHYSICS COURSE**
- 2:00 PERCEPTIONS OF ART AND GRAPHIC REPRESENTATION IN COLLEGE SCIENCE CLASSROOMS**
- 2:15 OVERVIEW OF POSTER SESSION**

THURSDAY EVENING

DIVISION POSTER PRESENTATIONS

Following the Dodgen Lecture

Location: Exhibit Hall C



1. CONSUMER PREFERENCES OF ORGANIC VS. CONVENTIONAL FOODS IN THE MISSISSIPPI GULF COAST REGION
2. THE ABILITY TO IDENTIFY HAND-WRITTEN FORGERY: INSTRUCTION OF GIFTED STUDENTS AT MAGNOLIA PARK ELEMENTARY SCHOOL
3. TERASCAN CURRICULUM DEVELOPMENT AND INTEGRATION OF SEASPACE TECHNOLOGY INTO THE CLASSROOM
4. GULF COAST RESEARCH LABORATORY: A COMPENDIUM OF GROWTH AND CHANGE AT TWO CAMPUSES

ZOOLOGY AND ENTOMOLOGY

March 6, 2014

THURSDAY MORNING

Location: Executive Conference Room

- 9:00** ASSESSMENT OF WATER QUALITY OF TWO LOTIC BODIES OF WATER IN JEFFERSON COUNTY, MISSISSIPPI
- 9:15** INVESTIGATING THE WATER QUALITY OF FOUR LARGE MISSISSIPPI LAKES AND GRAND BAY, MS-AL GULFCOAST
- 9:30** STATE OF WATER QUALITY OF LAKES GRENADA, ENID, SARDIS, AND ROSS BARNETT RESERVOIR IN MISSISSIPPI, USA
- 9:45** ALGAL COMMUNITY STRUCTURE IN FOUR MAJOR MISSISSIPPI LAKES AND IN GRAND BAY, MISSISSIPPI-ALABAMA GULF COAST
- 10:00** BREAK
- 10:15** STUDIES ON THE PARASITES OF THE COCKROACH, *Periplaneta americana* (Insecta:Blattide) IN LAGOS, NIGERIA
- 10:30** THE EFFECTS OF EMERGENT CONTAINER MOSQUITOES ON SURROUNDING PREDATOR COMMUNITIES
- 10:45** FITNESS LINKAGES ACROSS DIFFERENT LIFE STAGES: CONCLUSIONS FROM TEMPERATURE IMPACTS ON FECUNDITY AND SURVIVAL IN A CONTAINER-INHABITING MOSQUITO
- 11:00** DIFFERENCES IN CONSUMPTION RATES BETWEEN LARVAL AND ADULT *LACCOPHILUS FASCIATUS RUFUS* (COLEOPTERA: DYTICIDAE) ON LARVAL *CULEX QUINQUEFASCIATUS* (DIPTERA: CULICIDAE)
- 11:15** A COMPARATIVE STUDY ON THE HABITAT PROFILE OF THE LOWER MISSISSIPPI RIVER IN PORT GIBSON AREA AND THE POND NEAR THE FRONT GATE OF ALCORN STATE UNIVERSITY (ASU) CAMPUS DURING THE FALL OF 2014
- 11:30** BUSINESS MEETING
- 12:00** LUNCH BREAK

THURSDAY AFTERNOON

DIVISION POSTER PRESENTATIONS

Location: Exhibit Hall C

1:00-2:45



1. **TOXICOLOGICAL EFFECTS OF INORGANIC NITROGEN POLLUTION ON AQUATIC ECOSYSTEMS**
2. **COMPREHENSIVE VIEW OF WATER QUALITY OF ROSS BARNETT RESERVOIR, MS, USA**
3. **APPLICATION OF MOLECULAR PEDIGREES TO STUDIES OF VARIANCE IN REPRODUCTIVE SUCCESS AMONG CAPTIVE SPOTTED SEATROUT BRED FOR STOCK ENHANCEMENT**
4. **COMPREHENSIVE VIEW OF WATER QUALITY OF LAKE ENID, MISSISSIPPI, USA**
5. **MOLECULAR DETECTION OF SPOTTED FEVER GROUP RICKETTSIA IN IXODID TICKS FROM PAKISTAN**
6. **WATER QUALITY AND HARMFUL ALGAL BLOOM ANALYSIS OF LAKE SARDIS, MISSISSIPPI, USA**
7. **INVESTIGATION OF THE WATER QUALITY OF LAKE GRENADA, MS, USA**



NOTE PAGE

AGRICULTURE AND PLANT SCIENCE

Chair: William Evans,
Mississippi State University

Vice-Chair: Melinda Butler,
University of Southern Mississippi

March 6, 2014

THURSDAY EVENING

POSTER SESSION

Following Dodgen Lecture

P1.01

EFFECTS OF CADMIUM ON THE PRODUCTION OF PHYTOCHELATIN BY TRITICUM AESTIVUM DURING PHYTOEXTRACTION

Michael Collins, Tasha Norwood, Robert Robinson,
Brianna Burton, Gloria Miller, Maria Begonia,
Gregorio Begonia

Jackson State University, Jackson, MS, USA

Phytochelatins [PCs] are small metal-binding peptides that are induced to accumulate in plants as a response to metal toxicity during phytoextraction. We hypothesized that the production of total soluble thiols as indirect measures of PCs in roots will increase with time in plants grown in soil with cadmium (Cd)- and chelate amended soils. We also hypothesized that low levels of glutathione will be produced as a consequence of metal and chelate exposure. This study was therefore conducted to further elucidate the tolerance mechanism of a previously determined Cd hyperaccumulator plant species. Wheat (*Triticum aestivum* L. cv TAM-109) seeds were planted in 600 mL plastic tubes containing topsoil and peat (2:1, v:v) spiked with two levels of (0, 500 mg Cd/ kg dry soil) of cadmium nitrate. At six, eight and ten weeks after emergence, aqueous solutions of (250, 500 mg/kg dry soil, 1:1 ratio with the metal concentration of [ethylene bis (oxyethylene nitrilo)] tetraacetic acid (EGTA) were applied to the root zone. Plants were harvested at 5 days after chelate addition to coincide with the duration of maximum Cd availability as determined from the chelate – induced metal solubility study. During each harvest period, PC analysis was also carried out indirectly by analyzing concentrations of total acid-soluble thiols, total glutathione and oxidized glutathione. Results revealed that wheat was tolerant to treatment combinations of Cd and chelate as shown by the root and shoot biomass and metal uptake. There was an increase in the production of total soluble thiols with time in roots and low levels of glutathione. This study demonstrated that increased production of PC exhibited by Cd-exposed wheat partially explains the tolerance mechanism of this species against cadmium toxicity. [Support provided by the National Aeronautics and Space Administration through the University of Mississippi under the terms of Agreement No. NNX10AJ79H to JSU].

P1.02

EFFECTS OF HEAT AND ACID PRETREATMENTS ON SUGAR PRODUCTION FROM THE DEGRADATION OF PINE SAWDUST BY AN UNKNOWN FUNGAL ISOLATE AND TRICHODERMA REESEI

Tasha Norwood, Robert Robinson, Brianna Burton,
Michael Collins, Gloria Miller, Maria Begonia,
Gregorio Begonia

Jackson State University, Jackson, MS, USA

The filamentous fungus *Trichoderma reesei* is well known as an efficient producer of cellulases and is the main industrial source of cellulases and hemicellulases used to depolymerize biomass to simple sugars. The simple sugars are then converted to chemical intermediates and biofuels, such as ethanol. This study was conducted to analyze the effects of various pretreatments on the ability of *Trichoderma reesei* (ATCC # 26921), and an unknown fungal isolate in the degradation of lignocellulosic biomass of Southern pine sawdust under aerobic and anaerobic conditions. Samples of Southern pine sawdust were either autoclaved or treated with 25% H₂SO₄. Liquid medium was prepared and added to each of 48 Erlenmeyer flasks. *Trichoderma reesei*, and the unknown fungal isolate were inoculated into each flask and left to incubate for 0, 6, 9, 13, 16, and 22 days under aerobic and anaerobic conditions. At specific time intervals samples were analyzed to determine the concentration of glucose present using the Dinitrosalicylic Acid (DNS) method. The results of this study revealed that *Trichoderma reesei*, produced more reducing sugar compared to the unknown fungal isolate. Additionally, it was found that more reducing sugar was produced under aerobic conditions as compared to anaerobic conditions. We concluded that pretreatment methods may play significant roles in the degradation of lignocellulosic biomass of Southern pine sawdust and that the rate of degradation may depend on aerobic and anaerobic conditions. [Support provided by the National Aeronautics and Space Administration through the University of Mississippi under the terms of Agreement No. NNX10AJ79H to JSU].

P1.03

SUGAR PRODUCTION FROM DEGRADATION OF LIGNOCELLULOSIC MATERIAL BY PYCNOPORUS CINNABARINUS UNDER AEROBIC AND ANAEROBIC CONDITIONS

Brianna Burton, Tasha Norwood, Robert Robinson,
Michael Collins, Rose Kishinhi, Gloria Miller, Maria Begonia,
Gregorio Begonia

Jackson State University, Jackson, MS, USA

White rot fungi (which cause white rot in wood) are believed to be the most effective lignin-degrading microbes in nature and are the most promising microorganisms used for biological pretreatment because of their abilities to selectively degrade. This study was conducted to analyze the effects of various pretreatments on the ability of *Pycnoporus cinnabarinus* (ATCC # 48748), and an unknown bacterial isolate in the degradation of lignocellulosic biomass of Southern pine sawdust under aerobic and anaerobic conditions. Samples of Southern pine sawdust

were either autoclaved or treated with 25% H₂SO₄. Liquid medium was prepared and added to each of 48 Erlenmeyer flasks. Either, *Pycnoporus cinnabarinus*, or an unknown bacterial isolate was inoculated into each flask and left to incubate for 0, 6, 9, 13, 16, and 22 days under aerobic and anaerobic conditions. Samples were analyzed to determine the concentration of glucose present using the Dinitrosalicylic Acid (DNS) method. Our results revealed that samples that were pretreated with acid or heat, and *P. cinnabarinus* under aerobic conditions generally produced more sugar than the unknown bacterial isolate across all days and all treatments. Our results support the position that pre-treatment improves the formation of sugars or the ability to subsequently form sugars by the basidiomycete, *P. cinnabarinus*, [Support provided by the National Aeronautics and Space Administration through the University of Mississippi under the terms of Agreement No. NNX10AJ79H to JSU].

P1.04

PHYTOEXTRACTION OF CADMIUM-CONTAMINATED SOIL BY IPOMOEA LACUNOSA: EFFECTS OF CADMIUM, CHELATES AND PLANT GROWTH STAGE

Robert Robinson, Michael Collins, Tasha Norwood, Brianna Burton, Gloria Miller, Maria Begonia, Gregorio Begonia

Jackson State University, Jackson, MS, USA

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

Mississippi under the terms of Agreement No. NNX10AJ79H to JSU].

P1.05

PHENOLIC AND ANTHOCYANIN COMPOUND CONCENTRATIONS IN BLUEBERRY (*VACCINIUM CORYMBOSUM*) CULTIVARS

Ashten Rea¹, Donna Marshall²

¹William Carey University, Hattiesburg, MS, USA, ²USDA-ARS Poplarville, MS USA

Phenolic and anthocyanin overall compound concentrations were analyzed in 18 blueberry cultivars and 1 blueberry selection from Poplarville, MS. The selections were to compare with phenolic and anthocyanin concentrations of 1 corresponding blueberry selection from Crystal Springs, MS, in 2011, as well as serve for continuation of the blueberry analyses from the previous year, for comparison with Crystal Springs and Poplarville 2008 and 2010 selections. Analysis was carried out on blueberry juice partitions extracted from the blueberry fruit skin, seeds and pulp. The major phenolics in the extracted juice were identified by their characteristic spectra. Quantification was made by calibration curves of external standards for both the phenolics and anthocyanin. Total anthocyanins and phenolics were observed in all varieties. The highest levels of phenolics were observed in the Onslow at 251.8 while the lowest levels were observed in Baldwin at 81.2. For anthocyanins the highest value included Maru at 30.7 and the lowest with Baldwin at 0.42. The Blueberries have special interest due to their high antioxidant capacity. Research shows that phenolic components within blueberries may have multiple health benefits, while the anthocyanins may have health benefits that are independent of or in addition to the blueberry's antioxidant effects.

P1.06

EFFECT OF SUN AND SHADE ON SOYBEAN PLANT GROWTH AND PHYSIOLOGY UNDER POTASSIUM FERTILIZED AND NON FERTILIZED CONDITIONS

Caitlin Garrison, Manju Pande

Mississippi Valley State University, Itta Bena, MS, USA

The effect of sunlight and low light intensity due to shading in potassium (K) applied soybean plants were evaluated in a greenhouse experiment to determine if the plants fertilized with K will have preferable growth in shade compared to the non fertilized plants. The experiment was divided in 4 groups of 6 replicates; group 1 as control, and group 2 with 1.75% foliar K Treatment, under full sun. The 3rd and 4th groups were placed under the shade as control and K treated pots respectively. The results were analyzed on the basis of morphological assessment and physiological parameters. Plant height measured in the first week (wk) were taller under the shade (21.75cm) compared to plants in the sun (16.35cm), whereas at the end of two wks the plants in the sun increased in height (35.46cms) comparable to the shade plants (35.36cms). Chlorophyll concentration in the leaves of the plants in sun (wk2:32.53; wk 5: 38.6) was higher than in shade (wk 2:28.78; wk 5: 35.57) respectively. Application of K did not show any changes in the chlorophyll

measurements. Stomatal conductance measured higher in plants in sun before K treatment [wk 1:14.55 mmol/(m²-s); wk 2: 10.5mmol/(m²-s)] compared to the plants in shade [wk 1: 9.28mmol/(m²-s); wk 2:7.91mmol/(m²-s)]. Stomatal conductance increased in the K treated plants [wk 5:11.67mmol/(m²-s)] in the sun compared to control [wk 5:18.55mmol/(m²-s)], however, no clear trend was observed in the shade measurements. We conclude that potassium treatment of soybean plants grown in shade increased stomatal conductance transiently.

P1.07

CHROMOSOME SUBSTITUTION LINES: VALUABLE GENETIC RESOURCES TO INTROGRESS USEFUL GENES FROM WILD SPECIES INTO UPLAND COTTON.

Sukumar Saha¹, Jixiang Wu², Johnie N. Jenkins¹, Jack C. McCarty¹, David M. Stelly³, and B.T. Campbell⁴

¹USDA-ARS, Mississippi State, MS, USA, ²Plant Science Department, South Dakota State University, Brookings, SD, USA, ³Department of Soil and Crop Sciences, Texas A&M University, College Station, TX, USA, ⁴USDA-ARS Coastal Plains Soil, Water, and Plant Research Center, USA

Two important impediments in the genetic improvement of Upland cotton are: 1) under-utilization of diverse germplasm and 2) insufficient information about genes controlling important traits. The primary gene pool for cotton includes wild types of *G. hirsutum* L., as well as the other four 2n=52 species of *Gossypium* (*G. barbadense*, *G. mustelinum*, *G. tomentosum* and *G. darwinii*) all of which are readily hybridized with AD1 genomes (*G. hirsutum* L.) and thus share a common gross chromosome structure. However, previous interspecific introgression efforts using conventional breeding methods have had limited success, indicating considerable genetic conflicts in the hybrids preclude facile recovery of genotypes, useful for genetic improvement of Upland cotton (*G. hirsutum*). To overcome these challenges, we are developing alien chromosome substitution (CS) lines from *G. barbadense*, *G. mustelinum* and *G. tomentosum*. We have developed several CS lines from *G. barbadense* (CS=B), and *G. tomentosum* (CS-T) respectively based on cytological and molecular analysis. Here we report on the chromosomal effects on agronomic and fiber traits, based on a partial diallel crossing program among six CS-B lines (CS-B01, CS-B04, CS-B07, CS-B08Lo, CS-B15sh, CS-B18), six CS-T lines (CS-T01, CS-T04, CS-T07, CS-T08Lo, CS-T15sh, CS-T18), and TM-1. Five of six CS-B lines and two of six CS-T lines had significant additive genetic effects on lint percentage indicating the respective substituted alien chromosome carried alien alleles with potential to improve lint percentage in Upland cotton. Several of the chromosome substitution lines carried alien alleles with positive additive genetic effects for improved fiber length and strength. The near-isogenic nature of the chromosome substitution lines to the common parent TM-1 provided a unique opportunity to use specific mating designs among the CS lines of interest to create different chromosome specific recombinant lines useful for fiber traits and developing high-resolution molecular map of QTLs. Results suggested that chromosome substitution provided a tool that could be useful for targeted exploitation of the beneficial alleles from wild and unadapted germplasm in the genetic

improvement of Upland cotton.

March 7, 2014

FRIDAY MORNING

Forrest 1

O1.01

9:00 EFFECT OF LONG-TERM ORGANIC FARMING ON BIOMASS DEVELOPMENT AND SOIL PHYSICO-CHEMICAL CHANGES IN A MUSCADINE VINEYARD

Girish Kumar¹, Juan Silva², Frank Matta²

¹Alcorn State University, Lorman, MS, USA, ²Mississippi State University, Mississippi State, MS, USA

Environmental and health problems made organic farming the fastest growing sector in the field of agriculture. Muscadine grapes (*Vitis rotundifolia*) are native to the southeastern United States. In our 13-year experiment on muscadine grapes, variety 'Summit' was grown at 6.08m x 6.08m spacing on Memphis silt loam soil (Typic, silty, mixed, thermic Hapludalph) with fresh animal and forest waste. Three treatments of organic manures (cow-C; poultry-P; cow+poultry-CP) with pine mulch were applied in basins around each plant in a completely randomized design. A control treatment received regular inorganic fertilizers and traditional cultural practices. Leaf area index, percent canopy cover, stem diameter, and yield were higher in organic plants. No coliforms, yeasts and molds, or any other pathogenic organisms from organic manures were found on the grapes. Soil compaction was always higher in the control and it was lower in organic treatments. Concentrations of nitrate-N and P were higher in the surface soil, but there was no trend in N or P enrichment in lower layers of the soil. Fruit yield of organic plants continued to be higher and lowest in the control. This 13-year study suggests that the controlled application of animal waste with plant residues in basins of muscadine grape vines can be an agronomically and environmentally sound practice.

O1.02

9:15 EFFECT OF TEMPERATURE ON INFECTION OF BOTRYOSPHERA STEM BLIGHT IN SOUTHERN BLUEBERRIES

Barbara Smith², Melinda Miller-Butler¹

¹University of Southern Mississippi, Hattiesburg, MS, USA,

²USDA-ARS Poplarville, MS, USA

Botryosphaeria stem blight, sometimes called dieback, is a destructive disease of rabbiteye and highbush blueberries in the southeastern United States. Traditionally this disease has been attributed to the fungus *Botryosphaeria dothidea*, but more recently other species in the *Botryosphaeriaceae* have also been identified as causal pathogens of stem blight. We tested the effect of temperature on the pathogenicity of three species of *Botryosphaeriaceae*, *B. dothidea*, *Diplodia seriata*, and *Neofusicoccum ribis*, using a detached stem assay. Partially-hardened stems were wounded, inoculated with a mycelial block from 14 to 28-day-old cultures of the pathogens, and incubated for 6-21 days at 10, 15, 20, 25, 30, and 35 oC. Lesion length was measured, and isolations were made from five locations above and below the inoculation point on each stem. Stems

inoculated with *B. dothidea* developed longer lesions at a faster developmental rate and shorter incubation time than stems inoculated with either of the other two pathogens. Stems incubated at higher temperatures produced the longest lesions with the fastest developmental rate compared to stems incubated at lower temperatures. The highest recovery percentage among the three inoculated species was exhibited by *B. dothidea*. On average, the southern highbush cultivar 'Star', exhibited the longest lesions, the fastest developmental rate, and the shortest incubation time. Understanding the host/pathogen relationship between blueberry and these pathogenic species is necessary to develop effective control strategies for stem blight.

01.03

9:30 RHIZOBACTERIAL COMMUNITY STRUCTURE AND FUNCTION IN A DRYLAND AGROECOSYSTEM

Mavrodi, D.¹, Mavrodi, O.^{1,2}, Bonsall, R.², Paulsen, I.T.³, Weller, D.K.⁴, and Thomashow, L.S.⁴

¹ Department of Biological Sciences, The University of Southern Mississippi, Hattiesburg, MS, USA, ² Department of Plant Pathology, Washington State University, Pullman, WA, USA, ³ Department of Chemistry and Biomolecular Sciences, Macquarie University, Sydney, Australia, ⁴ Agricultural Research Service, US Department of Agriculture, Pullman, WA, USA

We recently discovered large populations of antibiotic-producing (*Phz*⁺) *Pseudomonas* bacteria on the roots of wheat grown over a million hectares of the Columbia Plateau. These bacteria produce nanomolar quantities of the antibiotic phenazine-1-carboxylic acid (PCA) in the wheat rhizosphere and provide natural protection of wheat from soilborne pathogens. Among surprising results of our studies were the arid conditions (<165 mm annual precipitation), under which *Phz*⁺ bacteria flourished in the rhizosphere of wheat. Significantly, the populations were low or undetectable in irrigated wheat fields leading us to hypothesize that *Phz*⁺ bacteria are uniquely adapted to cereals grown in low precipitation areas. To test this hypothesis, we established adjacent irrigated and non-irrigated wheat plots at Lind, WA, and monitored population dynamics of *Phz*⁺ bacteria and rhizosphere concentrations of PCA for a period of three years. Results of this study revealed that irrigation leads to the decline in populations and frequencies of indigenous *Phz*⁺ rhizobacteria. PCA recovered from roots followed the bacterial population trend. Our findings provide direct evidence that soil moisture (or the absence thereof) is a major factor driving the development of beneficial antibiotic-producing rhizobacteria. We are now carrying out a 16S rDNA-based profiling of microbial communities associated with dryland and irrigated winter wheat. The expected results will provide insight into the major phylogenetic groups represented in each community and enable us to determine whether these differences can be correlated with soil moisture and/or wheat growth stage.

9:45 BUSINESS MEETING

CELLULAR, MOLECULAR AND DEVELOPMENTAL BIOLOGY

Chair: Ghanshyam Heda,
Mississippi University for Women

Co-Vice-Chair: Mary Bonds,
Northwest Mississippi Community College

Co-Vice-Chair: Melissa Adams,
Copiah-Lincoln Community College

March 6

THURSDAY MORNING

Lakeview 1

8:15 OPENING REMARKS

02.01

8:30 T CELL CO-RECEPTOR FUNCTION IN
CHANNEL CATFISH, *ICTALURUS*
PUNCTATUS

Erin Taylor, Melanie Wilson, Eva Bengten

University of Mississippi Medical Center, Jackson, MS, USA

The antigen-specific activation of T cells is an extremely complex event that involves multiple protein-protein interactions within the T cell signaling complex. The membrane-bound co-receptors CD2, CD4, and CD8 contribute to T cell activation by binding to both antigen-presenting cells as well as to lymphocyte specific protein tyrosine kinase (Lck), which initiates the T cell signaling cascade in the cytoplasm. CD2 is expressed on all T and NK cells, while CD4 and CD8 are differentially expressed by T cell subsets. CD4 and CD8 homologs were previously characterized in catfish; however, it is unclear whether these molecules mediate T cell signaling. To functionally define the role of CD2, CD4, and CD8 in catfish T cells, partial CD2 and Lck sequences were identified using tBLASTn searches of EST databases using trout Lck and salmon CD2 amino acid sequences as queries. ESTs with high sequence identity to trout Lck and salmon CD2 were identified, and 5' and 3' RACE products were generated for each to amplify the full-length sequences. Catfish CD2 consists of two extracellular immunoglobulin domains, a transmembrane region, and a cytoplasmic tail containing a proline-rich Lck-binding motif. Catfish Lck contains a tyrosine kinase domain, as well as a CXXC motif for CD4/CD8 binding and a SH3 domain for CD2 binding. RT-PCR analyses of lymphoid cell lines showed that T cells specifically express both CD2 and Lck. Coimmunoprecipitation using anti-Lck magnetic beads was used to confirm specific association of Lck with CD2, CD4 or CD8 in catfish clonal cytotoxic T lymphocyte lines.

02.02

8:45 MICRORNA-200 REGULATES CELL MIGRATION/INVASION GENES IN A LUNG METASTATIC CELL MODEL

Maricica Pacurari¹, Kenneth Ndebele²

¹College of Science, Engineering, and Technology, Biology Department, Jackson State University, Jackson, MS, USA, ²Beth Israel Deaconess Medical Center, Harvard Medical School, Department of Pathology, Boston, MA, USA

Introduction: MicroRNA-200 family (miR-200a, -200b, -200c, -429, and -141) is an important regulator of epithelial-to-mesenchymal transition (EMT). In lung cancer and other cancers, EMT is the underlying step of metastasis. MiR-200 regulate epithelial identity via inhibiting transcriptional factors ZEB1 and ZEB2, which regulate the expression of E-cadherin and other genes controlling cell polarity. Loss of miR-200 expression is often found in metastatic cells. In the present study, we hypothesize that restoring miR-200a, -200b, -200c in H1299 non-small cell lung cancer cells decreases the expression of EMT/migration/invasion genes and inhibits mesenchymal phenotype by restoring the expression of E-cadherin. Experimental Design: Cell lines H1299, BEAS-2B, small airway epithelial cells (SAEC) and normal human bronchial/tracheal epithelial cells (NHBE) were cultured according to the supplier's recommendations (ATCC). Human miRIDIAN shMIMIC lentiviral miRNA for hsa-miR-200a, -200b, -200c, and control scrambled microRNA (Open Biosystems) were used for infection of H1299 cells. After stable transfection, mRNA and cell lysate were analyzed for gene expression (qPCR) and protein level (Western blot). Results: Quantification of miR-200 expression in human lung cancer stage 1 biospecimens indicated a very low level of miR-200b, -200c, and miR-429, respectively a 0.3-, 0.5-, and 0.5-fold decrease vs normal tissue. Restoring miR-200a in NSCLC H1299 cells down-regulated EMT genes vimentin, and CD44, and migration/invasion genes DLC1, and ATRX. Restoring miR-200b down-regulated the expression of CD44, DLC1, HNRNP3, and HFE. And re-expression of miR-200c down-regulated CD44, DLC1, ATRX, and HFE. Restoring miR-200c rescued the expression of epithelial phenotype marker, E-cadherin. A significant suppression of ZEB1 and ZEB2, activators of EMT, was induced by re-expressing miR-200. Conclusion: These results indicate that loss of miR-200b, -200c, or -429 mediate the expression of EMT marker genes and restoring miR-200 level induces the expression of epithelial marker, E-cadherin. Translational, these data also suggest development of novel lung cancer treatment therapies which should take into consideration miR-200 expression.

02.03

9:00 FORMATION OF FOUR-WAY DNA JUNCTION FACILITATED BY A SMALL MOLECULE

Arik Shams, Ann Brahan, Anthony Bell

The University of Southern Mississippi, Hattiesburg, MS, USA

The short-term goal of this research project is to employ small molecules as a means to stabilize four-way DNA junctions (4WJs) composed of natural DNA and chimeric nucleic acids. The long-term goal of the project is utilizing the 4WJs as

extracellular therapeutic inhibitors of DNA binding proteins [i.e. Histones and High Mobility Group Protein B (HMGB1b)]. A number of studies have shown that classical intracellular DNA-binding proteins have a variety of deleterious side-effects when present in the extracellular milieu. In order to develop a successful 4WJ therapeutic, we are focused on using modified nucleic acids to enhance the stability of the resulting 4WJ. The chimera of interest is PNA (peptide nucleic acid). PNA was selected because it is known to form DNA-PNA duplex/triplex structures with elevated thermo- and nuclease stability. 4WJs are prepared using fluorescently labeled DNA strands and a single PNA strand. Small molecules – derivatives of acridines – are currently being investigated as tools to potentially link the PNA-DNA strands to form 4WJs composed of multiple PNA strands. The junctions were visualized using polyacrylamide gels. Circular dichroism studies will be employed to characterize the structural properties of chimera of interest. Once a stable 4WJ structure is identified, the chimera was used to study binding and inhibition of HMGB1 in cell-based assays.

02.04

9:15 EFFECTS OF MICROGRAVITY ON IMMUNE FUNCTION: BENZOFURAN-2-CARBOXYLIC ACID DERIVATIVE AS A COUNTERMEASURE

Amanda Osborne¹, Joshua Agee¹, Ansley Scott¹, Ming Shenwu¹, Alamelu Sundaresan², Karla Marriot³, Shakhawat Bhuiyan⁴, Richard Wilkins⁵, Brad Gersey⁶, Pamela Denkins⁷, Willie Williams⁷, Jinghe Mao¹

¹Tougaloo College, Tougaloo, MS, USA, ²Texas Southern, Houston, TX, USA, ³Savannah State University, Savannah, GA, USA; ⁴Jarvis Christian College, Hawkins, TX, USA, ⁵Prairie View A&M, Prairie View, TX, USA, ⁶Prairie View A&M University, Prairie View, MS, USA, ⁷NASA, Houston, TX, USA

Microgravity, or zero gravity, suppresses immune function and threatens the health of those exposed to it. Astronauts are especially exposed to microgravity during spaceflight. With more and longer voyages through outer space occurring, it is imperative to develop countermeasures to prevent these effects. These countermeasures include a Benzofuran-2-carboxylic acid derivative, KMEG. Initial findings suggest KMEG increases cell proliferation and immune function. The hypothesis states: KMEG treated macrophages exposed to simulated microgravity will show an increase in immune function compared to those not treated and exposed to simulated microgravity. A bioreactor was used to simulate microgravity for at least 48 hours. The genes involved in the Stress & Toxicity PathwayFinder were examined using RT2 Profiler™ PCR Array. Compared to non-treated macrophages, the gene expression profiles showed a decrease in the expression of DNA damaging and repair genes and oxidative stress genes of the KMEG treated macrophages. Inflammation genes were more expressed in KMEG treated macrophages. The apoptosis signaling gene was down-regulated in KMEG treated macrophages, while it was up-regulated in non-treated macrophages. Therefore, KMEG could help alleviate the immune system suppression caused by microgravity.

02.05

9:30 EXPRESSION OF THE *pcd* GENE FROM *HALOTHIOBACILLUS NEAPOLITANUS*

Meredith Barefield, Erick Moffett, Evan Roberts, Gordon Cannon, Sabine Heinhorst

The University of Southern Mississippi, Department of Chemistry and Biochemistry, Hattiesburg, MS, USA

Carboxysomes are microcompartments found in all cyanobacteria and in many chemoautotrophic bacteria. They house ribulose-1,5-bisphosphate carboxylase/oxygenase (RuBisCO), the primary carbon fixing enzyme in the cell, and constitute the final step of the bacterial carbon dioxide concentrating mechanism. The structural protein components of the *Halothiobacillus neapolitanus* carboxysome are encoded by the *cso* operon; however, recently the gene for a novel carboxysome protein was found to be part of the gene cluster that is located immediately downstream from the *cso* operon, suggesting that additional proteins may play a role in carboxysome function and/or assembly. Among the downstream genes the *pcd* gene, which is predicted to encode a pterin-4a-carbinolamine dehydratase, is of particular interest because it is present in most genomes of carboxysome-containing chemoautotrophic bacteria. An expression construct of the *H. neapolitanus pcd* gene was generated and recombinant Pcd protein expressed in *E. coli*. Following optimization of expression and protein purification conditions, anti-Pcd antibodies will be raised and used to assess whether the Pcd protein is a carboxysome component and/or interacts with known carboxysome components.

02.06

9:45 MOLECULAR DETECTION OF SPOTTED FEVER GROUP RICKETTSIA IN IXODID TICKS FROM PAKISTAN

Jaclyn Williams¹, Nabanita Mukherjee¹, Zafar Iqbal², Kelsey Carter¹, Dmitry Apanaskevich³, Shahid Karim¹

¹University of Southern Mississippi, Hattiesburg, MS, USA,

²University of Agriculture, Faisalabad, Pakistan, ³Georgia Southern University, Statesboro, GA, USA

Background: Ticks are vectors for several species of spotted fever group rickettsiae (SFGR), which can be transmitted to vertebrate host during blood meals. In this study the prevalence of SFG Rickettsia occurring within Pakistani ticks was examined. **Methodology/Principal Findings:** Ticks (n=574) were collected from different host from five provinces in Pakistan including Sindh, Punjab, Kashmir, Northern region, and Baluchistan. The ticks were identified and samples were screened for SFGR by molecular detection using outer membrane protein (OmpA). Further validation of SFGR positive samples species confirmed with the amplification of citrate synthase (*gltA*) and a 17kDa (*hrtA*). A variety of tick genera were sampled including *Hyalomma*, *Haemaphysalis*, and *Rhipicephalus*. Positive samples have been subjected to BLAST analysis and were submitted to GenBank. Sequence identity has revealed homology to a

variety of Rickettsial species such as *Rickettsia africae*, *Rickettsia conorii*, and many other Rickettsial endosymbionts. **Conclusion/Significance:** These results demonstrated the prevalence of SFGR associated with ticks collected from Pakistan. Additionally, the detection of SFGR in Ixodid ticks is important for future studies to test the infection in humans.

10:00 Break

02.07

10:15 ROLE OF *MSA* IN VANCOMYCIN RESISTANCE IN *STAPHYLOCOCCUS AUREUS*

Dhritiman Samanta, Mohamed Elasri

The University of Southern Mississippi, Hattiesburg, MS, USA

Glycopeptide antibiotic vancomycin has been applied in the treatment of Methicillin Resistant –*Staphylococcus aureus* (MRSA) strains. However, vancomycin intermediate strains of *S. aureus* (VISA) have been reported. VISA strains are characterized by thick cell walls and decreased carboxypeptidase activity. In this study, we show that the *msa* locus plays a role in the regulation of vancomycin resistance in VISA strains. An *msa* deletion mutant was created by allelic replacement. Vancomycin susceptibility was measured by broth micro-dilution method. Growth rate of the *msa* mutant was measured by growth curve in different concentrations of vancomycin. Cell wall morphology was examined by transmission electron microscopy. For transcriptional analysis, qRT PCR was performed. Deletion of *msa* gene in strain Mu50 resulted in a significant decrease in the minimum inhibitory concentration for vancomycin, slower growth rate in vancomycin containing media and thinner cell wall compared to wild type. Transcriptional analysis revealed that the *msa* mutant does not reduce expression of *pbp4* in the presence of vancomycin, which was also confirmed by penicillin binding assay. Down-regulation of *pbp4* is a key factor in vancomycin resistance. The *msa* locus is essential for vancomycin resistance in these VISA strains. Specifically, our results indicate that *msa* regulates the expression of *pbp4*, which in turn plays a key role in cell wall synthesis and vancomycin resistance. Currently, we are investigating the amount of crosslinks in the cell wall of wild type and *msa* mutants by HPLC. This will allow defining the underlying mechanism for reduced vancomycin resistance in the *msa* mutant.

02.08

10:30 ARE PEPTIDE NUCLEIC ACIDS (PNAS) CAPABLE OF TRANSFERRING GENETIC INFORMATION VIA AMINOACYL-TRNA SYNTHETASES?

Crystal Serrano, Anthony Bell Jr.

University of Southern Mississippi, Hattiesburg, MS, USA

The RNA (Ribonucleic Acid) World Hypothesis is widely accepted throughout Biochemistry. However, flaws exist in this theory such as the instability of ribose. Biochemical reactions that could have occurred prebiotically have not been shown to

produce nucleosides or nucleotides. Also, polymerization of macromolecules is universally difficult without enzymatic activity. Over the past two decades, there has been an interest in PNA, a synthetic molecule because of experimental evidence showing that PNAs can Watson-Crick base pair with Deoxyribonucleic Acid (DNA). PNAs consist of a polypeptide, achiral, neutral backbone typically composed of N-(2-aminoethyl) glycine (AEG) units with adenine, cytosine, guanine and uracil-N-acetic acid substituents. These components have been synthesized under prebiotic conditions (Spark discharge reactions) and AEG polymerizes at 100° Celsius. Moreover, PNAs have been shown to form double and triple helix forms with DNA, causing an increase in stability of a DNA/PNA duplex over DNA/DNA duplexes. Our goal is to provide supporting evidence of PNA as a primordial molecule capable of processes now conducted by RNA or DNA, including the transfer of genetic information. To do so, we anneal a nonameric PNA and tridecameric RNA to form a RNA/PNA duplex, mimicking the acceptor stem of Alanine-transfer ribonucleic acid (tRNA^{Ala}). Aminoacylation assays will be performed to aminoacylate alanine onto the duplex using Alanine-tRNA Synthetase (AlaRS) enzyme.

02.09

10:45 CORRELATION BETWEEN FIBRONECTIN MATRIX AND EXPRESSION OF MYOFIBROBLASTIC FEATURES IN HUMAN ADIPOSE-DERIVED STEM CELLS

Tshering Dolma Lama Sherpa¹, Vivek Desai²,
Jean Schwarzbauer²

¹Mississippi University for Women, Columbus, MS, USA,

²Princeton University, Princeton, NJ, USA

During the wound healing process, fibroblasts migrate toward the wound site and new Extracellular Matrix (ECM) and differentiate into myofibroblasts. Myofibroblasts are important in the process of wound contraction and ECM remodeling. Previous studies in the lab have shown that Adipose Derived Mesenchymal Stem Cells (ADSCs), found in human adipose tissue have basal features of myofibroblast-like cells including the expression of α -smooth muscle actin (α SMA), collagen I, and fibronectin (FN). Here, we investigate whether these features associated with myofibroblasts are partly caused by the FN matrix which is abundant in the wound healing environment. We show that ADSCs have abundant FN matrix. When ADSCs are treated with Functional Upstream Domain (FUD) from S. pyogenes, which is known to inhibit FN polymerization, they had decreased FN matrix compared to the control. FUD treated ADSCs also expressed collagen I. In the future, we will also compare the effect of FN matrix inhibition by FUD on the expression of collagen I and α -smooth muscle actin, two primary myofibroblast markers. The results of this study will help us better understand the correlation between fibronectin matrix and the expression of myofibroblastic features.

02.10

11:00 ANALYSIS OF AMBLYOMMA CEMENT CONE PROTEINS

Rebekah Bullard, Shahid Karim

University of Southern Mississippi, Hattiesburg, MS, USA

Background: *Amblyomma americanum* (lone star tick) attaches to the host by inserting its hypostome, a structure of the mouthpart characterized by its harpoon like structure. After attachment, the tick salivates a plethora of pharmacologically active proteins to modulate the host immune defenses for attachment and prolonged blood-feeding. Additionally, the tick protects its mouth parts by building a solid proteinaceous matrix called the cement cone, which is thought to assist in long term tick attachment and modulate host defenses. **Methods/Findings:** This study analyzes the proteins of the tick cement by liquid chromatography-tandem mass spectroscopy (LC-MS/MS). In addition to this total RNA isolated from female *A. americanum* throughout the blood meal is subjected to RNA sequencing to select glycine rich proteins (GRPs) which were differentially expressed in early time points of feeding. The selected proteins were analyzed using qualitative real time PCR and RNA interference. Recombinant protein was used to explore additional functions these proteins may have on host defenses. **Conclusion:** The data acquired by RNA-seq and qRT-PCR show differential expression of the selected GRPs at earlier time points in tick feeding.

02.11

11:15 INHIBITION OF PROTEASOME AND LYSOSOMAL ENZYMES CAN PARTIALLY RESCUE CFTR DEGRADATION

Deanna Watson, Ghanshyam D. Heda

Mississippi University for Women, Columbus, MS, USA

Background and Objectives: Δ F508 is the most common mutation affecting the function of Cystic Fibrosis Transmembrane-conductance Regulator (CFTR), and is responsible for the genetic disease cystic fibrosis. We hypothesize that the surface instability of Δ F508 CFTR [Heda et al, Am J Physiol, 280, C166-C174, 2001] is may be due to its selective sorting to cellular sites different than that of wild type CFTR. In this study we aim to determine the role of proteasomes and lysosomes in CFTR degradation. **Methods:** Human bronchial epithelial cells (CFBE) and pig kidney epithelial cells (LLC-PK₁) stably transfected with Δ F508 or wild type CFTR were pre-treated with 5 mM sodium butyrate at 27°C for 60 h 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), or lysosomal enzymes (E64). Cell lysates were directly immunoblotted with anti-CFTR antibody or immunoprecipitated first with anti-CFTR antibody followed by its immunoblotting with anti-ubiquitin antibody. **Results:** MG132 and E64 partially rescued the degradation of plasma membrane Δ F508 CFTR in LLC-PK₁ and CFBE cell lines. Immunoprecipitated Δ F508 CFTR in LLC-PK₁

cells also appeared to be more ubiquitinated than its wide type counterpart. **Conclusions:** Partial rescue of CFTR degradation by MG132 and increased levels of CFTR ubiquitination suggest the role of ubiquitin dependent proteolytic system in CFTR degradation. Additionally, rescue of CFTR from degradation by E64 suggests that a portion of CFTR is degraded by lysosomal enzymes.

02.12

11:30 EXPANDING THE REPERTOIRE OF AMINO ACID ANALOGUES FOR USE IN THE SYNTHESIS OF NOVEL PEPTIDES

Douglas Van Iverson

University of Southern Mississippi, Hattiesburg, MS, USA

The ability to accommodate a variety of non-cognate amino acid (AA) substrates for incorporation into ribosomal translation make aminoacyl-tRNA synthetases (AARSs) of great interest in the areas of drug and biopolymer synthesis. However, only a small number (<200) of non-cognate substrates have been reported, and these are largely limited to unnatural α -amino acids, α,α -distributed amino acids, β -amino acids, and N-methyl amino acids. In an effort to expand the set of possible substrates the phospholipid phosphatidylserine (PS) has been examined. The ability to charge a phospholipid to a tRNA presents a system capable of substitution or modification of fatty acid moieties to yield a variety of properties or functionalities. Preliminary results using two $\alpha^{32}\text{P}$ -radiolabeled assays suggest the formation of PS-AMP and subsequent synthesis of PS-tRNA^{Ser}. This result is currently being confirmed using a MALDI-TOF MS assay.

11:45 Lunch

March 6, 2014

THURSDAY AFTERNOON

Lakeview 1

02.13

1:15 DETERMINING THE ROLE OF THE NITROGEN REGULATORY PROTEIN AREA IN THE DIMORPHIC FUNGUS *HISTOPLASMA CAPSULATUM*

Logan Tanner Blancett, Thomas Buford, Glen Shearer

University of Southern Mississippi, Hattiesburg, MS, USA

Histoplasma capsulatum (*Hc*) is the etiological agent of histoplasmosis, a common cause of respiratory mycoses in humans. *Hc* is a dimorphic organism existing as a mold (M) at 25°C and once inhaled by host (37°C) undergoes a dimorphic shift to the yeast (Y) phase. This dimorphic shift is essential for the pathogenesis of the organism within the host. It is most commonly found in the United States along the Mississippi and Ohio River Valley regions where high levels of bird and bat excrements can be found. Earlier experiments revealed that *Hc* is able to metabolize many complex nitrogen sources such as uric acid and allantoin. We also determined that many sole nitrogen sources are favored in only one phase of *Hc*

respectively. *AreA* has been characterized as the key negative-regulator of nitrogen metabolism in closely related ascomycetes. *AreA* represses transcription pathways of less energetically favored nitrogen sources in the presence of a preferential nitrogen sources such as ammonia or glutamine by binding the promoters of these specific nitrogen utilization pathways. The focus of this study is to begin experimentally determining if the *AreA* homolog found is the key negative regulator of nitrogen metabolism in *Hc*. Quantitative RT-PCR data suggests that *AreA* is at a constant transcript level regardless of the nutrient environment. Western blot data also suggests that it is constant at the protein level. Current work is underway-utilizing RNA interference as well as indirect immunofluorescence to further characterize *AreA*.

02.14

1:30 ENDOGENOUS CFTR EXPRESSION IN HUMAN PANCREATIC DUCT CELLS

Ariel Finch, Nadeema Appukutti, Ghanshyam D. Heda

Mississippi University for Women, Columbus, MS, USA

Background: CFTR is a membrane protein present on the surface of many epithelial cells and function as a chloride channel. A defective CFTR is responsible for causing genetic disease cystic fibrosis (CF). CFTR is expressed in trivial amounts and its endogenous expression is difficult to detect by biochemical techniques such as immunoblotting. In this study we aimed to improve the sensitivity of CFTR-immunoblotting by altering the concentration of SDS and methanol in transfer buffer. SDS facilitates the removal of proteins from polyacrylamide gels (PAGE) and methanol allows their binding to nitrocellulose (NC) membrane. **Methods:** Endogenous (CFPAC, Capan-1) and exogenous (LLC-PK₁ and CFBE) CFTR expressing cell lines were treated with 5 mM sodium butyrate at 27°C for 60 hrs to up-regulate the surface CFTR expression. Cell lysates were electrophoresed and transferred to NC membrane with various concentrations of SDS and methanol, and immunoblotted with anti-CFTR antibody. **Results:** The addition of SDS at 0.015% in transfer buffer increased the detection levels of CFTR expression by maximally transferring the proteins from PAGE to NC membrane. Concentration of methanol (5 to 20%) didn't influence the sensitivity of CFTR immunoblots. This improvement in immunoblotting, however, was not sufficient to detect the endogenous CFTR expression in CFPAC and Capan-1 cell lines. Endogenous CFTR expression in these cell lines, HOWEVER, WAS measured by immunoprecipitation with anti-CFTR antibody. **Conclusions:** SDS increased the sensitivity of CFTR immunoblotting, however, the endogenous CFTR expression can only be detected by immunoprecipitation prior to immunoblotting to significantly improve anticancer therapeutics.

02.15

1:45 **ENHANCEMENT OF RADICAL QUENCHING ABILITY OF CHEDDAR WHEY: MUTUAL SUPPLEMENTATION WITH THERMALLY GENERATED MAILLARD REACTION PRODUCTS**

Dipaloke Mukherjee, Zahur Haque

Mississippi State University, Mississippi State, MS, USA

Endogenous and exogenous reactive oxygen species (ROS) cause cell damage and can lead to cancer causing genetic mutations. Therefore, there is constant pursuit of powerful natural radical scavenging foods. This research investigates the enhancement of the short term (antioxidative activity)(AA) and long term (antioxidative persistence) (AP) ROS quenching ability of Cheddar whey (CW), which is naturally peptide rich, by mutual supplementation with thermally generated Maillard reaction products (MRPs) in the presence of added lactose. CW dispersions (3%, w/v) with and without lactose (1%, w/v) were prepared in McIlvaine's iso-ionic buffer (pH 7.0). Thermal treatment was for 0 – 4 hours at 90°C. AE and AP were determined from luminol-induced chemiluminescence (CL) due to unquenched hydroxyl radicals generated by pyrolysis of 2,2'-Azobis(2-methylpropionamidine) dihydrochloride (ABAP). The results exhibited that CW (with or without lactose) always had significantly better AE and AP compared to the blank (only the buffer without CW and/or lactose). However, addition of lactose significantly increased CW's antioxidative properties. Furthermore, there was a direct correlation between heating periods and AE. CW heated for 0, 1, 2 and 4 hours exhibited radical induced CL maxima of 109.5, 98.7, 86.4 and 55.0 relative light units (RLU), respectively. Values for CW+lactose were 97.2, 90.3, 77.3 and 41.6 RLU, respectively. The study indicated the significant enhancement of antioxidative properties of CW+lactose based on periods of heating. These data will lead to the development of powerful new antioxidants to alleviate the detrimental effects of cellular oxidative stress.

02.16

2:00 **BETULINIC ACID DOES NOT AFFECT RATES OF IN VIVO SPONTANEOUS FORMATION OF THE [URE3] PRION IN SACCHAROMYCES CEREVISIAE**

Samantha Humphrey, Ross Whitwam

Mississippi University for Women, Columbus, MS, USA

Prions are misfolded cellular proteins that are infectious because they can induce other copies of the same protein to misfold and aggregate into amyloids. In mammals, prions are associated with neurodegenerative diseases. In humans, misfolded, amyloid-forming (but non-infectious) proteins are associated with diseases like Alzheimer's disease and Parkinson's disease. Planchard et al. (2012. ACS Chem Neurosci 3: 900-908) showed that betulinic acid accelerates the *in vitro* amyloid formation from amyloid- β peptides. In mammalian prion diseases, it is believed that the amyloid less harmful than oligomers of the prion proteins. Anything that accelerates amyloid formation may be protective. We wanted to investigate whether betulinic acid

accelerates amyloid formation from prion proteins *in vivo*. Our hypothesis was that exposure of cells of *Saccharomyces cerevisiae* to betulinic acid would accelerate the spontaneous *in vivo* formation of the [URE3] prion by accelerating amyloid formation of misfolded [URE3] prions. However, incubation of prion-free yeast cells with 100 μ M betulinic acid did not accelerate rates of spontaneous *in vivo* prion formation. We then hypothesized that the betulinic acid might not be entering the cell, so we exposed prion-free yeast cells to 100 μ M betulinic acid in the presence of 0.2% saponin, a detergent known to increase cell permeability. Even in the presence of saponin, betulinic acid did not alter the rate of spontaneous *in vivo* prion formation in the yeast. This suggests that either betulinic acid does not affect the rates of *in vivo* [URE3] amyloid formation *in vivo* at the concentrations used.

02.17

2:15 **DECIPHERING THE PHYSIOLOGICAL ROLE OF CORAZONIN IN THE BLACK-LEGGED TICK (IXODES SCAPULARIS)**

Deepak Kumar, Shahid Karim

University of Southern Mississippi, Hattiesburg, MS, USA

Background: The black-legged tick (*Ixodes scapularis*) is the vector of Lyme disease, a competent vector of *Borrelia burgdorferi*. Understanding the physiology of tick vector is an important step in preventing tick and tick-borne illnesses. Corazonin (CRZ) is an important neuropeptide in arthropods/insects because it has multiple physiological roles such as controlling heart rate and modulating ecdysis behavior. Methods/Findings: In this study, we have cloned the cDNA sequence of Corazonin and Corazonin receptor (CRZR). CRZR found to be a G-protein coupled receptor (GPCR). Transcriptional gene expression revealed significant change in transcript level upon blood feeding in salivary glands and midgut tissues. Transcriptional gene expression studies of CRZ were validated by Immunofluorescence assay. In another experiment, CRZ and CRZR expression was investigated in abiotic stress. The physiological role of CRZ and CRZR were determined by RNA interference.

Conclusions: Our results demonstrate stress-induced expression of CRZ and CRZR in tick tissues. The functional role of CRZ in tick physiology and stress signaling pathway will be discussed.

2:30 **Business Meeting**

March 6, 2014

THURSDAY EVENING

POSTER SESSION

Following Dodgen Lecture

P2.01

CHARACTERIZATION OF GENE SAUSA300_1295 IN THE MSA OPERON OF STAPHYLOCOCCUS AUREUS

Mounir Radwan Saleh, Bina L. Jayana, Gyan S. Sahukhal, Mohamed O. Elasi

University of Southern Mississippi, Hattiesburg, MS, USA

Staphylococcus aureus is an important human pathogen that causes skin and soft-tissue infections, endovascular infections, pneumonia, septic arthritis, endocarditis, osteomyelitis, foreign-body infections, and sepsis. *S. aureus* produces a vast array of virulence factors that are controlled by global virulence regulators. Previously we identified *msa* as a new global virulence regulator that controls the expression of *sarA* and biofilm development. We have also shown that *msa* is a part of three gene operon which includes SAUSA300_1296, SAUSA300_1295 and SAUSA300_1294. To define the role of the individual genes in the operon, we deleted the SAUSA300_1295 from USA300_LAC strains and compared its phenotype with single SAUSA300_1294 single mutant and the *msa* operon deletion mutant. Our preliminary data showed that SAUSA300_1295 single deletion mutants' phenotype is similar to single *msa* deletion mutant and *msa* operon deletion mutant. All three mutants showed decreased pigmentation, increased extracellular protease activity, increased cell death and reduced biofilm formation. SAUSA300_1295 alone does not complement the phenotype which confirms that the genes in the *msa* operon are co-transcribed and functionally related. Identification of this operon and expression of the three open reading frames will allow us to define the mechanism of action of the *msa* operon locus.

P2.02

ROLE OF MSA IN REGULATION OF CELL MORPHOLOGY AND TELLURITE RESISTANCE IN STAPHYLOCOCCUS AUREUS

Ahmed Alzuway, Amelsaad El Barasi, Bina L. Jayana, Gyan S. Sahukhal, Mohamed O. Elasi

University of Southern Mississippi, Hattiesburg, MS, USA

Emergence of community-acquired methicillin resistant *Staphylococcus aureus* (CA-MRSA) strains is alarming. CA-MRSA strains cause severe infections among healthy individuals without predisposing risk factors outside the hospital setting. Their ability to quickly respond to environmental conditions by regulating virulence factors is a fundamental key behind the success of these strains. We have previously identified the *msa* operon as a new global regulator of virulence. Deletion of the *msa* operon in the CA-MRSA strain USA300_LAC, leads to a reduction of expression (-3.48 fold) in a neighboring divergent operon. String analysis for protein-protein interaction study also showed that the *msa* operon interacts with this operon. In this study, we investigate the

potential functional relationship between this operon and *msa*. Preliminary bioinformatics analysis showed that SAUSA300_1297-99 codes for three hypothetical proteins that may be involved in cell morphology and tellurite resistance. We have deleted this operon in CA-MRSA USA300_LAC strain and compared its phenotypes to the *msa* mutant. This analysis includes biofilm formation, autolysis, pigmentation and extracellular protease production. This study will define the potential role of *msa* in tellurite resistance.

P2.03

THE EFFECTS OF HIGH ENERGY RADIATION ON THE VESTIBULAR AND IMMUNE FUNCTION IN RATS

Ansley E. Scott¹, Ming Shenwu¹, Xuehui Tang², Jun Huang², Chunli Yang², Wu Zhou², Hong Zhu², Jinghe Mao^{1,2}

¹Tougaloo College, Tougaloo, MS, USA, ²University of Mississippi Medical Center, Jackson, MS, USA

The objective of the project is to study radiation effects on the vestibular and immune systems in rats. It is proposed that high energy radiation will compromise vestibular/balance system and immune function since nasopharyngeal cancer patients experience post-irradiation vertigo and whole body radiation therapy causes immune suppression. However, the underlying mechanisms are not fully understood. Sprague-Dawley rats were exposed to different doses of either unilateral cranial using 6 MeV electron beam (0 to 60Gy) or whole body using 18 MeV electron beam (0 to 10 Gy). For vestibular study, seven days post irradiation, single unit recording of vestibular afferent activity was performed. A total of 309 horizontal semicircular canal afferents' responses to sinusoidal earth-horizontal rotations (~1Hz) were analyzed. For immune function study, total RNAs were extracted from immune organs such as thymus and spleen. The genes involved in Stress and Toxicity PathwayFinder were examined using RT2 Profiler™ PCR Array.

Preliminary analysis shows that electron irradiation caused significant decreases in the gains of the irregular horizontal semicircular canal afferents. The gene expression profiles indicated significant changes in oxidative stress, DNA damage and repair as well as apoptosis related genes. In conclusion, these results indicate that radiation exposure induces specific functional deficiency of the vestibular and immune system in rats. Funding: Supported by NASA MSI EPSCoR (NNX12AK85A and NNX13AB31A), NIH R01DC012060 (HZ), NIH R01DC008585 (WZ).

P2.04

ASYMMETRIC LEAVES1 ESTABLISHES ORGAN BOUNDARIES IN ARABIDOPSIS FLOWERS

Denise Lasalle Ward¹, Sarah Liljegren², Megan Christy², William Groner², Catherine Gubert²

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The AS1 transcription factor is required to establish a boundary between the leaf and the stem, and for proper leaf development in *Arabidopsis* (Byrne et al., 2000). We have found that AS1

also regulates a critical boundary between the flower and flower stem. Specialized cells develop at the flower-stem boundary that secrete enzymes during the abscission process. A set of mutants that prevent abscission of the medial sepals were found to disrupt the *AS1* gene. Sequencing the *AS1* gene from mutant and wild-type plants revealed the site of the *as1-21* mutation. This mutation (W7*) introduces a premature stop codon in the open reading frame, blocking production of the full-length AS1 protein. The relevance of the *as1-22* mutation (E66K), which replaces a glutamic acid in the DNA binding domain with a lysine, was also analyzed. This highly conserved amino acid was found to be essential for a salt bridge that forms in the DNA binding domain and the ability of MYB transcription factors to bind DNA (Ko et al., 2008).

P2.05

BIOCHEMICAL ANALYSIS OF TWO *ASPERGILLUS NIDULANS* SUPPRESSOR MUTATIONS

Casey Andrew Spell, Sarah Lea Anglin

Millsaps College, Jackson, MS, USA

The filamentous fungus *Aspergillus nidulans* is a model organism for the study of the eukaryotic cell cycle. In this work, two specific genes that interact with known cell cycle proteins have been studied. The *snoA* gene functions during S phase, and mutations in *snoA* suppress the effects of a mutation in *nimO^{dbf4}*, which is a DNA licensing factor required for DNA synthesis. The *snxA* gene functions during G1 and interacts with *nimX^{cdc2}*, the master cell cycle control protein in all eukaryotes. The goal of our work with *snoA* was to use single-step affinity purification using an S-tagged *snoA* construct, followed by mass spectrometry, to identify SNOA and co-purifying proteins. Our results showed that SNOA protein was detectable by western blot at the predicted size (~250 kD), along with several smaller bands that are likely to be proteolytic degradation products. The goal of our work with *snxA* was to test the hypothesis that two hypomorphic mutations, *snxA1* and *snxA2*, have reduced expression of *snxA* mRNA compared to wild-type cells. To test this hypothesis, isogenic strains of *snxA+*, *snxA1*, and *snxA2* were grown and qRT-PCR was performed to quantitate levels of *snxA* mRNA. The levels of mRNA in the wild-type (*snxA+*) strain were found to be approximately 5-fold increased compared to both mutant strains (*snxA1* and *snxA2*). These data suggest that the hypomorphic phenotype is the result of lowered *snxA* expression. Future experiments are aimed at understanding the mechanism leading to lowered *snxA* expression in mutant strains.

P2.06

SEX DIFFERENCES IN THE PROGRESSION OF RENAL INJURY LEPTIN RECEPTOR KNOCKOUT DAHL SALT-SENSITIVE (SS) RATS

Devin Guillory^{1,2,3}, Kasi McPherson², Jan Williams²

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Obesity is a major risk factor for the development of chronic kidney disease (CKD). In the current study, we used Zinc-finger

nucleases to create a 16 base pair frame-shift deletion in exon 11 of the leptin receptor gene within the genetic background of the Dahl SS rat (SS^{Lepr} strain) to study the effect of obesity on the progression of kidney disease in SS rats. We observed an increase in body weight in both female and male SS^{Lepr} rats when compared to SS rats at 6 weeks of age. At the end of the study body weight increased in female and male SS^{Lepr} rats. The SS^{Lepr} strain exhibited impaired glucose tolerance and increased plasma insulin levels as early as 6 weeks of age suggesting insulin resistance while SS rats did not. However, glucose levels remained in the normal range throughout the course of the study. Both female and male SS^{Lepr} rats developed severe systolic hypertension when compared to the values seen in SS rats. The kidneys from the SS^{Lepr} strain displayed increased interstitial fibrosis when compared to SS rats regardless of sex. Interestingly, the major finding from the current study was that the survival rate in female SS^{Lepr} rats was markedly reduced versus male SS^{Lepr} rats. Overall, these data indicate that the SS^{Lepr} strain may be a useful model to study signaling pathways and/or sex differences that play a role in CKD associated with obesity. This research supported by NIGMS NIH P20GM104357 and AHA 12SDG9440034.

P2.07

TRACKING PLASTID (AND MITOCHONDRIAL) GENE MIGRATION IN *K. BREVIS*

Kelly Scott, Timothy McLean

University of Southern Mississippi, Hattiesburg, MS, USA

Karenia brevis is a marine dinoflagellate responsible for the harmful algal blooms (also known as red tides) in the Gulf of Mexico. *K. brevis* expresses antisense (AS) RNAs, each of which has a complementary region to the messenger RNA (mRNA) of a variety of genes. In dinoflagellates, many plastid (and mitochondrial) genes have migrated to the nuclear genome. It is unknown whether chloroplast genes, such as photosystem – D2, have migrated in *K. brevis*. It is also unknown where the gene that expresses the AS RNA for photosystem D2 resides. The protein-coding gene and the AS RNA-expressing gene could both be in the chloroplast, both in the nucleus, or some split combination between the two genomes. Primers designed from photosystem D2 ESTs were used in a series of RACE reactions to capture the unique regions of both photosystem – D2 AS RNA and mRNA. Gel imaging showed a distinct band for the unique 5' end of the mRNA. Sequencing of this band will allow for the design of a probe to determine which genome houses the photosystem – D2 mRNA. This work can be furthered to compile known locations for both the mRNA and AS RNA of both chloroplast and mitochondrial genes of *K. brevis*.

P2.08

ENHANCEMENT OF TOTAL RADICAL TRAPPING POTENTIALS OF SWEET WHEY: MUTUAL SUPPLEMENTATION WITH GREEN TEA EXTRACT

Zahur Haque, Dipaloke Mukherjee, Jingyi Yan,
Haley Abessinio, Sam Chang

Mississippi State University, Mississippi State, MS, USA

Intrinsic and extrinsic radicals are known to cause premature aging and genetic mutations that lead to morbidity and mortality. In our ongoing search for powerful natural antioxidative foods, we have investigated the enhancement of anti-oxidative efficacy (AE) and persistence (PE) of Cheddar (CW) and Edam Whey (EW) by mutual supplementation with green tea (GT) extract based on total radical trapping potentials (TRAP) over time. Whey dispersions (3%, w/v) were prepared in McIlvaine's isonic buffer (pH 7.0). GT leaves were extracted (1%, w/v) by steeping at 95°C for three minutes in the same buffer. This was diluted 16-folds to reach a point of least apparent antioxidative activity. Luminol-induced chemiluminescence (CL) due to free hydroxyl radicals generated by pyrolysis of 2,2'-Azobis (2-methylpropionamide) dihydrochloride (ABAP) was monitored through a period of one hour. At the cessation of hydroxyl radical generation the ABAP challenge was repeated and CL was monitored for another hour to assess AP. The results showed that the AE and APs of the whey samples were dramatically enhanced in the presence of the GT. The luminescence maxima for the blank depicting maximum radical generation was recorded to be after 52.30 minutes for the first challenge (449.5 relative light unit, [RLU]), whereas those for GT, CW and CW+GT were 154.3, 49.1 and 39.9 RLU, respectively. The study shows marked synergistic enhancement of anti-oxidative properties both of CW+GT and EW+GT and establish their potentials for utilization as natural and healthy antioxidants.

P2.09

MECHANISM OF *repo* REGULATION IN GLIAL CELLS OF *DROSOPHILA MELANOGASTER*

Jamie L. Wood, Bradley Jones

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During development cells change from unspecified to specified states. Cells of the nervous system begin as unspecified precursors and proceed along one of two developmental paths to become either neurons or glia. We seek to understand more about the genes that control this process using *Drosophila melanogaster* as a model system. Previous work from our lab and others has established the role of the master regulatory transcription factor Gcm in directing neuronal precursor cells to assume a glial fate. Gcm acts on many target genes, one of which is *reversed polarity (repo)*. *repo* is necessary for proper glial cell differentiation; once activated, its expression is maintained throughout the life of the fly through currently unknown mechanisms. We propose that *repo* expression is maintained in an autoregulatory manner, whereby Repo protein acts as a transcription factor on its own regulatory DNA sequence. We use both *in vitro* and *in vivo* expression systems to

show that Repo protein does act on its own regulatory DNA and induces the expression of reporter genes. We are also testing mutagenesis of putative Repo binding sites in the regulatory DNA to determine if reporter gene expression can be disrupted.

P2.10

RECONSTITUTION OF MUNC18-DEPENDENT MAST CELL EXOCYTOSIS

Matthew Grant Arnold, Hao Xu

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Membrane fusion is an evolutionarily conserved process essential to the function and survival of all eukaryotic organisms. This process requires SNARE proteins anchored in the opposing membranes to form a coiled coil bundle, known as the trans-SNARE complex. It has been proposed that the assembly and activity of trans-SNARE complexes are regulated by the Sec1/Munc18 protein family. The Munc18 proteins consist of three unique isoforms in mammals. Studies of Munc18-1 in neurotransmission have revealed that it exerts both positive and negative roles in fusion. However, the functions of Munc18 isoforms in non-neuronal tissues have not been clearly defined. Mast Cells are secretory cells of the immune system that specialize in the exocytosis of inflammatory mediators. Mast Cells express all three mammalian isoforms, but whether and how these three proteins regulate SNARE-dependent mast cell exocytosis remains largely unexplored. To investigate the functional relationship between Munc18 and SNAREs in mast cell exocytosis, the Munc18 isoforms were subcloned into expression vectors to allow for affinity purification. Purified Munc18 proteins are added to fusion reactions reconstituted with SNARE-bearing liposomes. Preliminary data suggests that purified Munc18-1 selectively increased the rate of fusion mediated by certain sets of SNAREs. Meanwhile, Munc18-2 and Munc18-3 will be isolated and used in reconstituted fusion assays. These studies will set up the stage to dissect the functional interactions between Munc18 isoforms and specific SNARE complexes in Mast Cell exocytosis.

P2.11

CHARACTERIZATION OF A NOVEL RING-TYPE UBIQUITIN E3 LIGASE GHRING2 INVOLVED IN COTTON FIBER DEVELOPMENT

Din-Pow Ma, Shiva Soma

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The ubiquitin-proteasome proteolysis pathway is responsible for the degradation of abnormal and short-lived proteins to regulate many important biochemical activities in eukaryotes. The ubiquitination of target proteins for degradation is a sequential action requiring 3 enzymes, an ubiquitin-activating enzyme (E1), an ubiquitin conjugating enzyme (E2), and an ubiquitin ligase (E3). Among these three enzymes ubiquitin ligase determines the specificity of the pathway. By employing affymetrix microarray analysis, we have identified a novel ubiquitin ligase E3 gene *GhRING2* that is expressed differentially between two *G. hirsutum* lines - TM1 (Texas Marker-1) and CSB-25 (Chromosome Substitution Line 25). The complete *GhRING2* gene sequence was obtained by

genomic and cDNA walking. Our studies have shown that the expression of *GhRING2* in cotton fiber is developmentally regulated, suggesting that the ubiquitin- proteasome pathway may regulate cotton fiber growth and development. The over-expressed GhRIN2 protein in *E. coli* has been shown to have the E3 ligase activity and is capable of catalyzing the formation of polyubiquitin chains via in vitro auto-ubiquitination. Using a yeast two-hybrid assay we have subsequently demonstrated that GhRING2 interacts with a PROTODERMAL FACTOR1 (GhPDF1) protein (294 amino acids). *GhPDF1* is expressed preferentially in immature ovules and fiber initials and the gene has been suggested to play a role in cell fate determination and fiber development. Pull down and plasmid swap assays were employed to confirm this interaction.

P2.12

DESIGN OF A MULTIFUNCTIONAL POLYPEPTIDE FOR APPLICATION IN CANCER DIAGNOSIS AND TREATMENT

Jennings Jasmine¹, Natalia Grace¹, Ming Shenwu¹, Drazen Raucher², Jinghe Mao¹, Manliang Feng¹

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It is desirable in cancer therapy that anticancer agent can be traced in-vivo during the treatment providing information not only for the anticancer drug delivery efficiency but also the effectiveness of the therapeutic treatment. In this research, we designed a multifunctional polypeptide containing a cell penetration segment, a targeted delivery segment and a tracing segment. The cell penetration segment contains a SynB1 peptide with a amino acid sequence of RGGRLSYSRRRFFSTSTGRA. The target delivery segment contains a elastin-like polypeptide (ELP) consist of repeated sequence of pentapeptides (VPGXG), where the guest residue X can be any amino acid except Proline. ELP possesses a unique inverse temperature-phase transition feature. It is employed in the designed polypeptide for thermal-targeted delivery. The last segment of the polypeptide contains a amino acid sequence that can binds rare earth metal ions. This segment of peptide when bind to rare earth metal ions such as Eu³⁺ and Gd³⁺ can produce fluorescent and magnetic feature that can be used to trace the designed polypeptide both in-vitro and in-vivo. The designed polypeptide was expressed and purified from *E. Coli*. The metal binding properties and phase transition properties of this newly designed polypeptide were characterized. The polypeptide has also be test in PC-3 human caucasian prostate adenocarcinoma cell. *This work is 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, and by Howard Hughes Medical Institute Precollege and Undergraduate Program (HHMI- 52007562). The authors also want to acknowledge support from National Science Foundation grant number IIP-1321375 and CBET-0931041.*

P2.13

HEME OXYGENASE REGULATION OF TROPHOBLAST ENAC MEDIATED MIGRATION

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During normal pregnancy, trophoblasts from the fetal placenta migrate into the maternal spiral arteries of the uterus to replace vascular smooth muscle cells. This remodeling of the spiral arteries accommodates increased fetal blood flow. In patients with preeclampsia, spiral artery remodelling is impaired due to impaired trophoblast migration. Recent studies suggest altered Epithelial Sodium Channel (ENaC) expression may be a contributing mechanism for impaired trophoblast migration. A recent study suggests that heme oxygenase-1 (HO-1) protects against hypertension in a rat model of placental ischemia; however, whether HO-1 regulation of ENaC contributes to the beneficial effects of HO-1 is unknown. The purpose of this study was to determine if HO-1 enhances ENaC mediated cytotrophoblast migration. We found that silencing of β ENaC and γ ENaC in cultured cytotrophoblasts (BeWo cells), by expression of dominant-negative constructs, reduced migration to 56 ± 13 and 26 ± 3 %, respectively ($p < 0.05$) of control. We then showed that HO-1 induction, using cobalt protoporphyrin, stimulates cytotrophoblast β ENaC expression by 1.5 and 1.8 fold (10 and 50 μ M) and migration (43 ± 5 % of control, $p < 0.05$). Importantly, the enhanced migratory response to CoPP was entirely blocked by ENaC inhibition with amiloride (10 μ M). Taken together, our results suggest that β and γ ENaC mediates cytotrophoblast migration and increasing β ENaC expression by HO-1 induction enhances migration. These findings suggest that HO-1 regulation of induction enhances migration. These findings suggest that HO-1 regulation of cytotrophoblast β ENaC and γ ENaC expression and migration may be a potential therapeutic target in preeclamptic patients.

P2.14

SUBCLONING AND EXPRESSION OF RAT SYNAPTOTAGMIN II FOR THE EXPRESSION RECONSTITUTION OF MAST CELL EXOCYTOSIS

Chris Bolden, Hao Xu

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Eukaryotic cells secrete a variety of substances by "regulated exocytosis" in response to extracellular stimuli. Secretion of neurotransmitters, hormones, and enzymes is a fundamental biological activity of the cell, and is achieved via fusion of secretory vesicles with the plasma membrane. SNARE (soluble N-ethylmaleimide-sensitive factor attachment protein receptor) proteins are central to exocytosis. Mast cells are specialized secretory cells that belong to the immune system and play a pivotal role in allergic responses. Mast cell exocytosis/secretion causes inflammatory response through the release of mediators such as histamine (mast cell degranulation). The process is dependent on calcium influx. Synaptotagmin II is a calcium sensor that is thought to regulate SNARE-dependent mast cell exocytosis.

Synpatotagmin II will be inserted downstream of the maltose binding protein vector and digested. A ligation will then be performed to create phosphate links. Afterwards, a transformation will be performed and then verified by ampicillin resistance plating and DNA sequencing. In the end, Synpatotagmin II will be expressed in large quantity through induction. The induction of the Synpatotagmin II protein will be examined using SDS-PAGE. Synpatotagmin II will then be purified. Purified Synpatotagmin II will be added to a reconstituted fusion system to assay for its ability to regulate fusion in response to calcium. The study will not only generate new insights into the regulatory machinery underlying mast cell exocytosis, but also contribute to the understanding of the general membrane fusion machinery in secretory cells.

P2.15

RECONSTITUTION OF MAST CELL EXOCYTOSIS

Sushmitha Vijaya Kumar, Hao Xu

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In response to pathogens and toxins, mast cells rapidly release a wide range of mediators (e.g., histamine) via compound exocytosis/degranulation, a process that is comprised of two membrane fusion reactions: the homotypic fusion of secretory granules to one another and their heterotypic fusion to the cell surface. Fusion requires SNAREs (soluble NEM sensitive factor attachment protein receptors) anchored in apposing membranes to form a four helical bundle, the so-called trans-SNARE complex. A number of SNAREs have been implicated in mast cell exocytosis, including VAMP2, VAMP7, VAMP8, SNAP23, syntaxin3, and syntaxin4, but it is not clear how they pair to form functional trans-SNARE complexes, and how these complexes are regulated upon mast cell activation. Using a reconstitution approach, we showed that either VAMP2 or VAMP8 can form a functional trans-SNARE complex with SNAP23 bound syntaxin3 or syntaxin4. In addition, we have sub-cloned the cDNAs for full length VAMP7, its N-terminal longin domain and its C-terminal SNARE domain into an expression vector. The recombinant VAMP7 proteins tagged with polyhistidine have been expressed and will be purified using Ni-NTA chromatography. The roles of full length VAMP7 in mast cell exocytosis will be studied in established proteoliposome fusion assays. The regulatory role of VAMP7 longin domain will also be investigated. By completing the reconstitution of mast cell exocytosis, our studies set the stage to interrogate the signaling events that control the fusion machinery.

P2.16

DETERMINING THE PROTEIN EXPRESSION OF THE NITROGEN REGULATORY PROTEIN AREA IN THE DIMORPHIC FUNGUS *HISTOPLASMA CAPSULATUM*

Terra Leigh Parker, Logan Blancett, Thomas Buford, Glenn Shearer

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Histoplasma capsulatum (*Hc*) is the etiological agent of histoplasmosis, a common cause of respiratory mycoses in humans. *Hc* is a dimorphic organism existing as a mold (M) at

25°C and once inhaled by host (37°C) undergoes a dimorphic shift to the yeast (Y) phase. This dimorphic shift is essential for the pathogenesis of the organism within the host. It is most commonly found in the United States along the Mississippi and Ohio River Valley regions where high levels of bird and bat excrements can be found. Earlier experiments revealed that *Hc* is able to metabolize many complex nitrogen sources such as uric acid and allantoin. *AreA* has been characterized as the key negative-regulator of nitrogen metabolism in closely related ascomycetes. *AreA* represses transcription pathways of less energetically favored nitrogen sources in the presence of a preferential nitrogen sources such as ammonia or glutamine by binding the promoters of these specific nitrogen utilization pathways. *AreA* contains three highly conserved domains across fungal species: an N-terminus, DUF 1752 and a GATA zinc finger. An *AreA* homolog has been identified in *Hc* that contains all three of the highly conserved domains. The focus of this project is to create a tagged-*AreA* construct for the use in western blotting and indirect immunofluorescence. This is to be completed in hopes of determining if *AreA* is being modified on the post-translational level as well as being sequestered to different compartments of the cell based on the nitrogen environment.

P2.17

IL-17 PROTECTS WEST NILE VIRUS INFECTION BY ENHANCING CD8⁺ T CELL MEDIATED CYTOTOXICITY

Dhiraj Acharya, Amber Paul, Jordan Elizabeth Lowery, Fengwei Bai

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West Nile virus (WNV), a mosquito borne virus with a growing threat in North America, can cause severe encephalitis in human for which specific antiviral drug or vaccine is currently unavailable. The pathogenesis of WNV encephalitis and the role of host immune system in recovery from WNV infection are still not adequately investigated. A newly characterized cytokine, interleukin-17 (IL-17) has been implicated in inflammation and some neuroinflammatory conditions, such as experimental autoimmune encephalitis. Here in, we found that IL-17^{-/-} mice developed enhanced viral load in blood and brain compared to wild-type (WT) control mice. Consistent with this, IL-17^{-/-} mice (20% survival) were more susceptible to severe WNV infection compared to WT (60% survival). Interestingly, we found that WNV specific effector CD8⁺ T cells isolated from IL-17^{-/-} mice have a reduced cytotoxicity compared to those from WT mice. These results suggested that IL-17 signaling protects WNV infection through enhanced CD8⁺ T cell mediated cytotoxicity. CD8⁺ T cells have been previously shown to play a prominent role in killing WNV-infected cells and protection from fatal WNV infection. Further studies are warranted to elucidate the mechanism by which IL-17 signaling regulates CD8⁺ T cell responses during WNV infection.

P2.18

NOVEL ANTIBODY CONJUGATED NANOPARTICLES BLOCK CMV INFECTION

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Cytomegalovirus (CMV) is a dsDNA herpesvirus, which infects a majority of the human population. Infection with CMV is often latent in healthy individuals with no obvious clinical symptoms. However, primary infection or reactivation of latent CMV can lead to life threatening conditions in immunocompromised individuals, such as AIDS patients and organ transplant recipients. CMV is also the most common cause of congenital infection in the USA, which can result in premature birth or permanent disabilities. At present, a vaccine is not available for CMV infection and the few antivirals that are available suffer from efficacy, resistance, and safety issues. We are interested in developing and testing new antivirals to treat herpesvirus infections. The aim of the current study is to synthesize novel antibody conjugated nanoparticles and test their potential as future antivirals against CMV. Three different shapes of gold nanoparticles (GNP) were synthesized and chemically linked to a monoclonal antibody raised against the surface glycoprotein (gB) of CMV. Our results show that all three gB-GNPs block viral replication, virus induced cytopathogenic effects, as well as virus spread in cell culture without causing significant cytotoxicity. When incubated with high concentrations gB-GNPs, the virions are completely coated by nanoparticles resulting in a block in virus entry into cells. At lower concentrations of gB-GNPs, the virus entry is not blocked, however, virus replication is blocked a later stage of infection. Thus, we have characterized novel antibody conjugated nanoparticles that specifically block CMV replication at multiple stages of infection without impacting cell viability.

P2.19

OSTEOPONTIN SIGNALING FACILITATES WEST NILE VIRUS ENCEPHALITIS

Amber Paul, Dhiraj Acharya, Linda Gates, Fengwei Bai

University of Southern Mississippi, Hattiesburg, MS, USA

West Nile virus (WNV) is a positive sense, single-stranded RNA *flavivirus* that can cause neuroinvasive disease, including flaccid paralysis, encephalitis and possible death. The mechanisms by which WNV enters the central nervous system (CNS) and host-factors involved in WNV-neuroinvasiveness are not completely understood. Osteopontin (OPN), a multi-function glycoprotein, has been implicated as a marker of neuroinflammatory diseases, such as neuroinvasive-HIV encephalitis. In this study, we found that OPN expression was dramatically up-regulated in both human peripheral blood mononuclear cells (PBMC) and murine bone marrow derived dendritic cells (BMDC) following WNV infection, indicating a role for OPN in WNV pathogenesis. After WNV challenge, wild-type (WT) C57BL/6 and *OPN*^{-/-} mice demonstrated comparable levels of viral clearance from blood and peripheral organs. In contrast, the viral burden in the brain

of *OPN*^{-/-} mice was significantly lower than that in WT mice. Consistent with this, *OPN*^{-/-} mice exhibited a higher (80%) survival rate than WT mice (20%) after a lethal dose (1000 Plaque Forming Units) of WNV infection. Together, these data suggest that the OPN signaling mediates WNV encephalitis.

P2.20

HISTONE H2B DIFFERENTIAL EXPRESSION IN YEAST AND MOLD MORPHOTYPES OF A DIMORPHIC PATHOGENIC FUNGUS HISTOPLASMA CAPSULATUM

Lacey Rachel Lee Howard, Glen Shearer

University of Southern Mississippi, Hattiesburg, MS, USA

Histoplasmosis, a relatively common pulmonary infection, is caused by the dimorphic fungus *Histoplasma capsulatum* (Hc), which can be found in the mold (M) form in soils (or when grown in the laboratory at 25°C) or in the pathogenic yeast (Y) form in infected mammals (or when grown in the laboratory at 37°C). *Histoplasma capsulatum* is prevalent in soils fertilized by bird excrement in the Ohio/Mississippi River Valley region. Since the mold-to-yeast conversion is essential for pathogenesis, controlling the morphogenesis of this dimorphic fungus may be essential to controlling histoplasmosis. Elucidation of this differentiation/de-differentiation process may also yield information regarding reversible differentiation in other eukaryotes. Our lab has identified a number of genes upregulated in the mold and yeast morphotypes. One such gene identified as strongly upregulated in the yeast morphotype was Histone H2B. H2B is involved in DNA packaging and thus may play a role in M-to-Y phase transition by allowing access to certain M phase genes while sequestering Y phase genes and vice versa. To analyze copy number and differential expression of *HcH2B*, Southern and northern blot were probed with *HcH2B* DNA from the G186AS strain. Real-time PCR was used to quantitate the differential expression from the northern blot. Southern blot analysis indicated that *HcH2B* appears to be a single copy gene. Northern blot analysis and real-time PCR showed that *HcH2B* was more highly upregulated in the yeast. Currently we are attempting to construct H2B allelic replacement mutants to study the impact of loss of function of this gene.

P2.21

EXPRESSION OF STRESS-RELATED GENES IN THE RED BLOOD CELLS OF THE ATLANTIC STINGRAY (*Dasyatis sabina*)

Ethan Joseph Semrad¹, Andrew Evans²

¹Belhaven University, Jackson, MS, USA, ²University of Southern Mississippi Gulf Coast Research Laboratory, Ocean Springs, MS, USA

Unlike the red blood cells (RBCs) of many vertebrate taxa, elasmobranch RBCs are nucleated. Because of this, they may play a pivotal role in the first response to stress. The first step to determine if RBCs are part of the elasmobranch stress response is to determine what stress-related genes they express. We took blood samples from Atlantic stingray (*Dasyatis sabina*) and performed PCR for the following physiological and osmotic stress-related genes: Heat Shock Protein 70 (*HSP70*), Serum-

and Glucocorticoid-Inducible Kinase (*SGK*), Mineralocorticoid Receptor (*MR*), Glucocorticoid Receptor (*GR*), Angiotensin Receptor (*AT*), and Natriuretic Peptide Receptor (*NPR-B*). Glyceraldehyde 3-Phosphate Dehydrogenase (*GAPDH*) is the housekeeping gene to which the expression of the other genes was compared. We saw that the RBCs expressed several of the genes involved in the stress response and thus may play a part in the first response to stress. There was strong expression of *HSP70*, *MR*, and *GR*, which implies that the RBCs may respond to cellular stress and corticosteroids. *NPR-B* was expressed in all groups but its expression was not as strong as *HSP70*, *MR*, and *GR*. *SGK* was not expressed under basal conditions and *AT* was only expressed by one of the samples so future studies are needed to determine if RBC *SGK* and *AT* gene expression is inducible by stress or other factors.

P2.22

THE POSSIBLE ROLE OF ABSCISIC ACID SIGNALING IN NITROGEN ASSIMILATION

Udhghatri Kolli, Jiaxu Li

Mississippi State University, Mississippi State, MS, USA

The Plant hormone abscisic acid (ABA) plays an important role in plants growth and development processes. ABA accumulates in plants under stress conditions and acts as a signal, leading to complex tolerance pathways. The expression patterns of many proteins involved in the developmental and metabolic process are reported to be altered in response to the endogenously applied ABA. In order to understand the effect of ABA on the expression and activity of enzymes, we studied the activity profiles of various stress responsive enzymes like super oxide dismutase, catalase, peroxidase and the enzymes involved in nitrogen assimilation pathway in response to application of ABA to the model plant *Arabidopsis thaliana*. Nitrogen is important for plant growth. Most plants get their nitrogen in from of nitrate and ammonium from the soil and are assimilated in the plants through nitrogen assimilation pathway. In an attempt to understand the role of ABA signaling in nitrogen metabolism and abiotic stress responses in plants, we looked at the effect of endogenously applied ABA on the activity of certain enzymes involved in nitrogen assimilation, like aspartate aminotransferase, alanine aminotransferase, and glutamate synthase in model plant *Arabidopsis thaliana*. Of all the enzymes studied, the change in the activity of aspartate aminotransferase in response to the endogenously applied ABA was found to be novel. So, the enzyme aspartate aminotransferase was further studied and the changes in the activity profiles of the enzyme under drought and high salt conditions were monitored.

P2.23

ROLE OF AN ABSCISIC ACID-ACTIVATED PROTEIN KINASE IN DROUGHT TOLERANCE

John Peebles, Yuxuan Hou, Jiaxu Li

Mississippi State University, Mississippi State, MS, USA

Drought is the major environmental factor limiting crop productivity. There is therefore a great need for crop improvements that will increase drought tolerance and stabilize

crop yield under drought conditions. Abscisic acid is an important hormone in mediating the adaptation of the plant to drought stress. We have previously identified an abscisic acid-activated protein kinase (AAPK) in fava bean and demonstrated that AAPK is a positive regulator that can enhance abscisic acid signaling. The objective of this project is to determine the role of a rice AAPK-like protein kinase in plant responses to drought stress. To this end, we have generated over-expression and under-expression (knockdown) lines of AAPK in rice. Analysis of AAPK over-expression lines shows enhanced drought tolerance, suggesting that AAPK is a positive regulator of drought tolerance.

March 7, 2014

FRIDAY MORNING

Lakeview 1

8:20 OPENING REMARKS

02.18

8:30 FIVE TRACE ELEMENTS RESPONSIBLE FOR ALTERING THE SOYBEAN SEED PROTEIN, OIL AND FATTY ACIDS COMPOSITION

Daniel Kibet, Mudlagiri Goli, Manju Pande

Mississippi Valley State University, Itta Bena, MS, USA

The current study is aimed to investigate the effects of five trace elements and citric acid (CA) and the combination of those elements with CA on soybean seed protein, oil, and fatty acids. The compounds were Mn, Cu, Zn, Mo, B and plant chemical citric acid (CA). Soybean cultivar (Bolivar with maturity group V) was grown in a repeated greenhouse experiment in a randomized complete block design. The compounds were applied in a combined combination of the compounds with chelating agent CA (example, Mn+CA) to soybean plants vegetative (V3) stage, and one time R3 (beginning of seed pod initiation) stage. The Mn, Cu and B treatments increased protein. Zn, Mo, CA, Cu+CA, Zn+CA, Mo+CA and B+CA increased the oil. The Mn, Mo, CA, Cu+CA, Zn+CA and Mo+CA treatments increased the palmitic acid. The CA, Mo + CA, B+CA increased the stearic. The Cu and B treatments increased the oleic acid. Mn+CA, Cu+CA, Zn + CA, Mo+CA and B+CA all decreased oleic acid. The similar treatments of Cu, Zn, Mo, B, CA, Mn+CA, Cu+CA, Mo+CA and B+CA all increased linoleic acid. Cu and B compounds behaved similarly to Fe compounds in that they increased oleic acid. A possible compound that can alter seed composition may exist and can be used to select for desirable seed composition constituents.

02.19

8:45 CYSTATINS PLAY ROLE IN TICK BLOOD FEEDING AND PATHOGEN INFECTION

Khemraj Budachetri, Shahid Karim

University of Southern Mississippi, Hattiesburg, MS, USA

Background: Intracellular tick-borne pathogens have developed mechanisms to survive in both the arthropod vector and reservoir host, by differentially expressing genes

depending on their environment. We hypothesized that tick cystatins play important role in tick blood feeding, pathogen colonization and transmission in ticks. In this study, three secretory tick cystatins from the *Amblyomma maculatum* sialotranscriptome were selected for further characterization based on their differential expression upon blood meal regulation. Methodology/Principal findings: The gene expression profile in tick tissues provided an evidence for physiological role during the slow or fast blood feeding stage. The functional assay with RNA interference of selected cystatins showed the marked reduction in tick blood meal uptake. Though, the exact mechanism of tick cystatin protein family in *R. parkeri* pathogenesis is not known yet. The global gene expression of *A. maculatum* tick salivary glands infected with *R. parkeri* infection was determined by RNA-seq. Expression of cystatins genes were validated by qRT-PCR as down regulated with infection which may facilitate pathogen for colonization and proliferation. Conclusions/Significance: Our results underscore the importance of tick cystatins during blood meal acquisition and pathogen infection.

02.20

9:00 AN ALLOSTERIC GAIN OF FUNCTION MUTATION CANNOT COUNTERACT A LOSS-OF-FUNCTION MUTATION AT THE GPIIb-IIIa BINDING SITE OF VWF A1 DOMAIN

Barsha Subba¹, Alexander Tischer², Pranathi Madde², Matthew Auton²

¹Mississippi University for Women, Columbus, MS, USA,

²Mayo Clinic, Rochester, MN, USA

Von Willebrand disease is a bleeding disorder caused by alteration or deficiency in von Willebrand factor (vWF). Whenever there is a vascular injury, the A1 domain of vWF is responsible for binding platelets via the receptor glycoprotein 1b- α (GPIIb/IIIa). To investigate how changes in the structure in the A1-domain of vWF affect GPIIb/IIIa binding, we generated R1450E, G1324S, and R1450E/G1324S mutants of the A1 domain of vWF protein. R1450E shows a gain of function and binds platelets stronger than WT A1. G1324S shows a loss of function and does not interact with platelets at all. When we examined the thermodynamic stability of the mutants by CD- and fluorescence spectroscopy, the gain-of-function R1450E mutant was less stable than wildtype A1, while the loss-of-function mutant G1324S mutant was more stable. We generated the double R1450E/G1324S mutant under the hypothesis that it would retain the superior platelet-binding ability of the R1450E mutant along with the superior thermodynamic stability of the G1324S mutant. However, CD- and fluorescence spectroscopy revealed the double mutant to be less stable than wildtype A1, while functional flow assays revealed that the double mutant was unable to bind platelets. Hence, we conclude that gain-of-function mutation combined with the loss-of-function mutation do not cancel each other out but yield both a less stable and an inactive A1-domain.

02.21

9:15 MOSQUITO CELL MODULATES CHIKUNGUNYA VIRUS INFECTIVITY

Dhiraj Acharya, Amber Paul, Joseph Spangler, Faqing Huang, Shiao Wang, Fengwei Bai

University of Southern Mississippi, Hattiesburg, MS, USA

Chikungunya virus (CHIKV) is a mosquito-transmitted alphavirus that can cause fever and chronic arthritis in humans. Recent CHIKV epidemics brought new insight to the CHIKV disease including higher number of symptomatic cases and more severe clinical manifestations. How CHIKV became a successful pathogen after long dormancy remains unresolved. Re-emergence of CHIKV was correlated with rapid spread of *Aedes albopictus* and increased fitness of CHIKV in this mosquito. We recently found that CHIKV generated in Vero cell (CHIKVero) infect earlier and produced high viral titer compared to mosquito cell generated virus (CHIKmos), when tested *in vitro* in both human and murine cell lines. Consistent with the difference in infection, we found differential expression patterns of host antiviral sensor and cytokines response in CHIKVero and CHIKmos infected cells. Interestingly, we found that CHIKmos has a reduced attachment to host cell, whereby only CHIKVero but not CHIKmos used heparan sulfate receptor to attach into cells. Murine *in vivo* study further confirmed that CHIKVero infection produced both high viremia and pronounced foot swelling, compared to CHIKmos infection. We conclude that mammalian cell-generated CHIKV is more infective than mosquito cell - generated CHIKV. This property might play an important role in CHIKV biology and evolution.

02.22

9:30 GOLD-NANOPARTICLES DELIVER ANTI-DENGUE SMALL INTERFERING RNA

Amber M. Paul¹, Yongliang Shi¹, Dhiraj Acharya¹, Amanda Cooley¹, John F. Anderson², Faqing Huang¹, Fengwei Bai¹

¹University of Southern Mississippi, Hattiesburg, MS, USA,

²Connecticut Agricultural Experiment Station, New Haven, CT, USA

There is currently no specific therapeutic or approved vaccine for Dengue virus (DENV) infection. A promising alternative to traditional vaccine development is using small interfering RNAs (siRNAs) that target specific viral genes as a therapeutic to inhibit viral replication in humans. However, siRNAs are vulnerable to degradation by serum-nucleases *in vivo*. In this study, we utilized biocompatible gold nanoparticles (AuNPs) to effectively deliver anti-DENV siRNAs *in vitro*. Vero cells that were exposed to AuNP:siRNA complexes before and after DENV-serotype 2 infection, had reduced DENV replication and infectious virion release. In addition, AuNP:siRNA complexes were not cytotoxic, as measured by a lactate dehydrogenase assay. Moreover, RNase-pretreated AuNP:siRNA complexes inhibited DENV replication, suggesting AuNPs protect siRNAs from RNase degradation. Collectively,

these results demonstrate that AuNPs can be used to deliver siRNAs into cells and control DENV infection *in vitro*, indicating a potential anti-DENV strategy.

02.23

9:45 STUDY OF THE ROLE OF THE MOLD-SPECIFIC MS95 GENE IN DNA REPAIR IN THE PATHOGENIC, DIMORPHIC FUNGUS HISTOPLASMA CAPSULATUM

Erin Michelle Smith, Logan Blancett, Davida Crossley, Glen Shearer

University of Southern Mississippi, Hattiesburg, MS, USA

Histoplasma capsulatum (*Hc*) is a dimorphic fungus that is the etiologic agent of the respiratory infection Histoplasmosis. In the environment, *Hc* exists as a multicellular, differentiated mold. The organism undergoes a shift to a unicellular, undifferentiated yeast once inhaled into the host's lungs. This mold to yeast transition is essential in the pathogenicity of *Hc*. Genes have been identified that are specific to the mold or yeast phase in order to study the molecular biology of this shift. In our lab, MS95 was identified in a subtractive cDNA library that was enriched for mold-specific genes. The gene was characterized via northern and southern blot analysis of four *Hc* strains, confirming that it is mold-specific. Using NCBI genbank and BLAST analysis, it was found that MS95 is homologous to the DNA damage-responsive gene *DDR48*, which functions in DNA repair in *Saccharomyces cerevisiae*. It is hypothesized that MS95 may be involved in DNA repair in *Hc*. In order to elucidate the function of MS95, a loss of function mutant was created via allelic replacement. To determine if MS95 is involved in DNA repair, wild-type and MS95 knockout mutant strains were grown on *Histoplasma* macrophage media (HMM) supplemented with varying concentrations of 4-nitroquinoline 1-oxide (4-NQO) or paraquat dichloride, which are known to induce DNA damage via oxidative stress. Growth was monitored for any changes between the two strains indicating that MS95 plays a role in DNA repair. Future experiments include creating a complement of MS95 and subjecting it to the same stress experiment.

10:00 Coffee Break

02.24

10:15 CHARACTERIZING A NEW OPERON, *msa*, AND ITS ROLE IN BIOFILM DEVELOPMENT AND VIRULENCE

Gyan Sundar Sahukhal, Mohamed O. Elasri

University of Southern Mississippi, Hattiesburg, MS, USA

Emergence of community-acquired methicillin resistant *Staphylococcus aureus* (CA-MRSA) strains is causing severe infections among healthy individuals without predisposing risk factors outside the hospital setting. The fundamental key behind the success of these strains is their ability to quickly respond to environmental conditions by differentially regulating genes. Previously we identified the

msa gene as a global regulator in *S. aureus*. In this study we define a new operon that contains the *msa* gene in CA-MRSA clinical strain USA300 LAC. Transcript analysis by SMARTer™ RACE cDNA amplification assay to find the transcription start and end shows that *msa* gene is part of a three-gene operon. RT-qPCR analysis of the expression of the three open reading frames and their intergenic regions also confirmed the structure of the *msa* operon. We delete the putative *msa* operon and studied different phenotypes of the mutant. We studied biofilm formation under static and flow conditions and examined the structure and composition of biofilm using confocal microscopy. Deletion of *msa* operon down-regulates the expression of global regulators *sarA*, and *agrA* by 3.59 and 6.7 fold respectively. The mutant showed significant increase in autolysis and reduced biofilm formation. The mutant also showed decreased pigmentation and increased extracellular protease activity. These results show that *msa* operon plays a key role in autolysis, biofilm development and regulation of virulence genes. Identification of this operon and expression of the three open reading frames will allow us to define the mechanism of action of this locus.

02.25

10:30 THE ROLE OF GenF IN THE ASYMMETRIC DISTRIBUTION OF THE VIRULENCE PROTEIN, IcsA IN SHIGELLA FLEXNERI

Birendra Sharma, Lauren D. Brandon

Mississippi University for Women, Columbus, MS, USA

Shigella spp. are obligate intracellular pathogens and causative agents of shigellosis. The pathogenesis of *Shigella* involves the invasion of colonic epithelial cells. Once the bacteria have entered a cell they recruit actin filaments for directional movement within these cells and for subsequent invasion of adjacent cells. The *Shigella* outer membrane protein, IcsA is the sole bacterial protein required for the recruitment of actin filaments. It is essential to *Shigella* pathogenesis in that it is targeted and restricted to the old pole of the bacterium and in that the polar distribution of IcsA is directly correlated with directional movement of *Shigella* within colonic epithelial cells and its efficient dissemination to uninfected cells. We are interested in identifying and characterizing mutations that affect the polar targeting of IcsA in *Shigella*. To this end, we have chosen to study an uncharacterized protein that is asymmetrically associated with the inner membrane of Gram negative bacteria. We have employed pcr to displace the corresponding gene (*genF*) with *natA* (nourseothricin acetyl-transferase). Such mutant was subjected to surface labeling experiments using antibodies to IcsA to examine the surface distribution of IcsA on intact bacteria. We found that IcsA was associated with each bacterium in a circumferential fashion as compared to wild type strains where IcsA was located at the old pole of each bacterium. We are interested in determining whether GenF represents a putative polar target for IcsA polar targeting and subsequent polar secretion to the surface of a given bacterium.

02.26

10:45 **ENHANCEMENT OF RADICAL QUENCHING ABILITY OF CHEDDAR AND EDAM WHEY: MUTUAL SUPPLEMENTATION WITH BLACK TEA EXTRACT**

Zahur Haque, Dipaloke Mukherjee, Wenji Shao, Haley Abessinio, Sam Chang

Mississippi State University, Mississippi State, MS, USA

Reactive oxygen species (ROS) induced oxidative damage of cells causes cellular damage leading to morbidity and mortality. Therefore, there is constant pursuit of powerful radical scavenging foods. This research investigates the enhancement of the short term (antioxidative activity)(AA) and long term (antioxidative persistence) (AP) ROS quenching ability of sweet whey (Cheddar [CW] and Edam [EW]) by mutual supplementation with black tea (BT) extract. Whey samples were produced by dispersing freshly prepared CW (3%, w/v) in McIlvaine's iso-ionic buffer (pH 7.0). BT was extracted (1%, w/v) in the same buffer. The extract was further diluted 16-folds to attain the point at which the least antioxidative activity is exhibited. Luminol-induced chemiluminescence (CL) due to proliferation of unquenched hydroxyl radicals due to pyrolysis of 2,2'-Azobis (2-methylpropionamidine) dihydrochloride (ABAP) was studied for an hour to assess AE of the samples following which the samples were challenged for a second time with an equal volume of ABAP to measure residual antioxidative capability referred to as AP. Data exhibited the dramatic enhancements of both AE and AP of the whey samples in the presence of BT. The chemiluminescence maxima for the blank (indicating the point of maximum radical proliferation) after the initiation of the first ABAP challenge was recorded after 12 minutes (970.5 relative light unit, [RLU]), whereas those for BT, CW and CW+BT were 206.9, 175.9 and 127.1 RLU, respectively signifying dramatic radical quenching. This showed significant synergy and provides clue to the development of powerful natural antioxidants to counter premature aging and disease.

02.27

11: 15 **THE REGULATORY RELATIONSHIP BETWEEN MSA AND SARA IN STAPHYLOCOCCUS AUREUS**

Justin Batte, Mohamed O. Elasri

University of Southern Mississippi, Hattiesburg, MS, USA

Staphylococcus aureus is the causative agent of many nosocomial and community acquired infections worldwide. This pathogenic microorganism possesses many different virulent genes that allow it to be successful in the infection and colonization process within the host. S. aureus has developed a very complex regulatory network that is responsible for the regulation of these different genes that are producing the virulence factors. Our lab has previously discovered one of these global regulators, called msa or (modulator of sarA). The msa gene has been prospected to "modulate" the effects of the known global regulator sarA. We have characterized the msa gene's

effect on the expression of many of the virulence genes and important regulators, including sarA, found within S. aureus. Many different phenotypic effects have been observed from an msa deletion mutant in USA300 LAC background such as decrease in biofilm production, increased rate of autolysis, increased protease activity, and decreased hemolytic activity. The main goal of this study is to determine if each effect is due to msa directly, or is through msa modulating sarA. Our experiments using an $\Delta msa \Delta sarA$ mutant in USA300 LAC background indicates that autolysis and protease activity are regulated by msa in a sarA-dependent mechanism. In addition to these findings, the biofilm production and hemolytic activity will be determined. Transcriptional analysis will also be performed using RT-qPCR to further characterize the regulatory relationship between msa, sarA, and several virulence factors.

02.28

11:15 **EVALUATION OF SMALL MOLECULES AS A METHOD TO STABILIZE THE FORMATION OF A STABLE FOUR WAY JUNCTION (4WJ)**

Ann Brahan, Anthony Bell

University of Southern Mississippi, Hattiesburg, MS, USA

Can a class of small molecules be used in vitro to form stable four-way junction DNA structures? The purpose of this research is to investigate the potential of small molecules as a method to induce the stable formation of four-way junctions (4WJ). 4WJs are referred to as Holliday junctions. 4WJs are most well known as intermediate structures involved in DNA recombination and repair. The proposed recombination model is based on genetic transfer between different chromosomes making contact points via Holliday junctions. It is widely suspected that 4WJs facilitate replication. However, there is an emerging view that 4WJs may serve as ideal substrates to stall replication. If the second scenario is plausible, the controlled formation of 4WJs could offer a potential method to inhibit the replication of pre- and cancerous cells. The long term goal of this project is to use small molecules to promote the formation of 4WJs in vitro. Our short term research goals are focused on screening commercially available small molecules to determine their efficiency in forming 4WJs. Polyacrylamide gel electrophoresis (PAGE gels) is the method of detection to monitor junction formation. Once a successful compound has been identified, the stability of the resulting 4WJ will be investigated further using circular dichroism.



CHEMISTRY AND CHEMICAL ENGINEERING

Chair: Zikri Arslan,
Jackson State University

Vice-Chair: Douglas Masterson,
University of Southern Mississippi

March 6, 2014

THURSDAY MORNING

Exhibit Hall B

7:55 OPENING REMARKS

Plenary Session I

ANALYTICAL CHEMISTRY/APPLIED SPECTROSCOPY

03.01

8:00 SELECTIVE EXTRACTION OF COPPER IONS FROM WATER SAMPLES USING ION- IMPRINTED POLYMER

Zikri Arslan¹, Vedat Yilmaz^{1,2}, Orhan Hazer³, Hayriye Yilmaz²

¹Jackson State University, Jackson, MS, USA, ²Erciyes University, Turkey, ³Bozok University, Turkey

This work describes selective solid extraction of Cu(II) ions from water using a Cu(II)-ion imprinted polymer prepared with 2-thiozylmethacrylamide. Cu(II) were quantitatively retained on a minicolumn of the polymer between pH 5 and 6. Non-imprinted counter of the polymer (NIP) provided maximum 61% recoveries. The experimental conditions were optimized for on-line preconcentration and determination of Cu(II) by inductively coupled optical emission spectroscopy (ICP-OES). A volume of 10 mL sample solution was loaded onto the column at 4.0 mL min⁻¹ by using a sequential injection system followed by elution with 1.0 mL of 2% (v/v) HNO₃. The IIP showed about 30 times higher selectivity to Cu(II) in comparison to NIP. The IIP also exhibited excellent selectivity for Cu(II) against the competing transition and heavy metal ions, including Cd, Co, Cr, Fe, Mn, Ni, Pb and Zn. Computational calculations revealed that the selectivity of IIP was mediated by the stability of Cu(II)-TMA complex which was far more stable than those of Co(II), Ni(II) and Zn(II) that have similar charge and ionic radii to Cu(II). A limit of detection of 0.4 µg L⁻¹ was obtained for an enrichment factor of 5. The method was successfully applied to determination of Cu(II) in fish otoliths (CRM 22), bone ash (SRM 1400) and coastal seawater and estuarine water samples.

03.02

8:15 ENVIRONMENTAL FATES AND TRANSFORMATION OF Cs, Co, AND Sr IN THE SOILS OF US COASTAL ECOSYSTEM

Fengxiang Han, Leondra S. Lawson, Ruipeng Dong, Christian Rogers, Hongtao Yu

¹Jackson State University, Jackson, MS, USA

With the fast growth of world population and increasing demand

for energy consumption, nuclear energy has become a promising emission-free clean energy. The concerns of the public on safe handling of nuclear energy power facilities have increased due to the recent nuclear plant accidents in Japan and others. Cesium (Cs), strontium (Sr), cobalt (Co) etc. are major radionuclides released from nuclear power plant accidents as fission products and reactor waste. In order to understand the ecological and biogeochemical impact of this integration on the US coasts, a controlled experiment with US coastal soils was designed. A coastal soil from Moss Point, MS was collected and spiked with different concentrations of cesium, cobalt, and strontium salts. The kinetic change over the course of two months was observed. The redox potential and the pH change for the spiked soils at two different moisture levels, field capacity and saturated paste water regimes, were recorded. In addition to the redox and pH studies, a selective sequential dissolution procedure was used to determine the metal speciation and solid-phase binding in the coastal soil. The concentrations of cesium, cobalt, and strontium were determined with ICP-OES and ICP-MS. This research monitors the dynamic changes in cesium, cobalt, and strontium among solid-phase components over time and provides insight as to their biogeochemical transformation in order to design the cost-effective remediation technology to remove these metals and better prepare the US for future potentially nuclear power plant accidents.

03.03

8:30 SORPTIVE REMOVAL OF ORGANIC COMPOUNDS AND METALS FROM AQUEOUS SOLUTION USING BIOMASS CHAR

Todd Mlsna, Matthew Essandoh, Bidhya Kunwar, Charles Pittman, Dinesh Mohan

Mississippi State University, Mississippi State, MS, USA

Char was prepared and used for the removal of organic compounds and metals from aqueous solution. The char was prepared by pyrolysis of the biomass materials at 450 °C. The characterization of the adsorbent was studied using Fourier transform infrared spectroscopy, scanning electron microscopy, scanning electron microscopy/energy dispersive X-ray spectroscopy, surface area measurement, and zero point charge measurement. Batch sorption studies were carried out at different pH values, concentrations and temperatures. The total amount of salicylic acid and ibuprofen adsorb were determined quantitatively using uv-vis spectrophotometer. The results obtained were evaluated using Freundlich, Langmuir, and Sips adsorption isotherm models. The results show that the sorption capacity of the prepared adsorbent was successful in removing organics and metals from aqueous solution.

03.04

8:45 MERCURY GAS EXCHANGES OVER BARE SOILS AND OTHER LANDFORMS IN MISSISSIPPI

James Cizdziel, Jiang Yi

University of Mississippi, Oxford, MS, USA

Emissions of mercury from soils are considered a major contributor to the atmosphere but there have been few

investigations directly and systematically comparing mercury flux rates for different soils. In order to evaluate and understand mercury gas exchange processes for bare soils and for other landforms in Mississippi, we measured mercury flux rates using a dynamic flux chamber under different experimental conditions. While measuring gaseous mercury, we monitored solar flux, temperature, and other key parameters. Solar radiation strongly correlated with mercury emission rates. Some of the highest fluxes were measured in wetland sediments, spiking above $30 \text{ ng m}^{-2} \text{ hr}^{-1}$. The goal is to develop a model to begin to predict and scale mercury emissions from different landforms found in Mississippi and to address the impact of a warming climate. In this talk, I will introduce the global cycling of mercury, explain our mercury measurement and flux methodology, describe our ongoing research monitoring mercury in air and measuring mercury flux rates, and present our most recent findings.

O3.05

9:00 STABILITY AND ANALYSIS USING THIN LAYER CHROMATOGRAPHY OF CURCUMIN & CURCUMIN IN TURMERIC AFTER HEATING IN EDIBLE OILS

Barsha Aangdembe Subba, Tshering Lama Sherpa, Adedoyin Adebowale, Ghanshyam Heda, Jiben Roy

Mississippi University for Women, Columbus, MS, USA

Turmeric is a popular curry spice, classified as 'generally recognized as safe' by US-FDA and widely used in cooking ethnic foods around the world. The active ingredient of turmeric is the curcumin having strong anti-oxidant and anti-inflammatory properties. These properties make curcumin a potential candidate for therapeutic investigations for many diseases including cancer and Alzheimers. The objective of this study is to find out the effects of heating curcumin as well as turmeric in edible oils. This investigation will give some idea about the stability of curcumin in turmeric in domestic cooking. While analyzing curcumin from edible oil, a unique new TLC method was developed using two different mobile phases: hexane followed by a mixture of dichloromethane (98.5%) and methanol (1.5%). The TLC plates with the colored spots were used for quantification after photo-scanning by a standard desktop scanner and then subjected to Quantity One 1-D analysis software (Bio-Rad Laboratories). The results of samples collected at different temperatures starting from ambient temperature to 250°C indicated that about 25% degradation occurs at 250°C . This simple and cost effective TLC analytical technique can be used for both qualitative and quantitative measurement of colored (or stained) organic compounds.

O3.06

9:15 COLORIMETRIC AND OPTICAL SENSING OF ANIONS BY SYNTHETIC RECEPTORS IN WATER

Alamgir Hossain

Jackson State University, Jackson, MS, USA

The selective recognition and sensing of anions is an important research area in supramolecular chemistry because of the fundamental roles played by anions in chemical, biological,

medicinal, and environmental applications. In particular, the optical sensing via fluorescence and absorption techniques is a rapid and cost-effective way to detect an anion at a micromolar level in solution. Therefore, a significant effort has been made towards the design of chromogenic and fluorogenic receptors that can selectively recognize anions and act as sensors. This presentation will highlight anion binding chemistry with synthetic receptors that exhibit remarkable changes in optical properties with visible color in the presence of anions. Acknowledgement: The National Science Foundation is acknowledged for a CAREER award (CHE-1056927) to MAH. The NMR core facility at Jackson State University was supported by the National Institutes of Health (G12RR013459).

9:30 BREAK

9:45 - 11:30 AM PLENARY SESSION - II

ORGANIC AND BIOCHEMISTRY

O3.07

9:45 METHODOLOGY DEVELOPMENT USING OXYALLYL SILANES AS HOMOENOLATE EQUIVALENTS

Julie Pigza

University of Southern Mississippi, Hattiesburg, MS, USA

The development of new methodology is proposed in which oxyallyl silanes will act as homoenolate equivalents in the addition to various electrophiles. Unlike standard allylation, oxyallyl silane addition furnishes an alkene at an increased oxidation state as a vinyl ether. This precludes the use of traditional methods for functionalization of an alkene such as hydroboration-oxidation which can be difficult when the compound contains a nitrogen or when the alkene is near a sterically hindered position. In addition, the vinyl ether serves as a masked aldehyde and allows for further conversions to build complexity in short order. The broader application of the methodology is the conversion to small ring systems often found within biologically active natural products. This presentation will discuss some aspects of the research obtained while I was an Assistant Professor at a community college in New York and which continues in my new position at the University of Southern Mississippi.

O3.08

10:00 (E)-1-(2-HYDROXYPHENYL)-3-(PIPERIDIN-1-YL)-PROP-2-EN-1-ONE: STRUCTURAL CHARACTERIZATION BY X-RAY AND V-T NMR

Seunghyun Choi¹, Bernie Kim¹, Jonghyun Park¹, Eun Lee¹, Young Jeon¹, Ken Lee², Youngjoo Byun¹

¹Korea University, Republic of Korea, ²Jackson State University, Jackson, MS, USA

Enaminones (N-C=C-C=O) are versatile building blocks in the heterocycle synthesis and useful intermediates in the medicinal chemistry. Chalcone- and flavonoid-derived enaminones have exhibited pharmacological activities. Even if aryl enaminones have been utilized as key intermediates in drug development as

well as key scaffolds in the drug design, there have been few reports on the structural determination of arylaminones. We herein describes the structural characterization of (*E*)-1-(2-hydroxyphenyl)-3-(piperidin-1-yl)-prop-2-en-1-one, one of arylaminones, by means of temperature-dependent NMR spectroscopy and X-ray crystallography. The synthesis of (*E*)-1-(2-hydroxyphenyl)-3-(piperidin-1-yl)-prop-2-en-1-one was achieved from commercial 2-hydroxyacetophenone in 3 steps. Reaction of 3-acetyl-4H-chromen-4-one, the key intermediate, with piperidine underwent the ring opening to afford the final compound in 22% yield. X-ray structural analysis of (*E*)-1-(2-hydroxyphenyl)-3-(piperidin-1-yl)-prop-2-en-1-one exhibited the strong hydrogen bonding between the oxygen of the carbonyl group and the hydrogen of the 2-hydroxyl group on the phenyl ring. The distance between the carbonyl oxygen and the hydrogen is 1.66Å, which is in the range of normal hydrogen-bonding interaction. Temperature-dependent NMR studies showed the gradual change of N-CH₂ peaks of the piperidine from broad singlet to sharp doublet at ¹H NMR and from the weak broad to the strong sharp peaks at ¹³C NMR, indicating the unique flexibility of the piperidine ring at room temperature. Gibb's free energy of rotation is 15.0 kcal/mol at 25°C, closed to coalescence temperature, which was obtained from the Eyring equation. This phenomenon was not observed when the piperidine ring was replaced with the 5-membered pyrrolidine ring.

Eyring's Equation $\Delta G^\ddagger = RT[\ln(k_b T/h) - \ln(k_{rate})]$.

03.09

10:15 THE PHOTOCHEMISTRY OF N-SUBSTITUTED HETEROAROMATIC SALTS

Wolfgang Kramer, Lauren Hoth, Priya Patel, Courtney Mullins, GeNita Finley, Muzamil Khawaja, Irene Corrao, Emily Stewart, Woods Curry

Millsaps College, Jackson, MS, USA

Photoinduced cell death (Photodynamic Therapy, PDT) is becoming increasingly popular as a non-invasive cancer treatment. Current FDA-approved Photodynamic Therapy agents are singlet-oxygen sensitizers and the photoinduced toxicity consequently depends on oxygen availability. Since oxygen levels are usually low in tumors, our approach for a PDT reagent uses N-substituted heteroaromatic salts which do not require an external oxygen source. N-substituted heteroaromatic salts contain a fragmentable nitrogen-oxygen bond that yield a heteroaromatic radical cation and an alkoxy radical upon photoinduced homolytic cleavage. Both transient species are known DNA cleavers and have been individually used for DNA cleaving applications. Despite the efficient production of DNA cleaving species, DNA cleaving efficiency with the simple salts based on quinoline, isoquinoline, phenanthridine is extremely low. This is likely caused by weak ground-state association which causes the transient species to decay without interacting with DNA. To increase DNA binding an aromatic imide (1,8-naphthalimide, a known DNA intercalator) was synthetically attached with a flexible linker. A simple condensation reaction, followed by N-oxidation and alkylation yielded the photochemical starting material. DNA binding is determined by UV/VIS and fluorescence titration with the isoelectronic,

photostable N-ethyl derivative. CD spectroscopy is used to observe changes in the three-dimensional structure of DNA. DNA-cleaving is determined by gel electrophoresis and CD spectroscopy. Comparison with restriction endonucleases indicated the N-substituted heteroaromatic salts to be double-strand cleavers.

03.10

10:30 OXALATE OXIDASE ACTIVITY IN *E. COLI*

Cory Toyota¹, David Silverman², Chingkuang Tu²

¹Millsaps College, Jackson, MS, USA, ²University of Florida, Gainesville, FL, USA

The *Escherichia coli* enzymes YfdW and YfdU are an oxalate:formyl-CoA transferase and an oxalyl-CoA decarboxylase, respectively, and are homologues of the two *Oxalobacter formigenes* enzymes FRC and OXC. Coupled, these enzymes catalyze the decarboxylation of oxalate to yield formate. We have shown that YfdW and YfdU are indeed necessary for an oxalate-dependent acid tolerance system in *E. coli*. Membrane inlet mass spectrometry (MIMS) has been used to effectively measure concentrations of small molecules, like NO and CO₂, in aqueous solution and to determine the Michaelis-Menten kinetic constants for enzymes like oxalate decarboxylase. In MIMS experiments, we detect [¹³C]-CO₂ from [¹³C]-oxalate in whole cell extracts, however, these are in low concentration and present even in $\Delta yfdW$ and $\Delta yfdU$ deletion strains of *E. coli*. Concomitant O₂ consumption suggests the presence of a so-far unidentified oxalate oxidase

03.11

10:45 SYNTHETIC STUDIES TOWARD SPIRO-ISOXAZOLINE DERIVED MCF-7, MDA-MB-231, PC-3, AND DU-145 ANTI-CANCER AGENTS

Ashton Hamme¹, Prasanta Das¹, Ann Omollo¹, Lungile Sitole¹, Eric McClendon¹, Drazen Raucher², Leslie Walker², Edward Valente³

¹Jackson State University, Jackson, MS, USA, ²University of Mississippi Medical Center, Jackson, MS, USA, ³University of Portland, Portland, OR, USA

A number of structurally unique 4-bromo spiroisoxazolines possessing a variety of aliphatic and aromatic substituents at the 3 position of the isoxazoline were synthesized through a 1,3-dipolar cycloaddition which was followed by an intramolecular cyclization of a pendant alcohol or carboxylic acid substituent. The biochemical antiproliferative activity was evaluated *in vitro* by using two breast cancer cell lines (MCF-7 and MDA-MB-231) and two pancreatic cell lines (PC-3 and DU-145) using the MTT viability assay, and IC₅₀ values were obtained. Spiroisoxazoline derivatives bearing a *p*-chloro and *o*-dichloro aromatic substituent at the 3 position showed a considerable antitumor activities in all four cell line with IC₅₀ values ranging from 43μM to 57μM.

Acknowledgements: This project was supported by grants from the National Institute of General Medical Sciences (SC3GM094081-04), the National Center for Research

Resources (5 G12 RR013459-15), and the National Institute on Minority Health and Health Disparities (8 G12 MD007581-15) from the National Institutes of Health.

03.12

11:00 CELLULAR AND MOLECULAR STUDIES ON PLANT FLAVONOIDS AGAINST OXIDATIVE STRESS

Bidisha Sengupta

Tougaloo College, Tougaloo, MS, USA

Literature data provide evidence that consumption of fruits and vegetables helps in reducing risk of developing a wide range of diseases including cancer, tumor, atherosclerosis, neurodegenerative disorders. In this preliminary study, we evaluated the effects of flavonol quercetin and anthocyanidin malvidin chloride against stress induced by amyloid beta (A β) peptide and a pesticide methyl parathion (MP) in neuronal cell lines. The flavonoids are present in common vegetable and fruits namely onion and bilberries respectively. For cellular investigations we used MTT cell viability assay while for molecular studies we relied on UV/Vis absorption, fluorescence and melting as well as modeling studies. Oxidative stress has been implicated in the development of various diseases. Research has shown that a healthy weight, low total fat, saturated, monounsaturated, and polyunsaturated fat intake as well as a diet rich in omega-3 fatty acids, vitamin C, vitamin E, lycopene, alpha-tocopherol, selenium, beta carotene, and quercetin are inversely associated with risk of diseases. There is a significant decrease in A β and MP induced cell death in presence of flavonoids. Molecular studies are carried out on DNA and protein extracted from the cells which are exposed to MP in absence and presence of the flavonoids. The beneficial effects of the flavonoids in prevention of Alzheimer's disease may be related to their antioxidative activities.

03.13

11:15 SYNTHESIS, CHARACTERIZATION AND STRUCTURAL STUDIES OF COPPER(II) LEVULINATE CONTAINING NITROGEN AND OXYGEN DONORS

Ramaiyer Venkatraman¹, Frank Fronczek²

¹Jackson State University, Jackson, MS, USA, ²Louisiana State University, Baton Rouge, LA, USA

Coordination compounds with unusual structures and properties are attracting increased attention due to their potential application in molecular magnetism, catalysis, gas sorption, fluorescent sensing and optoelectronic devices. The derivative of copper(II) levulinate with 2-aminopyrimidine is polymeric with zigzag chain of Cu₂(lev)₄ units, bridged by the base. The dimers lie on an inversion center in the crystal with square pyramidal coordination, with four oxygen atoms in a plane. The average Cu-O bond distance is 1.9746 Å, and 1.9634 Å, Cu-N 2.233 Å and 2.2026 Å, Cu-Cu 2.6431 Å. The reaction of copper (II) levulinate with hexamethylenetetramine leads to the triclinic crystalline product interconnected through the hexamine nitrogen forming a 2D chain. The average Cu-O bond distance is 1.9773 Å, Cu-N 2.2031 Å and Cu-Cu 2.6089 Å. The copper(II) levulinate with benzthiazole and as well with 2-

aminobenzthiazole crystallizes in monoclinic P2₁/n space group. In each case, the nitrogen donor ligand attaches the copper atom axially without disturbing the paddle wheel formation. Each levulinate anion coordinates to form a 1D chain. Surprisingly, the thiazole molecules have inverted in each of the complexes perhaps due to intra-molecular hydrogen bonding between proton of the amino group nitrogen atom and two carboxylate oxygen atoms. In the case of copper(II) levulinate with 4-hydroxy pyridine, the copper atoms are connected through the oxygen atom of the hydroxyl group rather than the pyridyl ring nitrogen. The average Cu-O bond distance is 1.9635 Å, and Cu-Cu 2.6304 Å.

11:30 Business Meeting

12:00-12:30 Lunch

Exhibit Hall B

12:30 - 1:45 PM PLENARY SESSION - III

PHYSICAL CHEMISTRY AND MATERIAL SCIENCE

03.14

12:30 STUDIES OF CHARGE RETENTION AND DISSIPATION IN ORGANIC THIN FILMS

Song Guo, Frederick McFarland, Alyssa Griffin

University of Southern Mississippi, Hattiesburg, MS, USA

Multi-component organic films have inhomogeneous morphologies, usually composed of quasi-ordered domains with amorphous areas between these domains. The electronic functions of organic materials are determined by the transport of the charge carriers within the materials. The locations of the charge carriers in a multi-component organic film could be affected by many factors which likely lead to a heterogeneous distribution of the charged species. Here atomic force microscopy (AFM) -based techniques are used to study the arrangements of charged species in mixed organic films. One of the methods we use here is to inject charges into organic films by the conductive tips of AFM with ultra high spatial accuracy. The responses of the local electronic properties towards external electrostatic perturbation are used to explore the dynamics of charged species and their interactions in organic films. The domain boundaries function as a barrier to contain the injected charges. The charge spreading pattern is an effective way to reveal the hidden connections and networks between different domains and aggregations in the complex organic films. By correlating the dynamics of charged species after AFM charging with the local topographic information obtained in standard AFM experiments, our results should help to understand how intermolecular interactions in doped films are affecting charge carrier distributions. The knowledge gained here should facilitate future utilization of these interactions to modulate the electronic properties and the doping efficiencies of doped organic films

03.15

12:45 SUPERAMPHIPHOBIC INORGANIC-ORGANIC THIOL-ENE SURFACES VIA SPRAY-DEPOSITION AND PHOTOPOLYMERIZATION

Li Xiong, Laken Kendrick, Hannele Heusser, James Goetz, Sergei Nazarenko, Derek Patton

University of Southern Mississippi, Hattiesburg, MS, USA

Superamphiphobic surfaces, exhibiting high contact angles and low contact angle hysteresis to water and low surface tension liquids, have attracted a great deal of attention in recent years due to the importance in many practical applications. In this work, we present a simple strategy for fabrication of superamphiphobic coatings based on photopolymerization of hybrid thiol-ene resins. Spray-deposition and UV cure of thiol-ene resins containing hydrophobic silica nanoparticles and fluorinated thiols provides a multiscale topography that endows the surface with superamphiphobicity and repellency towards several low surface tension liquids. Droplet impact and sandpaper abrasion tests indicate the coatings respectively possess a robust anti-wetting behavior and good mechanical durability.

03.16

1:00 SELF-ASSEMBLY AND RESPONSIVENESS IN POLYPEPTIDE-BASED STAR AND TRIBLOCK COPOLYMERS: FROM DESIGN TO FUNCTION

Daniel Savin, Jacob Ray, Ashley Johnson, Greg Strange

University of Southern Mississippi, Hattiesburg, MS, USA

This study involves the bottom-up design and tunability of responsive, peptide-based block copolymers. The self-assembly of amphiphilic block copolymers is dictated primarily by the balance between the hydrophobic core volume and the hydrophilic corona. In these studies, amphiphilic diblock, triblock and star copolymers containing poly(lysine) (PK) and poly(glutamic acid) (PE) were synthesized and their solution properties studied using dynamic light scattering, circular dichroism spectroscopy and transmission electron microscopy. These materials exhibit hydrodynamic size that is responsive to pH, due in part to the helix-coil transition in the peptide chain, but also due to changes in curvature of the assembly at the interface. This talk will present some recent studies in solution morphology transitions that occur in these materials as a result of the helix-coil transition and associated charge-charge interactions. We exploit the responsiveness of these materials to encapsulate and release therapeutics such as doxorubicin and demonstrate the potential to achieve triggered release as a function of pH due to morphology transitions

03.17

1:15 ZERO TO THREE DIMENSIONAL NANO ARCHITECTURE FOR LABEL-FREE SENSING AND WATER PURIFICATION

Paresh C. Ray

Jackson State University, Jackson, MS, USA

Development of highly sensitive biological and toxin chemical technologies have ability to shift medical diagnosis to the next level and will have numerous applications for our society. Two dimensional chemically derived graphene oxide is an atomically thin sheet of graphite decorated with oxygen-containing groups, holds great potential for ultrasensitive sensing capability. Here we will discuss our recent report on the two dimensional graphene oxide's "zero dimensional plasmonic nanoparticle hybrid can exhibit synergistic properties thereby enhancing the achievable sensitivity and selectivity using a variety of sensing mechanism. For the practical use of nanomaterials for our society, three dimensional hierarchical architectures development from interconnected nanoscale building blocks is very important. We will discuss our recent report on the development of three dimensional magnetic architectures using dithiothreitol (DTT) and magnetic hollow nanoflower attached hybrid graphene oxide for complete removal of arsenic from contaminated water.

03.18

1:30 EVALUATION OF CARBON NANOTUBES AS A POTENTIAL ADSORBER OF ORGANIC POLLUTANTS FROM WATER MATRIX

Danuta Leszczynska¹, Marek Golebiowski²

¹Jackson State University, MS, USA, ²University of Gdansk, Gdansk, Poland

Preparation of environmental samples for analysis requires several steps, which includes pretreatment of sample. Solid-phase extraction (SPE) is a well-established, and an effective procedure in the field of separation techniques. It is used for the pre-concentration and cleanup of analytical samples. Carbon nanotubes (CNTs) have great potentials to be employed as new sorbent materials. In this talk we will summarize results from the study on use of CNTs as a novel adsorbent for solid-phase extraction (SPE). We have tested efficiency of various CNTs (different size, shape and doping)-packed SPE cartridges on several model organic pollutants found in surface water. Under the optimized conditions, high sensitivity and good reproducibility of organic compounds were achieved. The proposed method was successfully applied to the analysis of raw surface water collected within Jackson, MS. The concentrations in the eluate were determined by GC/MS. A total of 32 compounds were identified in the water, including hydrocarbons, PAHs, fatty acids and other organic compounds. This work not only proposes a useful method for environmental water sample pretreatment, but also reveals great potentials of CNTs as an excellent sorbent material in analytical methods. **Acknowledgements:** The authors would like to acknowledge financial support from the People Programme (Marie Curie Actions) of the European Union Seventh Framework

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1:45 BREAK

2:00 – 3:30 PM PLENARY SESSION – IV

COMPUTATIONAL CHEMISTRY AND NANOTECHNOLOGY

03.19

2:00 NANOPARTICLES PROPERTIES PREDICTION: PHYSICO-CHEMICAL, TOXICOLOGICAL AND PHARMACOLOGICAL ASSESSMENT

Bakhtiyor Rasulev, Danuta Leszczynska, Jerzy Leszczynski

Jackson State University, Jackson, MS, USA

Nowadays nanomaterials find use in a variety of areas, such as electronic, pharmaceutical, cosmetic, energy, environmental and bio-medical applications, including applications as drug-delivery agents. Because of peculiar physical and chemical properties, the study of nanoparticles requires an interdisciplinary approach, involving multiple aspects ranging from physics and chemistry to biology and medicine. In this report we show results of several our studies where we investigated physico-chemical, pharmacological properties and toxicity of nanoparticles by computational methods. The discussed cases include solubility assessment of C60 fullerene in various solvents, toxicity and genotoxicity assessment of metal oxide nanoparticles, and pharmacological properties assessment of fullerene derivatives.

03.20

2:15 COMPUTATIONAL STUDIES ON SELECTED NANOMATERIALS: PROPERTIES AND INTERACTIONS

Jerzy Leszczynski

Jackson State University, Jackson, MS, USA

This talk highlights the most significant achievements and challenges related to our recent studies of nanomaterials. Among studied species are fullerenes, carbon nanotubes, metal and metal oxide clusters. Possible applications for hydrogen storage, DNA protection and damage, and nerve agent detections and decomposition are discussed. Also novel developments of Quantitative Structure – Activity Relationships (QSAR) approach in prediction properties of nanospecies and in the risk assessment of nano-size materials will be reviewed.

03.21

2:30 QUANTUM CALCULATIONS USING SPREAD SHEET

Joyce J.Chumo, William C. Mahone

Mississippi Valley State University, Itta Bena, MS, USA

Chemical applications of, Quantum Mechanics, utilizes the science of probability to probe molecular structures and molecular energies. These calculations often involve long

mathematical calculations and complicated computer algorithms. Computer algorithms can reduce the complexity of the calculations by doing numerical simulations. In the current research effort a student attempts to do crude molecular modeling using semi- classical techniques and numerical analysis using spreadsheets. We have used spread sheets to do simple particle in the box and radial probability distributions for hydrogen atoms. The results of which will be presented in this presentation. We are currently attempting to generate a viable molecular model for the hydrogen molecule ion using both particle in the box and radial probabilities. We are using these calculations to investigate molecular properties and determine molecular parameters.

03.22

2:45 ARE CONVENTIONAL STRAIN ENERGIES ADDITIVE?

David Magers

Mississippi College, Clinton, MS, USA

Numerous studies have shown that the conventional strain energies of small cyclic compounds can be accurately computed using homodesmotic and hyperhomodesmotic equations. Here, we investigate if the conventional strain energy might be additive in a series of bicyclic alkanes using homodesmotic and hyperhomodesmotic equations for the overall strain of each system and different hyperhomodesmotic equations for the individual rings in each. The twelve bicyclic hydrocarbons considered in this study each have two three-membered rings, two four-membered rings, or one of each. They may be grouped into four different groups. In the first group, the two rings of each system are separated by two bonds, and in the second group, the two rings are separated by a single bond. In each molecule in the third set, the two rings share one atom, and in the fourth group, the two rings share a bond. The electronic energies and corresponding zero-point-energy corrections are computed for all relevant molecular systems at the levels of self-consistent field theory, density functional theory, and second-order perturbation theory with both the cc-pVDZ and cc-pVTZ basis sets. The density functionals employed are B3LYP, M06-2X, and ω B97XD. In addition, single-point CCSD(T) calculations are performed for all systems at the corresponding MP2/cc-pVTZ optimized geometry. Results indicate that conventional strain energies computed at the MP2 level agree quite well with those determined with the CCSD(T) single-point calculations. We gratefully acknowledge support from the NSF (EPS-0903787) and the W.M. Keck Foundation.

03.23

3:00 ACCURATE THEORETICAL CALCULATIONS ON SILVER CLUSTERS: AVOIDING EMPIRICAL CORRECTIONS

Ming-Ju Huang, John Watts

Jackson State University, Jackson, MS, USA

Despite major advances in quantum chemistry, achieving high accuracy on even small silver clusters remains a major challenge. Silver is, of course, not unique in this respect as progress on calculations on all d-block metal clusters has lagged that on systems composed of main-group elements.

Furthermore, for some properties of metal clusters there is a lack of consensus among experimental results or experimental data are lacking. Accordingly, predictive-quality theoretical data can play a crucial complementary role. In this presentation, we describe our recent research on silver clusters. Our strategy is to use the coupled-cluster singles-and-doubles method combined with non-iterative triple excitations (i.e. CCSD(T)) with correlation-consistent basis sets. 4d and 5s electrons were correlated in all calculations. Effects of 4s and 4p correlation were also assessed. The methodology was validated on atomic and diatomic silver systems for which well-established experimental data are available. The accuracy achieved for these systems suggests that predictive-quality results can be expected for larger systems. Properties of the larger systems studied include structures and energies of ground and excited states, atomization energies, ionization energies, and vertical electron detachment energies. In the absence of experimental data, the present calculated data serve as reliable predictions. Overall the higher levels of theory used in the present study achieve *consistent accuracy for a range of properties*. Our CCSD(T) results also serve as a benchmark for density-functional theory (DFT) studies. We have observed that some prior DFT studies provide good results for single property, but are lacking in accuracy for others.

O3.24

3:15 UNDERSTANDING ELECTRON INTERACTIONS WITH DNA BASES, BASE PAIRS, AND STACKS

Glake Hill¹, Jake Anderson², Kari Copeland¹, Kristen Lewis¹

¹Jackson State University, Jackson, MS, USA, ²Belhaven University, Jackson, MS, USA

Redox properties of nucleic acid bases are important characteristics of DNA and are one of the key factors in the storage and transfer mechanism of the genetic information. Correct determination of the redox potentials, electron affinities (EAs), and ionization potentials (IPs) is of great interest for the understanding of thermodynamic and kinetic properties of DNA, possible radiation damage and repair, and oxidation reactions as well as excess electron transfer through DNA. DNA interaction with drugs and intercalating agents depends on the electron-donating abilities of bases. It is known that base alterations and single-strand breaks are mediated by the one-electron deficient DNA base radicals. Therefore, there is a need to understand the chemical and physical mechanism of DNA oxidation. Unfortunately, limited experimental information is available for the redox potentials, EAs, and IPs of DNA bases and base pairs. In this presentation, we present an *ab initio* approach to understanding the fundamental principles of electron mobility and radical formation in DNA strands. We present the most recent understanding about how redox potentials are affected throughout the strand. Finally, we make predictions about unique chemistry that may exist within the DNA strand that affects the electron mobility.

Poster Session I

Following Dodgen Lecture

P3.01

THEORETICAL STUDIES OF PERMEABILITY PROPERTIES OF POPC LIPID BILAYER

Anastasiia Golius¹, Leonid Gorb², Frances C. Hill³, Jerzy Leszczynski¹

¹Jackson State University, Jackson, MS, USA, ²Badger Technical Services, LLC, MS, USA, ³U.S. Army Engineer Research and Development Center, MS, USA

Lipid bilayer is an important selective barrier of the living cell and lipids have been considered as the predominant components for bioaccumulation of organic chemicals. Physicochemical methods use the octanol:water partition coefficient (K_{ow}) and lipid:water partition coefficient (K_{lip}) as the standard for predicting chemical uptake and bioaccumulation. The main purpose of present work was to determine $\log K_{ow}$ and $\log K_{lipw}$ for 44 energetic compounds using computational methods. $\log K_{ow}$ were determined with two methods: COSMO-RS (approach which is a quantum chemistry based statistical thermodynamics approximation for the verification and prediction of thermodynamic properties of liquids) and Abraham linear solvation energy relationship (LSER). In order to determine $\log K_{lip}$ with COSMOmic approach (mechanistic approach to the calculation of membrane-water partition coefficients and internal distributions within membranes and micelles) lipid bilayer fragment with POPC (1-Palmitoyl-2-oleoylphosphatidylcholine) lipid type have been considered. We compared our results with available experimental data. Analysis $\log K_{ow}(\text{exp})$: $\log K_{lipw}(\text{exp})$ and $\log K_{ow}(\text{COSMO})$: $\log K_{lipw}(\text{COSMO})$ correlations suggests that octanol reasonably approximates the average adsorption properties of POPC lipid bilayer. The properly measured or calculated data are located in the range $\log K_{lipw} = \log K_{ow} \pm 1$ (LU). We guess that in cases when octanol—water and lipid water constants are not located in the range $\log K_{lip} = \log K_{ow} \pm 1$ simply means that the most probably those constants are not measured or calculated properly.

P3.02

CHEMOENZYMATIC SYNTHESIS OF BOTH ENANTIOMERS OF 3-AMINOALCOHOLS FROM A COMMON SYNTHETIC INTERMEDIATE

Roshetta Williams, Benjamin Lewing, Waning Lu, Dale A. Rosado

Mississippi College, Clinton, MS, USA

Amino alcohols are found in a wide variety of biologically active compounds and have been used as chiral ligands for transition metal catalysts and to induce chirality in asymmetric synthesis. Ethambutol, an anti-tuberculosis drug, contains two (S)-2-amino-1-butanol moieties. Replacement of the 2-aminoalcohols of ethambutol with 3-aminoalcohols may yield ethambutol analogues with increased activity. In order to investigate the properties ethambutol analogues containing 3-aminoalcohols, an efficient synthetic route to both enantiomers has been developed. Reduction of diethyl 2-ethylmalonate with

LiAlH₄ yields a 1,3-diol. The diol is quantitatively converted to a diacetate by treatment with acetic anhydride. Hydrolysis of the diacetate with *Pseudomonas fluorescens* Lipase in phosphate buffer yields an acyl alcohols that can be treated with diphenyl phosphoroazide yields an acyl azide. (S)-2-(aminomethyl)-1-butanol is obtained after reduction of the acyl azide with LiAlH₄. The enantiomer of the 2-(aminomethyl)-1-butanol was synthesized by manipulation of the protecting groups and repetition of the azidation and reduction chemistry. The synthetic route outlined above using mild conditions, produces good yields in each step, and results in synthesis of both enantiomers of 2-(aminomethyl)-1-butanol from a common acyl alcohol intermediate.

P3.03

STUDY OF VARIOUS CARBON NANOTUBES AS ALTERNATIVE EXTRACTORS OF SULPHONAMIDES FROM WATER

Ibrahim Hinds¹, Monika Paszkiewicz², Marek Golebiowski², Piotr Stepnowski², Danuta Leszczynska¹

¹Jackson State University, Jackson, MS, USA, ²University of Gdansk, Gdansk, Poland

Solid phase extraction (SPE) is a convenient sample treatment technique that is used to eliminate potential interferences and pre-concentrate the analyte. This enables improved accuracy and precision and lower detection limits. Carbon nanotubes (CNTs) are novel materials, which possess many unique electronic, mechanical and chemical properties, high surface area and excellent strength. In this study, the usefulness of carbon nanotubes for the extraction of six sulphonamides from water samples was tested. Four different types of carbon nanotubes (CNTs), and four different mixtures as a mobile phase were tested. Qualitative and quantitative analyses were carried out by high performance liquid chromatography (HPLC). Sulphonamides separation was performed on a Supelco Discovery C18 5 µm (250x4.6mm i.d.) and gradient mode using water containing 0.0025 % of trifluoroacetic acid and acetonitrile (ACN) as solvents A and B, respectively. Carbon nanotubes as adsorbent have shown a perfect extraction/preconcentration of sulphonamides at the trace levels. The best results were obtained using MWCNTs and mixture of ACN and MeOH (50:50, v/v), the percentage recoveries were in the ranges of 72-102 % with the standard deviation < 2.9. In conclusion, the developed methods are simple and successful for the extraction of sulfonamides and can be applied to isolation of this compound from environmental water samples. **Acknowledgements:** The authors would like to acknowledge financial support the People Programme (Marie Curie Actions) of the European Union Seventh Framework Programme FP7/2007-2013/ under REA grant agreement n° 295128, from the National Science Foundation, under Grant No. NSF EPSCoR # 362492-190200-01\NSFEPS-0903787, and from NSF CREST under Grant No. HRD # 0833178.

P3.04

APPLICATION OF CARBON NANOTUBES AS A SOLID PHASE EXTRACTION SORBENT FOR ISOLATION OF VITAMINS FROM BIOLOGICAL SAMPLES

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Most HPLC methods have been designed for the detection of vitamins in food, pharmaceutical preparations, and urine. A limited number of methods for the simultaneous determination of more than one B vitamin have been reported in the literature, but none of these is specifically designed for vitamins determination at a trace level. Moreover, there are no pre-concentration methods dedicated to isolation water-soluble vitamins at trace level. The objective of this study was to develop sensitive and accuracy method useful in simultaneously vitamins analyses in one chromatographic run is necessary. Determination of vitamins at trace level requires a suitable method for concentrating these analytes. For this purpose, SPE columns with five different type of carbon nanotubes as stationary phase were tested. In those tests we used 250 mL of deionized water spiked with 20 µl of standard solution of 12 water-soluble vitamins. Qualitative and quantitative analyses were carried out by high performance liquid chromatography (HPLC). It was found that both the type and mass of the nanotubes, and the composition of the eluent have a significant effect on the efficiency of extraction. In conclusion, described method reveals potentials of CNTs as an advantageous sorbent material in SPE. The CNTs-packed SPE cartridges showed reliable and attractive analytical performance to isolation of vitamins. The proposed SPE method is be applied to extraction of water soluble vitamins from biological samples prior to HPLC analysis. **Acknowledgements:** The authors would like to acknowledge financial support the People Programme (Marie Curie Actions) of the European Union Seventh Framework Programme FP7/2007-2013/ under REA grant agreement n° 295128, from the National Science Foundation, under Grant No. NSF EPSCoR # 362492-190200-01\NSFEPS-0903787, and from NSF CREST under Grant No. HRD # 0833178.

P3.05

IMMOBILIZATION OF SALEN ON CHROMOSORB 106 POLYMER AND APPLICATION TO SOLID PHASE EXTRACTION OF TRACE ELEMENTS FOR ICP-MS ANALYSIS

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Determination of trace element and rare earth elements (REEs) metals is challenging task from complex samples and natural waters. In this study, a solid phase extraction method is presented using new chelating column prepared by chemical immobilization of salen (N,N'-bis (salicylidene) ethylenediamine) onto backbone of Chromosorb 106, a styrene divinylbenzene copolymer. The method was optimized for quantitative preconcentration of a number of elements including rare earth elements. A minicolumn of salen-immobilized

Chromosorb 106 retained the elements within pH range from pH 3 to 8. Optimum retention pH was around pH 5 where retention of matrix ions (Ca, Mg and Na) was minimal. Elution of retained elements from the column was performed with dilute HNO₃ ranging from 1 to 10%. All elements were recovered with 1% HNO₃, a concentration of 2% HNO₃ was used throughout to maintain effective column cleanup. One milliliter of 2% HNO₃ was sufficient for complete removal providing a preconcentration factor of 5 for a sample volume of 5 mL. The column has shown significantly high capacity for solid phase extraction of the element from natural water samples and complex matrices. The detection limits for 5 mL blank solution were 0.05 to 0.1 ng L⁻¹ for REEs and 3 to 15 ng L⁻¹ for transition elements and heavy metals. The method was applied to the analysis of estuarine and coastal seawater sample by ICP-MS.

P3.06

A COMPARISON OF THE BRADFORD ASSAY WITH THE BICINCHONIC ACID ASSAY FOR MEASURING PROTEIN IN SOIL EXTRACTS

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In 1996 Wright *et al* discovered an abundant soil glycoprotein produced by the common soil fungi arbuscular mycorrhiza (AM). Since AM is in the phyla Glomeromycota, this protein was named glomalin. The large majority of terrestrial, vascular plants form a symbiosis with AM. The fungus colonizes plant roots to receive exudates such as sugars and, in turn, provides roots with nutrients such as nitrogen and phosphorous. Glomalin has been shown to comprise ~27% of the carbon sequestered in soils. It has thus been estimated that up to a third of the world's carbon is stored as glomalin. To study glomalin Wright *et al* developed methods to extract it from soil. We have employed their commonly used method in which soil is mixed with 20 mM citrate and then autoclaved at 15 psi, 121°C for 0.5-1 hours. This also extracts various humic substances (HS) and different soil proteins that are not destroyed by the harsh conditions. The Bradford colorimetric assay is often employed to estimate protein in such extracts. However, the Bradford assay is subject to serious interference from the HS coextracted from soil. Recent research has focused on finding alternatives which can measure extracted soil proteins accurately. One possible alternative is the Bicinchoninic acid protein assay. We compare these assays in detecting the model protein bovine serum albumin after it is added to soil citrate extracts. The correlation of high soil organic carbon content with high measured protein content in extracts is also examined using standard and new methods.

P3.07

ENCAPSULATION AND SELECTIVITY OF SULFATE WITH A FURAN-BASED HEXAAZA MACROCYCLIC RECEPTOR IN WATER

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The presence of an excess amount of sulfate in drinking water is related to several health related problems including diarrhea and laxative effects. That's why; chemists are synthesizing many types of receptor (urea, thiourea, ammine and amide based) to bind sulfate anion and other anions also. Polyammonium-based molecules which are soluble in water have been shown to be effective hosts for a variety of anions in both solution and solid state. To bind anions effectively, we have been interested to introduce furan spacers within the macrocyclic frameworks. We successfully synthesized polyazamacrocyclic using 2,5-diformylfuran with linkage *N*-methyl-2,2'-diaminodiethylamine from Schiff base condensation followed by reduction. This receptor has been studied for anions by ¹H NMR titrations in D₂O, showing that the receptor selectively binds sulfate to form a strong 1:1 complex (log *K* = 5.1). Structural characterization of the sulfate complex reveals that one sulfate is encapsulated in the macrocyclic cavity *via* hydrogen bonding and electrostatic interactions

P3.08

CHARACTERIZATION OF NIR EMISSIVE SILVER NANOCLUSTERS ON SINGLE STRANDED DNA TEMPLATE

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Investigators require noninvasive extrinsic probes in order to obtain key information about abnormalities in cellular function and biomolecular interactions. Metal nanoclusters made of Ag and Au are likely to prove highly effective in this regard, due to their strong fluorescence and high stability. DNA oligonucleotides serve as scaffolds to grow metal nanoclusters which are highly emissive and stable, allowing them to be used as noninvasive biological labels for *in vivo* interrogation. Near infrared (NIR) emissive and highly stable bio-probes are important in advancing studies of individual biomolecular function. Through the careful selection of nucleotide sequences, we plan to synthesize a new class of near-infrared (NIR) fluorescent clusters that can be used for *in vivo* interrogation. Improved photon penetration through tissues by NIR longer wavelength (above 700 nm) reduces background fluorescence of live cells as well as provide detail anatomic and molecular information, making the NIR emissive silver nanoclusters ideal as novel biological probes. We initiated our studies using single stranded DNA oligonucleotides with varied sequences where each has an abundance of a specific DNA base (adenine, guanine, thymine and cytosine). UV/Vis absorption and fluorescence spectroscopic investigations were carried out and

preliminary results indicate a specific sequence to have more NIR emission than the other. Specific emission and absorption bands are characteristics of a particular DNA oligonucleotide. Highly parallel analysis will be conducted using systematic variations in sequences of short oligonucleotides from an array. Screening will be performed to identify stable NIR fluorescent silver nanocluster in physiologically compatible environments.

P3.09

A THIOPHENE LINKED TRIPODAL POLYAMINE RECEPTOR FOR ANION SENSING

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Selective recognition and sensing of anions are of great importance as it finds application ranging from clinical diagnosis to environmental monitoring. Some anions at certain concentration boost our body as essential nutrients while others are renowned carcinogen. Therefore, a significant effort has been recently given on selective sensing of anions. The topology of these sensors is important to understand their interactions with anions. Tripodal sensors containing amine functional group in each pod are efficient in anion encapsulating within their cavity. During this study we have synthesized a new receptor functionalized with thiophene groups, and studied for its anion sensing ability with a variety of techniques. This poster will focus on the details of binding studies of the new compound for halides and oxoanions. Acknowledgement: This research was supported by the Minority Access to Research Careers/Undergraduate Student Training in Academic Research (MARC/U*STAR) Program (Grant No. 5T34GM007672-31).

P3.10

STUDIES OF A MACROCYCLE-BASED RECEPTOR FOR ANION SENSING

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Because anions play an important role in chemistry and biology, anion selectivity with synthetic receptors is a new area of chemical research. In particular, polyazamacrocycles are effective receptors for anions, showing high selectivity and affinity both in solution and solid state. During this work, we have synthesized a new hexaaza-monocycle that has active binding sites as amine functional groups. The new macrocycle has been converted into dansylated macrocycle and dinuclear metal complex, showing fluorescence and visible colour change in the presence of certain inorganic anions in solution. During this presentation, details of fluorescence and colorimetric results will be discussed. Acknowledgement: This research was supported by the NIH Minority Access to Research Careers/Undergraduate Student Training in Academic Research (MARC/U*STAR) Program (Grant No. 5T34GM007672-33).

P3.11

POLYPHENOLIC COMPOUNDS AGAINST OXIDATIVE STRESS IN HEPG2 CELLS

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Oxidative stress has been implicated in the development of various diseases. Research has shown that a healthy weight, low total fat, saturated, monounsaturated, and polyunsaturated fat intake as well as a diet rich in omega-3 fatty acids, vitamin C, vitamin E, lycopene, alpha-tocopherol, selenium, beta carotene, and quercetin are inversely associated with risk of prostate cancer. The beneficial effects of these nutrients in prevention of prostate cancer may be related to antioxidant levels. Literature data provide evidence that consumption of fruits and vegetables helps in reducing risk of developing a wide range of diseases including cancer, tumor, atherosclerosis, neurodegenerative disorders. In this preliminary study, we evaluated the effects of three compounds present in fruits and vegetables, namely fisetin, a flavonol; luteolin, a flavone; and malvidin chloride an anthocyanin, in hepatocellular carcinoma cell line (HepG2) and a model DNA (calf thymus) which are exposed to oxidative stress by methyl parathion, using the MTT assay and UV melting studies. These therapeutic effects of fisetin, malvidin chloride and luteolin may contribute to their anti-carcinogenic effects.

P3.12

INFLUENCE OF FLAVONOIDS IN REDUCING OXIDATIVE STRESS IN HUMAN SERUM ALBUMIN: A CRITICAL STUDY USING OPTICAL SPECTROSCOPY AND MOLECULAR MODELING

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We have explored the interactions of quercetin and malvidin chloride with human serum albumin (HSA), using optical spectroscopy and gel electrophoresis, combined with molecular modeling approaches. Methyl parathion (MP) is a known pesticide and oxidative stress inducing agent. Quercetin and Malvidin Chloride, are ubiquitous bioactive flavonoids, belonging to flavonol and anthocyanidin families and are abundant in onion and bilberries respectively. They are known to possess antioxidant, anti-carcinogenic, hypolipidemic, vasoprotective and other important therapeutic properties. Specific interactions of the flavonoids with their carrier protein HSA are confirmed from flavonoid-induced quenching which is evident from steady state fluorescence, change in absorbance as well fluorescence anisotropy. UV/Vis melting and CD studies indicate no significant change in the secondary structure of HSA upon flavonoid binding indicating the usefulness of this flavonoid in medicinal biology. Both temperature dependent fluorescence measurements and molecular docking investigations reveal that apart from hydrogen bonding and van der Waals interactions, electrostatic interactions also play crucial role in flavonoid-HSA interactions. Our studies indicate that the flavonoids can inhibit the MP induced structural perturbations of HSA to a significant extent. Studies are underway

P3.13

CONVENTIONAL STRAIN ENERGIES OF THE DIAZETIDINES AND THE DIPHOSPHETANES

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The conventional strain energies of 1,2-diazetidene, 1,3-diazetidene, 1,2-diphosphetane, and 1,3-diphosphetane are determined within the isodesmic, homodesmotic, and hyperhomodesmotic models. Both cis and trans isomers of each of these systems are considered. Optimum equilibrium geometries, harmonic vibrational frequencies, and corresponding electronic energies and zero-point vibrational energies are computed for all pertinent molecular systems using SCF theory, second-order perturbation theory, and density functional theory and employing three correlation consistent basis sets of Dunning and coworkers: cc-pVDZ, cc-pVTZ, and cc-pVQZ. Single point fourth-order perturbation theory, CCSD, and CCSD(T) calculations employing the cc-pVTZ and the cc-pVQZ basis sets are computed using the MP2/cc-pVTZ and MP2/cc-pVQZ optimized geometries, respectfully, to ascertain the contribution of higher-order correlation. Three DFT functionals, B3LYP, ω B97XD, and M06-2X, are considered to determine if they can yield results similar to those obtained at the CCSD(T) level. We gratefully acknowledge support from the NSF (EPS-0903787) and the W.M. Keck Foundation.

P3.14

CALCULATING ENTHALPIES OF FORMATION FOR AMINO DERIVATIVES OF TRINITROTOLUENE

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Homodesmotic reactions are a subset of isodesmic reactions. Isodesmic reactions conserve bonds and bond types; homodesmotic reactions further preserve bonding environments. Homodesmotic reactions and isodesmic reactions which are almost homodesmotic can be used to compute enthalpies of formation to within one or two kcal/mol of experimental results without having to compute atomization energies. Despite the different zeros of energy, one may set the computed enthalpy of the model reaction equal to the experimental enthalpy for the same reaction. From the computed enthalpy of reaction, the desired enthalpy of formation is determined by use of reference values for all other systems in the reaction. In the current study, the enthalpies of formation of amino derivatives of trinitrotoluene (TNT) are computed. Such derivatives have been postulated to be intermediates in environmental degradation of TNT. Optimum equilibrium geometries, harmonic vibrational frequencies, and the corresponding enthalpies are computed for all of the reactants and products in each model equation using SCF and density functional theory. The DFT functionals employed are Becke's three-parameter hybrid functional using the LYP correlation functional (B3LYP), the M06-2X high nonlocality hybrid functional from Thulstrup and Zhao, and the

ω B97XD functional from Head-Gordon and coworkers which includes empirical dispersion. The basis sets employed are Dunning and coworkers' correlation consistent basis sets: cc-pVDZ, cc-pVTZ, and cc-pVQZ. We gratefully acknowledge support from the NSF (EPS-0903787) and the W.M. Keck Foundation.

P3.15

COMPUTATIONAL ANALYSIS OF GOLD CLUSTERS WITH DNA BASES

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The computational study of the interaction of Adenine and Thymine (AT) Watson Crick base pairs with gold dimers was studied using density functional theory (DFT). Structures of Adenine, Thymine, H₂O and Au:Au are drawn using GaussView5 software and so are the structures of the Adenine-Thymine complexes. The structures of the complex differ only in that the position of H₂O and Au:Au varies from one complex to another. The 6-31+G** is used to optimize the structures except for Au:Au whose atomic number is more than 6-31+G** can optimize. The basis set LanL2DZ is used for gold (Au:Au). The optimized structure, gold dimer binds to one of the nitrogen atoms of a DNA base. Water molecule forms a hydrogen bond with either oxygen or Nitrogen of either Adenine or Thymine. Adiabatic electron affinity (AEA) calculated values show that both water and gold dimer placed on Adenine molecule give higher results. Gold dimer placed on Adenine and water placed on Thymine gives the lowest adiabatic electron affinity.

P3.316

MOLECULAR MODELLING OF MOLECULARLY IMPRINTED POLYMERS

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This study aims to provide simple but reliable theoretical model for monomer selection for molecular imprinting towards detection of nitroaromatic compounds, such as dinitrotoluene, DNT or trinitrotoluene, TNT. Presented data shows, that molecularly imprinted polymer/non-imprinted polymer, MIP/NIP, system can be sufficiently characterized by use of very simple model. Analysis of that model provides detailed description (qualitative and quantitative) of hydrogen bonding between the template and polymeric matrix, and can be used as theoretical tool for monomer selection towards the imprinting process. *Ab initio* DFT/B3LYP functional has been applied for structural, solvent and vibrational frequency calculations of nitroaromatic-monomer and nitroaromatic-polymer complexes. Binding energy, IR spectra, solvent influence and MIP selectivity have been carefully evaluated. Additionally, experimental FT-IR data of the hydrogen bonding formation between DNT and methacrylic acid is presented to show the agreement between theoretical results and the experiment.

P3.17

AN AFM ANALYSIS ON PVP/PMMA BLEND

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This study will look at the morphology of a polymeric blend of polymethyl methacrylate (PMMA) and polyvinyl pyrrolidone (PVP). Polymethyl methacrylate is a hydrophobic polymer whereas polyvinyl pyrrolidone is hydrophilic. PMMA can dissolve in a wide range of organic solvents and known to swell in size in organic solvents. PVP is a polymer derived from the N-vinylpyrrolidone monomer and soluble in water as well as other polar solvents. These polymers will be dissolved in a common solvent. The blended polymer mixture will be made into a thin film by casting on a substrate and analyzed by Atomic Force Microscopy (AFM). It is hypothesized that the blend will undergo phase separation because of their different solubility properties and possibly other molecular interactions. The solvent choices affect the morphology of the blend. Therefore, there will be insight on the effect of different solvents on the polymeric blend in relation to the polymer's individual properties. A binary system for a solvent is also used to change morphology and dissolvability. Changes in the ratio of the PVP/PMMA blend also affect the solubility of the polymeric blend and the morphology of the material. This can open a new range of applications for PMMA and PVP for usage and applications.

P3.18

HIGH TEMPERATURE SOLVENT ANNEALING OF DH6T ON HOPG: AN ATOMIC FORCE MICROSCOPY STUDY

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Thiophene-based polymers are commonly used in various organic electronic applications such as photovoltaics and organic transistors. α,ω -Dihexylsexithiophene (DH6T) is a thiophene-containing oligomer commonly used as a model system for the chromophores in the thiophene-polymers. Here we explored the correlations between surface morphology of DH6T thin films and their surface potentials on highly ordered pyrolytic graphite (HOPG). Atomic force microscopy (AFM) is used for the analysis of the structure and electronic properties of organic thin films at sub-micron scale. Here AFM is used to analyze structural changes and their effects on the surface potential for a given area of graphite before and after hot-solvent annealing. Prior to annealing, DH6T topography revealed large layered islands with straight island edges. The resulting film after annealing is more dispersed and the overall height disparity decreased, indicating that DH6T layering had been reduced. After annealing, the DH6T islands show larger surface potential difference from the uncovered HOPG substrates. We expect that the DH6T islands are much more close-packed after a thorough annealing. It is clear that the molecular packing of DH6T have a dramatic effect on their local surface potentials.

P3.19

AMPHIPHILIC COPOLYMER-GRAFTED SILICA NANOPARTICLES AS A TEMPLATE FOR NOVEL OIL DISPERSANTS

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Silica nanoparticles have been grafted with amphiphilic block copolymers, polycaprolactone-*b*-polyethylene glycol, at varying grafting densities, using both grafting-from and grafting-to processes. It is shown that brush height scales differently depending on the grafting density. Grafting density was controlled by synthesis of a monolayer on the surface of silica nanoparticles using varied ratios of 3-amino propyldimethylethoxysilane and trimethylethoxysilane. This afforded silica nanoparticle surfaces that ranged from fully saturated with reactive amine groups or very sparsely functionalized. Amphiphilic block copolymers were attached by first using a grafting-from reaction in which the amine-functionalized silica nanoparticles served as the initiating species in a ring opening polymerization ϵ -caprolactone and catalyst triethyl aluminum to yield polycaprolactone-functionalized silica nanoparticles. The hydroxy-terminated polycaprolactone was then reacted with a carboxylic acid functionalized polyethylene glycol using activated ester coupling in a grafting-to reaction to yield amphiphilic block copolymer functionalized silica nanoparticles. It was found that at low grafting densities brush height scaled with degree of polymerization, N , as $N^{3/5}$, and at higher grafting densities brush height scaled with N . Amphiphilic block copolymer grafted nanoparticles were characterized using dynamic light scattering and transmission electron microscopy. These materials are expected to be excellent candidates for oil remediation.

P3.20

INTERACTION OF RECOMBINANT CBBQ AND CBBQ, OF HALOTHIOBACILLUS NEAPOLITANUS, WITH RUBISCO

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Carboxysomes are polyhedral microcompartments found in cyanobacteria and many chemoautotrophs. Within their shell they contain the enzyme ribulose-1, 5-bisphosphate Carboxylase/Oxygenase (RubisCO) which fixes CO₂. Downstream of the carboxysome operon there is another operon containing several genes that may enhance carboxysome function. Two of these genes, *cbbQ* and *cbbO*, encode potential RubisCO activases. Using recombinant CbbQ and CbbO protein, and RubisCO isolated from carboxysomes the interaction between these proteins was studied. The CbbO and CbbQ proteins were both His tagged allowing them to be purified with Ni-NTA column chromatography. Each of these tagged proteins was incubated with RubisCO on a Ni-NTA column. If the proteins interacted, then both the RubisCO and the recombinant protein would be present in the eluate. These studies suggest that CbbO and CbbQ do not interact individually

with RubisCO. This study was done again but both CbbO and CbbQ were incubated with RubisCO, and again no interaction was found. Another interaction study was done through the co-expression of nontagged CbbQ with tagged CbbO. This study suggested that there may be interaction between CbbO and CbbQ.

P3.21

SYNTHESIS AND BINDING STUDIES OF HEXAUREA-BASED TRIPODAL RECEPTORS

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Urea-based neutral receptors are important for anion recognition, which can bind an anion by strong hydrogen bonding interactions. In particular, a receptor with multifunctional urea groups is expected to bind anions strongly, leading to a significant selectivity for a target anion. During this study, two new receptors bearing hexaurea functionalities have been synthesized from multi-step synthetic techniques. The new compounds were characterized using NMR, IR, and Mass spectroscopy. Qualitative and quantitative analyses of ^1H NMR as well as the infrared spectroscopy enable us to confirm the structure of the new receptors. The anion binding studies of these receptors were performed by ^1H NMR titrations in DMSO- d_6 . In this poster we will present the details of synthetic procedures and the results of anion binding titrations in solution.

Acknowledgements: The NSF is acknowledged for a CAREER award (CHE-1056927) and EPSCoR grant.

P3.22

CATALYTIC EFFECTS OF Al(III), Sc(III), Y(III) ON GENERATION OF CADMIUM VAPOR IN THE PRESENCE OF KCN

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It is known that cadmium forms volatile species when reacted with strong reducing agents such as NaBH_4 . Nevertheless, the efficiency of Cd vapor generation is very poor in comparison to other vapor or hydride forming elements, such as arsenic and selenium, and mercury. Various chelating and catalytic agents have been utilized to alleviate the interferences. Among those Co-thiourea pair has been the popular to date though the experimental condition require close control. In this study, catalytic effects of Lewis acid metal ions, including Al(III), Sc(III) and Y(III) were examined for generation of volatile Cd species. KCN and as NaBH_4 was used to aid in generation reactive cyanoboranes. The effect of solution acidity was examined from 0 to 12% HCl. Cadmium vapor formed between 3 to 7% HCl windows. Al(III) appeared more effective than Sc(III) and Y(III). An improvement up to a factor of 10 was achieved. The interferences from transition metals ions were investigated at 0.5 $\mu\text{g/mL}$ levels for determination of Cd by vapor generation ICP-MS.

P3.23

A NEW DIPODAL UREA-BASED RECEPTOR FOR SELECTIVE BINDING OF FLUORIDE

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Among various important anionic analytes, fluoride is one of the most significant anions due to its critical role in dental care and treatment of osteoporosis; therefore, fluoride binding and recognition by synthetic receptors is attracting a growing interest. Fluoride is found more frequently in different sources of water but with higher concentrations in groundwater due to the presence of fluoride-bearing minerals. Because of the duplicitous nature of fluoride, it is important to design the artificial receptor for extracting, removing and separating this particular anion from fluoride-bearing minerals or fluoride containing systems. During this study, we have synthesized a new *p*-cyano based bis-urea receptor from the reaction of 2,2'-Diamino-N-methyldiethylamine with *p*-cyano isocyanate under refluxed condition in CH_2Cl_2 . In the solid state, the bis-urea receptor binds halides through N-H...halide interactions. In solution, the host binds the halides with an order of $\text{I}^- < \text{Br}^- < \text{Cl}^- < \text{F}^-$. In this poster, the detailed studies of this receptor's affinity for halides will be discussed. **Acknowledgements:** The National Science Foundation is acknowledged for a CAREER award (CHE-1056927) to MAH. This work was supported by the National Institutes of Health (G12RR013459).

P3.24

DECONTAMINATION OF TOXIC FLUORIDE FROM WATER BY A NOVEL CLASS OF SYNTHETIC RECEPTOR

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Fluoride is a known toxic species when its concentration exceeds more than 2.0 ppm level in water, causing severe damage of teeth and kidney. Therefore, it is urgent to develop new fluoride receptors that can bind and remove fluoride from water. Because of the high electronegativity of fluoride, this tiny anion is found as a hydrated species rather than free state in an aquatic system. During this study, we synthesized a new thiophene-based aza-monocyclic receptor with extended space which upon investigation was found to efficiently capture hydrated fluoride from the environment system.

P3.25

SELECTIVE DETECTION AND PHOTOTHERMAL THERAPY OF CANCER CELLS USING IRON CORE GOLD SHELL NANOPARTICLE-SWCNT HYBRID NANOSTRUCTURES

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Due to the fact that gold nanoparticles possess unique optical properties and are considered to have low toxicity toward humans, the use of gold nanoparticle based biological detection devices and therapeutic agents are very attractive. Multifunctional nanomaterials can potentially be even more superior because more than one physical property can be exploited to target or separate a particular biological agent. Single walled carbon nanotubes (SWCNTs) arrayed with iron core gold shell nanoparticles have the potential to be used for medical diagnosis via magnetic resonance imaging (MRI) because of the magnetic properties of the iron core, and the plasmonic gold shell can be useful for photothermal therapy through irradiation at a specific wavelength or cancer detection through surface enhanced Raman spectroscopy. After synthesizing the desired iron oxide nanoparticle, a specific synthetic protocol was used to encase the iron nanoparticle with gold thereby creating a gold nanoshell. These iron core gold shell nanoparticles were then anchored onto a functionalized SWCNT through the formation of a sulfur carbon bond. The hybrid further bound, specifically to SKBR-3 cells which, upon exposing to LASER, were killed due to heat generated by nanoparticles. **Acknowledgments:** We thank the National Science Foundation (PREM NSF DMR- 1205194 and HBCU-RISE: HRD-1137763) and the Analytical CORE Facilities were supported by NIH/NCRR (Award Number: G12RR013459) and NIH/NIMHD (Award Number: G12MD007581).

P3.26

DESIGN OF A SOLAR PHOTOREACTOR: GREEN CHEMISTRY APPLICATIONS AT MILLSAPS COLLEGE

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In 1912, at the International Congress of Applied Chemistry in New York, Giacomo Ciamician, the father of organic photochemistry, presented his vision of 'the Photochemistry of the Future': "On the arid lands there will spring up industrial colonies without smoke and without smokestacks; forests of glass tubes will extend over the plains, and glass buildings will rise everywhere; inside of these will take place the photochemical processes that hitherto have been the guarded secret of the plants, but that will have been mastered by human industry which will know how to make them even more abundant fruit than nature, for nature is not in a hurry and mankind is." (Science 1912, 36, 385-394) The requirement of specialized equipment and reaction conditions as well as high costs, however, has been used as an excuse by the chemical industry to widely ignore chemical transformations with light. More than 100 years later Ciamician's vision thus awaits its realization today. We are developing and building cost effective

solar photoreactors for a variety of applications. Those can range from wastewater treatment to photochemical transformations. For our purpose, we hope to optimize synthetic pathways we employ in our lab to synthesize new compounds. The concept of Green Chemistry is discussed and several solar photoreactors are shown to evaluate different design features. The focus is on optimizing the solar photoreactors for use in Mississippi. Solar radiation is impaired by cloudiness compared to states such as California or Arizona.

P3.27

PHOTOCHEMISTRY OF N-ALKOXY HETEROAROMATIC TETRAFLUOROBORATES: ANALYSIS OF THE REACTION PATHWAYS BY pH MONITORING

Priya Patel, Muzamil Khawaja, Katie Odom, Brooke Lassiter, GeNita Finley, Wolfgang Kramer

Millsaps College, Jackson, MS, USA

N-methoxy substituted aromatic heterocycles undergo a photoinduced homolytic N-O-bond cleavage. The reaction produces a methoxy radical and a heteroaromatic radical cation. The quantum yields of ion/radical formation have been determined by laser flash photolysis/quenching for the title compounds. Each transient species was produced with a yield of about 0.6 (± 0.05). The energy wasting step appears to be a radical recombination reaction, which also produces a proton. At Millsaps, we attempted to analyze the homolytic N-O bond cleaving reaction by focussing on the proton. This would give us a versatile tool for the analysis of the energy wasting side reaction and thus also the efficiency of the overall reaction. The methods we employed were titration with p-nitrophenolate and pH monitoring with buffer systems. It was important to keep the pH above about 6 to avoid acid base equilibria with other photoproducts. Product distribution was determined by GC/MS after basic extraction. Interestingly, only four major isomers were formed. Attempts to correlate the isomeric distribution with the solvent polarity was unsuccessful so far.

P3.28

BIFUNCTIONAL 1,8-NAPHTHALIMIDES AS FLUORESCENCE SENSORS

Melinda Solomon, Anna Allred, Irene Corrao, James McVaugh, Emily Stewart, Woods Curry, Wolfgang Kramer

Millsaps College, Jackson, MS, USA

1,8-Naphthalimides exhibit a moderate fluorescence that can be used as a sensor for oxidative power and pH of a solution if connected to an appropriate N-substituent. We have used pyridine derivatives as substituents and the protonation as well as the oxidation state of the pyridine nitrogen determines the quenching efficiency. The electron rich pyridine N-oxides diminish the fluorescence tremendously, and an interesting dependency on substitution pattern is observed. Protonated pyridines do not quench naphthalimide fluorescence and thus the pH of the solution directly influences luminescence. The N-alkylated pyridine substituents can also be used for this purpose, they mimic the protonated pyridines and can be used as standards. Stern-Vollmer analysis suggests different modes of quenching for the N-oxides and parent heterocycles. Solvent

polarity strongly influences fluorescence behavior by changing the energy levels of the excited states. To obtain more information about the quenching process, intermolecular quenching experiments are employed. Quenching of N-methyl 1,8-naphthalimide with various pyridine derivatives with electron donating and withdrawing substituents shows that certain substitution positions are more efficiently quenching than others.

P3.29

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

Courtney Mullins, Gurjit Kaur, Lauren Hoth, Woods Curry, Emily Stewart, Jonathan Giurintano, Wolfgang Kramer

Millsaps College, Jackson, MS, USA

Current Photodynamic therapy uses sensitizers to generate singlet oxygen which causes cell death. The hypoxic environment of most cancer tissues makes oxygen a limiting reagent for this approach and several methods have recently been developed to circumvent this problem. The photoinduced homolytic N-O bond cleavage of N-Heteroaromatic compounds with an N-alkoxy substituent (onium salts) leads to the formation of a heteroaromatic radical cation and an alkoxy radical. Both of these species have been shown to induce DNA cleavage, each with a different mechanism. The synthesis of the nitrogen onium salts includes the oxidation of the heteroaromatic nitrogen and subsequent O-alkylation. To increase the DNA cleaving efficiency by enhancing ground-state association we synthetically attached a known DNA-binder, 1,8-naphthalimide. Several bifunctional compounds have been synthesized and their photochemistry has been investigated. Here we present the DNA cleaving efficiency of a series of bifunctional DNA-cleavers which has been analyzed by gel electrophoresis and CD spectroscopy. Comparison with restriction endonucleases indicated the N-substituted heteroaromatic salts to be double-strand cleavers.

P3.30

GOLD NANOPOPCORN ATTACHED SINGLE-WALLED CARBON NANOTUBE HYBRID FOR RAPID DETECTION AND EFFECTIVE KILLING OF BACTERIA

Thomas Ondera, Ashton Hamme

Jackson State University, Jackson, MS, USA

We report the fabrication of a rapid and stable surface-enhanced Raman scattering (SERS)-based nanohybrid developed to overcome low reproducibility and stability concerns associated with most SERS-based sensors. Herein, pre-functionalized single-walled carbon nanotubes (SWCNTs) undergo [2+3] Huisgen cycloaddition reaction with in-situ generated nitrile imine under Microwave (MW) irradiation and are further modified with 4-aminothiophenol under MW-irradiation to form flexible templates that will allow Gold nanopopcorns (AuNPs) to covalently and uniformly attach at minimum inter-particle distance thus yielding plasmonic substrate with excellent aqueous stability and abundant hotspots. Furthermore, antibody-labeled biosensors fabricated with these AuNPs attached-

SWCNT substrates rapidly detect *E. coli* in drinking water with good selectivity and sensitivity. The detection limit of *E. coli*, selected as the model to establish proof of principle, was found to be 1.0×10^2 CFU/ml. The AuNP attached-SWCNT nanohybrid offers impressive photothermal pathogen killing effect. The high performance of the SERS-based nanohybrid developed here may thus indicate its potential for further application in monitoring pathogens susceptibility to antibiotics and multiplex detection in raw samples. **Acknowledgments:** The project described was supported by the National Science Foundation (HBCU-RISE: HRD-1137763), the National Institutes of Health through the NCRR-RCMI (Award Number: G12RR13459), and NIH/NIMHD (Award Number: G12MD007581) for the use of the Analytical CORE Facilities.

P3.31

SWCNT-CONJUGATED IRON-CORE GOLD-SHELL NANOPOPCORN FOR TARGETED MAGNETIC SEPARATION & ENRICHMENT AND PHOTOTHERMAL DESTRUCTION OF MULTI DRUG RESISTANCE SALMONELLA

Yunfeng Lin, Ashton Hamme

Jackson State University, Jackson, MS, USA

Salmonella enteric serovar Typhimurium definitive type 104 presents one of the greatest health challenges in today's society. Due to the resistance to drugs, current technology cannot effectively kill the presence of multiple drug resistant salmonella (MCRS) inside human body. As a result, the development of low toxic, highly sensitive methods for the detection/killing are in high demand. Driven by the need, in this presentation, we report for the first time, the development of SWCNT-conjugated iron-core gold-shell nanopopcorn-driven approach for targeted magnetic separation & enrichment, label free surface enhanced Raman spectroscopy (SERS) detection, and selective photothermal destruction of MDR *Salmonella* DT104. In order to confirm the successful synthesis of the nanoparticles, FTIR, SERS, UV Spectroscopy, and TEM, was used. Experimental data show that our SWCNT-conjugated iron-core gold-shell nanopopcorn can be used for targeted separation & SERS imaging of MDRS bacteria. A targeted photothermal experiment, using 670-nm light at 1.5 W/cm^2 for 15 minutes, results in selective irreparable damage to most of MDRS.

Acknowledgments: We thank the National Science Foundation (HBCU-RISE: HRD-1137763) and the National Institutes of Health RCMI program (G12RR13459 (Analytical CORE facilities)).

P3.32

ADSORPTION OF HERBICIDES ON THE SURFACE OF NANO-PARTICLES OF IRON OXIDE AND IRON OXIDE

Selene Perales, Matthewos Eshete

Mississippi Valley State University, Itta Bena, MS, USA

Some herbicides and insecticides are shown to pose health risk in animal as well as in human. They can get in to water systems, such as rivers, streams, lakes etc., from agricultural runoff. We wanted to understand the fate of these herbicides and insecticides in water system and also to identify chemical

compounds capable of absorbing organic compounds on their surface, which could potentially help remove them from water system. One of the oxides used as an adsorbent is Iron oxide which occurs naturally in water system. Nano-particle Iron oxide was also used in the study. Herbicides that are tested are Propazine and Dinoseb. Propazine is used for controls of broadleaf weeds and annual grasses, and it is also implicated as a possible human carcinogen. Dinoseb was used, in the United States, to control weeds in agricultural crops such as soybeans, vegetables, fruits, nuts and also as insecticide in grapes. Dinoseb was withdrawn from the market in 1986 due to harmful health effects, including birth defects, experienced among people who worked near high levels of this compound. The adsorption of Dinoseb and Propazine on the surface of Iron Oxide and Nanoparticle Iron Oxide was investigated. Result show different adsorption pattern on the surface of these oxides.

P3.33

PHOTO-ENHANCED TOXICITIES OF SULFUR-DOPED TiO₂ NANOPARTICLES TO ZEBRAFISH EMBRYOS (*DANIO RERIO*): AN *IN VIVO* INVESTIGATION

Xiaoqia He, Winfred Aker, Huey-Min Hwang

Jackson State University, Jackson, MS, USA

We investigated the role of light on the acute toxicities of Sulfur-doped (S-TiO₂) and Sigma TiO₂ nanoparticles in zebrafish. It was found that the acute toxicity of S-TiO₂ NPs was enhanced by simulated sunlight (SSL) irradiation (96-h LC₅₀ of 116.56 ppm) and exceeded that of Sigma TiO₂, which was essentially non-toxic. Behavioral disorder, in terms of rheotaxis, was significantly increased by S-TiO₂ NP treatment under SSL irradiation. In order to further understand its toxicity mechanism, we investigated hair cells in neuromasts of the posterior lateral line (PLL) using DASPEI staining. Significant hair cell damage was observed in the treated larvae. The Comet assay was employed to investigate the DNA damage, which might be responsible for the loss of hair cells. Production of the superoxide anion (O₂^{•-}), a major ROS generated by TiO₂ NPs, was assayed and used to postulate causative factors to account for these damages. Oxidative effects were most severe in the liver, heart, intestine, pancreatic duct, and pancreatic islet—results consistent with our earlier findings in the investigation of embryonic malformation. TEM micrographs, used to further investigate the fate of S-TiO₂ NPs at the cellular level, suggested receptor-mediated autophagy and vacuolization. Our findings validate the benefit of using the transparent zebrafish embryo as an *in vivo* model for evaluating photo-induced nanotoxicity. These results highlight the importance of conducting a systematic risk assessment in connection with the use of doped TiO₂ NPs in aquatic ecosystems. This study was supported by NSF-CREST program with grant #HRD-0833178.

March 7, 2014

FRIDAY MORNING

Exhibit Hall B

8:00 OPENING REMARKS

PLENARY SESSION – V

O3.25

8:15 SOLUBILITY AND ION RELEASE PROPERTIES OF SILVER NANOPARTICLES: EFFECTS OF pH AND SURFACE COATINGS

Zikri Arslan¹, Husniye Imamoglu¹, Oliva Premira-Pedrozo², Mehmet Ates^{1,3}

¹Jackson State University, Jackson, MS, USA, ²Universidad Metropolitana, PR, ³Tunceli University, Turkey

Silver nanoparticles (Ag NPs) are used in health-care products, disinfectants, therapeutics, and biosensors. The release of toxic Ag ions from Ag NPs raises concerns for human health. This study presents variation in solubility and stability of various Ag NPs in neutral, acidic and alkaline media. Octanol/water system was used as a model to understand partitioning of Ag NPs between organic and aqueous media. Effects of pH and coating were examined with 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. 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. ICP-MS analysis showed that Ag NPs were primarily in octanol and did not extract into water significantly. NPs were stable in octanol, but did aggregate in water substantially. At low pHs, Ag ions were released to some extent, but not in neutral and alkaline pHs. The results indicated that Ag NPs were unstable in water. Nonetheless, ions were released that was mediated mainly by the pH of medium

O3.26

8:30 A NOVEL ROUTE TOWARDS THE SYNTHESIS OF BROMOTYROSINE DERIVED SPIROISOXAZOLINE NATURAL PRODUCTS AND ANALOGOUS CORE STRUCTURES

Prasanta Das¹, Edward Valente², Ashton Hamme¹

¹Jackson State University, Jackson, MS, USA, ²University of Portland, Portland, OR, USA

The marine sponges (e.g. order *Verongida* and *Suberea mollis*) are widely known to produce a series of α -oximinotyrosine derived monomeric and dimeric spiroisoxazolines with a broad spectrum of pharmacological activities including antiviral, antimicrobial, anti-HIV, antifungal, antifouling, Na⁺/K⁺ ATPase inhibition, HDAC inhibition, and antineoplastic properties. Our synthesis basically relies on two approaches, a non aromatic approach towards the spiro-diketone followed by multifunctionalization to furnish the desired molecular architecture resembling the natural product core. In doing so, the spiro-diketone was converted to its methoxyenone derivatives which were further converted to the corresponding spiro-diene and spiro-quinone like derivatives via two different functional group transformation approaches. However, the second approach (LiHMDS and Br₂) was found to be beneficial to expedite our synthetic plan where the allylic geminal dibromo compound was formed and was subsequently treated with

DABCO *in situ* to afford the mono bromo spiro-diene and spiro-quinone systems. Further bromination of adjacent to the carbonyl was achieved either by NBS-dark or by PTB reaction conditions. Finally, the diastereoselective reduction of spiro-ketone with $\text{Zn}(\text{BH}_4)_2$ afforded the desired spiroisoxazoline core structures in a 4:1 diastereomeric ratio. On the other hand the dibromo-quinone derivative could also be utilized to synthesize a series of spiroisoxazolines containing natural product analogues of biological interest. **Acknowledgements:** The project described was supported by NIH/NIGMS (Award Number: SC3GM094081-04) and the Analytical and NMR CORE Facilities were supported by NIH/NCRR (Award Number: G12RR013459) and NIH/NIMHD (Award Number: G12MD007581).

O3.27

8:45 INVESTIGATION OF THE CO-SOLVENT-SUBSTRATE INTERACTION IN PLE HYDROLYSIS REACTIONS

Maureen Smith¹, Douglas Masterson¹, Marlen Schmidt², Uwe Bornscheuer³

¹University of Southern Mississippi, Hattiesburg, MS, USA,

²Enzymicals LLC, Germany, ³University of Greifswald, Germany

Hydrolase enzymes, such as Pig Liver Esterase (PLE), are widely used in organic synthesis due to their low cost, stability, and ability to accept a wide range of substrates. It has been demonstrated that the addition of organic co-solvents to the phosphate buffer can dramatically alter the enantiomeric excess (ee) of the reaction. We have found that the addition of just 2% EtOH into our buffer solution greatly increased the enantiomeric excess of the hydrolysis of compound (1) from 23 %ee to 85 %ee. We have found that this increase in enantioselectivity is highly substrate specific. For example, addition of varying amount of EtOH co-solvent to the hydrolysis of compound (2) showed only moderate increases in enantioselectivity, and addition of EtOH co-solvent to the hydrolysis of compound (3) did not show any effect. We believe this is due to the hydrogen bonding ability of the side chain in the substrate. We propose that as the hydrogen bonding ability of the substrate decreases, the ability of EtOH to influence the enantioselective outcome of the reaction is decreased. We have conducted several NMR titration experiments to measure the extent of hydrogen bonding between our substrate and co-solvent. We have also prepared a second series of substrates where the ability of the side chain to form hydrogen bonds has been altered in order to further test this hypothesis.

O3.28

9:00 ELECTROCHEMICAL STUDY OF PALLADIUM BASED NANOCATALYSTS FOR DIRECT FORMIC ACID FUEL CELLS

Tamanna Shanta, Wujian Miao

University of Southern Mississippi, Hattiesburg, MS, USA

Formic acid (HCOOH) has been considered a promising fuel in power technologies, for its low toxicity, low crossover, good electrical conductivity, high open circle potential, and

availability from biomass. However, effective electro-oxidation of HCOOH requires the use of highly efficient anodic catalysts. We report here the syntheses of two palladium (Pd) based nano-materials and their catalytic activities towards the electrochemical oxidation of HCOOH . Pd nano-materials, probably nanotubes, were first synthesized using octa-ammonium-polyhedral oligomeric silsesquioxane (POSS) as template and NaBH_4 as reducing agent. The electrochemical oxidation of HCOOH was conducted at a glassy carbon electrode (GCE) pre-casted with the Pd catalyst in 0.10 M HCOOH - 0.10 M 0.10 M H_2SO_4 . Catalytic oxidation of HCOOH at a peak potential of $\sim +0.10$ V vs Ag/AgCl (3.0 M KCl) was observed in cyclic voltammetry (CV) and linear scan voltammetry (LSV). The second Pd nano-sized catalysts were prepared by chemical reduction of PdCl_2 mixed with graphite nano-particles (GNP) (~ 10 nm). The as-prepared Pd/GNP catalyst was casted on a GCE, and used for HCOOH oxidation. In this case, HCOOH showed a broad electrochemical oxidation peak at $\sim +0.30$ V vs Ag/AgCl (3.0 M KCl). The different catalytic behavior of the two Pd-based catalysts could be attributed to two different oxidation pathways, i.e., the direct pathway of HCOOH oxidation (the first catalyst) vs an indirect oxidation pathway associated with CO intermediate formation (the second catalyst). Financial support from the CAREER Award (CHE-0955878) is gratefully acknowledged

O3.29

9:15 CHEMOENZYMATIC PREPARATION OF α -METHYL- β -PROLINE ANALOGUES: EFFICIENT TEMPLATE BASED DEVELOPMENT OF ORGANOCATALYSTS FOR ASYMMETRIC ANTI-MANNICH REACTIONS

Harikiran Kotapati, Jamarii Robinson, Ginger Keen, Souvik Banerjee, Douglas Masterson

University of Southern Mississippi, Hattiesburg, MS, USA

The Mannich reaction is an important carbon-carbon bond forming reaction between carbonyl compounds and amines. α -Proline catalyzes Mannich reactions to yield *syn* selective products, where as β -proline affords *anti* selective products. Here in, we report a synthetic strategy for the preparation of α -methyl- β -proline analogues by employing chemoenzymatic pathway that involves porcine liver esterase (PLE). Starting with optically active amino acids, malonate diesters will be prepared and subjected to asymmetric hydrolysis by PLE to afford stereoisomerically enriched half esters. By employing a novel cyclization strategy, these half esters will be converted to α -methyl- β -proline analogues with two chiral centers on pyrrolidine ring. Prepared α -methyl- β -proline analogues will be tested for their catalytic activities in *anti* Mannich reaction using nonpolar organic solvents. (*R*)- α -methyl- β -proline prepared by chemo enzymatic strategy was tested for its catalytic activity in *anti* Mannich reactions (97% ee and 8:1 dr).

03.30

9:30 TRACE METALS AND CHLOROPHYLL *a* CONCENTRATIONS IN THE MISSISSIPPI RIVER AND SIX MAJOR TRIBUTARIES DURING 2012 AND 2013

Derek Bussan, Jason Payne, Clifford Ochs, James Cizdziel

University of Mississippi, Oxford, MS, USA

The Mississippi River Basin (MRB) drains 41% of the contiguous United States. Major tributaries of the MRB include the Upper Mississippi, Missouri, Arkansas, Tennessee, Illinois and Ohio Rivers, all of which come together to form the Lower Mississippi River. The MRB includes urban and agricultural land uses which may contribute heavy metals to the system as well as nutrients that can influence algal production. In this study, 18 metals (Be, Rb, Sr, Cd, Cs, Ba, Tl, Pb, Mg, Al, V, Cr, Mn, Fe, Co, Ni, Cu, and Zn) and chlorophyll *a* (Chl-*a*) were determined in the Mississippi River and six tributaries in the summer of 2012 and 2013. In addition, samples were collected at 11 sites in a longitudinal study of the Mississippi River from Grafton, Illinois to Natchez, Mississippi during the summer of 2013. A correlation was found between measured concentrations of vanadium and Chl-*a* content in the summer of 2012 study, both were highest in the Missouri, Upper Mississippi and Illinois, and lowest in the Tennessee, Ohio, and Arkansas rivers. This indicates that tributaries in geographic proximity were more alike in Chl-*a* and chemical properties. R-values obtained for looking at all sites sampled for Chl-*a* vs. V were 0.83, and 0.73 for the 2012 and 2013 study. This talk will describe our research, explain our analytical methodology, and present our findings.

03.31

9:45 FROM RADIOISOTOPE SYNTHESIS AT JOHNSON & JOHNSON TO ORGANIC RESEARCH AT SOUTHERN MISS

Matthew Donahue

University of Southern Mississippi, Hattiesburg, MS, USA

Radioactivity is the spontaneous emission of radiation from an unstable nucleus. Since the discovery of radioactivity by Becquerel, Skłodowska-Curie, and Curie (Physics Nobel Laureates in 1903) scientists have utilized radiation for biomedical research. Long-lived radioisotopes such as tritium ($t_{1/2}$ 12.3 years) and carbon-14 ($t_{1/2}$ 5730 years) are powerful tools used to evaluate the potential of preclinical drug candidates for commercial development. The intrinsic properties of each isotope make them uniquely useful for determining different absorption, distribution, metabolism and excretion (ADME) properties of a drug. In this seminar, I will discuss my experiences as a synthetic organic chemist handling radioactive materials and describe the importance of such materials in a pharmaceutical research environment. This presentation will also discuss my transition from pharmaceutical research in pre-clinical drug development employing radioisotope labeling of small organic molecules to setting up an academic research laboratory in the Department of Chemistry and Biochemistry at the University of Southern Mississippi. The culture differences between basic research conducted in academia and that

conducted in the private sector will be discussed to give students an idea of what life is like after earning their degree.

10:00 AM BREAK

PLENARY SESSION – VI

03.32

10:15 PHOTOELECTROCHEMICAL STUDIES ON LAYERED ORGANIC-INORGANIC HYBRID PEROVSKITE PHOTOELECTRODES FOR WATER SPLITTING

Arun Siddarth Sridhar, Wujian Miao

University of Southern Mississippi, Hattiesburg, MS, USA

The present contribution reports results from structural characterization, electrochemical, and photoelectrochemical studies on layered organic-inorganic hybrid perovskite ($\text{CH}_3\text{NH}_3\text{SnX}_3/\text{CH}_3\text{NH}_3\text{PbX}_3$; X= Cl, Br, I) photoelectrodes for visible light water splitting. Sequential deposition technique was used for facile preparation of perovskite photoelectrodes on fluorine-doped tin oxide (FTO) glass. Scanning electron microscopic (SEM) studies were employed for surface morphological characterization. Optical nature of the photoelectrodes was investigated by UV-Vis spectroscopy and photoluminescence spectra. Electrochemical and photoelectrochemical studies were performed in a quartz cell holding a conventional three-electrode setup with an Ag/AgCl (3.0 M KCl) as the reference electrode. A standard xenon lamp was used as the visible light source for photocurrent measurements. The results obtained confirm the photoactivity and effectiveness of hybrid perovskite photoelectrodes for photoelectrochemical water splitting. Though these classes of perovskite sensitized photoelectrodes have been employed in solid state and mesoscopic solar cell applications, our contribution reports for the first time their application in efficient photoelectrochemical water splitting. We are hopeful that the present study would stimulate further work on this field. Financial support from the NSF CAREER Award (CHE-0955878) is gratefully acknowledged

03.33

10:30 ANION BINDING AND SELECTIVITY OF THIOUREA-BASED RECEPTORS: A COMPARATIVE STUDY

Maryam Emami Khansari¹, Avijit Pramanik¹, Douglas R. Powell², Md. Alamgir Hossain¹

¹*Jackson State University, Jackson, MS, USA*, ²*University of Oklahoma, Norman, OK, USA*

Development of new molecular receptors capable of recognition of anions through non-covalent interactions has emerged into considerable research interest due to their biological and environmental relevance. Dipodal and tripodal receptors bearing urea/thiourea functional groups could be employed in the binding of anions due to the directional conformation of two NH groups that favors the formation of a stable host-guest complex. Because of the enhanced acidity of sulfur atom compared to oxygen atom, a receptor with the thiourea functionality, is expected to bind an anion strongly. In order to investigate the chelating effect of the ligand on binding affinity towards the

anions, we have synthesized two novel receptors; tripodal 4-cyanophenyl thiourea and methylated dipodal 4-cyanophenyl thiourea, and studied the anion bindings by a variety of techniques. Herein, we report the solid state evidence for full encapsulation of a sulfate anion within a dimeric capsule of a tripodal receptor, via multiple H-bonding interactions with the six thiourea groups. We also report the complexation of fluoride with 4-cyanophenyl substituted tripodal thiourea receptor which is stabilized by six H-bonds within the cavity. In solution also, the tripodal receptor is proved to have much more interaction with the anions than the corresponding dipodal. **Acknowledgement:** The National Science Foundation is acknowledged for a CAREER award (CHE-1056927) to MAH. The work was supported by the National Institute of health (G12RR013459). The NMR instrument used for this work was funded by the National Science Foundation.

O3.34

10:45 FATTY ACID SYNTHESIS IS INHIBITED BY INEFFICIENT UTILIZATION OF UNUSUAL FATTY ACIDS FOR GLYCEROLIPID ASSEMBLY

Philip Bates¹, Sean Jonson², Xia Cao³, Jia Li⁴, Jeong-won Nam⁴, Jan Jaworski⁴, John Ohlrogge³, John Browse²

¹University of Southern Mississippi, Jackson, MS, USA,

²Washington State University, Pullman, WA, USA², ³Michigan State University, East Lansing, MS, USA, ⁴Donald Danforth Plant Science Center, St. Louis, MO, USA

Degradation of unusual fatty acids through β -oxidation within transgenic plants has long been hypothesized as a major factor limiting the production of industrially useful unusual fatty acids in seed oils. *Arabidopsis* seeds expressing the castor fatty acid hydroxylase accumulate hydroxylated fatty acids up to 17% of total fatty acids in seed triacylglycerols, however total seed oil is also reduced up to 50%. Investigations into the cause of the reduced oil phenotype through in vivo [¹⁴C]acetate and [³H]₂O metabolic labeling of developing seeds surprisingly revealed that the rate of de novo fatty acid synthesis within the transgenic seeds was approximately half that of control seeds. RNAseq analysis indicated no changes in expression of fatty acid synthesis genes in hydroxylase-expressing plants. However, differential [¹⁴C]acetate and [¹⁴C]malonate metabolic labeling of hydroxylase-expressing seeds indicated the in vivo acetyl-CoA carboxylase activity was reduced to approximately half that of control seeds. Therefore, the reduction of oil content in the transgenic seeds is consistent with reduced de novo fatty acid synthesis in the plastid rather than fatty acid degradation. Intriguingly, the co-expression of triacylglycerol synthesis isozymes from castor along with the fatty acid hydroxylase alleviated the reduced acetyl-CoA carboxylase activity, restored the rate of fatty acid synthesis, and the accumulation of seed oil was substantially recovered. Together these results suggest a previously unidentified mechanism that detects inefficient utilization of unusual fatty acids within the endoplasmic reticulum, and activates an endogenous pathway for post-translational reduction of fatty acid synthesis within the plastid.

O3.35

11:00 INTERACTIONS OF ANTIPARASITIC ALKALOIDS WITH LEISHMANIA PROTEIN TARGETS: A MOLECULAR DOCKING ANALYSIS

Ifedayo Ogungbe¹, William Setzer²

Jackson State University, Jackson, MS, USA, ²University of Alabama, Huntsville, AL, USA

Leishmaniasis is a collection of chronic diseases caused by protozoa of the genus *Leishmania*. Current antileishmanial chemotherapeutics have demonstrated adverse side effects and R&D into new safer alternative treatments are needed. A molecular docking analysis has been carried out to assess possible *Leishmania* biochemical targets of antiparasitic alkaloids. A total of 209 antiparasitic alkaloids were docked with 24 *Leishmania* protein targets. The strongest docking alkaloid ligands were flinderroles A and B and juliflorine with *Leishmania major* methionyl-tRNA synthetase; juliflorine, juliprosine, prosopilosidine and prosopilosine with *Leishmania mexicana* glycerol-3-phosphate dehydrogenase; and ancistrogriffithine A with *L. major* N-myristoyltransferase. This molecular docking study has provided evidence for what classes and structural types of alkaloids may be targeting specific *Leishmania* protein targets.

O3.36

11:15 HIGH-THROUGHPUT VIRTUAL SCREENING OF FULLERENE NANOPARTICLES FOR BIOLOGICAL TARGETS: LIGAND-PROTEIN INVERSE DOCKING

Lucky Ahmed, Bakhtiyor Rasulev, Jerzy Leszczynski

Jackson State University, Jackson, MS, USA

Fullerene and its derivatives have a wide spectrum of biological activities, including the inhibition or modulation of some proteins/enzymes' activity. Identification of a potential drug for protein targets is one of the directions in drug discovery process. The purpose of this study is to find possible biological targets for fullerene derivatives, and select potentially active and/or toxic fullerene derivatives that have high binding affinity with defined targets (protein molecules). The large database of biological targets (about 1200 protein structures) and total of 170 fullerene derivatives are used for virtual high-throughput screening. For this purpose, quantum-mechanical and protein-ligand docking studies are carried out to find out the protein binding sites with optimal binding affinity for fullerene derivatives. The obtained data could potentially assist experimental studies for development of drug delivery agents and drug-like compounds. Finally, we will create a database of potential biological targets for fullerene nanoparticles and database of specific pairs (protein - fullerene derivative) with computed binding affinities for potential use by academic and pharmaceutical industry scientists in toxicity estimation and drugs (or drug delivery agents') development.

03.37

11:30 ELECTROGENERATED CHEMILUMINESCENT STUDIES OF CHARGE TRANSFER BETWEEN CdSe/ZnS and CdTe/CdS QUANTUM DOTS AND THEIR APPLICATIONS TOWARDS THE DEVELOPMENT OF HIGHLY SENSITIVE ECL IMMUNOSENSORS

Yiliyasi Wusimanjiang, Wujian Miao

University of Southern Mississippi, Hattiesburg, MS, USA

Semiconductor nanocrystals or quantum dots (QDs) are considered to be promising fluorescent and electrogenerated chemiluminescent (ECL) labels for biosensors or optical imaging studies. Due to their tunable optical properties, many QDs have been employed as probes in multiplexing analysis. Water soluble QDs, CdSe/ZnS with a fluorescence emission at 540 nm and CdTe/CdS at 767 nm, were used in this study. Upon the electrochemical oxidation, a significant enhancement on ECL intensity of the CdTe/CdS-tri-n-propylamine (TPrA) system was observed with the addition of CdSe/ZnS QDs. Close examination of the electrochemical and ECL data revealed that the above ECL enhancement occurred even before the electrochemical oxidation of CdSe/ZnS. Charge (or electron) transfer from the CdSe/ZnS- species, which was generated by reducing CdSe/ZnS with TPrA? free radical, to CdTe/CdS QDs to form ECL production needed CdTe/CdS- species could be responsible for the above observed phenomena. A sensitive ECL immunosensor based on the above ECL enhancement behavior has been developed for the detection of biomolecules. Financial support from the NSF CAREER Award (CHE-0955878) is gratefully acknowledged.

03.38.

11:45 SYNTHESIS OF ENANTIOMERIC ENRICHED C^α- METHYL-GAMMA AND DELTA- SERINE AND OTHER UNNATURAL AMINO ACIDS THROUGH A LACTAM INTERMEDIATE

Emily Vogel, Douglas Masterson

University of Southern Mississippi, Hattiesburg, MS, USA

The synthesis of C^α-methyl-gamma and delta-serine and other amino acids are of interest to those studying foldamers, peptidomimetics, and pharmaceuticals because of their ability to form stable secondary structures and resistance to enzymatic degradation. Previously synthesis of these disubstituted methyl analogues has been limited due to steric congestion. Our method avoids sterics by opening an activated lactam synthon under a basic hydrolysis. The synthesis of the lactam is made through the enzymatic hydrolysis of prochiral malonic esters, containing the respective phthalimide side chain homologue, into chiral half esters. Deprotection of the phthalimide through hydrazine hydrolysis promotes the cyclization into lactam esters. The ester is then reduced to a primary alcohol to form a lactam intermediate which is protected and ring opened into C^α-methyl gamma and delta-serine. Alternatively, the alcohol intermediate can be functionalized, protected, and hydrolyzed into other C^α-methyl-gamma and delta- amino acids making this strategy versatile in preparing a variety of amino acid derivatives. Future work will explore the possibility of making this an enantio-

divergent synthesis.

03.39

12:00 SYNTHESIS OF AN UNSYMMETRICAL GLUTATHIONE DISULFIDE ANALOGUE AS A POTENTIAL GLUTATHIONE REDUCTASE INHIBITOR

Michael Sims, Douglas Masterson

University of Southern Mississippi, Hattiesburg, MS, USA

Glutathione is a cysteine-containing tripeptide that is oxidized to glutathione disulfide under oxidative conditions. The enzyme glutathione reductase can then reduce this dimer back to glutathione. Previous work has shown that di-substitution of methyl groups at the α-positions on both natural cysteine residues alters the -SS- dihedral angle in the glutathione reductase active site such that the analogue is completely resistant to reduction and acts as a competitive inhibitor for the enzyme. A mono-methylated glutathione disulfide analogue was therefore desired to determine the extent to which this steric effect influences the activity of glutathione reductase. Herein, we report the synthesis of a novel unsymmetrical cysteine analogue with only one methylated cysteine residue, the structure of which was confirmed by nuclear magnetic resonance spectroscopy and mass spectrometry. This compound will be later used for the solution-phase peptide synthesis of a mixed glutathione disulfide analogue. The results of this project could not only yield a new glutathione reductase inhibitor, but also elucidate a more fundamental relationship between the -SS- dihedral angle and glutathione reductase activity.

12:30 ANNOUNCEMENT OF STUDENTS' AWARDS

(Student awards sponsored by JSU Department of Chemistry & Biochemistry)

ECOLOGY AND EVOLUTIONARY BIOLOGY

Chair: Brent Hendrixson,
Millsaps College

Vice-Chair: Paul Mack,
Mississippi University for Women

Thursday Afternoon

March 6, 2014

Executive Conference Room

04.01

1:00 AN INTEGRATIVE APPROACH TO DELIMITING SPECIES BOUNDARIES IN TARANTULAS FROM A NORTH AMERICAN BIODIVERSITY HOTSPOT

Alexis Guice, Brent E. Hendrixson

Millsaps College, Jackson, MS, USA

The "sky island" archipelago of southern Arizona and New Mexico represents the northernmost extension of Madrean pine-oak woodland habitat in North America. This threatened "biodiversity hotspot" is characterized by significant plant and vertebrate endemism but comparatively little is known about its

terrestrial arthropod fauna. Tarantulas of the genus *Aphonopelma* are commonly encountered in these high-elevation habitats but no species have been formally documented or described from these areas in the United States. Populations collected from the Peloncillo, Santa Catalina, Santa Rita, and Huachuca Mountains appear distinct from all other *Aphonopelma* but exhibit few distinguishing characteristics. In this study, we test the null hypothesis that all sampled populations belong to a single widely distributed species by implementing an integrated taxonomic strategy that incorporates data from morphology, mitochondrial DNA, behavior, and species distribution models. Results suggest that some populations are adaptively divergent from the others and multiple species should be recognized. These patterns are comparable to those observed in other groups of similarly distributed arachnids (e.g., scorpions in the *Vaejovis vorhiesi* species complex) indicating that a common underlying process of divergence is at work in this region. This study further illustrates the importance of coupling process(es) of divergence with species delimitation and highlights the continued need to prioritize conservation efforts in this region due to its rich—but largely unrecognized—arthropod diversity and the threats facing these fragile habitats (e.g., logging, human encroachment, and climate change).

04.02

1:15 THE EVOLUTIONARY HISTORY OF TWO LARGELY SYMPATRIC FRESHWATER CATFISH SPECIES (HEPTAPTERIDAE: RHAMDIA) REVEALS CONGRUENT PHYLOGEOGRAPHIC PATTERNS IN A COMPLEX MIDDLE AMERICAN LANDSCAPE

Carmen Liliana Hernandez, Wilfredo A. Matamoros

University of Southern Mississippi, Hattiesburg, MS, USA

The complexity of the Central American (CA) landscape and its geological history have been regarded as major forces that have shaped the region's contemporary patterns of species distribution and phylogeographic structure. Two species of freshwater catfishes, *Rhamdia guatemalensis* and *R. laticauda*, are both widespread and mostly sympatric across the CA landscape. This provides a unique opportunity to determine how landscape constraints and geologic history have influenced their distribution and population genetic structure. In this study, phylogenetic relationships of Middle American and Colombian *Rhamdia* were inferred from analyses of mitochondrial cytochrome b (cyt-b) DNA sequence data. The analysis included 86 sequences from 11 drainages plus 120 sequences from 42 additional drainages from previously published data. Our phylogenetic analysis detected multiple cyt-b lineages representing putative, but recently synonymized, species in Colombia and Ecuador. In addition, *Rhamdia guatemalensis* appeared as a distinct lineage from *R. quelen*, although some recent authors also have considered them synonyms. Our time calibrated phylogeny and ancestral areas reconstructions suggest that the genus *Rhamdia* originated 19 million years ago. Central American *Rhamdia* populations appeared in the late Pliocene, about 3 million years ago and in part seem to follow a stepping stone model of colonization from south to north. However, in both species populations there are shared haplotypes between

drainages on the Atlantic and Pacific from some regions in Central America. This suggests that more recent geologic events (e.g., stream capture) may have also shaped the distribution of mitochondrial lineages across the CA landscape.

04.03

1:30 ANALYSIS OF FISHING HOOKS REMOVED FROM IMMATURE SEA TURTLES INCIDENTALLY CAPTURED BY RECREATIONAL FISHERMEN IN THE NORTHERN GULF OF MEXICO

Andrew Coleman, Jonathan Pitchford

Institute for Marine Mammal Studies, Gulfport, MS, USA

Sea turtle by-catch in recreational fisheries is poorly understood. Since 2010, over 500 immature sea turtles, mostly Kemp's ridley sea turtles (*Lepidochelys kempii*), have been incidentally captured by recreational fishermen using hook and line at fishing piers along the Mississippi Sound, which has been identified as a critical developmental habitat for this species. The majority of these turtles were transported to the Institute for Marine Mammal Studies (IMMS), where they received a full veterinary exam in which fishing hooks were removed if present. Once removed, the hook type was characterized, and the hook length and gape measured. Whether the hook was offset or not and the type of bait were also noted. These data were used to explore the relation between hook characteristics and both turtle size (i.e., straight-line carapace length) and hooking location (i.e., oral or swallowed). For this analysis, 291 hooks belonging to the three main hook types (J-hook—69%; circle—20%; kahle—11%) were included. No significant differences were observed in the means of turtle sizes between the oral and swallowed hooking location groups ($F(1,289) = 1.47, p = 0.22$) or hook types ($F(2,288) = 1.42, p = 0.24$). Classification tree analyses supported these findings as no discernible patterns were evident for predicting hooking location in the incidentally captured turtles. Although the current study was based on observational data and was not a controlled study, it is one of the firsts that has attempted to characterize recreational fishing gear that results in sea turtle by-catch.

04.04

1:45 VEGETATION AND FLORA ON LOWLANDS IN THE CENTRAL BLACK BELT OF MISSISSIPPI—HOW LOW DID THE ORIGINAL PRAIRIE GO?

Julian J. N. Campbell¹, W. Randy Seymour²

¹Bluegrass Woodland Restoration Center, Lexington, KY, USA, ²Roundstone Native Seed, Upton, KY, USA

Patterns of native vegetation are summarized for the central Black Belt in Mississippi, excluding larger river valleys and other peripheral transitions. This effort is based on inventory of three 200-300 acre sites—one previously studied upland site (Pulliam Prairie) and two lowland sites here detailed—plus general reconnaissance and review. The old fields, roadsides and other open areas adjacent to lowland woods, including shallow ponds managed for water-fowl, contain diverse mixtures of native graminoids and forbs. There are virtually no direct

transitions from such open areas to remnants of upland prairies, because corresponding soils on the landscape today are largely converted to row crops. However, roadsides, fencerows and woodland edges with gamagrass and associates (including an undescribed species of *Amsonia*) appear to harbor remnants of the lower grassland types that existed before modern agricultural conversion, when activities of herbivores (including beavers) and people (including fire) probably opened up the lowland woods in places, maintaining canebrakes and other brushy transitions. Lowland woods are generally dominated by oaks, hickories, sweetgum, green ash or red maple. Willow oak is the most abundant large tree, with a variety of associates from dry to wet sites. Small wooded sloughs and ponds support local populations of overcup oak, pumpkin ash and cypress, plus buttonbush in more open areas. Narrow riparian zones have distinctive composition, especially on mesic levees with swamp chestnut oak, black walnut and sugar maple. Plans for conservation in the region should address the full diversity of native species and original habitats, now sadly fragmented.

O4.05

2:00 VARIABILITY OF METHANE AND NITROUS OXIDE EMISSIONS FROM AN AGRICULTURAL LANDSCAPE IN THE MISSISSIPPI DELTA

Michael P. Keating, Clifford A. Ochs, Marjorie M. Holland

University of Mississippi, Oxford, MS, USA

Agricultural practices influence nutrient dynamics through the application of fertilizer which stimulates both plant production and microbial activity. Two potent greenhouse gases, methane (CH_4) and nitrous oxide (N_2O), can be produced through microbial transformations of nutrients applied to farmland. In this study, we examined the variability of CH_4 and N_2O emissions from an agricultural landscape in Tunica Co., Mississippi. The purpose was to determine the largest source of CH_4 and N_2O emissions across three different habitats in an agricultural setting. A static chamber technique was utilized to make gas measurements from soybean and corn cropland, vegetated riparian buffer, and vegetated wetland. Gas measurements were taken along a soil moisture gradient from the cropland to the vegetated wetland to observe soil moisture effects on gas emissions. Across all habitats, N_2O emissions were negligible. CH_4 emissions differed significantly across the three habitats and increased sequentially from cropland to riparian buffer to vegetated wetland. The results indicate vegetated wetlands are the largest source of CH_4 emissions in agricultural landscapes and are affected by soil moisture levels. Negligible N_2O emissions suggest that denitrification is converting nitrate to nitrogen gas instead of the intermediate metabolite, N_2O . We conclude that in agricultural settings, wetlands are more important than fertilized fields as sites for methane production.

2:15 BUSINESS MEETING

March 6, 2014

THURSDAY EVENING

POSTER SESSION

Following Dodgen Lecture

P4.01

RESPONSE OF THE GUT MICROFLORA TO THE ENERGETIC DEMANDS OF LONG-DISTANCE PASSERINE MIGRATION

William Lewis, Frank Moore, Shiao Wang

University of Southern Mississippi, Hattiesburg, MS, USA

The gastrointestinal tract of vertebrates is home to a vast array of microbes, referred to as the gut microbiota, which are known to play an important role in pathogen defense, food digestion, and fat metabolism of the host. Little is known about the gut microbiota of passerines; furthermore no studies have investigated the relationship between migratory energetic demand and passerine gut microbiota. The condition of a bird after the non-stop flight across the Gulf of Mexico (GOM) is likely an indicator of stress and energetic demand experienced during crossing. Birds arriving at the Northern GOM in poor condition may have differing microbiota compared to birds arriving in better condition. Gray Catbirds and Swainson's Thrushes were captured immediately after crossing the GOM during spring migration at the University of Southern Mississippi's long-term banding site in coastal Louisiana. Fecal samples, representative of the gut microbiota, were collected and the energetic condition of each bird was assessed. Fecal samples were collected from the same bird throughout its stopover duration to determine how the gut microbiota changes during stopover when birds have a chance to improve condition. The 16S rRNA gene of the bacterial genome was amplified and the microbial community structure was analyzed through Denaturing Gradient Gel Electrophoresis and cluster analyses. DNA concentrations in all of the samples were low, potentially due to high throughput times of birds combined with physiological changes and stressors associated with migration. Analysis from recapture samples suggests that the gut microbiota undergoes restructuring during stopover.

P4.02

A FLORA OF THE JOHN C. STENNIS SPACE CENTER IN HANCOCK COUNTY, MISSISSIPPI, USING SPECIFY 6 SOFTWARE AND DIGITALLY IMAGED COLLECTIONS FROM THE USM HERBARIUM (USMS)

Daniel McKinney McNair

University of Southern Mississippi, Hattiesburg, MS, USA

A unique feature of the University of Southern Mississippi Herbarium (USMS) is its number of vascular plant collections from the John C. Stennis Space Center in Hancock County, Mississippi. Most of the collections, representing several hundred species, are vouchers for environmental assessments conducted for NASA by Dr. Jean Wooten, professor emerita at USM. The Stennis property is located within the range of the longleaf pine ecosystem, a plant and animal community characterized by high species diversity and endemism. Over 95% of longleaf pine plant communities have been converted to urban and agricultural uses, so it is important to preserve and manage what little remains. Monitoring plant species in these areas, both native and non-native, is a major part of this preservation effort. Stennis collections were imaged and organized within a Specify database that allows users to create

highly customizable queries for more efficient access to data. The Specify database allows users to generate statistics using those queries and/or the data fields associated with each imaged collection. The primary goal of this project then is to provide a research tool for future studies at Stennis.

P4.03

PLETHODON WEBSTERI PHYLOGENY IN MISSISSIPPI

Ellie Giglio¹, Anna Nations¹, Tom Mann², Debora Mann¹, Cory Toyota¹

¹Millsaps College, Jackson, MS, USA, ²Mississippi Museum of Natural Science, Jackson, MS, USA

Samples from *Plethodon websteri*, lungless, woodland salamanders, were collected from three disjunct locations within a 28 km radius near Jackson, MS, and a fourth disjunct population was sampled from Legion State Park in Louisville, MS, 136-160 km east northeast of the 3 Jackson vicinity populations. The southernmost of the Jackson-area populations was assigned to *P. websteri* by Highton (1986), based on electrophoretic similarity to those included within the original description of *P. websteri* (Highton 1979), and which included the population at Legion State Park, which was the only MS population known at the time. The other two Jackson area populations were assumed to be *P. websteri* based upon their proximity to the tested, southernmost population. Color patterns of the Legion State Park animals are highly variable, and those in the three Jackson-vicinity populations are relatively homogeneous. Also, behavioral differences between the Louisville-area population and the Jackson-area populations are manifest during photography sessions. It is hypothesized that despite electrophoretic similarity the Louisville and Jackson-area populations have differentiated to some degree, and that the Jackson-area populations are more similar to one another than they are to the Louisville population. Samples of *P. ventralis* were also collected as an outgroup. Phylogenetic analysis was undertaken by comparing two mitochondrial genes, CYTB and ND2. Results were compared with literature analysis (Kozak 2006), and support the hypothesis that the more southwesterly populations are more similar to each other than they are to the Louisville-area population, but all populations still cluster as *P. websteri*.

P4.04

DEPARTURE DECISION OF RUBY-THROATED HUMMINGBIRDS (*ARCHILOCHUS COLUBRIS*) DURING AUTUMN MIGRATION

Theodore Zenzal¹, Robert Diehl², Michael Ward³, Frank Moore¹, Jill Deppe⁴

¹University of Southern Mississippi, Hattiesburg, MS, USA, ²U.S. Geological Survey, Bozeman, MT, USA, ³University of Illinois, Urbana, IL, USA, ⁴Eastern Illinois University, Charleston, IL, USA

Migration is an essential part of the life history of many bird species. There is much to learn about movement biology during migration, particularly factors related to an individual's decision to resume migratory flight after stopover. The Ruby-throated Hummingbird (*Archilochus colubris*) is a Nearctic-Neotropical

migrant whose migration biology is poorly understood. Further, their small size and high energy expenditure could make ecological barriers, like the Gulf of Mexico, quite formidable in which a miscalculation could be fatal. We hypothesize that departure direction will depend on energetic condition, while time of departure will be weather dependent. Additionally, we expect to see a relationship between departure time and departure direction. Toward this end, we attached miniature radio transmitters to Ruby-throated Hummingbirds that stopped along the northern coast of the Gulf of Mexico in 2011-2012 and recorded departure decisions using an automated radio-telemetry system. Departure direction and time of departure were selected as response variables in circular-circular and circular-linear regression models, while sex, energetic condition, wing length, wind direction, wind speed, and barometric pressure were selected as predictor variables in various models. A test of homogeneity was used to examine the relationship between departure time and departure direction. Departure direction was impacted by wind speed, energetic condition, and wing length. Departure time was not impacted by any factors; however, there was a relationship between time of departure and departure direction. These data suggest that an individual's condition, morphology, and prevailing winds encountered may dictate migration route, and indirectly time of departure.

GEOLOGY AND GEOGRAPHY

Chair: Zachary A. Musselman,
Millsaps College

Vice-Chair: Omar Harvey,
University of Southern Mississippi

March 6, 2014

THURSDAY MORNING

Forrest 2

O5.01

9:00 NATURAL HISTORY AND THE MISSISSIPPI GEOLOGICAL SURVEY

Michael B. E. Bograd

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

Natural history and what today would be called environmental science have been an integral part of the work of the Mississippi Geological Survey since its formation in 1850. An example of this aspect of applied geology is on page 149 of the 1854 *Report on the Agriculture and Geology of Mississippi* by B. L. C. Wailes. Describing the damage to cotton plants from insect attacks, Wailes noted that the "increase of these maladies may probably be traced in some measure to the extirpation or disappearance of birds, owing chiefly to the destruction of our forests, leaving them in a degree without protection or shelter." E. W. Hilgard's 1860 report on the geology and agriculture of Mississippi describes the features of our agricultural regions, the nucleus of the physiographic regions map (based on the state geologic map) that defines soils, forest resources, and

ecoregions maps of the state. In the twentieth century, the Survey mapped soils as well as geology, and published also on the botany, forestry, zoology, meteorology, archaeology, and erosion problems of Mississippi. The agency has collections of representative rocks and fossils, has long supported museums, and published several reports on the geology of state parks. Today, geologists of the MDEQ Office of Geology identify natural curiosities brought in by the public, and apply knowledge of the state's geology and published geologic maps to environmental issues such as coastal erosion, protection of aquifer recharge areas, and cleanup of contaminated sites.

05.02

9:15 NEWLY RECORDED PREHISTORIC TALLAHATTA QUARTZITE QUARRY SITE DISCOVERED DURING GEOLOGICAL MAPPING PROJECT IN NESHOBA COUNTY, MISSISSIPPI

James Starnes¹, David Thompson¹, David Abbott²

¹Mississippi Department of Environmental Quality, Office of Geology, Jackson, MS, USA, ²Mississippi Department of Archives and History, Jackson, MS, USA

An extensive prehistoric Tallahatta Quartzite quarry was recently discovered during geological mapping of the USGS 7.5 min. Deemer Quadrangle. The geologic quadrangle was authored by David E. Thompson and was published in 2012 as Open-File Report 248 by MDEQ's Office of Geology under the USGS StateMap Grant. The quarry site, 22Ne579 (The David Thompson Quarry), was subsequently recorded by archaeologist David Abbott of the Mississippi Department of Archives and History. Tallahatta Quartzite (TQ) is a sedimentary quartzite (orthoquartzite) that occurs in the sandy marine beds of the Eocene Age, Basic City Member of the Tallahatta Formation along its outcrop belt in east-central Mississippi. Preferred use of TQ by prehistoric people goes back as early as the Paleolithic cultural period, as other geologic materials for tool making, such as chert resources, are absent throughout much of east-central Mississippi. Due to its abundance, knapping qualities, and the esthetics of the stone, TQ found wide distribution among prehistoric peoples across much of the region into south and western Mississippi, and into the "Delta" region of Arkansas and Louisiana. TQ quarries like 22Ne579 are often extensive, exhibiting thick deposits of mining debris, and were likely in use over multiple cultural periods. Preliminary work by David Abbott indicates that 22Ne579 is a large quarry with extensive deposits. Hammer-stone fragments of hard sandstone from the Kosciusko Formation were recovered in preliminary documentation of quarry Site 22Ne579. Cobbles of Kosciusko Sandstone found at the site were likely brought in to break off large spalls of TQ.

05.03

9:30 NATIVE AMERICAN EFFIGY PIPES MADE FROM THE GLENDON LIMESTONE OF MISSISSIPPI

David T. Dockery III¹, Vincas P. Steponaitis²

¹Mississippi Department of Environmental Quality, Office of Geology, Jackson, MS, USA, ²Research Laboratories of Archaeology, University of North Carolina at Chapel Hill, NC, USA

Native American effigy pipes composed of off white or buff brown limestone from sites in Mississippi and neighboring states were assembled for examination at the Mississippi Department of Archives and History in Jackson on January 29, 1996. These pipes were examined by Vincas P. Steponaitis and David Dockery, and some 10 were identified as carved from the Early Oligocene (about 30 million years old) Glendon Limestone, based on the occurrence of tests (shells) of the large Foraminifera *Lepidocyclina supera*. *L. supera* tests are large enough to be seen without magnification, though magnification helps to see the tests' internal structure, and are guide fossils to the Glendon Limestone and overlying Byram Formation. Steponaitis and Dockery subsequently examined limestone pipes at Harvard University, the Smithsonian Institution, and the Grand Village of the Natchez Indians and have found examples from the Glendon Limestone at all three institutions. This study was published in: Vincas P. Steponaitis and David T. Dockery III, 2011, Mississippian Effigy Pipes and the Glendon Limestone: American Antiquity, v. 76, no. 2, p. 345-354. In November of 2013, Steponaitis and Dockery examined additional limestone pipes in the Gilcrease Museum in Tulsa, Oklahoma, the Sam Noble Oklahoma Museum of Natural History at the University of Oklahoma in Norman, Oklahoma, and the Oklahoma History Center in Oklahoma City, Oklahoma; results are to be published in the Gilcrease Journal in 2014.

05.04

9:45 GLACIALLY FACETED STONE FROM THE PRE-LOESS TERRACE DEPOSITS IN MISSISSIPPI

James Starnes¹, Keith Peacock²

¹Mississippi Department of Environmental Quality, Office of Geology, Jackson, MS, USA, ²Mississippi Gen and Mineral Society, Florence, MS, USA

A largely glacially derived origin has been attributed to the ancestral Mississippi River Pre-loess Terrace deposits that underlie the loess and occupy the eastern valley wall or "bluffs" that border the modern river's alluvial plain. This inference is due to the abundance of Sioux Quartzite and likely ice-rafted boulder clasts found in the Pre-loess terrace gravels. The Pre-loess Terrace Deposits seem to be largely derived from rivers and streams draining the glacial margins during Pleistocene glacial episodes and newly exposed bedrock and moraines in the upper reaches of the ancestral Mississippi River during interglacial episodes. Due to the weathering and abrasion of a long distance fluvial transport of the Pre-loess gravels into Mississippi by the ancestral Mississippi River, many of the obvious signs of the glacial effects on these gravels have long been worn away. Frost-cracks, glacial polish, glacial facets, and

striations have been worn smooth into common river rocks, largely erasing these gravel's previous glacial histories. On rare occasions these structures have been found preserved. Though more commonly found on more weather resistant boulders of chert and quartzite that are attributed to be ice-rafted, rare cobble-size specimens of chert and quartzite have been found in the "bluff" streams of Mississippi which still exhibit excellent glacial faceting, polish, and parallel striations.

05.05

10:00 LATE OLIGOCENE MAMMALS AND HERPTILES FROM WAYNESBORO, MISSISSIPPI

George Edward Phillips¹, Andy Weller², James Starnes³

¹Mississippi Museum of Natural Science, Jackson, MS, USA,

²Mississippi Gem and Mineral Society, Waynesboro, MS, USA,

³Mississippi Department of Environmental Quality, Office of Geology, Jackson, MS, USA

Terrestrial mammals are scarce in pre-Pleistocene deposits of the Gulf Coastal Plain because this region is richest in sediments containing marine fossils. Only two terrestrial mammal-rich 'local faunas' have been previously reported from Mississippi and both are Pleistocene—one from the Mississippi River Valley and the other from the Black Prairie District. However, a diverse paralic local fauna of Late Oligocene (~25 million years old) age has been gradually coming to light since December 2012. So far, the fauna is known only from the greater Waynesboro vicinity, although similar deposits and fossils may lie in adjoining Alabama. The fossils occur in a ~1.0 m thick lag deposit at the base of the lignitic deltaic clay composing the lower Catahoula Formation, where it transitions into the interbedded marl-clay beds of the subjacent marine Paynes Hammock Formation. This extremely fossiliferous although highly fragmentary marginal marine clastic facies consists of, at first glance, a typical Gulf Coastal Plain Oligocene marginal marine vertebrate assemblage, namely fish, crocodilian, turtle, and dugong. However, the turtles comprise several species, including a pleurodiran (Podocnemididae), a giant tortoise (*Hesperotestudo*), 2-3 as yet unidentified brackish or freshwater species (sensu Cryptodira), and numerous elements belonging to a softshell turtle (Trionychidae). Salamander vertebrae have also been recovered. Perhaps most interesting, however, are the diversity of terrestrial mammal remains awaiting description and attributable to the rhino *Subhyracodon*, a small three-toed horse (cf. *Miohippus*), a tapir, the anthracothere *Arretotherium*, a protoceratid (cf. Synthetoceratinae), a hypertragulid (cf. *Nanotragulus*), rodents, a leporid, and small carnivores.

10:15 BREAK

05.06

10:30 DINOSAURS NESTING NEAR A LOWER COFFEE FORMATION (UPPER CRETACEOUS) MUD FLAT?

George Edward Phillips¹, David Hanes²

¹Mississippi Museum of Natural Science, Jackson, MS, USA,

²North Mississippi Gem and Mineral Society, Tupelo, MS, USA

Dinosaur remains have been recovered from most major Upper Cretaceous marine units in the state, typically as unassociated bones and teeth; however, none have been documented from the Coffee Formation. In southern Prentiss County (Booneville vicinity), rare fragmentary dinosaur remains are known from the basal lag of the immediately superjacent Demopolis Formation. In addition, southern facies of the Coffee Formation, namely the Tupelo Tongue and its Chapelville bed, are otherwise rich in shallow marine organisms. Recently, an association of hadrosaur (*Ornithischia*: *Hadrosauridae*) bones composing a single adult individual, plus a loosely associated dentary of a nestling, were collected near Booneville in central Prentiss County, just north of the Tupelo Tongue. The bones lie within a thin (~45 cm) interval in the upper part of a 3 m sequence of dominantly clay beds in the lower Coffee. Most of the section is comprised of thinly laminated, micaceous, lignitic, reduced clay intervals interpreted collectively as a high subtidal to low intertidal mud flat. However, within the same interval as the dinosaur bones are scattered, poorly preserved remains of marine vertebrates and moldic marine mollusks. Less than 50 cm below the bone interval is a ~40 cm thick bed of moldic sand comprised almost entirely of trigoniid bivalve *Pterotrigonia* impressions. Given their inferred gregarious nature and that hadrosaur remains—eggs to adults—are not uncommon in shallow neritic and marginal marine deposits globally, including the Gulf Coastal Plain, the (unpreserved) supratidal portion of the "Coffee Coast" near Booneville very likely supported hadrosaurine rookeries.

05.07

10:45 LATE PLEISTOCENE TO HOLOCENE MEANDERING AND LATERAL MIGRATION WITHIN THE BIG BLACK RIVER, MISSISSIPPI

Zachary A. Musselman

Department of Geology, Millsaps College, Jackson, MS, USA

The Big Black River (BBR) in western Mississippi has an anomalous straight reach (ASR) near Edwards, Mississippi. The ASR is an obvious fluvial anomaly on maps and imagery as the BBR shifts from its general southwesterly flow to a west-northwest flow for about 6.5 km, before returning to its meandering southwesterly flow. Previous studies in the area are limited, with explanations for possible causes of the ASR including jointing and faulting. Neotectonic activity has not been supported by earlier tectonic geomorphic investigations. Geomorphic indicators of change within the BBR floodplain such as abandoned channels and ridge and swale topography suggest the river migrated to the west along the ASR. The timing of formation of the ASR was investigated using optically stimulated luminescence (OSL) and radiocarbon dating of

floodplain and abandoned channel deposits. Six hand augered holes were sampled to a depth of approximately 5 meters. Four holes were sampled south of the ASR along a bearing parallel to the river and two oxbows/meander scars were sampled north of the ASR. OSL ages indicate Late Pleistocene sedimentation at the eastern most sampling site and Holocene sedimentation in the most western site. Lateral migration rates based on the OSL dates along the ASR range between 18.0 cm/yr and 19.2 cm/yr, and average 18.5 cm/yr. The OSL and radiocarbon dates coupled with the landforms in the adjacent floodplain near the ASR reveal lateral migration of the BBR to the west beginning in the Late Pleistocene.

11:00 LUNCH

March 6, 2014

THURSDAY AFTERNOON

05.08

1:00 TEMPORAL AND STRATIGRAPHIC ANALYSIS OF THE SHTOJ ALLUVIAL FAN, SHKODRA, ALBANIA

Catherine Henry, Stan Galicki

Department of Geology, Millsaps College, Jackson, MS, USA

Multi-proxy analysis of sediment cores taken on the distal margins of the Shtoj alluvial fan were used to interpret the Late Holocene paleoenvironment in northwestern Albania. The 50 km² Late Pleistocene-Holocene alluvial fan that formed at the head of the 372 km² Kir River drainage basin has an average gradient of 2 m km⁻¹ and is the smallest of three fans on the western slopes of the Prokletije Mountains. Dry bulk density, organic carbon, magnetic susceptibility, particle size determination, sediment composition, and AMS 14C ages provide the basis for interpretation. Seven sequential cores taken to a total depth of 2.87 m were supplemented with hand auger samples to a total depth of 3.49 m. The vertical succession of sand, clayey/silty sand, sandy clay, mud, and peat facies in the cores document fan expansion after 1730 cal yr BP. The Kir River is the probable source of the fan; however, the fan has been abandoned and the Kir is now a tributary to the Drin River. A possible river terrace preserved in the central fan area and channel scars visible on aerial photos suggest a possible ancient course of the Kir. The Late Holocene expansion of the fan is attributed to an increase in water availability due to wetter climate. The alluvial sedimentary record supports a recent interpretation of wetter climate from 1800-1500 cal yr BP using stable oxygen isotope ratios for lacustrine sediments from Lake Shkodra 6 km to the west

05.09

1:15 HISTORICAL CHANNEL ADJUSTMENT IN THE PASCAGOULA RIVER BASIN AND ADJACENT SYSTEMS, SOUTHEAST MISSISSIPPI

Michael Ayers, Frank Heitmuller

University of Southern Mississippi, Hattiesburg, MS, USA

Our project identified historical channel cross-section adjustment in thirteen rivers of the Pascagoula Basin over the

last 30-50 years. Historical depth and stream flow measurements, taken at established USGS gaging stations, were digitally scanned into a computer. Incremental width, depth and discharge values were then transferred into an excel spreadsheet. For each section, the depth was subtracted from the mean gage height, that value representing the channel bed elevation. When the bed and bank elevations were plotted together; the resulting graph depicted the channel form. Plotting elevation measurements of the channel bed at consistent locations over time enabled assessment of changes in shape, bed elevation and spatial position. The purpose of this project was to create site specific cross-sections along the main stem rivers and tributaries of the Pascagoula fluvial system that would accurately depict a record of historical channel adjustment for the entire watershed. Noticeable in preliminary results were cycles of bed and bank incision; then aggradation, from decade to decade. Cycles were present at majority (11 out of 13) rivers. Once changes in channel geometry over the last several decades were documented they may be attributed to either naturally occurring fluvial processes (e.g., floods) or anthropogenic disturbances (e.g., logging-induced sedimentation).

05.10

1:30 SPATIAL DISTRIBUTION OF SOCIAL VULNERABILITY AND VULNERABLE POPULATIONS IN COASTAL HAZARD INDUCED AT-RISK ZONES

Joslyn Zale, J.O. Joby Bass, Bandana Kar, James Dickens

University of Southern Mississippi, Hattiesburg, MS, USA

A number of communication platforms requiring integration of warning platforms, technologies, and public and private sector stakeholders are in place to alert at-risk communities take preparatory actions to mitigate impacts of any disaster. Despite technological advancements, these platforms have been criticized for their failure to reach out the at-risk population, as illustrated by Hurricanes Katrina and Sandy. Although one component of this problem could be the availability of these platforms, the other component may be the socio-economic characteristics of the at-risk population that make them less responsive to warning messages and more vulnerable to disaster impacts. The Mississippi Gulf Coast counties are at higher risk from frequent and intense tropical storms. This ongoing project explores how the socio-economic conditions of the at-risk communities in this area influence the effectiveness of the warning systems by answering the following research questions: (1) What is the spatial distribution of population in platform coverage areas?; (2) What percentage of the population in coverage areas is located in at-risk (especially at risk to tropical storms and coastal flooding) zones?; and (3) What is the socio-economic and cultural distribution of population in platform coverage areas and at-risk zones? The coastal areas of the study counties are at higher risk from storm surge impact, are densely populated, and include multiple racial (Caucasian, African American, and Asian) and income (less than \$25,000 to more than \$100,000 annually) groups. The spatial distribution of socially vulnerable groups coincides with the physically at-risk areas.

05.11

1:45 PHOTOOXIDATION OF PYROGENIC ORGANIC CARBON AND CONSEQUENCES FOR CO₂ AND NUTRIENT LOADING TO THE GULF OF MEXICO

John T. Howell, Omar R. Harvey

University of Southern Mississippi, Hattiesburg, MS, USA

Historical fire data indicates that since 2002, 25% of recorded vegetation fires within the continental US occurred in the northern Gulf Coast of Mexico (NGOM) region. Average size of these fires was 103 acres and contributes an estimated 1-2 Megatons of pyrogenic C yr⁻¹ to the soil carbon pool. Accounting for the fate and transport of this pyrogenic carbon (pyC) is crucial to deciphering the critical links between fire, biogeochemical cycles and environmental sustainability in the sensitive terrestrial and aquatic ecosystems of the NGOM. While the role of microorganisms on the fate and transformation of pyC has been widely studied, very little research has been conducted to quantify contributions of abiotic processes such as photooxidation. This study focuses on the photooxidation of dissolved pyC derived from the burning of natural/cultivated forest systems within the Pine Belt Region of Mississippi. The goal of this research is to quantify contributions of photooxidation of pyC to CO₂ and nutrient loadings along the Gulf of Mexico. Results thus far indicate that photooxidation could account for as much as 50% of pyC loss from aqueous systems with the amount of photooxidation being directly proportional to solar irradiance. Such observation suggest that vegetation fires in late winter and subsequent transport of associated pyC during the frequent rainfall events of spring could be a significant source of CO₂ emissions and/or nutrient release in surface water bodies of the NGOM. Our presentation will discuss how current burning practices may contribute to the annual dead zone in the GOM.

05.12

2:00 REACTIONS IN RIPARIAN SOILS AND THEIR IMPACT ON PHOSPHATE AND NITRATE RETENTION

Taylor Runyan, Omar Harvey

University of Southern Mississippi, Hattiesburg, MS, USA

Excessive amounts of phosphate and nitrate from terrestrial sources (particularly runoff from agricultural fields) have been identified as a major contributor to hypoxic conditions and eventual eutrophication of the Gulf of Mexico. One management strategy suggested to control eutrophication, is the establishment of riparian/buffer zones in agricultural areas. The general idea is that the buffer zone will serve to minimize water/nutrient runoff from agricultural fields to streams and eventually the ocean. However, given the high spatial variability in soils knowledge of the nutrient retention capacity and the reactions involved is crucial to determining the overall efficacy of this management strategy. For example, under most conditions the negative charge on organic matter and clay minerals dictates that soils will most likely repel, rather than attract, negatively charged species such as PO₄³⁻ and NO₃⁻. The retention of both PO₄³⁻-P

and NO₃⁻-N in riparian soils can therefore be expected to occur only in presence of soil minerals with positive charge characteristics and/or conditions suitable for the chemical reduction of NO₃⁻ to NH₄⁺. Our presentation will cover: 1) the nitrate and phosphate retention capacity of soils in three riparian zone settings along the lower Mississippi River, and 2) the mechanism(s) by which these soils retain NO₃⁻ and PO₄³⁻.

2:15 BUSINESS MEETING

HEALTH SCIENCES

Co-Chair: Angelia Garner,
University of Mississippi Medical Center

Co-Chair: Felicia Tardy,
University of Mississippi Medical Center

Co-Vice-Chair: Denise Krause,
University of Mississippi Medical Center

Co-Vice-Chair: Stacy Vance,
University of Mississippi Medical Center

**March 6, 2014
THURSDAY MORNING**

Lamar 1

06.01

9:00 SCOLIOSIS AND OTHER LONG-TERM COMPLICATIONS OF RADIATION THERAPY IN PEDIATRIC CANCER PATIENTS WITH CHEST WALL SARCOMAS

Rajiv P. Heda¹, Meghan E. Brown¹, Matthew Krasin²

¹Rhodes College, Memphis, TN, USA, ²St. Jude Children's Research Hospital, Memphis, TN, USA

BACKGROUND: Pediatric cancer patients who are treated with radiation therapy are at risk for long-term complications. Patients with chest wall sarcomas who received radiation therapy to the chest are at risk for specific long term effects on organs including bone, lung, thyroid and heart. It is hypothesized that radiation dose is related with specific late effects including scoliosis and pneumonitis.

METHODS: 20 pediatric patients with chest-wall sarcomas (IRB approved SJ trial) were analyzed to correlate organ radiation dose, clinical factors and the risk of subsequent late effects (scoliosis, pneumonitis, hypothyroidism). Dose to the spine, lung, thyroid and heart was calculated from the radiation treatment plan. Follow-up evaluations included clinical examinations, imaging (MRI, CT, X-Rays), and laboratory studies.

RESULTS: The range of scoliosis identified on follow-up imaging ranged from 0 to 64 degrees (median 11.8 degrees). No correlation was identified between radiation dose to the spine or tumor size and degree of scoliosis. Degree of surgery and tumor distance from the spine did not correlate with scoliosis. Radiation pneumonitis was not correlated with mean dose or

volume of lung receiving 24Gy. Other late effects will be evaluated.

CONCLUSIONS: Neither scoliosis or pneumonitis were correlated with radiation dose.

O6.02

9:15 COMPARISON OF CONVENTIONAL AND SUSTAINED DELIVERY OF ANTIOXIDANTS TO SUPPRESS THE SK-OV-3 CELL LINE IN OVARIAN CANCER

Jennifer Harpole, Michelle Tucci, Hamed Benghuzzi

University of Mississippi Medical Center, Jackson, MS, USA

Ovarian cancer is the leading cause of mortality among gynecologic cancers. The objective of this study was to investigate the synergistic effect of antioxidants Thymoquinone (TQ) and Epigallocatechin-3-gallate (EGCG) using SK-OV-3 cell line as a model. A total of 144 wells were plated with 10^5 SK-OV-3 cells. The wells were divided into groups of 72 wells for conventional and sustained delivery, respectively. Each group was subdivided into 4 groups of 6 wells. Group 1 served as control and groups 2, 3, and 4 were treated with TQ (16 μ M), EGCG (3 μ g/ml), and TQ + EGCG, respectively. Biomarkers and morphological evaluations were performed following standard lab techniques. The results of the study revealed: (1) there were no differences in cellular protein concentrations between TQ, EGCG, and control in conventional and sustained delivery for 24 and 48 hour phases; conversely at 72 hours, protein concentration of TQ was significantly increased in conventional and unchanged in sustained delivery ($p < 0.05$), (2) an increase in nitric oxide following administration of EGCG and combination therapy at 24 and 72 hours regardless of route of administration, (3) conventional and sustained delivery of TQ, EGCG, and combination did not induce intracellular oxidative stress at 24 and 48 hours, (4) there was no membrane or cellular damage noted to the cells in conventional or sustained delivery at all phases. Overall conclusion: the results indicated the use of sustained delivery of TQ + EGCG inhibited the metabolic activities of SK-OV-3 ovarian cancer cell line in culture.

O6.03

9:30 MEDICATION MEASUREMENTS OF FRED'S PHARMACY CLIENTS

Iris Nguyen¹, Blair Gingrich²

¹*Cooperative Intern Program Mississippi Gulf Coast Community College-Jackson County Campus Biological Sciences Students, Gautier, MS, USA*, ²*Fred's Pharmacy, Gautier, MS*

The twenty-first century has seen an increase in prescription medication among different age groups. New illnesses are continuously discovered, some fatal. However, not all of them were cured by prescriptive medication, because there were alternative ways. Nonetheless, patients continued to request the same drugs to treat their issues when certain drugs were only intended as a temporary fix. Society has become more and more dependent on drugs. The purpose of this project was to survey and determine the percentage of medications requested by clients at Fred's Pharmacy. The method of research approach

was to trace and document what certain ages among people purchased at the pharmacy as to why they needed those medications. Then, using that information to define the cause of why they would demand the prescription. The outcomes collected outline the medical complications of today's society, which in turn, were targeting certain age groups.

O6.04

9:45 TRAUMA INDUCED INFLAMMATION, SEPSIS AND AGING

D. Olga McDaniel, Debbie Rigney, John Porter, Gregory Timberlake

University of Mississippi Medical Center, Jackson, MS, USA

In African American and Caucasian populations advanced age and preexisting co-morbid risk factors such as hypertension and diabetes have differential effects on the outcome of clinical complications such as systemic inflammatory response syndrome (SIRS) and sepsis in elderly patients with trauma/injury insult. **Hypothesis:** Characterization of specific factors to post-trauma clinical complications in the trauma care setting may help in designing strategies to improve outcomes and the development of efficient patient care and management. **Methods:** Charts of patients, who were admitted to the SICU at the University of Mississippi Medical Center (UMMC) for >72 hours between 2006 and mid-2008 were reviewed. Patients with blunt or penetrating trauma that resulted in injuries with severity scores (ISS) ranging 10-75, met the criteria for inclusion in the study. Health disparity data, age, race, gender and presenting ISS were included in the analysis. **Results:** Effects of co-morbid risk factors such as hypertension and diabetes were more prominent at an older age in African American patients vs. Caucasians. These risk factors were associated with higher incidence of SIRS and sepsis after trauma/injury insults. adjusting for the ISS and age, old age was an important risk factor in the development of systemic inflammation and sepsis in African American patients ($p < 0.03$). However, univariate analysis of the data showed HTN and diabetes were variable risk factors regardless of the ISS. **Conclusion:** The ISS may not fully influence the outcome of sepsis, and patients susceptible to the development of sepsis were a unique subset with a potential for infection.

10:00-12:00 Career Symposium Sponsored by Health Sciences

12:00-1:00 Plenary Speaker

POSTER SESSION I

Following Dodgen Lecture

P6.01

DATA MINING AND VISUALIZATION TECHNIQUES TO SUPPORT EPIDEMIOLOGIC RESEARCH IN ORAL HEALTH

Denise Krause

University of Mississippi Medical Center, Jackson, MS, USA

Massive amounts of clinical and research data are collected daily. Unfortunately, it is often difficult to understand or draw

inferences from these data due to their complex nature. There is increasing interest in visualizing and exploring data to allow organizations to make quicker and better informed decisions and to make faster innovations in scientific research and discovery.

The hypothesis of this study was that data mining and visualization tools and techniques will facilitate epidemiologic and health services research for dental faculty and students.

Specific aims were to:

1. Implement tools to develop data analytics, data visualization, and data mining capabilities to establish an informatics platform on which to conduct oral health research.
2. Connect to the electronic dental record database (EDR) to perform ad-hoc query analyses.
3. Produce visualizations from EDR data to assist in understanding the quality of EDR data and how those data can be further used to facilitate research.
4. Perform exploratory research to examine several oral and general health indicators from the EDR, comparing differences by gender, race, age group, and geography.

Each of the variables of interest was charted. Drillable dashboards were created to visually represent the oral health variables under study and to highlight disparities of age, race, or gender. These techniques assisted us in recommending strategies to improve data quality. In spite of some data challenges, we found that using data visualization tools and techniques to mine data in the EDR to be potentially useful for epidemiologic, health services, clinical informatics, and public health informatics research.

P6.02

COMPARATIVE ANALYSIS OF FLUORESCENT AND NON-FLUORESCENT IMMUNOSTAINING FOR LASER CAPTURE MICRODISSECTION (LCM) OF SINGLE CELLS FROM FROZEN TISSUE SAMPLES

Gouri J. Mahajan, Somair Riaz, Dharmendra Goswami, Mark Austin, Craig Stockmeier

University of Mississippi Medical Center, Jackson, MS, USA

Laser Capture Microdissection (LCM) is an analytically-robust method of tissue dissection and isolation with a high cellular resolution. LCM provides the unique benefit of morphological, histological and visual identification of cells in complex eukaryotic tissue, which is lost in flow cytometry of homogenized tissue that employs Fluorescent Activated Cell Sorting (FACS). Compared to FACS, the LCM methodology also has the added advantage of maintaining a captured cell's nuclear and cytoplasmic integrity. However, FACS provides the ability to sort cellular nuclei based on nuclear membrane marker expression that ensures cellular specificity based on known molecular identity. The innovative engineering and instrumentation behind currently available LCM instruments leave a significant room for improvement in the field of biology to establish efficient methods of characterizing the molecular identity of cells. Assimilation of extremely rapid immunohistochemical staining methods can provide the LCM technique an unparalleled advantage in combining molecular

identification of cells with morphological identification and cytoplasmic integrity. By employing the rapid immunostaining methods, unique cells in complex eukaryotic tissue structures can be studied such as distinct cells in brain tissue and anaplastic cells in tumor samples. Here, we compare the universal Hematoxylin & Eosin (H&E) staining method with the more specific fluorescent labeling approach as two distinct techniques of rapid frozen tissue immunostaining for LCM use. The H&E staining method is widely employed because of high tissue penetration and ease-of-use, but limits the single-cell LCM to morphological identification of cells by the experimenter. On the other hand, the fluorescent labeling approach provides molecular identification of cells that is more specific for single-cell LCM. Our comparative analysis provides objective criteria to distinguish the use of either methodology, based on end-point biological application and limitations.

Supported by GM103328 and the University of Mississippi Medical Center.

P6.03

ASSESSING THE ROLE OF SUPRA-PHYSIOLOGIC LEVELS OF RETINOIC ACID (ATRA) IN OVALBUMIN AND MOLD-SENSITIZED F344 RAT LUNG TISSUES AND IMPROVEMENT OF RELATED PATHOLOGY BY CITRAL

Ibrahim Farah, Carlene Holt-Gray, Joseph A. Cameron

Jackson State University, Jackson, MS, USA

The role of retinoic acid (All Trans Retinoic Acid; ATRA) in the development of lung pathology and tissue remodeling are not well established in the literature. As well, the role of citral (inhibitor of retinoid function) in the improvement of lung pathology was not ascertained under an in vivo setting. Therefore, it is hypothesized that ovalbumin and mold exposure will sensitize lung tissues to supra- physiologic levels of ATRA leading to lung tissue pathology and that citrals (C1 and C2) will reverse or ameliorate the related pathological damage to lung tissues. The study used an IACUC approved between-subject in vivo randomized split plot factorial design (F344 rat model; N=76). Two groups representing intratracheal mold spore instillation and ovalbumin (intraperitoneal) were exposed to 16 different treatments including vehicle, ATRA, citrals (C1 and C2) and their combinations by intraperitoneal route. Rat weight data and blood were collected on Days 1 and 21. All animals were sacrificed on day 21 and lung tissues were processed for histopathology. Results showed that even though C1 and C2 were not toxic individually, their combination at high dosing (50 mg/kg) was lethal. Evidence from weights and blood (ANOVA and Duncan) as well as histopathological analysis supported the findings that exposure of ovalbumin-sensitized and mold-sensitized rats to ATRA showed different levels of lung tissue damage that was improved by C1 and C2 respectively. This promising study showed variable responses on the interaction of ovalbumin, citrals, mold and ATRA as related to their improvement of lung tissue pathologies.

P6.04

TRICHOMONAS VAGINALIS VIRUS IN TRICHOMONIASIS

Cory Toyota¹, Karen Ezelle², John C. Meade¹

¹University of Mississippi Medical Center, Jackson, MS, USA,

²Millsaps College, Jackson, MS, USA

Trichomoniasis, caused by the protozoan *Trichomonas vaginalis*, is the world's most common non-viral sexually transmitted disease. It responds well to metronidazole treatment, but is linked to increased susceptibility to HIV infection, pregnancy complications, and demonstrates a pronounced racial disparity, infecting ten times more African American women than Caucasian women. *T. vaginalis* isolates are also infected with up to four distinct double stranded RNA viruses (TVV1-4) which have been proposed to enhance pathogenesis of trichomoniasis by provoking inflammation. We are working to determine the presence of the four strains of TVV from two subtypes of *T. vaginalis* and assess their relationship with the clinical manifestations of trichomoniasis. RNA is purified from clinical isolates of the protist, cDNA produced by RT, strain-specific PCR products are amplified, and results are analysed by agarose gel electrophoresis.

P6.05

THE EFFECTS OF LOW LEVEL LASER THERAPY ON ADULT PATIENTS WITH CARPAL TUNNEL SYNDROME: A SYTEMATIC REVIEW

Felix Adah, C. Glaze, K. Guthrie, K. Ingram, K. Parish, J. Slaughter, C. Walker, W. Wuerdeman

University of Mississippi Medical Center, Jackson, MS, USA

Background and Significance: Carpal tunnel syndrome (CTS) is a common entrapment neuropathy affecting many patients. Low level laser therapy (LLLT) may be effective in alleviating pain and improving functional deficits in patients with CTS. The purpose of this systematic review was to evaluate the effects of low level laser therapy in reducing pain and increasing grip strength in patients with CTS. Methods: PubMed database was searched through February 2013 with no date restrictions using the clinical terms for carpal tunnel syndrome and laser. An abstract screen was conducted to further eliminate studies that did not specifically focus on the effects of laser for pain and grip strength on CTS. Study quality was evaluated using the PEDro scale, a scale that assesses the validity of randomized controlled trials in physical therapy studies. The maximum score is a ten; the higher the score, the better the internal validity. The 2011 Centre of Evidence Based Medicine (CEBM) scale is a five-level scale used to score the studies based on study design with lower scores identifying higher levels of evidence. Results: Four of the thirteen studies identified by the search strategy met all specified criteria. The average PEDro score was 7.75/10, with a range of PEDro scores from 6/10 to 9/10. In regard to CEBM levels of evidence, three studies were scored level II and one scored level III. Conclusion: In all four studies, there was a significant within group difference with a decrease in pain and increase in grip strength from baseline to post-treatment measurements, but only two of four studies had a significant

between group differences for the low level laser group. . Laser can be applied during acute, subacute and chronic conditions; it is suggested that laser be considered along with other modalities when treating CTS. It is recommended that future research looks at the energy level on which laser can be delivered for the best clinical efficacy.

P6.06

RESEARCH STUDY: CANCER PATIENTS' MOTIVATORS

Katelynn Sigmon¹, Brooke Kennedy¹, Maggie Clarkson²

¹Cooperative Intern Program Mississippi Gulf Coast Community College Jackson County Campus Biological Science Students, Gautier, MS, USA, ²Singing River Hospital Systems Regional Cancer Center, Pascagoula, MS, USA

The purpose of this project was to identify the primary motivators associated with clinical research participation among cancer patients at the Singing River Health System Regional Cancer Center. Cancer as a disease continues to challenge the health care team in prevention, early detection, treatment and symptom management. Clinical research studies are the primary driver of improvements in cancer care. Increased participation in clinical research trials supports faster solutions to cancer care challenges. A survey was conducted to identify factors associated with patient participation. Results were analyzed to identify the top three motivators and compare results by age, gender, disease/type, stage of cancer, and other variables. Recruitment strategies were evaluated for opportunities to improve cancer patient research study participation rates based on survey results.

P6.07

TOXICITY OF VIBRIO CHOLERA IN MISSISSIPPI COASTAL WATERS

Robert Buntyn, Reid Warren, Shuo Shen, Jay Grimes

University of Southern Mississippi, Hattiesburg, MS, USA

Less than one percent of *Vibrio cholerae* strains in the U.S. coastal waters possess the cholera toxin. Cholera toxin is expressed in the *ctxA* gene and is responsible for the illnesses caused by *V. cholerae*. Our hypothesis was that Mississippi coastal waters would reflect similar statistics and to investigate this hypothesis water samples were collected from three different locations (2 estuaries and 1 bathing beach) in Ocean Spring, MS. Salinity, water temperature, time, and GPS coordinates were recorded for each sample. Water samples were placed in alkaline peptone water, incubated overnight at 42°C, and the surface pellicle was plated onto thiosulfate-citrate-bile salts-sucrose (TCBS) agar and incubated at 42°C. Sucrose positive colonies were purified by re-streaking onto Marine Agar 2216 (MA) and stock cultures were maintained in MA soft agar deeps. Each isolate was then plated onto MA and DNA was extracted from this growth. A pair of DNA primers for outer membrane protein W (*ompW*) was then used in a polymerase chain reaction (PCR) to verify the putative *V. cholerae* isolates. Out of 28 isolates, 23 were *ompW* positive and these strains are now being tested for the presence of *ctxA*. Thus far, 7 strains have tested positive for *ctxA*, which is an unusually high percentage.

P6.08

LINKAGE TO CARE AND MEDICATION ADHERENCE IN PERSONS LIVING WITH HIV/AIDS

Denise Krause¹, Kenneth Butler², Warren May³

¹University of Mississippi Medical Center, School of Dentistry, Jackson, MS, USA, ²University of Mississippi Medical Center, School of Medicine, Jackson, MS, USA, ³University of Mississippi Medical Center, Center of Biostatistics and Bioinformatics, Jackson, MS, USA

The objective of this study was to examine the issues of linkage to care and medication adherence for persons living with HIV/AIDS (PLWHA). A random sample of 1,500 PLWHA was derived from the Mississippi State Department of Health's HIV/AIDS reporting system. Data were obtained on access to care, sociodemographic characteristics, and medication adherence. A total of 220 interviews were completed by PLWHA in Mississippi (87% African-American, 52% female). Most participants agreeing to participate in the study reported that they received all the medical care they believed necessary (82%). A majority of participants (75%) had received a prescription for anti-retroviral medications within the last twelve months. Of the remaining participants that reported that they had not been given a prescription (25%), one-third of them noted their doctor had not prescribed them (35%), were told they did not need them yet (20%), felt they didn't need to take them (12%), or were not able to afford the medications (7%). Those reporting other reasons said that they had not been taking anti-retroviral medications because they had not been to see a doctor (67%). Eliminating barriers and enhancing access to care is an important goal to improve adequate medication provision and adherence for PLWHA. Based on the findings of this study, improving access to care of specific services is a major factor in improving medication adherence. Overall, most participants in our sample reported sufficient access to care and good medication adherence.

P6.09

ROLE OF HEPATOMA UP-REGULATED PROTEIN (HURP) IN PROSTATE CANCER RESISTANCE TO CHEMOTHERAPEUTIC DRUGS

James Kent, Jr.¹, Abdelouahid El-Khattouti², Tangeng Ma², Mohamed Hassan², Ingrid Espinoza², Christian Gomez²

¹Mississippi University for Women, Columbus, MS, USA, ²University of Mississippi Medical Center, Cancer Institute, Jackson, MS, USA

The goal of this study is to investigate the tumorigenic mechanisms of Hepatoma Up-Regulated Protein (HURP) in prostate cancer (PCa). HURP is a cell-cycle-regulated and microtubule-associated protein. It functions as a Ran GTPase effector and is involved in the stabilization of the mitotic kinetochore fibers. We found that HURP expression in PCa is an independent predictor of aggressive disease. To study the association between HURP levels and the efficiency of killing PCa cells using chemotherapeutic drugs, LNCaP cells were transfected with a Lenti viral Tet-On expression system for tightly regulated expression of HURP. Empty vector- (3G) and

HURP-overexpressing (HURP) LNCaP cells were treated with docetaxel and bortezomib. Cell survival was determined by standard MTT assay and the fraction of surviving cells vs. drug concentration was expressed as IC₅₀ concentration using GraphPad Prism. When treated with docetaxel and bortezomib, the empty vector transfected cells showed IC₅₀'s of 2.12nM and 18.59nM respectively. HURP overexpressing cells were nearly three-fold higher with IC₅₀'s of 6.11nM and 49.45nM respectively. These results demonstrate that HURP overexpression increases chemoresistance in PCa cells. Additionally, our findings set the benchmarks to propose HURP as a predictor of the therapeutic response and as a potential target for PCa treatment. Support: DOD PC094680 (CRG), PCF Creativity Award (CRG), MS INBRE research scholar award (JEK).

P6.10

CONFIRMATION OF SOUTHERN BLOT GENOTYPING IN HBV USING THE POLYMERASE CHAIN REACTION

Antario Moore, Chase Williams, Donna Sullivan

University of Mississippi Medical Center, Jackson, MS USA

Hepatitis B Virus has 7 known genotypes (A-H) with various strain originating from different parts of the world. Genotypes A and D are the most prevalent in the Southern United States and is the focus of this study. Patient samples were collected, DNA was extracted using a QIA cube instrument, PCR was run using forward and reverse primers for A and D, and Southern blot was performed using the process of Gel electrophoresis. Result confirm the importance of purely extracted DNA samples and a 260/280 ratio that averages 1.8. 14 HBV DNA samples are tested via TaqMan PCR and the results confirm the importance of Southern blot in quantifying HBV viral loads.

P6.11

DESIGNER DRUG BATH SALTS: FOR MORE THAN JUST HOT WATER

Sjauwanda Michelle Barfield, Danielle Torrain, Stacy Hull Vance

University of Mississippi Medical Center, Jackson, MS, USA

In recent years, synthetic analogues of cathinone have emerged as psychostimulant-like drugs of abuse in commercial "bath salt" preparations. Cathinone (2-amino-1-phenylpropan-1-one) is a naturally occurring β -keto analog of amphetamine that has served as a structural template for discovery of compounds with a range of pharmacological activities (Baumann, et.al, 2012). These active cathinones are continuously developed and modified by drug designers to avoid detection or legal scrutiny. **Hypothesis:** Our hypothesis is the patient ingested a drug of abuse that resulted in symptoms of psychosis that was observed. **Objective:** The objective of our study was to demonstrate the importance of comprehensive toxicology instrumentation in detecting MDPV as well as other newly created synthetic cathinone analogues. **Case Description:** A 19-year old Caucasian male presented to the emergency department with auditory and visual hallucinations. He stated that 3-4 male voices were repeatedly prompting him to kill people, but did not specify anyone in particular. The patient also stated that

someone was trying to steal his thoughts. His symptoms had begun several hours prior to presentation. The patient denied homicidal ideations, suicidal gestures, drug abuse and alcohol consumption. **Discussion:** Many recent drugs of abuse are developed using amphetamine as a starting point. There is a large incentive to explore the pertinent chemical space and create structural modifications which exploit legal loopholes and are marketed under the appealing brand “designer drugs”. “Designer drugs” of which MDPV is categorized are constantly evolving and it is crucial to reduce the time lag between market entry of a compound and its identification and classification.

P6.12

ASSESSING THE PSYCHOMETRIC PROPERTIES OF THE CHRONIC STRESS INVENTORY

Kenneth Butler¹, Wanmei Wang², Michael Griswold², Thomas Mosley¹, Lateia Taylor³, Jan Williams³, Michael Garrett¹, M. Wuerdeman¹

¹University of Mississippi Medical Center, Memory Impairment and Neurodegenerative Dementia, Jackson, MS, USA,

²University of Mississippi Medical Center, Center of Biostatistics and Bioinformatics, Jackson, MS, USA, ³University of Mississippi Medical Center, Jackson, MS, USA

Background: We addressed the need of a brief chronic stress survey with the development of the Chronic Stress Inventory (CSI).

Methods: At baseline, data were collected on sociodemographic, anthropometric, and psychosocial variables. The perceived stress scale (PSS), selected questions from the East Side Village Health Worker Partnership (MLE), the Center for Epidemiologic Studies – Depression (CES) scale, and the CSI were administered at baseline. The CSI was re-administered at 1-, 3-, and 6-month(s) via telephone by clinic staff. The reliability related to internal consistency was measured by Cronbach’s alpha coefficient and test-retest by intra-class correlation coefficients. Construct validity was performed through comparison of CSI scores with three psychometrically valid instruments (PSS, MLE, and CES). Reliability was measured by calculating correlation coefficients and comparing CSI baseline with CSI scores at 1-month, 3-months, and 6-months.

Results: Internal consistency measured by Cronbach’s alpha was adequate for the CSI ($\alpha = 0.70$). The mean scores were 1.4 ± 1.1 (MLE), 9.2 ± 7.7 (PSS), 3.4 ± 4.5 (CES) and 12.5 ± 4.1 (CSI) at baseline. The correlations between the CSI and MLE, PSS, and CES scores were 0.45, 0.56, and 0.40, respectively. The mean CSI scores at 1-month (13.8 ± 3.9), 3-months (14.2 ± 4.7), and 6-months (13.8 ± 4.6) were similar to baseline. The correlation coefficients were 0.56 (1-month), 0.59 (3-months), and 0.57 (6-months) compared to baseline.

Conclusion: The CSI appears to be a sound instrument with adequate psychometric properties for measuring chronic stress in middle aged and elderly individuals and could be a useful tool in longitudinal research or clinical applications.

P6.13

CONTRASTING DIFFERENCES OF CHRONIC ENDOTHELIN A RECEPTOR (ETA) BLOCKADE DURING THE PROGRESSION OF RENAL INJURY IN TYPE-1 AND TYPE-2 DIABETIC NEPHROPATHY

Denisha Spires¹, Tiffani White², Lateia Taylor², Jan Williams²

¹Tougaloo College, Jackson, MS, USA ²University of Mississippi Medical Center, Jackson, MS, USA

The endothelin (ET) system has been shown to play an important role in the development and progression of diabetic nephropathy (DN) via the endothelin A (ETA) receptor. Preliminary studies from our laboratory indicate that the induction of diabetes (STZ, 50 mg/kg, i.p.) in Dahl salt-sensitive (STZ-SS) rats promotes the development DN that was associated with an increase in ET-1 excretion. Therefore, the present study examined whether chronic ETA blockade with ABT-627 prevents the progression of renal injury in STZ-SS rats with pre-existing renal disease. After 6 weeks of ABT-627 (5mg/kg/day) treatment, proteinuria was markedly decreased in ABT-627 treated STZ-SS rats versus vehicle treated rats without any changes in arterial pressure (310 ± 32 vs. 517 ± 68 mg/day, respectively). The degree of glomerulosclerosis and renal interstitial fibrosis was significantly reduced in the kidneys of ABT-627 treated STZ-SS rats compared to vehicle STZ-SS rats. We next determined whether treatment with ABT-627 would be beneficial in a type-2 diabetic model (T2DN rat) with pre-existing renal injury. In contrast to the STZ-SS study, ABT-627 had no effect on the progression of renal injury in T2DN rats. In conclusion, these data indicate that treatment with an ETA receptor blocker prevents the progression of renal injury in type-1 diabetes but not in type-2 diabetes. This research supported by NIGMS NIH P20GM104357 and AHA 12SDG9440034.

P6.14

THE USE OF ANTIOXIDANTS TO SUPPRESS THE CAOV-3 CELL LINE IN OVARIAN CANCER

Jennifer Harpole, Michelle Tucci, Hamed Benghuzzi

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Recent studies in our laboratory have indicated that the exposure of Thymoquinone (TQ) and Epigallocatechin-3-gallate (EGCG) to Caov-3 ovarian cancer cell line resulted in major pathophysiological responses. This study was executed to investigate the effectiveness of TQ and EGCG on their invasive behavior using Caov-3 ovarian cancer cell line as a model. A total of 72 wells were plated with (10^5) Caov-3 ovarian cancer cells according to standard lab protocols. Each group was subdivided into 4 groups of 6 wells each. Group 1 served as control and groups 2, 3, and 4 were treated with TQ (16 μ M), EGCG (3 μ g/ml), and TQ + EGCG, respectively. Biomarkers and morphological evaluations were performed following standard lab techniques. The results of the study revealed: (1) there were no differences in cellular protein concentrations between TQ, EGCG, and control at all phases ($p < 0.05$); (2) an increase in nitric oxide following administration of EGCG and the combination at 24 and 48 hours ($p < 0.05$); (3) TQ, EGCG, and the combination therapy did not induce intracellular oxidative stress (glutathione levels) at all phases; and (4) there

were no membrane or cellular damage to the cells at all phases. The results of this study provided the literature with more insights regarding manipulation of ovarian cancer behavior (regardless of the stage or grade) through potent antioxidants such as TQ and EGCG. The results also indicated the use of TQ + EGCG inhibited the metabolic activities of Caov-3 ovarian cancer cell line in culture.

P6.15

USEFULNESS OF HEALTH FAIR URINE SCREENING

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Health fairs are commonly held and offer a variety of test. The basic dipstick method is the most rapid screening procedure that could be helpful in the early detection of renal or urinary tract diseases among apparently health or asymptomatic subjects in the hope of preventing and retarding progression to chronic renal failure. Urine analysis, a simple inexpensive test, is the corner stone in the evaluation of kidney function. **Objective:** The objective of this study was to determine the usefulness of urine screening for kidney disease, diabetes, UTI, proteinuria and bacteremia. **Hypothesis:** The data collected will be beneficial in the detection of renal disease and urinary tract infections. **Data Collection:** Subjects for this study were individuals who submitted a urine specimen at a health fair conducted at a Church in the Jackson MS area. **Results:** In the patient population screened we were able to detect 24 patients that did not know they had hematuria (47%) with no identifiable health issues. We were also able to identify 13 (25.5%) patients with possible Urinary tract infections. Routine urine screening can a very useful tool in identifying health issues due to the low cost and relatively easy specimen collection.

P6.16

SYNERGISM BETWEEN ESSENTIAL OILS AND AMPICILLIN AGAINST VANCOMYCIN-RESISTANT ENTEROCOCCUS FAECIUM

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The utilization of essential oils has been shown to effectively inhibit the growth of pathogenic bacteria. In this study, we investigated the antibacterial effects of combining plant and fruit-based essential oils and a beta-lactam antibiotic against vancomycin-resistant *Enterococcus faecium* (VRE). The antibacterial nature of each essential oil (eucalyptus, tea tree, orange and lemon) and the antibiotic ampicillin was assessed using a broth microdilution method. The combined effects between essential oils with ampicillin were measured by checkerboard assay. Fractional inhibitory concentration (FIC) values were calculated in order to describe the interactions between each combination of ampicillin and essential oil. Of the four essential oils evaluated, two showed a synergistic effect with an $FIC \leq 0.5$; the remaining oils showed indifference with a $0.5 > FIC \leq 4$. Results indicate a synergistic effect between ampicillin/lemon oil and ampicillin/orange oil with an FIC ranging from 0.375 to 0.5. These findings suggest that lemon and orange essential oils may enhance the efficacy of ampicillin

against resistant strains of *Enterococcus* species.

P6.17

THE EFFECTS OF GENISTEIN AND 5-FU ON OVARIAN CANCER CELLS

Stacey Bodkins, Gerri A. Wilson, Michelle A. Tucci, Hamed Benghuzzi

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Ovarian cancer deaths account for 50% of cancer in women over 63. Treatments include surgery, chemotherapy, radiation therapy, immunotherapy, and vaccine therapy. Genistein is a natural compound that is found in soybean and has shown potential to be effective in suppressing cancer cell growth. Our goal was to compare Genistein with a known chemotherapeutic agent, 5-FU for suppression of adenocarcinoma of the ovary using SKOV-3 ovarian cells. We evaluated cellular growth by assessing total cellular protein concentration, and cellular toxicity by evaluation of total glutathione levels along with cytomorphological evaluation. Our results indicate Genistein alone was not effective in reducing cell protein or inducing changes in cellular glutathione for the duration of study. Cells treated with 5-FU also did not show significant changes in total cellular protein levels, but did show evidence of cellular toxicity as indicated by the reduced level of glutathione and changes in cellular morphology. Administering both compound together resulted in a significant decline in cellular protein and glutathione compared to control and to the addition of individual compounds for the duration of study. The morphological evaluation showed changes in the combo group as early as 24 hours that remained even after 72 hours of treatment. The results show the potential to add a combination of cancer drugs that work in different parts of cell cycle that when added individually do not effectively reduced cancer cell load. Combining drugs that target different phases of the cell cycle may be more effective in reducing the cancer cell load and may potentially aid in reducing cellular resistance to drugs.

P6.18

THE EFFECTS OF GENISTEIN AND 5-FU ON CANCER CELLS

Chakiras S. Alexander, Gerri A. Wilson, Michelle A. Tucci, Hamed Benghuzzi

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BACKGROUND: CAO3 is a specific type of malignant tumor cell and is among the many types of ovarian cancer. Much research has indicated that CAO3 is an epithelial cell on the surface of ovaries. Several treatments have been introduced, however, none has been successfully conclusive. In this experiment, Genistein, Fluorouracil (5-FU), and the combination (Combo) of these two agents have been used to determine their effect on CAO3.

METHODS: Protein assay and Glutathione assay were performed. CAO3 was cultured and treated with Genistein, Fluorouracil, and the Combo in different intervals: 24-hour, 48-hour, and 72-hour. The cells were collected and stained. Pictures were taken to observe the cell morphology and their

reduction.

RESULTS: The objective of this experiment has been achieved. The results for the assays have indicated that Genistein, Fluorouracil, and the Combo have reduced CAOV3 cell population.

CONCLUSION: Although the effects of Genistein, Fluorouracil, and the combo have been established, the results also indicated that there are more tests needed if CAOV3 is to be eliminated entirely.

P6.19

THE EVALUATION OF THE ANTIMICROBIAL PROPERTIES OF TEA TREE OIL

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The use of medicinal plants for the treatment of diseases has been studied for many years. As bacteria have become increasingly more resistant to conventional antibiotics, alternative methods of treatment have gained much attention. In recent years, there has been an increase in the concern of the negative aspects of conventional medicine. With both of these concerns, the research of medicinal plants has become a prominent subject throughout the scientific community. Previous studies have shown that tea tree oil, an essential oil obtained from the plant *Melaleuca alternifolia*, is effective for treating a number of ailments, including bacterial, fungal, and protozoan infections. The specific aim of the study was to evaluate the antimicrobial properties of tea tree oil on various gram-positive and gram-negative bacteria. The hypothesis for this study was when compared to commercially available antibiotics, tea tree oil will be as or more effective in inhibiting the growth of bacteria. To execute the specific aim, suspensions various gram-positive and gram-negative organisms were plated to Mueller Hinton II agar plates. After inoculation, filter paper disks containing ampicillin or ciprofloxacin, and 50 and 100 µL of tea tree oil were added to the plates. In addition, a filter paper disk that had been saturated in tea tree oil for 24 hours was added to these plates. The plates were then incubated at 37°C in 5% CO₂. After 24 hours, the plates were removed from the incubator, and the zones of inhibition were measured to the nearest millimeter. Results from this study indicate the potential of tea tree oil as an effective agent in inhibiting the growth of bacteria.

P6.20

THE EFFECT OF GARLIC ON FADU CELLS

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Garlic is currently under study for its ability to reduce cancer risks. Garlic and garlic supplements are sometimes promoted to prevent or treat cancer. However, there is not enough evidence at this time to support eating large amounts of garlic, or taking garlic supplements for cancer prevention and treatment. Garlic is thought to reduce cell proliferation, or induce cell death. Several compounds in garlic may have anti-cancer properties, but compounds of one type in particular—the Allyl sulfur

compounds—are said to play a major role. In the present study, we investigated the characteristics of FaDu cells (a hypopharyngeal carcinoma cell line) with multidrug resistance (MDR) following a challenge with various doses of garlic oil. The resistant cell line, FaDu, was exposed to to escalating concentrations of Garlic stepwise for over 24 and 48 hour periods. Cellular protein levels as well as morphology were studies over time. Compared with untreated FaDu cells, the cells exposed to garlic showed an inverse dose dependent effect in both cellular protein concentration as well as an increase in cellular density and morphology. Lower concentrations appeared to stimulate the mitotic activity of the cell while higher doses resulted in cytolysis of the cells. Our results suggest that lower doses are not beneficial for reducing cancer cell number while higher doses can reduce the cell population in a similar manner as a known chemotherapeutic agent, 5FU. More experiments ar needed to determine the mechanism involved in both low dose and high dose treatments on cancer cells.

P6.21

MORPHOLOGICAL EFFECTS OF GENISTEIN, THYMOQUINONE, FLUOROURACIL, AND LASER THERAPY ON LARYNGEAL CARCINOMA CELLS

Osasu Adah, Gerri A. Wilson, Felix Adah, Michelle Tucci, Hamed Benghuzzi

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Low level laser therapy (LLLT) involves exposing cells or tissue to low levels of red and near infrared (NIR) light, and is referred to as “low level” because of its use of light at energy densities that are low compared to other forms of laser therapy that are used for ablation, cutting, and thermally coagulating tissue. The precise biochemical mechanisms underlying the therapeutic effects of LLLT are not yet well-established. From observation, it appears that LLLT has a wide range of effects at the molecular, cellular, and tissue levels. In addition, its specific modes of action may vary among different applications. Within the cell, there is strong evidence to suggest that LLLT acts on the mitochondria to increase adenosine triphosphate (ATP) production, modulation of reactive oxygen species (ROS), and induction of transcription factors. LLT has shown promise for down regulating inflammation by reducing the presence of reactive oxygen species (ROS). In normal cells, high levels of ROS are damaging to the cells and the cells have the ability to squelch the production of ROS enzymatically. Cancer cells exhibit elevated levels of ROS and due to their accelerated metabolism needed to maintain proliferation. The goals of this experiment were: (1) to determine the effects of laryngeal cancer cells exposed to LLLT for a period of 30 minutes to determine the effects on cell survival; and (2) to determine the effects of natural chemotherapeutic agents or a known conventional chemotherapeutic agent, 5FU along with exposure to LLLT on cancer cell growth. Cells were treated with laser, Thymoquinone (TQ), Genistein (G), 5FU, or laser in the presence of TQ, G, or 5FU for 30 minutes followed by incubation for a period of 24 hours. The cells were harvested and cellular protein, intracellular glutathione, and morphology were evaluated. The results show a decrease in cell numbers following treatment with TQ and 5 FU for 24, 48, and 72 hours, while genistein treatment showed changes in cell number after

72 hours. Interestingly, the cells in the presence of laser were reduced within 24 hours, and treatments with Laser + 5FU, laser + G, and laser + TQ were significantly reduced further than when given the compound alone. The results show that laser and chemotherapeutic interventions may be synergistic and beneficial treatment for laryngeal cancer. These findings are important since laryngeal cancer is difficult to resect, but laser therapy could be guided into the area to reduce the tumor size or used following resection.

P6.22

THE EFFECTS OF FLAXSEED OIL AND 5-FU ON CAO-V-3

Jessica Sikes, Ally Deaton, Gerri A. Wilson, Hamed Benghuzzi, Michelle Tucci

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Limited experimental evidence suggests that omega-3 polyunsaturated (n-3) fatty acids (Omega 3) inhibit the proliferation of cancer cells in vitro. The goal of our study was to compare various doses of Omega 3 to a known chemotherapeutic agent, 5FU that inhibits cells in the S-phase of the cell cycle. Cells were treated with low, medium, and high dose Omega 3 or 5 FU for periods of 24, 48, and 72 hours. The cells were stained with hematoxylin and eosin and the cells were evaluated for morphological differences and cellular damage. Cellular morphology for low dose treatment was similar to the control untreated cells for the duration of the experiment. The cells in the medium and high dose treatment groups were more eosinophilic with evidence of hydrophilic swelling and increased cellular debris. Higher doses of Omega 3 fatty acids may change the constituents of the membrane phospholipids or disrupt the membrane. This will result in substantial change in the physical properties of the membrane including membrane organization, ion permeability, and cellular elasticity.

P6.23

THE EFFECTS OF DEMINERALIZED BONE MATRIX PROTEIN AND ESTROGEN ON SERUM MARKERS OF BONE FORMATION IN OSTEOPOROTIC FEMALE RATS

Taylor Ross, Gladys Lester, Michelle Tucci, Hamed Benghuzzi, Stacy Vance

University of Mississippi Medical Center, Jackson, MS USA

Bone cell activity is a normal occurrence marked by breaking down and rebuilding of bone at remodeling sites. Bone continues to remodel over the life-span of an individual. At menopause there is a disruption in bone remodeling that leads to decreases in bone density. The ability to administer agents to correct the negative bone balance is crucial for treating osteoporosis that can be associated with post-menopausal bone loss. Estrogen is known to protect the remaining bone by inhibition of osteoclastogenesis, and does not contribute to substantial increases in bone density. Currently, there are few pharmaceutical agents that can reverse the bone loss, but they are associated with significant side effects including risk of bone cancer. One agent, that has limited side effects and is used in fracture repair, Demineralized Bone Matrix Protein (DBM), is a

known stimulator of bone cells and may have the potential to reverse bone loss associated with post-menopausal bone loss.

OBJECTIVE: The purpose of this study is to establish the effects of DBM and E on bone formation in an osteoporotic rat by evaluating serum markers of calcium and alkaline phosphatase (which would indicate osteoblast activity) and compare the finding to ovary intact and Ovariectomized female rats. **HYPOYHESIS:** DBM will increase bone density and increase serum alkaline phosphatase activity to a greater extent than E. **MATERIALS AND METHODS:** A total 40 rats were equally divided into four groups (n=10). Animals in Groups 1-3 were ovariectomized and animals in group 4 retained their ovaries and served as control. Animals in Groups 2 and 3 received DBM or E over an eight week period and body weights and blood samples were collected. Serum was obtained and analyzed for bone markers. **RESULTS:** In this study the estrogen administration resulted in a decrease in body weight of ovariectomized animals back toward control intact animal weights within 2 weeks following estrogen administration. Serum calcium levels, alkaline phosphatase, and acid phosphatase activities were compared between the groups and control intact animals, and no significant differences were detected. Bone strength was increased in the estrogen treated group when compared to the ovariectomized female rats not receiving treatment. **CONCLUSIONS:** DBM is a compound that works to build bone that has been fractured, but does not contribute to increasing bone density or osteoblast activity in post-menopausal osteoporosis. Estrogen can increase bone strength, but the serum alkaline phosphatase activity indicates that it does not stimulate osteoblastic activity.

P6.24

THE EFFECTS OF SUSTAINED DELIVERY OF ESTROGEN ON THE GLOMERULI PATHOLOGY

Zelma Cason, Michelle Tucci, Hamed Benghuzzi

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Several studies have indicated that estrogen replacement therapy in post-menopausal women may interfere with the functional capacity of the renal system. This study hypothesize that sustained delivery of estrogen will alter the glomerular function. The specific objective of this investigation was to evaluate the effect of physiological dose (10-20 pg/ml) of sustained delivery of estrogen on the glomerular histopathology using adult ovariectomized adult rats as a model. A total of 60 rats were divided into four equal groups and served as intact, control, sham (OVX), exposed to sustained delivery of E, respectively. At the end of 2, 4 and 8 weeks post treatment 5 animals from each group were sacrificed and the kidney were removed, fixed and processed for histopathological evaluation following standard laboratory protocols. The results of this study demonstrated that the wet weights of the kidneys collected from estrogen treated animals has shown a slight increase in weight compared to intact animals (p< 0.05). Histopathological evaluation revealed that the glomeruli appeared slightly larger in the E treated animals compared OVX, Sham and intact animals. This observation may contribute to a functional change in the filtration rate and has to be taken in consideration in the renal function assessment.

P6.25

EVALUATING EFFECTIVENESS OF LABORATORY TRAINING OF CYTOTECHNOLOGY STUDENTS USING TURNINGPOINT, A PRODUCT OFFERING OF TURNING TECHNOLOGIES, INC.

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The newly developed software called "TurningPoint" represents one of the leading assessment delivery and data collection solutions for learning environments. It not only creates interactive presentations, but is proven to enhance effective instruction, increase knowledge retention, engage participants, and immediately assess understanding. TurningPoint includes data collection systems that securely transfer digital data for various assessment, testing, and certification programs. Today, an estimated six million Response Card keypads have been delivered to K-12 schools, universities, and businesses worldwide. The objectives of this study were to implement an interactive clinical diagnosis reporting system that would evaluate learning and student understanding, and that would be able to provide immediate feedback to the students. The clinical materials consisted of 1200 cases (150 cases per student) to be evaluated. Cytologic cases from five major diagnostic categories were selected, randomized, assembled into sets, and evaluated by students. The students were asked three questions on each case, which included their targeted diagnosis, specimen adequacy statement, and any other reportable finding. TurningPoint technology (the "Clicker") was used to collect a student's final answers. Cytotechnology faculty then printed out student responses, reviewed any discordant cases at the multiheaded microscope, and ultimately generated a final grade for the each individual session. Overall, the student's responses in all five diagnostic categories progressively improved for the entire duration of the course involved. In conclusion, observations obtained from this study suggest that TurningPoint technology proved to be an effective tool in providing excellence in education for cytotechnology students.

P6.26

COMPARISON BETWEEN SUSTAINED DELIVERY OF DANAZOL AND ANDROGENS ON THE MORPHOLOGICAL STATUS OF VENTRAL PROSTATE IN ADULT RATS

Ham Benghuzzi, Michelle Tucci

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This study was designed to explore the response of ventral prostate upon the continuous delivery of androgens. To accomplish this, Sprague Dawley rats (n=160) were divided into four groups equal groups. Three treatment groups were each implanted with ceramic drug delivery devices designed to deliver continuous physiologic doses of testosterone (T), dihydrotestosterone (DHT), or danazol (D). The control group was left intact and unimplanted. At the end of 1, 3, 6, and 9 months post treatment, a total of 10 animals from each group were sacrificed and ventral prostate were removed and processed for histopathological evaluation. Morphometric analysis of cuboidal epithelial cells lining the tubules of the

ventral prostate in these rats gave an indication of pre-clinical manifestation as seen at the cellular level during early development of benign prostatic hyperplasia. Using Image Pro software, the total cell area, nuclear area and cell length were measured by following standard lab protocols. Number of cells per high power field as well as the nucleus to cytoplasm ratio (n/c ratio) was measured. Results of this study showed: (1) danazol exposure showed a slight increase in cell number compared to the control, T and DHT groups; (2) all androgen exposed animals exhibited a smaller cuboidal epithelial cells compared to control animals; (3) T, DHT and D groups showed larger nuclear area than the control, and all three treatment groups showed a larger n/c ratio than the control group (p<0.05). These results suggest that genomic stimulation as a response to irritation may be caused by the sustained delivery of potential androgens. In conclusion, danazol therapy to treat hypogonadism has to be closely monitored and the status of accessory reproductive organs such as prostate has to be taken in consideration.

P6.27

COMPARISON OF THE HEMACYTOMETER AND THE COUNTESS AUTOMATED CELL COUNTER

Hillary Leonard, Iliane Miranda, Stacy Hull Vance

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Although many different automated cell counters are currently available in research and diagnostic laboratories the Neubauer chamber, also known as the hemocytometer, remains one of the most widely used methods for cell counting. The invention of the hemocytometer made cell counting possible and allowed standardization of the cell concentration between samples. **Hypothesis:** The Countess Automated Cell Counter will be more accurate, reliable, rapid, and effortless than the manual method, the Hemocytometer. **Objectives:** To test the inter-user variation for manual and automated cell counting methods for multiple users. **MATERIALS AND METHODS:** Experiment 1: Three trained users loaded three separate countess slide chambers with CSF. Each chamber was counted by each of the users. The same work flow was followed for the hemocytometer counts. The error bars show differences in user count results, while the column heights show differences in sample preparation for each instrument. **RESULTS:** After an 8 week training the course on the correct use and care of a hemocytometer the student's hemocytometer the variability among the individual users were not significantly different. Sample A inter-user variability was 1.876. Sample B inter-user variability was 2.146. **CONCLUSION:** A hemacytometer in the hands of trained user has been the method of choice for cell counting for over a 100 years and is still the number one method of choice for Medical Laboratory Science students. Due to the time requirements and tedious nature of a hemacytometer automated counting systems will become necessary in many research and clinical laboratories.



P6.28

MORPHOLOGICAL EVALUATION OF A549 CELLS FOLLOWING THE EXPOSURE TO OMEGA FATTY ACIDS IN CULTURE

Jana Bagwell, Michelle Tucci, Ham Benghuzzi

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The A549 cell line in which is derived from adenocarcinoma human alveolar basal epithelial cells has been used as a model for cancer research. This cell line has shown good suitability as a model for respiratory studies due to presence of type II alveolar functionality. Additionally, this cell type secretes surfactant that contains phospholipids in which plays a major role in reducing alveolar surface tension. The objective of this study was to evaluate the morphological features of the A549 cells upon the exposure to low and high doses of omega fatty acids. Sterile aseptic techniques were followed throughout the experimentations by following standard lab protocols. Morphological evaluation was conducted by using two different standard staining protocols namely: hematoxylin & eosin (H-E) stain was used (to evaluate general qualitative assessment of cell characteristics); and The alcian blue stain (to identify mucin production and assess the ability of the cells to produce phospholipid surfactant). A549 cells were treated with a low and high concentration of flaxseed oil, providing omega 3•6•9 fatty acids and allowed to incubate for 24, 48 and 72 hours. The results of this study revealed: (i) at the end 24 hours of incubation, the cells showed slight indication of growth qualitatively compared to the control group; (ii) at the end 48 and 72 hours of incubation, an increase in growth was observed with islands of confluent cells forming when compared to the control group; (iii) maintenance of cell functionality was observed by evidence of alcian blue mucopolysaccharide staining in and around the peripheral of the cell; (iv) no visible signs of debris or cytotoxicity were noted at both low and high doses and at all three incubation intervals. The results of this pilot study suggest that the exposure of Omega fatty acids to A549 cells can provide an adequate matrix for defining and identifying the components of an asthma inflammatory condition. Further investigations are highly recommended to assess the quantitative measurements of cell viability, integrity and actual cell count as well as functional capacity.

March 7, 2014

FRIDAY MORNING

Forrest 2

9:00 Business Meeting

POSTER SESSION II - BASE PAIR

10:00-11:50

Exhibit Hall C

P6.29

SOCIAL BEHAVIORAL PHENOTYPING OF THE C57BL/6 MOUSE

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Our laboratory has extensive data demonstrating that early life exposure to antidepressant drugs in rats results in profound neurobiological and social behavioral changes during development. We now want to take advantage of transgenic technologies to explore the biological basis of these changes. While transgenic technology is relatively limited in rats, it is extremely well-established and validated in mice. However, the social behavioral phenotype of mice differs significantly from that of rats. The C57Bl/6 mouse is the most commonly used background strain for transgenic development. Therefore, the object of the current study is to establish the developmental social behavioral phenotype of the C57Bl/6 mouse.

Male and female breeder mice were obtained from Jackson Laboratories. Females were housed in harems of two per male mouse and were examined daily for a cervical plug as evidence of conception. The males were then removed from harems and the pregnant females were left undisturbed except for periodic weighing during the course of their pregnancy (20-21 days). After delivery, male and female pups were marked using indelible markers to identify sex. Between postnatal days (PN) 5 and 12, pups were isolated for 5 min from their dams and ultrasonic separation-induced vocalizations were recorded (Metris Sonotrack). At PN19, pups were tested in an activity monitor (Columbus Automex) for freezing response to a novel 70 dB white noise tone. After weaning, pups were housed in gender-segregated groups and tested preference for a novel conspecific mouse versus a mouse-sized inanimate object.

At the time of this abstract, data from these experiments is being analyzed and will be presented at the meeting. However, initial results suggest significant differences between mice and rats in both ultrasonic vocalizations in response to maternal separation as well as greatly reduced preference for a novel conspecific versus an inanimate object when compared to rats. Interestingly, mice appear to respond quite similarly to rats when presented with a loud novel tone.

Supported in part by the Base-Pair Program and by GM103328.

P6.30

THE EFFECTS OF MYCOPHENOLATE MOFETIL ON THE PROGRESSION OF DIABETIC NEPHROPATHY

Carlos Rucker¹, Denisha Spires², Tiffani Slaughter³, Judson Womack¹, Alyssa Pennington¹, Denisha Spires², Tiffani White³, Lateia Taylor³, Jan Williams³, Kedra Wallace⁴

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Diabetes is the leading cause of chronic renal disease (CRD). Recent studies suggest that renal inflammation is involved in the progression of CRD and chronic blockade of the immune response with various anti-inflammatory agents attenuates the development of renal injury. The induction of diabetes in Dahl salt-sensitive (SS) rats with streptozotocin (STZ, type-1 diabetic model) causes renal abnormalities similar to patients with diabetes-induced renal disease. Therefore, the current study examined the importance of activation or infiltration of immune cells in the progression of renal injury in STZ-treated SS rats. This study was performed on 9 week-old SS rats which were placed in metabolic cages for a 24hr-urine collection to determine baseline protein excretion. Blood samples were also taken from the tail for the measurement of glucose levels. Then, the rats were injected with STZ (50 mg/kg, i.p.) and protein excretion was measured every 3 weeks until 9 weeks of diabetes was completed. After 3 weeks of diabetes (3 weeks post STZ injection), rats were divided into two groups: (1) vehicle and (2) mycophenolate mofetil (MMF, 20 mg/kg/day, s.c., immunosuppressive agent) and treated for 6 weeks. We observed a 3-fold increase in CD8+ T-cells and a 2-fold increase in B-cells in STZ-SS rats compared to non-diabetic rats after three weeks of diabetes. Three weeks post STZ injection, protein excretion was similar in both treatment groups (380±40 mg/day). Chronic treatment with MMF had no effect on glucose levels throughout the course of study. Treatment with MMF reduced protein excretion by 30% and reduced glomerular injury and renal fibrosis in STZ-SS rats. These data suggest that the use of immunosuppressive drugs such as MMF may serve as a treatment for the progression of DN. This research supported by NIGMS NIH P20GM104357 and AHA 12SDG9440034.

P6.31

NORMAL PREGNANT T REGS INHIBIT PATHOPHYSIOLOGY ASSOCIATED WITH HYPERTENSION IN RESPONSE TO REDUCED UTERINE PERFUSION PRESSURE (RUPP) IN PREGNANT RATS

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The RUPP rat model of preeclampsia (PE) exhibits much of the pathology characterizing this disease such as hypertension, inflammation, suppressed regulatory T cells (Tregs), oxidative stress (ROS), and AT1-AA during pregnancy. The objective of this study was to determine if supplementation of normal

pregnant (NP) Tregs into RUPP rats would attenuate the pathophysiology associated with preeclampsia. CD4⁺/CD25⁺ T cells were isolated from spleens of NP rats and differentiated into Tregs in culture. On day 12 of gestation NP Tregs were injected into pregnant rats undergoing RUPP; day18 carotid catheters were inserted and day19 blood pressure (MAP) was recorded, blood and tissues were analyzed. MAP increased from 100±2 mmHg in NP (n=17) to 125±2 mmHg in RUPP (n=22) but was 117±3 mmHg in RUPP+NP Tregs (n=18; p<0.05). Importantly, pup weight was 1.91±0.06 in RUPPs but increased to 2.06 ±0.09 in RUPP + NP Tregs (p>0.05). Inflammatory markers in RUPPs decreased with NP Tregs; placental and renal ROS was 339 and 603 RLU in RUPP but was 178 and 171 RLU in RUPP+Tregs (p<0.05); TNF-α was 20.9 pg/mL in RUPP and 12.59 pg/mL in RUPP+Tregs rats (p>0.5); AT1-AA was 17.27 bpm in RUPP but was attenuated with NP Tregs to 0.50 bpm (p>.0001). We conclude that suppressed Tregs may play an important role in the inflammation and hypertension associated with PE.

This work was supported by NIH grants RO1HD067541 and T32HL105324.

P6.32

INHIBITION OF AT1-AAS BY INTERRUPTING LYMPHOCYTE COMMUNICATION OR BY DIRECT BINDING REDUCES BLOOD PRESSURE IN RESPONSE TO PLACENTAL ISCHEMIA OF PREGNANCY; EMPHASIZING THE IMPORTANCE OF NOVEL DRUG DEVELOPMENT IN THE TREATMENT OF PREECLAMPSIA

Nathan Campbell, Javier Castillo, Justin Porter, Lorena Machado, Denise Cornelius, Kedra Wallace, Babbette LaMarca

University of Mississippi Medical Center, Jackson, MS, USA

Preeclampsia, (PE) hypertension with proteinuria during pregnancy, is associated with activating antibodies to the angiotensin II receptor (AT1-AA). The objective of our study was to determine if AT1-AA inhibition improves pregnancy outcomes in the RUPP rat model of PE. We utilized two novel approaches to inhibit AT1-AAs: 1) block lymphocyte crosstalk of RUPP CD4⁺ T cells with B cells in NP recipients. To do so splenic CD4⁺ T lymphocytes were magnetically separated, incubated with 2.5 ug/ml anti CD40 ligand overnight and transferred into NP rats on day 12 of gestation (NP+anti-CD40ligand RUPP CD4⁺ T cells). 2) specific epitope binding - AT1-AA inhibitory peptide (2ug/ml saline) was infused via miniosmotic pumps into RUPP rats beginning day 14 of gestation. On day 19 of gestation, MAP, blood and tissue were collected from all groups of rats.

Blood pressure was 99±/-2 in NP(n=18) and 120±/-4 in NP+RUPPCD4+T cells (n=5;P<0.001)and 121±/-2 mmHg in control RUPP rats (n=19;P<0.001). MAP was 105 ±/-3 in NP + anti-CD40-ligand RUPP CD4+T cells and was 109 ±/-6 mmHg (n=9 P<0.02) in RUPP + AT1-AA inhibitory peptide, both of which were significantly lower than RUPP controls. In addition, pup weight was 2.4 ±/- 0.04 in NP; 1.9 ±/- 0.06 in RUPP and 2.2 ±/- 0.14 g (P<0.05) in RUPPs + AT1-AA inhibitory peptide.

P6.33

ROLE OF TNF-ALPHA IN THE PROGRESSION OF DIABETIC NEPHROPATHY

Alyssa Pennington¹, Judson Womack¹, Denisha Spire², Tiffani White³, Lateia Taylor³, Jan M. Williams³

¹Murrah High School, Jackson, MS, USA, ²Tougaloo College, Jackson, MS, USA, ³Department of Pharmacology, University of Mississippi Medical Center, Jackson, MS, USA

Diabetic nephropathy (DN) is one of the major causes of end stage renal disease. Recent studies suggest that renal inflammation is critical for the development of DN. TNF-alpha is inflammatory cytokine that has been used as a marker and predictor of chronic renal disease. In preliminary studies, we observed that the renal expression of TNF-alpha was elevated in Dahl salt-sensitive (SS) rats with streptozotocin (STZ, type-1 diabetic model). Therefore, the current study examined whether chronic blockade of TNF-alpha with Etanercept (ETN) would prevent the progression of renal injury in STZ-treated SS rats. This study was performed on 9 week-old SS rats which were placed in metabolic cages for a 24hr-urine collection to determine baseline protein excretion. Blood samples were also taken from the tail for the measurement of glucose levels. Then, the rats were injected with STZ (50 mg/kg, i.p.) and protein excretion was measured every 3 weeks until 9 weeks of diabetes was completed. After 3 weeks of diabetes (3 weeks post STZ injection), rats were divided into two treatment groups: (1) vehicle and (2) ETN (0.8 mg/kg twice a week, s.c.) and treated for 6 weeks. After 3 weeks of diabetes, protein excretion increased from 78±5 to 234±46 mg/day. Treatment with ETN reduced protein excretion by 20%. Administration of ETN had no effect on glucose levels and the values were similar to those obtained from vehicle-treated diabetic SS rats. These data indicate that ETN may be a beneficial therapy for the progression of DN. This research supported by NIGMS NIH P20GM104357 and AHA 12SDG9440034.

P6.34

PROLONG COLD/WARM PRESERVATION TIME MAY HAVE IMPACT ON KIDNEY ALLOGRAFT FUNCTION IN ASSOCIATION WITH EXPRESSION OF ALLOGRAFT INFLAMMATORY FACTOR-1 AFTER TRANSPLANTATION

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Background and Hypothesis: It has been shown that an extended cold or warm preservation time during organ procurement and transplantation has been associated with increased risk of graft failure. In addition, increased inflammatory markers including allograft inflammatory factor 1 (AIF-1) and cytokines each has been separately demonstrated to correlate with a poor outcome of allograft transplantation. Therefore, we hypothesize that cold/warm preservation time may increase the release of AIF-1 from the donor organ, stimulating the recipient's immune system and production of inflammatory cytokines. This may lead to the development of organ dysfunction. **Methods:** 1) in a

preliminary study we assessed the impact of cold and warm preservation time on the clinical outcomes in patients that had undergone renal allograft transplantation; 2) we examined expression levels of AIF-1 mRNA in the peripheral blood mononuclear cells (PBMCs); 3) kidney function was evaluated by the level of estimated glomerular filtration rate (eGFR). **Results:** In a preliminary study, we have demonstrated a 5-fold increase in the level of GFR when cold preservation time was <10 hour as compared to >20 hours. There was no direct correlation with warm preservation time and GFR. **Conclusion:** Prolonged Cold and warm preservation time inversely has impact in the outcome of allograft function.

P6.35

THE EFFECTS OF IGF-1 ON MESENCHYMAL STEM CELLS

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Chronic non-healing tissue injuries currently affect over five million Americans each year. This problem continues to grow and is a multi-billion dollar burden on society in terms of health care dollars and loss of productivity, as well as decreased quality of life for these individuals. Research studies examining enhancement of tissue healing with biological tools has become a topic of great interest. Platelet Rich Plasma (PRP) has recently been recognized as a treatment method to improve healing of bone and soft tissues. The goal of biologic treatment is to enhance natural processes and deliver more effective results through a less invasive and safer treatment. In response to the shortcomings of prior research, this study tested how one component of PRP (IGF-I) effects the mesenchymal stem cells. More specifically, does IGF-I enhance cellular proliferation. Mesenchymal stem cells were plated onto 24 well plates at a density of 1 x 10⁶ cells per well and treated with IGF-1 at doses of 0.1, 1, or 10 ng/mL and cell number, viability, morphology and damage were assessed at each time point. Our results show a dose dependent increase in cellular protein levels without evidence of cellular damage for the duration of the experiment, as well as, changes in cellular morphology when compared with untreated mesenchymal cells. The changes in morphology suggest that the mesenchymal stem cells may be differentiating and our future plans are to determine if IGF-1 is transitioning the cells into a certain lineage.

P6.36

THE EFFECTS OF LOW LEVEL LASER LIGHT THERAPY ON LPS STIMULATED MACROPHAGE CELLS

Courtland Brown¹, Gerri A. Wilson², Felix Adah², Michelle Tucci², Hamed Benghuzzi²

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Low level laser therapy (LLLT) has shown to have positive effects on pathological conditions such as tendinopathies, osteoarthritis, and wound healing. In addition, it has been

shown to reduce markers of inflammation. Although it can be used clinically, there is some controversy as the effectiveness of the LLLT because the biochemical mechanisms, timing, applied light intensity, and effective wavelengths are not fully understood. Our goal is to determine the effects of LLLT on acute inflammation using LPS stimulated macrophages as a model. Macrophage like cells were plated at a density of 1×10^6 cells per well onto 6 well plates and divided into 4 groups (cells only, cell + LLLT, cells + LPS, and cell + LPS + LLLT. Cells in each treatment group were evaluated at 24 and 72 hours after a single LLLT treatment. Cellular protein concentrations were similar after 24 hours, but at 72 hours the cellular protein concentrations in both laser treatments groups were significantly less than cells receiving no treatment or cells stimulated with LPS. Nitric oxide production at 24 hours was significantly higher in both treatment groups receiving LPS. At 72 hours the cells which received LLLT treatment with or without LPS stimulation were significantly elevated when compared to control cells. Cellular morphological changes were also seen in LPS stimulated and LLLT treated cells. Macrophage cells are affected by LLLT and further studies are needed to determine the effects of LLLT on inflammatory markers.

P6.37

THE EVALUATION OF CHONDROCYTES ON PCL SCAFFOLDS

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Tissue engineering is a science that is dedicated to designing and characterizing materials to help repair damaged tissues. Scaffolds, which are small disk like structures, can hold cells from any tissue within the body. If a scaffold containing cells is inserted into injured tissue, the cells can help regenerate the tissue. The scaffolds used in my research are made out of polycaprolactone (PCL), a biodegradable polyester. The objective of my research is to determine how chondrocyte cells adapt to the PCL scaffolds material over time in cell culture under anoxic conditions (6% O₂) that would mimic the injured tissue in vivo. PCL scaffolds were placed in media with cells for periods of 24, 48, and 72 hours in 24 well tissue culture plates. Alamar blue assay was used to determine the number of cells on each scaffold daily. PCL scaffolds were collected and the cell numbers and cell viability were determined. Our results show that chondrocytes under low oxygen grown on scaffolds had higher tissue densities after 72 hours than chondrocytes grown on scaffolds at 21% oxygen. The research findings are important and suggest that the experimental conditions to characterize the scaffolds must be performed at oxygen levels that are found normally found within the body.

P6.38

UNDERSTANDING THE LINK BETWEEN REWARD AND OBESITY

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Obesity is a risk factor for a number of diseases. One contributor to the current obesity rates may be the high fat content in processed foods. The goal of the current study was to test the value of fat and a drug of abuse in genetically obese and lean animals. Experiment 1 used 8 obese and 8 lean Zucker rats. Rats were placed in an operant box containing two levers, where pressing the right lever would give an award of fat in the form of corn oil. Lever presses required to receive corn oil were increased over days. Experiment 2 used 5 obese and 5 lean Zucker rats. Pressing the right lever would reward the rat with an intravenous infusion of cocaine. Lever presses required to receive cocaine were increased over days and plotted as a function of response requirement. Obese subjects displayed a higher demand for corn oil than did its lean counterparts. Corn oil intake in the obese rats was less sensitive to increases in response requirement than in their lean counterparts, indicating that the obese rats valued corn oil more than the lean rats. The effect of increasing response requirement for cocaine on cocaine intake was similar in the obese and lean rats, indicating that, unlike the case with corn oil, obese subjects are not more sensitive to the rewarding effects of a drug of abuse.

P6.39

THE GEOGRAPHIC DISTRIBUTION OF MAMMOGRAPHY RESOURCES IN MISSISSIPPI

Elizabeth Nichols, Denae Bradley, Roy Duhe, Fazlay Faruque

University of Mississippi Medical Center, Jackson, MS, USA

Breast cancer is the most frequently-occurring cancer and the second-leading cause of cancer death in women. Since 1990, breast cancer mortality rates have steadily declined in the U.S.A. due to the combined use of screening mammography and adjuvant therapy. However, improvements in survival have not been uniform in all populations and in all geographic regions. Despite having lower incidence rates for breast cancers, African-American women die from these diseases at higher rates than do Caucasian women. Because of the profound impact of population-based disparities on Mississippi's overall breast cancer control outcomes, we investigated whether the geographic distribution of mammography resources affects breast cancer incidence, staging and/or mortality. We used Geographic Information Systems (GIS) technology to map all mammography facilities in Mississippi and the surrounding states. Publicly-available population characteristics available through the U.S. Census Bureau, and breast cancer statistics available through the Mississippi Cancer Registry, were geocoded into this map. The geographic distribution of mammography resources primarily correlates with population densities and major traffic arteries in Mississippi. The relationships between cancer outcomes and mammography resources are complex, and must be interpreted in the context of other demographic characteristics. Our results may be useful in

identifying counties where breast cancer education and screening programs should be modified or intensified.

P6.40

MAPPING AND IDENTIFICATION OF A GENETIC MUTATION THAT CAUSES CATARACTS

Zaliya Morris¹, Ashley Johnson¹, Jonathan Lee¹,
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Cataracts are a major cause of blindness. The most common forms of cataracts are age and UV- related and develops mostly in the elderly, while congenital cataracts appear at birth or in early childhood. The Dahl salt-sensitive (SS/Jr) rat is an extensively used model of salt-sensitive hypertension. In the mid 1980's, cataracts appeared in a few animals in the Dahl S colony, presumably the result of a spontaneous mutation. The mutation was fixed and bred to establish the SS/Jrcat substrain. The SS/Jrcat substrain has been exclusively used by a single investigator to study the role of steroids and hypertension. Using a classical genetic analysis approach, we localized the cataract gene with high-resolution to a less than 1 Mbp region on chromosome 9 using an F₁[SS/Jrcat X Spontaneous hypertensive rat (SHR)] X SHR segregating population. The 1 Mbp region was found to contain only 13 genes, including 4 genes from the γ -crystallin (Cryg-b,-c,-d,-e) gene family. Mutations in the many of the γ -crystallins are known to play a role in cataract formation in both humans and rodent models. All of the γ -crystallins were sequenced and a novel point mutation in the start codon (ATG $\rightarrow$ GTG) of the Crygd gene was identified which led to the complete absence of CRYGD protein and the likely cause of cataracts in the SS/Jrcat strain. In summary, the identification of the genetic cause in this novel cataract model may provide an opportunity to better understand the development of cataracts, particularly in the context of hypertension.

12:00-2:00 Millsaps-HHMI Undergraduate Scholars Symposium

HISTORY AND PHILOSOPHY OF SCIENCE

Chair: Kenneth Curry,
University of Southern Mississippi

Vice-Chair: Paula Smithka,
University of Southern Mississippi

March 6, 2014

THURSDAY MORNING

Forrest 1

07.01

9:00 THE UTILITY OF ARISTOTLE'S BIOLOGY IN CURRENT TAXONOMIC PRACTICE

Georgia Rae Rainer

Florida State University, Tallahassee, FL, USA

Aristotle established the first systematic investigation into the biological world through several different works largely concerning animals. He not only developed a precise methodology for biological investigations, but he also recorded extensively detailed descriptions of the features of many animals. By using this abundant empirical data, he was able to distinguish natural kinds and give causal accounts for their various attributes. In this paper, I will give an overview of Aristotle's methodology and analyze the criteria on which he formulates natural kinds. I will also consider his views on essentialist definitions in biology and square that with continuous individual variation and his seemingly inconsistent usage of species and genus. Finally, I will argue that Aristotle's original principles of biological investigation can be a helpful arbiter in the current species debate and yield insight into our understanding of natural kinds.

07.02

9:30 COMTE DE BUFFON AND CONCEPTS OF BIOLOGICAL SPECIES IN THE EIGHTEENTH CENTURY

Kenneth J. Curry

University of Southern Mississippi, Hattiesburg, MS, USA

The concept of biological species that biologists embrace impacts the verisimilitude of their classification schemes expressing natural relationships among groups of organisms and it impacts their understanding of how evolution might proceed and even the possibility of evolution. Here I explore the eighteenth century roots of contemporary systematics and evolutionary theory. Classification schemes of the eighteenth century included pragmatic systems, such as that of Carl Linnaeus (1707–1778), based on a few key characters for identifying members of a taxon, and natural systems, such as that of Antoine Laurent de Jussieu (1748–1836), based on a multiplicity of characters. Georges-Louis Leclerc (Comte de Buffon; 1707–1788) argued that species should be based primarily on interfertility of organisms, rather than on particular characteristics. To the eighteenth century natural philosopher, species conceived either on a multiplicity of characters or as

interbreeding groups seemed so stable as to preclude the notion of evolution. Buffon's extensive research on hybrid animals led him eventually to wrestle and vacillate over whether species could or could not evolve leading to subtle nuances in the way 'species' was applied both in his systematics and his nascent evolutionary thought. Ultimately Buffon could not give up his belief in the fixity of species, yet his own research demonstrated the plausibility of evolution. His considerable influence paradoxically dissuaded biologists from embracing evolution while moving them inexorably toward that embrace. His concept of species as interfertile populations, recast by Ernst Mayr (1904–2005), became the most popular species concept of the twentieth century.

10:00 BUSINESS MEETING

07.03

10:15 THE METAPHYSICAL INCOMPATIBILITY OF SPECIES AS NATURAL KINDS

Paula J. Smithka, Kenneth J. Curry

University of Southern Mississippi, Hattiesburg, MS, USA

In "Natural Kinds in Evolution and Systematics: Metaphysical and Epistemological Considerations" (2009), Ingo Brigandt argues that "a species or a higher taxon can be construed both as an individual and a natural kind, i.e., both views are metaphysically compatible" (p.78, *italics his*). He then suggests that one conceptualization could be pragmatically preferable depending upon certain epistemic considerations in a particular scientific context. Brigandt is correct that epistemic issues are at play in taking species (or higher taxa) as natural kinds or as individuals. Those views are epistemologically compatible, and Brigandt employs the term 'construed' which is an epistemic notion. That species are individuals (SAI) or natural kinds are not metaphysically compatible because they differ with respect to the nature and persistence of objects. SAI is typically associated with a perdurantist model of object-persistence. The individual is the whole species, a space-time worm, extending from speciation to extinction, and organisms are temporal parts of this whole. However, on the natural kinds approach, organisms are the individuals which are members of a kind, conceptually grouped together based on the properties and inter-relationships of those organisms. This view is associated with the endurantist model of object-persistence. Individual organisms are whole and complete at each time at which they exist. That species are natural kinds, in particular homeostatic property cluster kinds, is a more coherent model than SAI because one can consider a kind as an individual, since the kind-term serves as the conceptual and grammatical subject of one's sentences concerning evolutionary units.

07.04

10:45 HOMEOSTASIS AND THE COHESION OF BIOLOGICAL SPECIES

Kenneth J. Curry, Paula J. Smithka

University of Southern Mississippi, Hattiesburg, MS, USA

Homeostasis was suggested by Eldredge and Gould (1972) as a mechanism to explain the apparent cohesive nature of biological species. Boyd (various papers since the 1980s) brought the concept of homeostasis into philosophical discussions of

species, partially in a metaphorical sense, leading to species conceived as homeostatic property cluster kinds. Most philosophical discussions have focused on the application of property clusters and property cluster kinds (natural kinds) to species while the role of homeostasis is frequently assumed or sometimes misunderstood. We take homeostasis to describe principle mechanisms of a complex system, in this case a species, characterized by feedback loops and redundancy which allow that system to ignore or recover from a modest external perturbation with little change. Homeostasis can be discovered at any level of biological organization with organism, population, and species commonly represented in species discussions. The explanatory power of homeostasis can be employed to understand such species-level phenomena as (1) the coherence of property clusters over long periods of time characteristic of species stasis or (2) the disruption of a homeostatic property cluster suffering persistent perturbation and reconstituting around a new homeostatic "center" characteristic of the emergence of a new species from a speciation event.

March 6, 2014

THURSDAY AFTERNOON

07.05

1:00 BIOLOGICAL ENTITIES AND PERSISTENCE OVER TIME: PERDURING LINEAGES OF ENDURING ORGANISMS

August W.M. Martin

Leiden University, Leiden, The Netherlands

Models of biological entities as either 3D or 4D are implicit in biological science. Organisms are seen as 3D entities with 4D life histories. Subfields differ with respect to the objects of their focus: Genomics and genetics study genes as 3D objects that function in 4D, ecology views populations as 3D groups of organisms, and systematics views lineages as 4D historical entities. This is the conceptual ontology of biological science. Two questions concern me: 1) Can these entities be abstract, without the above spatiotemporal structures, and biology get on with its work? Regardless, 2) is it conceivable to have an ontology in which these entities have these structures? I answer both in the affirmative. While biological theories and explanations could still function with some objects, such as lineages, as abstract entities, there is still the prospect of a viable ontological concomitant. Sider (2001: 100, 118) discusses an ontology of enduring entities and perduring events (what Reydon has called a "mixed metaphysics" in 2008: 179) and Rieppel (2009: 40) holds that that the requisite view of time would be possibilism or growing block (what he calls "futuralism"). Biological ontology construed would contain perduring lineages having at their temporally expanding tips enduring organisms, that leave behind perdurant life histories, as their temporal parts. I discuss the feasibility of this ontology of perduring lineages of enduring organisms in context to other views of time, language, tense, and explanation.

07.06

1:30 ALTRUISM AS AN EVOLUTIONARY TOOL

Cody Legan Collins

University of Southern Mississippi, Hattiesburg, MS, United States

Traditional notions of natural selection hold that fitness occurs at the level of the organism. With this notion in mind, cooperation amongst organisms would seem evolutionarily disadvantageous. In spite of this, cooperation exists to such a degree as to be called altruism: the organism benefits others at significant cost to itself, reducing its own fitness. This tension between the actions of the seemingly selfless organism and evolutionary theory can be explained if one considers the organism's actions as maximizing the number of genes that will be passed along. In this light, altruistic behavior can be seen as evolutionarily advantageous. Amongst non-kin groups, the genetics is less relevant, but altruistic actions can still be explained in terms of evolutionary advantage- other factors such as reciprocity come to play.

2:00 BREAK

07.07

2:15 THEORETICALLY SPEAKING: HUME, SCIENCE, & THE CHARACTER OF THEORETICAL TERMS

Arthur L. Morton

Saint Xavier University, Chicago, IL, USA

Hume clearly saw himself to be concerned with philosophy's failure to provide genuine understanding. From the outset Hume laments the "disgrace" that has been cast on philosophy by the "systems of the most eminent philosophers" who, having adopted principles "upon trust", proceed to "lamely" deduce their consequences. As Hume found her, Philosophy was embroiled in endless controversies, involving systems that lacked coherence, where there was no topic "which [was] not the subject of debate," where "even the rabble without doors [could] judge from the noise and clamour," that things were "not well within" Hume's language in the introduction to the Treatise clearly reflects a significant disappointment with the state of philosophy, with the philosopher's inability to make any definite contribution to our understanding, and with their widespread failures to communicate any coherent system. Many commentators have taken Hume's expressed distrust of philosophy to have led him into a radically skeptical position wherein he was committed both to the impossibility of any genuine scientific understanding and the unintelligibility of theoretical terms, maintaining that, "Hume's epistemology is too narrow to permit post-Humean philosophers of science to borrow from him a cogent explanation for the theoretical character of science." Contrary to these claims I show that Hume not only endorsed the use of theoretical terms but made the establishment a theoretical foundation for genuine scientific understanding front and center among his philosophical aims

07.08

2:45 GLOBAL NAVIGATION SATELLITE SYSTEMS AND REMOTE SENSING LAW: DOES SCIENTIFIC PROGRESS AUGMENT OR THREATEN CONSTITUTIONAL RIGHTS?

Michael Dodge

University of Mississippi School of Law, Oxford, MS, USA

This presentation is an historical analysis of the development of scientific and technical abilities regarding Global Navigation Satellite Services (GNSS) and remote sensing, and their applications to the privacy interests of citizens as guaranteed under the Fourth Amendment to the United States Constitution. GNSS not only provides essential navigational capabilities, but also provides services to laboratories the world over. Remote sensing, while often utilized as a tool for geological information sciences, has increasingly been tasked to monitor individual human activity. This application is not without controversy, and forces society to weigh scientific development and concomitant law enforcement activities with timeworn legal protections. Specifically, the Fourth Amendment protects citizens from unreasonable searches and seizures, leading to three prominent questions: Firstly, what constitutes searches? Secondly, to what extent must something be taken or held to constitute a seizure? And thirdly, what does the term "unreasonable" mean, both philosophically, and legally? Finally, the courts, as arbiters of this realm, are left to sift through myriad and rough questions of law, policy, and ethics. This presentation aims to grapple with the ever-present issue of the reactive nature of law to science and technology, to deconstruct recent case law and policy, and to discern whether this time around, critical Constitutional rights are being protected, or if they find themselves under foot of the march of scientific progress. It will conclude that a balance between science and law must be sought, and that they can work together to protect individual liberties.

07.09

3:15 AGAINST A GLOBAL RESOURCES TAX

Adam Hamilton

Florida State University, Tallahassee, FL, USA

Thomas Pogge, in his "An Egalitarian Law of Peoples" (1994), argues that a Rawlsian approach to global justice must incorporate a distributive, egalitarian component. To this end, he proposes a global resource tax (GRT), which would redistribute excess wealth from the wealthiest countries to the poorest based upon their destitution and population.[1] He argues that a relatively small GRT, as little as 1%, could yield a substantial benefit "if well targeted and effectively spent." [2] John Rawls, on the other hand, argues in his Law of Peoples (1999) that beyond a duty of assistance to establish democratic institutions in burdened societies, [3] no distribution of resources between nations is necessary to satisfy the demands of global justice. I agree with Rawls – both that the site of distributive egalitarian justice is strictly domestic, and that international obligations do not extend beyond efforts to make burdened societies well-ordered. I invoke Amartya Sen and his Development as Freedom (2001) to bolster my position with pivotal distinctions

between the kinds of distribution that must occur in order for justice to be satisfied. Ultimately, I conclude that the domestic state is, due to the political freedoms which are provided at the national level, also the best and most effective site for economic egalitarian policies. [1] Pogge, Thomas. "An Egalitarian Law of Peoples." *Philosophy & Public Affairs*. 23:3 (Summer 1994) p. 201; [2] *Ibid.* p. 204; [3] Rawls, John. *The Law of Peoples*.

March 7, 2014

FRIDAY, MORNING

Garden Room

07.10

8:45 JUMPING THE GUN: ELUCIDATING THE EVIDENTIAL GULF BETWEEN CLAIMS OF AUTOMATICITY IN THE BRAIN AND THE ILLUSORY FUNCTION OF CONSCIOUSNESS

Anthony William Woods

University of Southern Mississippi, Hattiesburg, MS, USA

In his book *The Atheist's Guide to Reality* (2011), Alexander Rosenberg titled the eighth chapter "The Brain Does Everything without Thinking About Anything at All." The title and content of this express the view of a burgeoning trend within the philosophical movement: the elevation of automatic, unconscious processes of the brain to governance over behavior while demoting the role of traditional consciousness. This trend has compelling evidence to serve as its underpinning. As Rosenberg states, "Blindsight, the Libet experiments, and the rearview mirror of experience should make us deeply suspicious of this apparently obvious matter" (p. 170). The question which emerges is just how deeply ought the suspicion to run? Rosenberg and others interpret this evidence that what we think consciousness does (e.g we think about things) and agency are illusory, merely a phenomenological aspect of what our brain is doing unconsciously. Evidence that the brain may exhibit some automaticity in its processes is not a sure underpinning for the thesis that what consciousness does is altogether illusory. The evidence to which they appeal falls short of its intended mark. I argue that consciousness and what we think it does plays a functional and valuable role in our human lives.

07.11

9:15 CONSCIOUSNESS: A PHYSICAL PROCESS

Rachel Smilo

University of Southern Mississippi, Hattiesburg, MS, USA

The nature of consciousness has been, and continues to be, debated by philosophers. Dualists such as Descartes and David Chalmers contend that consciousness is non-physical. No amount of science will be able to account for the "phenomenal feel" of conscious experience because it cannot be explained in simply biochemical physical terms. Physicalists, such as Paul Churchland and Alex Rosenberg, argue that conscious experience is no more than physical, biochemical processes carried out by our brains. I will argue in favor of physicalism as the more correct theory of the two. The main reason physicalism is wrongly discredited comes from the misleading language of folk psychology and a lack of a neurobiological framework in which to talk about consciousness.

9:45 BREAK

This symposium is co-sponsored with **Psychology and Social Science** (Sheree Watson is chairman).

10:00 A SYMPOSIUM ON SILVA, LANDRETH, AND BICKLE'S ENGINEERING THE NEW REVOLUTION IN NEUROSCIENCE (Oxford University Press, 2013)

This interdisciplinary symposium will bring together a neuroscientist and a philosopher of science for a 2 hour author meets critics session on Alcino Silva, Anthony Landreth, and John Bickle's recent book, with Bickle commenting on both presentations. Possible topics for discussion include the empirical adequacy of Silva, Landreth, and Bickle's Framework for scientific experiments, derived from state-of-the-art research in the field of 'molecular and cellular cognition' (MCC); the varieties and specific roles of distinct Integration procedures they articulate for relating distinct experimental results; the potential and plausibility of automated "research maps" to indicate what has been accomplished experimentally and the data still missing for establishing causal hypotheses linking cognitive functions to specific cellular and molecular mechanisms, and the authors' speculations on the future of a science of experiment planning. Each talk will be 20 minutes, followed by 10 minutes of discussion, leaving 30 minutes at the end of the three presentations for audience discussion. Given the book's distinctive interdisciplinary focus, this symposium will be of interest to practicing research scientists interested in the representation of knowledge in their fields, and to philosophers interested in the rationality of short-term and long-term experimental research programs in science.

Abstract of Engineering the Next Revolution in Neuroscience: The New Science of Experiment Design (New York: Oxford University Press, 2013)

Science is growing at a pace that exceeds our comprehension. This is no less true of neuroscience than any other discipline. Ambiguity about what is known and what has been disproven confounds researchers and hampers research planning. There are simply too many research articles and too few hours in the day for anyone to read all that is relevant, let alone distinguish the reliable results from the sketchy ones. *Engineering the Next Revolution in Neuroscience* explores the proposal that we can overcome these obstacles to scientific progress, and revolutionize neuroscience, by using a framework to map the experimental record. With case studies from learning and memory research, the authors show that we can construct networks of experimental research that make the state of our knowledge manifest. Armed with maps of experiments, scientists can determine more efficiently what their fields have accomplished and where the unexplored territories still reside.

Panelists

Michael Bishop, Ph.D. is Professor of Philosophy and Director of Graduate Studies at Florida State University. His primary research interests include philosophy of science, epistemology, and philosophy of psychology/mind. He received his Ph.D. in Philosophy from the University of California, San Diego, in 1990. He is the author of *Epistemology and the Psychology of Human Judgment* (co-author J.D. Trout, Oxford University Press) and more than 30 professional articles, book chapters, and

reviews, including in *Nous*, *Philosophy of Science*, *Synthese*, and *Studies in the History and Philosophy of Science*. His work has been supported by a grant from the National Science Foundation.

Diane Lebesgue, Ph.D., is Assistant Professor of Neurobiology and Anatomical Sciences at the University of Mississippi Medical Center. Her primary research interests include the neural circuitry and molecular machinery that underlies sex differences in neuropsychiatric diseases and addiction. She received her Ph.D. in life sciences at the Université de Tours in 1997 and did postdoctoral training at the Biotechnology Research Institute at the Université de Montreal, Canada and in the Department of Neuroscience at the Albert Einstein College of Medicine, where she also served as an instructor in neuroscience. She has published 14 research articles. Her research is supported by a Mentored Scientist Career Development Award from the National Institute of Drug Abuse.

Discussant

John Bickle, Ph.D. is Professor of Philosophy, Adjunct Professor of Psychology, Head of the Department of Philosophy and Religion, and Fellow of the Institute for Imaging and Analytical Technologies (I2AT) at Mississippi State University. His primary research interests include philosophy of neuroscience, scientific reductionism, and cellular/molecular mechanistic explanations in neuroscience. He received his Ph.D. in Philosophy from the University of California, Irvine, in 1989. He is the author of four books (*Psychoneural Reduction: The new Wave*, MIT Press, 1998; *Philosophy and Neuroscience: A Ruthlessly Reductive Account* (Kluwer, now Springer, 1992; *Understanding Scientific Reasoning*, 5th Ed. (co-authors Ronald Giere and Robert Mauldin, Thompson 2006; and *Engineering the Next Revolution in Neuroscience* (co-authors Alcino J. Silva and Anthony Landreth, Oxford University Press, 2013), editor of the Oxford handbook of *Philosophy and Neuroscience* (Oxford University Press, 2009), and more than 75 articles, book chapters, and reviews. His work has been supported by grants from the National Science Foundation and the National Institutes of Health.

MARINE AND ATMOSPHERIC SCIENCES

Chair: Scott Milroy,
University of Southern Mississippi

Vice-Chair: Remata Reddy,
Jackson State University

March 6, 2014

THURSDAY MORNING

Lamar 1

08.01

10:15 A VIROMIC STUDY ON SERUM COLLECTED FROM WILD *TURSIOPS TRUNCATUS* (BOTTLENOSE DOLPHIN)

Corey D. Russo¹, Manolito Torralba², Karen E. Nelson², D. Jay Grimes¹

¹Gulf Coast Research Laboratory, University of Southern Mississippi, Ocean Springs, Mississippi, USA, ²J. Craig Venter Institute, Rockville, MD, USA

Background: Viral particles constitute 10^6 - 10^9 /mL of oceanic waters. Viral infections in marine mammals are responsible for mass stranding events, unusual mortality events, chronic infection, clinically expressed disease, and inapparent/sustained infections. Virology studies on *Tursiops truncatus* (bottlenose dolphins) are of particular importance as the bottlenose dolphin is a sentinel species. Specific primer approaches have identified viral particles representative of 8 viral families in the bottlenose dolphin. We have implemented a random primer approach, followed by full genomic sequencing of purified viral RNA and DNA from bottlenose dolphin samples. The purpose of this study is to identify and characterize viromes of bottlenose dolphins.

Materials: Dolphin Serum was collected in 2 collection events in 2 consecutive years off the coast of Sarasota, FL. Samples were transported on dry ice to the University of Southern Mississippi – GCRL. Samples were collected from free ranging, wild dolphins. 30 samples have been collected and examined.

Results: RNA and DNA has been purified and confirmed to be viral nucleic acid via 16sPCR. Viral nucleic acid was randomly amplified via a multiple displacement amplification procedure. Samples, furthermore, have been sequenced via MiSeq and library reconstruction is in progress.

Conclusions: The specific primer approach falls short in characterizing the viral ecology of a sample. A better understanding of viruses capable of infecting bottlenose dolphins is important in disease diagnosis, etiology, treatment, and infectivity and evolutionary relationships amongst viruses. As sentinel species, studies involving virus exposure and the health of the bottlenose dolphin are applicable to both ocean and human health.

08.02

10:30 THE EFFECTS OF OCEAN ACIDIFICATION ON COASTAL MARINE NON-CALCAREOUS PHYTOPLANKTON

Joshua Stephen Bergeron

University of Southern Mississippi, Long Beach, Mississippi, USA

It has been suggested that anthropogenic additions to atmospheric CO₂ could reduce marine surface water pH to as low as 7.8 by the end of the century. This study evaluated the possible impacts of ocean acidification to the realized growth rate of coastal non-calcareous marine phytoplankton. A seawater sample containing a natural assemblage of phytoplankton was collected from the near-shore waters of Long Beach, Mississippi, filtered through a 54 micron mesh to remove macrozooplankton grazers, and divided into 25 equivalent 200mL batch cultures enriched with f/2 medium. Six cultures were tested at each pH level and one was filtered immediately for spectrophotometric quantitation of chlorophyll-a. Four target pH levels of 8.2(initial), 7.5, 6.8 and 6.1 were achieved through the direct or gradual (4d) addition of 0.1N HCl/NaHCO₃ solution. Acidified batch cultures were incubated at 21.9oC for 12 days, according to a 14/10 light/dark cycle using a 30W fluorescent bulb. Microscopical cell counts were performed throughout and a final spectrophotometric quantitation of chlorophyll- α was performed for each of the 24 cultures. Realized growth rates among phytoplankton incubated after direct acidification were established to be 0.2894 $\pm$ 0.0003 at pH8.2, 0.2860 $\pm$ 0.0002 at pH7.5, 0.2950 $\pm$ 0.0003 at pH6.8, and 0.2741 $\pm$ 0.0003 at pH6.1. The realized growth rates among phytoplankton incubated after gradual (4d) acidification were slightly higher at all levels of pH. The results suggest that the realized growth rates for non-calcareous phytoplankton are unaffected by acidification at the pH levels tested. This is possibly due to natural coastal environments that promote tolerance to veritable pH.

08.03

10:45 STUDIES OF LARGE-SCALE SURFACE FLUXES, VERTICAL MOTIONS, INTENSITY CHANGE AND TRACK PREDICTION ASSOCIATED WITH LAND FALLING HURRICANE KATRINA

Suseela Reddy, Duanjun Lu, Quinton Williams

Jackson State University, Jackson, MS, USA

Our study investigated the possible correlation between large-scale heat fluxes, vertical motions and intensity change associated with landfall of Hurricane Katrina. After reaching the category 5 intensity on 29 August 2005 over the central Gulf of Mexico, Katrina weakened to category 3 before making landfall on 29 August 2005, Louisiana coast with maximum sustained winds over 110 knots. We examined the vertical motions associated with this intensity change of the hurricane. The data for Convective Available Potential Energy (CAPEV), sea level pressure and wind speed were obtained from Atmospheric Soundings, University of Wyoming and NOAA National Hurricane Center (NHC) for the period 24 August 24 to 3

September 2005. We developed an empirical model and a program using C++ to calculate surface potential temperatures and heat fluxes using the data sources mentioned. Vertical motions using CAPEV values were calculated and results show maximum large-scale heat fluxes of 7960 W/m² during landfall with a central pressure of 905 mb on 29 August 2005. CAPEV and the vertical motions peaked 3 to 5 days before landfall. We also used the NCAR Numerical model (WRF/ARW) with data assimilation to ascertain our model's performance with respect to hurricane tracking and intensities associated with hurricane Katrina. Results from our model's are in good agreement with the actual observations. Our model also reproduced the precipitation, intensity change and track associated with hurricane Katrina. The model presented could form an early warning system to predict land falling hurricanes associated with severe weather over the Gulf of Mexico.

08.04

11:00 STUDIES OF ATLANTIC TROPICAL STORM/HURRICANE DEVELOPMENT AND RESPONSES TO CONDITIONS IN EQUATORIAL PACIFIC OCEAN

Jerryl Roberts, Remata Reddy, Zhenbu Zhang, Tor Kwembe

Jackson State University, Jackson, MS, USA

It has been well established that warm and cool phases of eastern equatorial Pacific waters have a significant impact on the number of hurricanes which form in the Atlantic Ocean each year. Warm El Niño conditions in the eastern Pacific tend to lead to fewer hurricanes in the Atlantic, while cool La Niña conditions generally result in more hurricanes. Multiple mechanisms have been proposed to explain such a correlation, and in an attempt to move toward a better understanding of these mechanisms, we take a look at which phases of Atlantic tropical cyclone development are impacted by La Niña/El Niño using the data from NOAA National Hurricane Center (NHC) and statistical tools. Our study investigated that there has been a significant increase in the average number of Atlantic tropical storms during La Niña conditions compared to those of El Niño. However, the percentage of these tropical storms that develop into hurricanes has been nearly identical under varying La Niña/El Niño conditions. This leads to the conclusion that conditions in the Pacific impact Atlantic tropical cyclones during the early phases of their development, but have no effects during later hurricane-developing stages. The fact is that there are more/fewer hurricanes and major hurricanes due to there being more/fewer storms during La Niña/El Niño conditions. In the present study, we discuss the impacts of blocking high and global warming on Atlantic Hurricanes.

08.05

11:15 VARIATIONS OF TROPICAL CYCLOGENESIS FACTORS OVER THE PAST 10,000 YEARS

Christopher Wilson¹, Ryan Zamora², Robert Korty², Tor Kwembe¹

¹Jackson State University, Jackson, MS, USA, ²Texas A&M University, College Station, TX, USA

Earth's elliptical orbit varies over long timescales, and the month during which it makes its closest approach to the Sun has

moved from July 10,000 years before present (BP) to early January now. This shift has resulted in decreasing amounts of incoming solar radiation during peak months of tropical cyclone activity in the North Hemisphere. Earlier work showed, counterintuitively, that higher amounts of summer solar radiation are counterproductive for tropical storm formation because the ocean surface responds more slowly than the atmosphere, making deep convection more difficult. Here we use output from the Transient

Climate Evolution (TraCE) simulation of the Community Climate System Model version 3 (CCSM3) to investigate how the environmental conditions that favor tropical storm formation respond to the changing amount of solar radiation. These factors include vertical wind shear, relative humidity, and vorticity. Effects of wind shear, relative humidity, and upper ocean structure on tropical cyclone formation were performed using the Coupled Hurricane Intensity Prediction System (CHIPS) model. Data from the TraCE was then input to CHIPS to evaluate how these conditions could have affected the formation and intensity of possible storms during the past.

08.06

11:30 A STUDY OF LARGE-SCALE VERTICAL MOTIONS, PROCESSES AND INTENSITY CHANGE ASSOCIATED WITH LAND FALLING TROPICAL STORM LEE OVER THE GULF OF MEXICO USING REMOTE SENSING AND SATELLITE DATA

Warith Abdullah, Christopher Wilson, Remata Reddy, Tor Kwembe

Jackson State University, Jackson, MS, USA

Tropical Storm (TS) Lee formed on September 2, 2011 from a broad, disorganized tropical wave that entered the Western Caribbean in late August. The storm meandered inland on September 4 roughly 50 miles southwest of Lafayette, LA. On September 4th, T.S Lee pressure drops to 988 mb and begins to make landfall on Louisiana-Mississippi coast on September 5th. Lee's high moisture content and slow speed promoted 24 hour rainfall totals in excess of 5 to 11 inches in most locations over the Gulf States. Strong upper-level winds out of the west-northwest generated 30 knots of wind shear over tropical wave, keeping heaviest thunderstorms disorganized. Tropical depression positioned south of high-pressure ridge providing weak steering currents. Warm ocean temperatures provide plenty of moisture and energy for heavy rain potential and storm intensification. We investigated the possible relationship between the large-scale vertical motions and intensity change associated with the landfall of TS Lee. We also examined the vertical motions associated with the intensity change of the TS. The data on Convective Available Potential Energy (CAPEV), sea level pressure, and wind speed were obtained from the Atmospheric Soundings and NOAA National Hurricane Center (NHC), for the period of August 25 to September 10, 2011. We computed vertical motions using CAPEV values. The study showed that the large-scale vertical motions reached maximum (24 m/s) during storm intensification. The large vertical atmospheric motions associated with the land falling TS Lee produced severe weather including thunderstorms, tornadoes

and heavy precipitation. The processes associated with intensification and heavy precipitation will be discussed.

08.07

11:45 CAN THEY BE HEARD? A SPATIAL STATISTIC ANALYSIS OF TORNADO SIRENS ACROSS THE STATE OF MISSISSIPPI

Hope Longwith¹, Duanjun Lu¹, Alan Gerard²

¹*Jackson State University, Jackson, MS, USA*, ²*NWS Weather forecast Office, Jackson, MS, USA*

There are 840 tornado sirens across the state of Mississippi. The spatial distribution of sirens in any given area is generally determined by the radial siren hearing distance in relation to the surrounding population and the urban building obstruction potential in that area. Point siren locations were buffered using multiple distances and analyzed in conjunction with U.S. Census data and tornado fatality locations in a GIS. Total siren radial hearing square mileage of the State and major cities with respect to population coverage, income levels, and spatial correlation to fatalities for were determined using the multiple buffered siren radial hearing distances. The results from this study would be presented to Mississippi Emergency Management Agency (MEMA) and local emergency managers and to spatially and fiscally optimize siren placement for their community.

12:00 Lunch

08.08

1:00 INFLUENCES ON THE DEVELOPMENT OF HYPOXIA IN MISSISSIPPI BIGHT WATERS

Peng Ho, Alan Shiller, Melissa Gilbert

University of Southern Mississippi, Stennis Space Center, MS, USA

A unique multi-year time series of eight stations was undertaken extending from St. Louis Bay (SLB) to the Mississippi Bight (2008-2011) which included ancillary data (salinity, temperature, oxygen, nutrients) as well as trace element and water isotopic data. These data provided insight into potential causes of hypoxia along this transect. Several freshwater inputs, including SLB, the Pearl River, and the Mississippi River influenced this region. Surface salinity data showed the seaward extent of freshwater influence varied each year. Oxygen profiles indicated the hypoxia zone occurred in the early spring and summer and spread between the Mississippi Sound and Bight; however, the area and strength of hypoxia varied each year depending on the extent of stratification. Oxygen isotope data (delta-O18) showed different fresh water sources mixing in the Mississippi Sound and Bight during hypoxic periods. High Cs concentrations (5-99 nM) were observed in Mississippi Sound waters due to the release of Cs into SLB from a point source. The results of delta-O18 and Cs in the surface waters showed SLB waters were limited to nearshore regions and not a strong influence on the development of hypoxia. Ba in bottom waters was distributed in two different negative relationships with salinity. Ba data suggested high salinity hypoxic water was influenced by sediment input (including possible submarine groundwater discharge) while low salinity water was mixed

vertically with surface water during periods of weak stratification. Mn was also enriched (90-11000 nM) in the bottom waters during hypoxic periods, likely due to input from reducing sediments.

08.09

1:15 NUMERICAL SIMULATION OF ATMOSPHERIC MERCURY IN MISSISSIPPI

Duanjun Lu¹, James Cizdziel², Yi Jiang², Loren White¹, Remata Reddy¹

¹Jackson State University, Jackson, MS, USA, ²University of Mississippi, Oxford, MS, USA

As a continuation of our recent work that studied temporal patterns of atmospheric mercury species in northern Mississippi during 2011–2012, we applied an air quality modeling system, the Community Multi-scale Air Quality (CMAQ), to evaluate model ability in capturing ambient concentration of atmospheric mercury in both summer and winter. Our motivation lies in the reason that quantifying the impacts of mercury components in atmospheric mercury cycling will aid to produce optimal and effective mercury control strategies. The meteorological model of system was able to reproduce surface temperature and wind speed; and photochemical model captured well in surface O₃ and NO₂ concentrations for both summer and winter months; But the model system lacked a skill in reproducing SO₂ concentration with significant overestimates in both summer and winter. The model underestimated weekly wet deposition of total mercury partly because of errors for precipitation from meteorological model. The air quality model overestimated atmospheric ambient elemental mercury (Hg⁰) concentration in summer whereas slightly underestimated in winter. The model exhibited a good skill in capturing seasonal variability of reactive gaseous mercury (RGHg) while it produced a significant overestimate for particulate mercury (PHg) in both summer and winter. Sensitivity test revealed that anthropogenic emissions had great influences in local/regional ambient concentrations of Hg⁰, RGHg and PHg where anthropogenic emissions made a contribution of 10-20% for ambient Hg⁰, 20-40% for RGHg and 40-60% for PHg.

08.10

1:30 DISSOLVED METHANE CONCENTRATIONS IN MISSISSIPPI AND LOUISIANA COASTAL AND ESTUARINE WATERS

Hannah Roberts, Alan Shiller

University of Southern Mississippi, Stennis Space Center, MS, USA

Dissolved methane concentrations within St. Louis Bay were collected in 2013 and samples from the Northern Gulf of Mexico were collected in 2010, 2011 and 2013. Methane is the third most abundant greenhouse gas in the atmosphere; however freshwater, estuarine and marine fluxes to the atmosphere vary widely between studies. Through headspace equilibration and cavity-ring down spectroscopy, samples were collected and analyzed. Open ocean samples were analyzed while at sea. Concentrations ranged from 0-25 nM in the open ocean water column and up to 630 ÅµM in the Orca Basin brines. The surface waters were slightly supersaturated and small

maximums were observed approximately at depth with the chlorophyll maxima. Small increases in concentration were observed in some bottom samples, possibly related to methane seeps. Samples collected within St. Louis Bay allowed for a mass balance to be calculated and previously difficult sources and sinks to be estimated. Concentrations ranged from 0-150 nM within the interior of the estuary, with complex relationships with wind and temperature. The largest sink out of the estuary is through air-sea equilibration. Flux to the atmosphere is well within the range of previous studies, with estimated methane residence times varying from 1-15 hours. The atmospheric exchange implies a large flux of methane out of bay sediments, possibly associated with submarine groundwater discharge.

08.11

1:45 ASSEMBLAGE COMPARISONS OF LIVING BENTHIC FORAMINIFERA WITHIN BATHYAL OILED AND UN-OILED SITES OF THE NORTHEASTERN GULF OF MEXICO

Valerie Cruz¹, Charlotte Brunner¹, Kevin Yeager², Kevin Briggs³

¹University of Southern Mississippi, Stennis Space Center, MS, USA, ²University of Kentucky, Lexington, KY, USA, ³U.S. Naval Research Laboratory, Stennis Space Center, MS, USA, ⁴Texas A & M University, Galveston, TX, USA

Live benthic foraminiferal assemblages were studied at contaminated and uncontaminated bathyal sites around the source of the Deepwater Horizon oil spill. In this study, samples collected in October 2010 and 2011 were divided into un-oiled, moderately oiled and heavily oiled groups, in which the [PAH] ranged from 29 to 7,553 ng/g. Non-metric multidimensional scaling (MDS) and cluster analyses were conducted to compare all surface samples, including three pseudo-replicates from one site. Additionally, a heavily oiled site and an un-oiled site were studied downcore to assess the impact on the foraminiferal depth of habitation (DOH). A total of 284 species, 101 genera and 6 orders have been identified in the > 45-Åµm fraction. Among the surface samples, the variability in density between the pseudo-replicates was not significantly different from that of the control and moderately oiled groups, but the variability in assemblage within pseudoreplicates was distinctly less than between sites. The MDS and cluster analysis show that surface assemblages vary with water depth and other variables as yet uninterpreted. The assemblages from the heavily oiled and un-oiled cores were distinctly different and mirrored by the macrofauna. In 2010, the standing stock was 1.6 times greater at the heavily oiled site, but the DOH was 2 times greater at the un-oiled site. In 2011, the standing stocks of the two sites were similar, but the DOH remained shallower at the oiled site. Tentatively, the trends in density, DOH, standing stock, and diversity at the heavily oiled site appear consistent with hypertrophy.

08.12

2:00 A MARINE INFECTIOUS DISEASE MODEL

Gorka Bidegain¹, Eric, N. Powell¹, John, M. Klinck², Eileen, E. Hofmann²

*Gulf Coast Research Laboratory, University of Southern Mississippi, Ocean Springs, MS, USA*¹ *Center for Coastal Physical Oceanography, Old Dominion University, Norfolk, VA, USA*², *U.S. Naval Research Laboratory, Stennis Space Center, MS, USA*³, *Texas A&M University, Galveston, TX, USA*⁴

Aquatic disease dynamics consist of complex relationships among hosts and pathogens. The study of the determinants of epizootics, their initiation or termination, together with the prediction of the impact of climate change in the ecology and distribution of pathogens require innovative strategies towards the identification of processes, monitoring, and modeling. We developed an ecological model of the Kermack-McKendrick type, sufficiently flexible to study the dynamics of a wide range of marine invertebrate diseases. The model considers a single population of benthic filter feeder organisms consisting of susceptible and infected animals, and infective particles simulating pathogens. It is applicable to diverse host-pathogen systems by means of setting specific initial conditions and parameters such as infection, filtration, mortality and recruitment rates. We evaluate the sensitivity of the model analytically, examining the input parameters and initial conditions in order to answer the questions: What conditions are needed to produce either high infection prevalence or absence of infection? Are there any conditions that cause a significant reduction of prevalence in an infected population? The model performed adequately and proved to be a valuable tool for studying the ecological dynamics of marine host-pathogen systems since it allows an understanding of which factors have the largest influence on model outputs. Moreover, coupling this model to a hydrodynamic model, capable of simulating larval and pathogen dispersion, might be a powerful approach to predict climate-change-driven spatial and temporal evolution of host-pathogen interactions.

08.13

2:15 A STUDY OF REGIONAL AIR QUALITY TRENDS OVER GULFPORT REGION FOR ASSOCIATION WITH METEOROLOGICAL PARAMETERS, AND HEALTH IMPACTS

Francis Tului, Joseph Perry, R. Suseela Reddy

Jackson State University, Jackson, MS, USA

The increased industrial, commercial, and transportation activity surrounding off-shore and on-shore of Gulf of Mexico has been affecting the regional air quality. Some of the major air pollutants of concern are particulate matter, nitrogen oxides, sulfur dioxide, and Ozone caused by the emissions from sources such as cars, power plants, chemical plants, industrial boilers, power plants, oil refineries. In particular, the population in the urban areas over the US southern regions is likely to be exposed to higher levels of air pollutants under certain weather conditions and meteorological conditions. Air Quality is strongly affected by weather, while air borne diseases are also

aggravated by meteorological conditions. In human beings, health related diseases like asthma are of much concern in addition to climate sensitive diseases such as malaria and smog. It is important to investigate and understand the interplay between air pollutants, meteorological parameters, and health. In the present study, we present a detailed study of the long term and spatial variations of air pollutants such as particulate matter and Ozone in selected regions of Mississippi – Northern, Central, and Southern. The health data will be collected from CDC and will be examined for any association with the observed air pollutant data and meteorological data in these regions.

MATHEMATICS, COMPUTER SCIENCE, AND STATISTICS

Chair: Elgenaid Hamadain,
University of Mississippi Medical Center

Co-Vice-Chair: Jamil Ibrahim,
University of Mississippi Medical Center

Co-Vice-Chair: Andrew Harell,
Alcorn, MS

March 6, 2014

THURSDAY EVENING

POSTER SESSION

Following Dodgen Lecture

P9.01

ADDING FUNCTIONALITY TO FREEMAT: IMPLEMENTING *fzero* FUNCTION TO FIND ROOTS OF NONLINEAR FUNCTIONS

Joseph Clark, Patricia Franklin, Canary Robinson, Krishna Aditya

Alcorn State University, Lorman, MS, USA

In Fall 2013 Scientific Computation class we implemented and studied several algorithms to find roots of nonlinear functions. The implementations were done in Freemat which is a freeware and is a clone of popular Mathematical software Matlab.

Matlab has a function named *fzero*, which can find roots of nonlinear functions. It takes two or three arguments. The first argument is a function. In case of three arguments, second and third arguments are the values in the domain of the function, and these values should bracket a root of the function. In case of two arguments to the function, the second argument should be a value close to the root.

Freemat does not have this function. We added this functionality to Freemat. In case of three arguments, our implementation uses Bisection algorithm to find the root of the function and in case of two arguments, implementation uses Newton-Raphson algorithm to find the root. We tested our implementation extensively on several nonlinear functions and it worked as well as the method in Matlab.

P9.02

ADDING FUNCTIONALITY TO FREEMAT: IMPLEMENTING *companion* FUNCTION TO GENERATE COMPANION MATRIX OF A GIVEN POLYNOMIAL

Leonard Turner, Richard Vanderpuye, Lawrence Warre, Krishna Aditya

Alcorn State University, Lorman, MS, USA

A polynomial of the form $P_n = a_n x^n + a_{n-1} x^{n-1} + \dots + a_1 x + a_0$ of degree n , will have n roots. The coefficients $a_n, a_{n-1}, \dots, a_1, a_0$ can be real or complex numbers. The roots of the polynomial will be real or complex. We implemented and studied two algorithms to find all the roots of a given polynomial simultaneously. The two algorithms are Durand-Kerner algorithm and Aberth algorithm. The implementations were done in Freemat which is a freeware and is a clone of popular Mathematical software Matlab. One method of finding all roots of a polynomial simultaneously, is to find companion matrix of the given polynomial and then finding the eigen values of the companion matrix. The roots of the polynomial are same as the eigen values of the companion matrix. Matlab has a function of the name *eig* to find the eigen values of a matrix and function by the name *companion* to generate companion matrix of a given polynomial. Freemat has a function to find eigen values of a matrix but lacks a function to generate companion matrix of polynomials. We wrote a function in Freemat to generate companion matrix of a polynomial thereby extending functionality of Freemat.

March 7, 2014

FRIDAY MORNING

Lamar 2

8:30 Welcome

O9.01

8:35 COBWEB AND BIFURCATION DIAGRAMS

Tapen Tiwari, Chunmun Trivedy

Alcorn State University, Lorman, MS, USA

The Cobweb plot and Bifurcation diagram are two visual tools that are widely used to investigate the asymptotic and qualitative behavior of one dimensional discrete dynamical system such as the classic logistic map. The fixed points of logistic iterations may be attractive or repulsive or the iterations may produce a periodic orbit. Using a Cobweb plot, it is possible to analyze the nature of a fixed points, including its stability and deterministic chaos. A Bifurcation diagram specifically shows how dynamics change as the parameter varies. Hence, the fixed points or periodic orbits of a system are shown as a function of a bifurcation parameter of the system. In this presentation we will elaborately show how to create interactive Cobweb plot and Bifurcation diagram with Mathematica easily.

O9.02

9:00 FRACTAL DIMENSION BASED DETECTION OF ARCHITECTURAL DISTORTION ANOMALIES IN MAMMOGRAPHY

Erol Sarigul

Alcorn State University, Lorman, MS, USA

Breast cancer is one of the devastating, deadly diseases for women nowadays. Computer-aided detection (CAD) can assist radiologists in improving the mammographic screening process by suggesting mammographic regions with suspicion of malignancy. Architectural distortion (AD) is one of three common mammographic signs of breast cancer. The mammographic signs of AD can be easily confused due to the limitations of 2-D mammography and/or the effect of the superimposed tissues. As a result, AD is often missed in screening mammography by both radiologists and commercial CAD system. Although architectural distortion is such an important anomaly in breast cancer detection, very few detection algorithms have been developed in the literature. Fractal dimension based methods presents promising alternative to tackle problems in biomedical image processing field. The implemented algorithm analyzes and detects architectural distortion anomalies by utilizing fractal theory. Fractal analysis is a popular technique in biomedicine as increasingly more studies are being done to analyze many complex physical phenomena. The fractal dimension represents the rate of additional structural detail as the measurement scale changes. In mammography, normal breast parenchyma behaves as a fractal object. If any anomaly exist in breast parenchyma structure, that self-similarity behavior is disrupted and indication of anomaly. Therefore, the calculated fractal dimension for an image with architectural distortion should be lower than the fractal dimension of normal image. This algorithm has been developed to evaluate if fractal dimension can be applied effectively to indicate the presence of architectural distortion in screening mammograms. This paper presents the results in detail using publicly available DDSM mammography dataset.

O9.03

9:15 TESTING STATISTICAL HYPOTHESIS RELEVANT TO PARAMETERS OF INVERSE HYPERGEOMETRIC DISTRIBUTION

Lei Zhang^{1,4}, Hongmei Han², Dachuan Zhang³, Elgenaid Hamadain⁴, William D. Johnson²

¹Mississippi State Department of Health, Office of Health Data and Research, Jackson, MS, USA, ²Pennington Biomedical Research Center, Baton Rouge, LA, USA, ³Louisiana State University, Baton Rouge, LA, USA, ⁴The University of Mississippi Medical Center, Jackson, MS, USA

Consider the case of two-stage sampling where (first stage) m bins are selected from a large population of M bins each containing N items, (second stage) inverse subsampling is performed without replacement from each of the m bins, and a binary observation is made on each subsample item (inverse hypergeometric distribution). Denote the two types of items *Red* and *Blue*. Assuming N is known but the number of each type is not, we consider the hypothesis that the mean number of *Red*

items in the M bins is equal to a specified value denoted $\mu_R = R_0$. We employ an unbiased parameter estimator and use the Delta Method to approximate the estimator's variance. We then use a large sample statistic to test the hypothesis. We selected various parameter values for the inverse hypergeometric distribution to empirically investigate performance of the test in terms of exact calculations of the ability of the test to maintain significance at the nominal 0.05 level under the null hypothesis and inform power of the test for specified parameter values when the null hypothesis is false. The empirical findings validate utility of the test.

09.04

9:30 IMPACT OF HEARING AID USE ON SPEECH PERCEPTION- IN- NOISE AND SELF-PERCEIVED OUTCOMES IN INDIVIDUALS WITH UNILATERAL SENSORY HEARING IMPAIRMENTS

Charles Bishop, Elgenaid Hamadain

University of Mississippi Medical Center, Jackson, MS, USA

We evaluated performance on an objective measure of speech perception in noise (QuickSIN) and two subjective, self-report, handicap questionnaires (APHAB and SSQ) of a group of 22 individuals with unilateral, moderate or worse, sensory hearing impairment. Measurements were performed before the participants were dispensed a hearing aid ("unaided" condition), and performed again after at least three months of hearing aid use ("aided" condition). Results were consistent with statistically significant ($p < 0.05$) improvements ("unaided" compared to "aided" conditions) in QuickSIN performance when speech and noise were spatially separated, with speech directed toward the "worse" ear and noise directed toward the "better" ear. The APHAB questionnaire showed "aided" benefit for all test sub-categories near the 50th percentile of the normative data for "successful hearing aid users." The SSQ showed statistically significant ($p < 0.05$) improvements for the group for all test sub-categories between "unaided" and "aided" test conditions. In conclusion, we feel that hearing aid use by individuals with unilateral hearing impairments provides measurable improvements in speech perception in noise and self-perceived hearing handicap.

09.35

9:45 AN AUTOMATED MEDICATION COMPLIANCE ASSISTANT

Mohammed Mohammed¹, Wissam Ahmed Hassan¹, Kamal Ali¹, Elgenaid Hamadain²

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

This paper describes a system that utilizes smart devices to alert the user when medications (Pills or Tablets) are not taken on time. The system comprises a multi compartment box in which medications are stored. Each compartment houses the medications to be taken at a particular time. All compartments are equipped with a transmitter detector pair that can detect the existence of medication in that compartment. A microcontroller system attached to the compartment box checks for the existence

of medications at a user programmed time and at subsequent user determined intervals. This microcontroller communicates via WiFi or Bluetooth with a smart device application. The smart device application will then alert the user if medication is not taken on time. This alert can be done through SMS, Voice or any variety of other alarm stimuli. The system will also alert the user to refill compartments at the end of the week. The system can also be connected to the user's pharmacy system to request refills at the appropriate time. All system's records are stored and made accessible to the user to share with his or her health providers. It is anticipated that this system will improve compliance with medication orders as well as allow the health providers track such compliance.

09.06

10:00 BIG DATA FOR DEFENSE AND HOMELAND SECURITY: DEFINITION, APPLICATIONS, CHALLENGES AND OPPORTUNITIES

Alvin Jackson, Alvin Matthews, Jyotirmay Gadewadikar, Steve Adzanu

Jackson State University, Jackson, MS, USA

There is a lack of consensus on exactly how big is big data and what is big data. Big Data is just not about size, what today is big data will not be big data tomorrow. Big Data is any attribute that challenges the constraints of a system capability or business need. More so, working and utilizing big data is challenging in the context of United States Defense and Homeland Security Context. In this work we will explain first what is big data and its evolution over the time. Typical applications will be presented. Big Data has enabled organizations to solve problems which were possible before and take on challenged they previously wouldn't. Data available to enterprise is increasing, so as analyzable data, but computing platforms have not been able to keep up with the data surge. Percentage of available data an enterprise can analyze is decreasing proportionately to what is available to enterprise. Organizations are not evolving but they are getting naive about their business over the time because of the big data challenges. This work will specifically focus on specific homeland security challenges and opportunities and will present Big Data Principles for Homeland Security Applications.

10:15 Business meeting

10:30 BREAK

09.07

10:45 ESTABLISHING A STUDENT-CENTERED OPEN SOURCE SOFTWARE COMMUNITY

Hyunju Kim

Jackson State University, Jackson, MS, USA

We proposed to initiate and maintain a Student-centered Open Source Software (SOSS) Community in order to educate Computer Science (CS) majors in the areas of software development and reengineering. Open Source Software (OSS) is software that provides source code to download, modify, and redistribute. This source code can be thus used for educational purposes, and our SOSS community utilizes such OSS code and OSS community structures to provide a repository and

knowledge base of student development projects, workspaces and opportunities for real-world software development, and a virtual classroom for CS majors at any level. We also expect to collect and analyze various educational and research data from the community. This presentation discusses components and tools of the SOSS community, its structure and functionalities, criteria for selecting appropriate OSS seeds for student development project, and how the community can be utilized in various areas of CS education.

09.08

11:00 ANTIGENBRIDGES: AN ONLINE RESOURCE TO QUANTIFY AND VISUALIZE INFLUENZA ANTIGENIC DISTANCE USING SEQUENCE INFORMATION

Namarta Kumar¹, Jialiang Yang², Xiu-Feng Wan²

¹Mississippi Valley State University, Itta Bena, MS, USA,

²Mississippi State University, Mississippi State, MS, USA

Rapid identification of emerging influenza antigenic variants is crucial to the prevention and control of influenza disease. Traditional serological assays to detect antigenic variants are expensive, labor intensive, and time consuming, which have become a major bottleneck for a successful vaccination program. With the advances in sequencing technologies, genomic sequences have become one of the cheapest, fastest and most accessible biological resources. Previously we developed and experimentally validated a computational method to quantify influenza antigenic distances solely using hemagglutinin (HA) sequences (Sun et al. 2013. *Mbio.* 4(4). pii: e00230-13). In this study, we developed a webserver for AntigenBridges, and this webserver is supported by PHP. The users can input a set of influenza sequences, and AntigenBridges can quantify the antigenic distances for these viruses. The users can also visualize the antigenic relationships of these viruses to be compared using either two or three dimensional antigenic cartography. Future study is to expand AntigenBridges to other subtypes of influenza viruses besides H3N2 influenza A virus. In summary, AntigenBridges can be used in timely identification of influenza antigenic variants thus potentially facilitate selection of vaccine strain candidates.

09.09

11:15 BIGDATA X-INFORMATICS MOOC: RESEARCH INTO INCREASING ITS EFFICACY

Ifeanyi Onyenweaku¹, Ya'Shonti Bridgers²

¹Mississippi Valley State University, Itta Bena, MS, USA,

²Elizabeth City State University, Elizabeth City, NC, USA

X-informatics MOOC is a course that had been available to students, during the spring 2013 classes by Indiana University, School of Informatics and Computing. It is now available for the fall 2013 classes. Therefore, we were to create features that will improve the interaction between its educational content and its users (students and professors). On that account, we made surveys on other online educational sites like Coursera, Udemy, Udacity, Duolingo, and MIT OpenCourseware. These surveys gave us the opportunity to observe features, on these sites, that enabled effective communication between the different calibers

of students and the online courses. Our findings enabled us to create new features or modify old features that will enhance student-site interactivity. I gave constructive feedback on previous videos and slides made for the course so that the new videos and slides to be made would be much more comprehensive. In addition, I ran python codes needed for the course (as python is a pre-requisite for the course) and documented how to use the Enthought Canopy Python Software to run these codes for the user's use. Finally, having gained knowledge, about visual design and educational pedagogies, from articles like "Information Architecture for the WWW" by Peter Morville and Louis Rosenfield and "Peer Instruction in CS: Research and Experience" by Daniel Zingaro and Leo Porter, we used AXURE to create the near perfect design / wireframes, with the observed features, that will interact effectively with the student; hence, catalyzing efficient learning.

09.10

11:30 USING EXCEL IN THE HEALTH SCIENCES DISCIPLINES EFFICIENTLY AND EFFECTIVELY

Jamil Ibrahim

University of Mississippi Medical Center, Jackson, MS, USA

Evidence-based decision making requires transforming raw data into useable information. One readily available and affordable tool is Excel. The presenter will address the advantages and disadvantages of using Excel to accomplish these functions.

09.11

11:45 COMPUTATIONAL STUDIES ON SELECTED NANOMATERIALS: PROPERTIES AND INTERACTIONS

Jerzy Leszczynski

NSF CREST Center, Department of Chemistry, Jackson State University, Jackson, MS, USA

This talk highlights the most significant achievements and challenges related to our recent studies of nanomaterials. Among studied species are fullerenes, carbon nanotubes, metal and metal oxide clusters. Possible applications for hydrogen storage, DNA protection and damage, and nerve agent detections and decomposition are discussed. Also novel developments of Quantitative Structure – Activity Relationships (QSAR) approach in prediction properties of nanospecies and in the risk assessment of nano-size materials will be reviewed.

09.12

12:00 USING GEOMETER'S SKETCHPAD TO DRAW 2D FRACTALS

Brandi Smith¹, Ya'Shonti Bridgers²

¹Mississippi Valley State University, Itta Bena, MS, USA,

²Elizabeth City State University, Elizabeth City, NC, USA

The use of technology in the classroom can serve as an aide in student achievement. Drawing fractals serves this purpose since fractals are beautiful and exist everywhere in this world. However, the simulation/drawing of fractals is not easy and it requires lots of skills both from geometry and from computer

technology. In this project, we simulate 2D fractals, especially 2D snowflakes and hence exhibit their beauties. Drawing fractals, like the snowflake fractal, requires knowledge of recursion/iteration, the process of a function which calls its self. Sketchpad is a software program which can be easily used to implement recursion/iteration. Given an initial shape, the rule for iterations are applied to this initial shape and then the generator generates the desired fractals. The purpose of this project is to further engage into the properties and characteristics of 2D fractals through drawing and appreciate the beauties of fractals. The ability to use this software to draw 2D fractals enhances geometric and computer skills, such that new knowledge and experience will be gained.

09.13

12:15 ITERATING A LOGARITHM

Xianglong Ni

Oak Grove High School, Hattiesburg, MS, USA

We analyze the periodic points of a logarithm. Via a bijection between these points and their path patterns, we find that there are 2^n n -periodic points. The number of proper n -periodic points is then found by the Principle of Inclusion-Exclusion.

09.14

12:30 APPROXIMATION OF SOLUTIONS TO DIFFERENTIAL EQUATIONS: 1D TO 2D PROBLEMS

Haiyan Tian

University of Southern Mississippi, Hattiesburg, MS, USA

We solve elliptic partial differential equations using orthogonal trigonometric functions. To help students understand mathematical concepts and relevance of problems, we go from one-dimensional to 2- dimensional cases.

09.15

12:45 CREATING EMERGENCY MANAGEMENT MOBILE APPS USING MIT APP INVENTOR

HR Shih, Jacqueline Jackson, Dameisha L. Wilson, Jarrett C. Simmons, Casey Fitch-Randolph, Jasmine D. Keys

Jackson State University, Jackson, MS, USA

Emergency management is the discipline of dealing with and avoiding both manmade and natural disasters. Jackson State University has established an "Emergency Management Technology" (EMT) program. The goal of EMT program is to train the future emergency management professionals to manage a crisis, to help prevent the worst, and to improve outcomes in all types of disasters. Mobile technology has expanded dramatically around the world. With its growing usage, this technology can be a powerful tool to help in case of emergency. This study exposes EMT students to their unfamiliar area. Students, with no prior programming experience, design mobile applications using MIT APP inventor. The mobile apps created can and are used to help people prepare for emergencies and to offer guidance in emergency situations. MIT App Inventor is a graphically rich visual programming tool. It does not require

writing code and enables users to create applications for devices running Android operating system. MIT App Inventor has become popular in the classroom for introductory courses for computing students. This study investigates if MIT App Inventor is a productive tool that allows non Computer Science (CS) major students to access all of the mobile device's features and provide an easy way to build useful apps. This research also studies the abilities and limitations of the MIT App Inventor. In addition, this study evaluates the feasibility of using App Inventor to promote computational thinking for non-CS majors. This project is funded by NSF and JSU's Center for Undergraduate Research.

09.16

1:00 TOWARD A FRAMEWORK FOR DIVERSE, DISTRIBUTED INTERACTIVE SYSTEMS

Marcus Brumfield, Jonathan Taylor, Cornelius Toole

Tougaloo College, Tougaloo, MS, USA

The state of the art in the interactive computing involves components that are diverse, distributed and numerous; yet most interactive system architectures assume only user, with one physical context for interaction, all existing within a platform monoculture. We present work toward software architectures that supports the integration of distributed, heterogeneous components for interactive applications, as well as a development framework for building such applications. This framework supports interactive systems that can vary in the number, type and locality of its components by using an abstraction the decouples concerns of device management from application integration; furthermore, these abstractions are supported by a communication framework that enables a system to maintain its logical architecture, while being variable in its physical architecture. Here we present the design of this framework and its characteristics as it exists today and what we envision going forward.

PHYSICS AND ENGINEERING

Chair: Partha Biswas,
University of Southern Mississippi

Vice-Chair: James Stephens,
Southwest Mississippi Community College

THURSDAY MORNING

Lamar 2

O10.01

8:30 STUDY OF HYDROGEN MICROSTRUCTURE IN AMORPHOUS SILICON: AN AUGMENTED SPACE APPROACH

Parthapratim Biswas

University of Southern Mississippi, Hattiesburg, MS, USA

A study of formation of voids and molecular hydrogen in hydrogenated amorphous silicon is presented by introducing a hybrid approach that involves the inversion of experimental nuclear magnetic resonance data of amorphous silicon in conjunction with *ab initio* total-energy relaxations in an augmented solution space. The novelty of this approach is that voids and molecular hydrogen appear naturally in the models unlike conventional approaches, where voids are created artificially by removing silicon atoms from the network. Two representative models with 16% and 18% hydrogen concentration are studied in this work. The results show that the microstructure of the amorphous network consists of several microvoids and few hydrogen molecules for concentration above 16% H. The microvoids are highly irregular in shape having a linear dimension between 5-15 Å. The internal surface of a microvoid is decorated with 6-9 hydrogen atoms in the form of monohydride Si-H configurations as observed in the nuclear magnetic resonance experiments of *a*-Si:H. The microstructure consists of (0.9-1.4)% hydrogen molecules within the microvoids. These observations are consistent with infrared, nuclear magnetic resonance and calorimetric measurements.

O10.02

8:45 DUAL FUNCTION SERS ACTIVE NANOPARTICLE PLATFORM FOR MELAMINE SENSING

Anant K. Singh, Y. Jones

Alcorn State University, Alcorn State, MS, USA

In recent years, there were two reported outbreaks of food borne illness associated with melamine. Melamine alone is of low toxicity; however it is able to form an insoluble complex with cyanuric acid, which can lead to kidney toxicity. The presence of melamine and its related compounds in milk, feed, and other foods has resulted in the need for reliable methods for the detection and accurate identification of this class of contaminants. Surface-enhanced Raman spectroscopy (SERS) has lagged behind other analytical techniques utilized in routine chemical analyses despite the information-rich spectra produced. This can be attributed in part to the difficulties in finding effective substrates that provide high sensitivity and highly

reproducible SERS responses. Here in we have developed a chemically stable highly efficient SERS oxide plasmonic gold nano particle hybrid. Experimental data with melamine show that the SERS enhancement factor for hybrid platform is about two order of magnitude higher than only nanoparticle. Our results demonstrate that in hybrid SERS platform, graphene oxide will enhance the SERS signal via chemical enhancement. We show that hybrid SERS platform can be used for highly selective and ultra sensitive detection of melamine in parts per quadrillion level. Our results provide a good approach for developing ultra sensitive SERS platform for toxin chemical detection and analysis.

O10.03

9:00 DIGITAL HOLOGRAPHIC MICROSCOPY TECHNIQUE FOR PARTICLE IMAGING AND CHARACTERIZATION

Nava Raj Subedi, Matthew Berg

Mississippi State University, Starkville, MS, USA

This work describes the digital holographic microscopy (DHM) technique for particle imaging and characterization. In this work, the interference pattern produced by superposition of unscattered reference light and the scattered light is recorded by a digital camera. This pattern constitutes a hologram from which an image of the particle is computationally reconstructed by using fast Fourier transform. This technique has the potential to provide in situ particle information in near real-time. Implementing digital holographic interferometry with imaging could potentially provide particle size, shape, and composition information simultaneously, which could be a signature for implementation as an instrument for laboratory and field-based applications with different particle-diagnostic capabilities.

O10.04

9:15 ADSORPTION OF NITROGEN ON GRAPHENE: A FIRST-PRINCIPLES STUDY

Basu Oli^{1,2}, Anil Adhikari¹, Narayan Adhikari¹

¹*Tribhuvan University, Kirtipur, Kathmandu, Nepal*, ²*University of Southern Mississippi, Hattiesburg, MS, USA*

Using first-principles calculations based on Hartree-Fock (HF) and Density Functional Theory (DFT), we systematically studied the variation of energy of graphene clusters by increasing their sizes. Our findings show that the energy of graphene increases as the size of the clusters increases and for the cluster size more than 30 carbon atoms, the energy per carbon atom remains almost constant. This shows that the graphene clusters are stable with respect to energy for the larger size of clusters. The adsorptions of nitrogen (N) atom on hydrogen passivated graphene (H-graphene) clusters have been studied using DFT with generalized gradient approximation (GGA). The adsorption energies (E_b), charge transfer of nitrogen using natural bond orbital (NBO) method, HOMO-LUMO gap and electric dipole moment of adatom-H-graphene system were calculated. The adsorption energy of nitrogen atom increases as the size of H-graphene increases. The presence of small dipole moments in the adatom-H-graphene system exhibit the covalent character of the nitrogen atom-H-graphene interaction. Our findings on the adsorption energy of the nitrogen atom on H-

graphene clusters agree with the previously reported data.

9:30 BREAK

O10.05

9:45 EXPERIMENTAL VERIFICATION OF SIMULATED TEMPERATURE-TIME PROFILES ASSOCIATED WITH ACOUSTIC RADIATION FORCE IMPULSE IMAGING PUSH PULSES IN TISSUE-MIMICKING PHANTOMS

Cecille Labuda¹, Charles Church²

¹University of Mississippi, Oxford, MS, USA, ²NCPA, Oxford, MS, USA

Acoustic radiation force impulse (ARFI) imaging uses ultrasonic push pulses to displace tissue and tracking pulses to track the tissue displacement and rebound thus giving a qualitative measure of tissue stiffness. While the intensity of the tracking pulses is the same as typical B-mode imaging, the push pulses tend to be of much higher intensity, leading to temperature increases in the tissue. Thermocouples were embedded in a tissue-mimicking phantom, and the phantom was exposed to ultrasonic pulses with parameters similar to ARFI push pulses. Temperature-time profiles were measured before, during and after exposure. Measured temperature increases for single push pulses were of order 10^{-3} degrees, however, the time required to return to ambient temperature was much longer than the exposure time. Temperature-time profiles were simulated and compared with the measurements. Reasonable agreement between measured and simulation data was obtained.

O10.06

10:00 THEORETICAL INVESTIGATION OF ACOUSTIC-GROUND AND WIND-GROUND COUPLING

Vahid Naderyan, Richard Raspet, Craig Hickey

University of Mississippi, Oxford, MS, USA,

Wind noise at low frequency is a problem in seismic surveys, reducing seismic image clarity. In order to find a solution for this problem, it is important to investigate wind-induced ground motions. It has been observed that sound coupled into the ground principally excites vertical vibrations in the ground, whereas wind noise excites horizontal components more than vertical components in geophones. A simple argument as to why similar frequencies of wind noise and acoustic signals produce different responses, involves examination of the driving pressure perturbation on the ground surface. The ground is modeled as a slow elastic half-space with p-wave and s-wave speeds less than the speed of sound in air. Using differential equations for wave propagation in elastic media, propagation constants are determined. Boundary conditions at the air-ground interface are applied to determine the displacement amplitudes of the horizontal and vertical wave motions. From the incident and reflected amplitudes at the air-ground interface, the vertical to horizontal ratio of the ground displacement is calculated as a function of angle of incidence. The same calculations are done for wind-ground coupling and the results are compared to

acoustic-ground coupling case. These theoretical calculations lead to a better understanding toward future experimental and computational investigations of the problem.

O10.07

10:15 ACOUSTO-ELECTRIC IMPEDANCE OF PERIODICALLY POLED LiNbO3 WAFER

Ola Nusierat, Lucien Cramaldi

University of Mississippi, Oxford, MS, USA

The electric impedance of the ZX-cut LiNbO3 wafer with periodically poled ferroelectric domains is investigated. The inversely poled domains have the positive and negative piezoelectric constants in the neighboring domains. The frequency range of 1 to 5 MHz is used for the experiments and theoretical calculations. The equations of motion and Poisson equation for piezoelectric media describe the acoustic vibrations. The electrical and mechanical boundary conditions are used to theoretically calculate the electric impedance. Based on the solutions to the equations above, an impedance of a periodically poled vibrator was theoretically calculated and further numerically simulated. The acoustic vibrations are excited by an electric current of corresponding frequency range that is applied along the wafer length. The phase velocities of different acoustic modes are altered in the presence of periodically poled domains. The periodic pattern causes the reflections and diffraction of ultrasonic vibrations. As a result, the plate acoustic waves cannot propagate within certain frequency range, which is called the “stop band.” It occurs at the frequencies of so called “domain resonance.” The “domain resonance” is a specific effect appearing when the domain length is equal to a half wavelength of the acoustic mode. Both effects were observed in different structures including inversely poled LiNbO3. The theoretical calculations and computer modeling are verified by the experimental measurements from the ZX-cut LiNbO3 wafer with 0.45mm of domain length. The theory and the experiment are in a good agreement.

O10.08

10:30 LAMB WAVE PROPAGATION IN ELECTRONIC MATERIAL PLATES

Saminda Adikaram, Chandrima Chatterjee, Igor Ostrovskii

University of Mississippi, Oxford, MS, USA

The propagation and dispersion characteristics of Lamb waves in electronic materials are investigated. Lamb waves propagate through an acoustic waveguide with a thickness comparable to the wavelength. They have a particle motion in both the direction of propagation and normal to the plate base surfaces. A plate supports two sets of Lamb wave modes, namely symmetric (S) and anti-symmetric (A). They have unique velocities that depend on the relationship between the wavelength and plate thickness. Out of these, two zero order modes S0 and A0 are studied here. In the experiments, Lamb waves propagate through the YZ-cut-LiNbO3 wafer and the samples of glass, brass and aluminum within the frequency range of 63kHz to 4.91MHz. The sample thicknesses are from 0.07mm to 4.67mm. The delay time of burst propagation is measured for different sample lengths between 40 mm and 400 mm. Out of these data, the

group velocities and their dispersion are computed for the zero order S0 and A0 modes. Group velocities of Lamb waves in all of the above mentioned samples are found to be dispersive with a similar pattern. The S0 mode has a low dispersion when the product of frequency times thickness is lower than approximately 1MHz/mm whereas the A0 mode is less dispersive when the same product is higher than about 1MHz/mm. Experiment fits good to theory. The results obtained can be useful in practical applications such as examining the uniformity of materials and non-destructive testing (NDT).

10:45 BREAK

O10.09

11:00 A SIMPLIFIED METHOD TO ESTIMATE FLOOD DEPTH FOR YAZOO RIVER

Himangshu S. Das

Jackson State University, Jackson, MS, USA

The Yazoo River Watershed covers approximately 320 km long complex channel and tributary system extending from Memphis, TN to Vicksburg, MS. The river is formed by the confluence of the Tallahatchie River and the Yalobusha River in Greenwood, TN and ultimately discharges to Mississippi river. Due to the low lying and flat terrain of the watershed, frequent flooding is a major problem which threatens the wellbeing and economy of the neighborhood surrounding the watershed. Although real time flood advisory data from USGS are available for the major cities like Belzoni in the North and Yazoo city in the South, no information are available for most of the areas along the watershed (about 180 km).

The objective of this study is to develop a simplified flood forecasting model for the Yazoo river watershed so that the emergency managers can make objective decisions by quantifying the magnitude and extent of flooding of a future event. For this study, unsteady HEC-RAS model was used to understand the flow dynamics of the river system. For calibration, four observed flow conditions representing low flow, normal flow, moderate flow and very high flow were used at the upstream boundary at Belzoni city. Model stages were then compared with the observed stage data at the downstream boundary at Yazoo city. In general, model results well compared with the observed data.

Later, we developed rating curves for four stations along the Yazoo River watershed using wide ranges of historic flow conditions observed at the upstream model boundary (Belzoni city). The figure below shows the synthetic rating curves illustrating the correlation between Belzoni water stage and the expected flow and stage conditions at the downstream stations. Results show high correlation values for each station. The implication is that, once a river stage data at Belzoni is available from the USGS advisory, stage and flow data at other downstream stations along the watershed can be predicted using the synthetic rating curves shown here. From this simplified rating curves, the emergency personnel can evaluate whether or not a flooding condition is eminent at any given location of the Yazoo river watershed once USGS advisory data is available at the upstream.

O10.10

11:15 EMERGENCY MANAGEMENT: SHELTER-IN-PLACE

Pao-Chiang Yuan, Jessica Buck

Jackson State University, Jackson, MS, USA

“Shelter-in-Place” has been used for many years, and it is a quick decision by authority to ensure community safety. According to the Red Cross (2013), the term “shelter-in-place” means to take immediate shelter where you are—at home, work, school, or in between. It may also mean “seal the room;” in other words, take steps to prevent outside air from entering. In year of 2013, several shelter-in-place (SIP) installations were implemented in different cities. This was due to terrorism, shootings, refinery incidents, gas leaks and hazardous material spills. When there is not enough time to evacuate the mass population, shelter-in-place installations maybe the only feasible option. Most of SIP is short period time that may not exceed five hours of usage. On April 19, 2013, a shelter-in-place installation was used during the manhunt for the suspected Boston Marathon bombers. Federal Emergency Management Association (FEMA), Centre of Diseases Control (CDC) and Red Cross emphasize the use of SIPs for various reasons. For example, the CDC use SIPs during radiation emergencies, because radioactive materials rapidly decays and dissipates surrounding objects.

At Jackson State University (JSU), we have researched available emergency management plans for cities, counties, State, businesses, universities and industries. In regards to shelter, most plans simply just ask people to stay inside. There are other plans that make some mention of SIPs, but it is not in great detail. This paper we will reinvestigate types of SIP, discuss the air exchange rate, and identify the type of gas flow simple calculation. This paper will also describe how a building was selected on campus to demonstrate the SIP during a simulated emergency incident. There will be collaboration with hazardous material officer and emergency management officer at JSU to help develop a SIP plan for the University.

O10.11

11:30 EARTHQUAKE PREPAREDNESS AT MISSISSIPPI HBCU (HISTORICALLY BLACK COLLEGES AND UNIVERSITIES) CAMPUSES

Brenda Wilder, Tim Collins, Terika Tillman, Ro’chelle Williams

Tougaloo College, Jackson, MS, USA

“Earthquake Preparedness at Mississippi HBCU (Historically Black Colleges and Universities) Campuses” was a research project that studied Mississippi HBCU campuses to determine if each is prepared in the event of an earthquake. HBCU campuses included in the study were Alcorn State University in Lorman, MS, Jackson State University in Jackson, Mississippi, Hinds Community College in Raymond, MS, Mississippi Valley State in Itta Bena, MS, Rust College in Holly Springs, MS, and Tougaloo College in Tougaloo, MS. The researchers used interviews, surveys, and publications to collect data. The research showed that not all HBCUs are sufficiently prepared for an earthquake disaster in Mississippi.

O10.12

11:45 FINDING THE ELASTIC BOTTOM PARAMETERS OF AN ELASTIC SEAFLOOR USING EQUIVALENT FLUIDS

Bharath Kandula, Michael Vera

University of Southern Mississippi, Hattiesburg, MS, USA

The Basin Acoustic Seamount Scattering Experiment was conducted using the North Pacific Acoustic Laboratory source (with a depth of 810.90 m) located near Kauai, Hawaii. A portable receiver array was used to record the transmissions at a range of 3.59 km from the source. The sea bottom near source is very steep due to its volcanic origins. Received data shows that sound energy was reflected from the seafloor near the source. The aim of this study is to estimate the seafloor parameters (density, sound speed in the bottom and shear speed) using the received data. This is a geoaoustic inversion process. A complex-density (CD) equivalent fluid that results in the best correspondence between acoustic simulations and the experimental data was found through a search process. Equivalent fluids can be used to mimic the elastic solids in acoustic simulations. Sound waves which have interacted with the seafloor can be modeled by using the equivalent fluids in acoustic simulations. In order to determine the actual elastic seafloor for which the CD equivalent fluid is an effective representative, a "brute-force" search is performed. Reflection coefficients resulting from all discrete values for each of the parameters within a specified interval are compared to the equivalent fluid. Using the brute force technique, the feasibility of finding the estimated values of the elastic bottom parameters for a volcanic seafloor from the CD equivalent fluid is investigated.

12:00 Business Meeting and Lunch

March 6, 2014

THURSDAY AFTERNOON

Garden Room

O10.13

1:00 EXPLORING NEW PHYSICS IN FLAVOR EXPERIMENTS

Alakabha Datta

University of Mississippi, Oxford, MS, USA

I will discuss how low energy precision flavor experiments can find physics beyond the standard model of particle physics. The new particles of this new physics may or may not be directly produced at colliders such as the LHC

O10.14

1:30 TAU NEUTRINO AS A PROBE OF NONSTANDARD INTERACTION

Ahmed Rashed¹, Preet Sharma¹, Alakabha Datta²

¹University of Mississippi, Oxford, MS, USA, ²Massachusetts Institute of Technology, Cambridge, MA, USA

We study the Δ -resonance and deep inelastic scattering

contributions in the tau- neutrino nucleon scattering in the presence of a charged Higgs and a W' gauge boson. The extractions of the atmospheric mixing angle θ_{23} rely on the standard model cross sections for neutrino nucleon scattering in tau-neutrino appearance experiments. Corrections to the cross sections from the charged Higgs and W' contributions modify the measured mixing angle. We include form factor effects in the new physics calculations and find the deviations of the mixing angle. If high-energy Long Base Line experiments are designed to measure θ_{13} through tau neutrino appearance, the new physics effects in neutrino nucleon scattering can impact the extraction of this mixing angle. Finally, we investigate the new physics effects on the polarization of the tau lepton produced in the neutrino nucleon scattering.

O10.15

1:45 CP VIOLATION PREDICTED AT LHC FOR BSM

Shanmuka Shivashankara,

University of Mississippi, Oxford, MS, USA

The Large Hadron Collider (LHC) can produce charged lepton pairs via gluon-gluon or anti-quark-quark interactions. By including a modified vector boson current with CP phases, an asymmetry is detected in the transverse energy spectrum between a charged lepton and its anti-particle. The detection of this asymmetry at the LHC would confirm the vector boson's existence and thus new physics beyond the standard model (BSM).

O10.16

2:00 COSMOLOGICAL TEST OF THE UNIMODULAR GRAVITY

Robert H. Brandenberger¹, Yifu Cai¹, Pisin Chen², and Caixia Gao³

¹McGill University, Montreal, Canada, ²National Taiwan University, Taipei, Taiwan, ³University of Mississippi, Oxford, MS, USA

We study cosmological perturbation theory within the framework of Unimodular Gravity. We show that the Lagrangian constraint on the determinant of the metric required by Unimodular Gravity leads to an extra constraint on the gauge freedom of the metric perturbations. Although the main equation of motion for the gravitational potential remains the same, the shift variable, which is gauge artifact in General Relativity, cannot be set to zero in Unimodular Gravity. This non-vanishing shift variable affects the propagation of photons throughout the cosmological evolution and therefore modifies the Sachs-Wolfe relation between the relativistic gravitational potential and the microwave temperature anisotropies. However, for adiabatic fluctuations the difference between the result in General Relativity and Unimodular Gravity is suppressed on large angular scales. Thus, no strong constraints on the theory can be derived.

2:00 BREAK

O10.17

2:15 EFFECTS OF GENIPIN ON DECELLULARIZED PORCINE CARTILAGE

Steven Elder

Mississippi State University, Starkville, MS, USA

Drawbacks to osteochondral transfer include donor site morbidity, limited availability, risk of graft rejection and disease transmission. Our objective is to develop an alternative decellularized osteochondral xenograft. Full-thickness articular cartilage disks (5 mm diameter) were obtained from a porcine stifle joint. They were decellularized via a previously published method which involves treatment with sodium hydroxide, guanidine-hydrochloride, and hydrogen peroxide. Disks were then crosslinked with 0.01% and 0.1% aqueous genipin for 3 days at room temperature with agitation. Genipin is derived from the *Gardenia jasminoides* Ellis fruit. It is inexpensive and simple to use, and crosslinking density can be adjusted according to concentration. Prior to decellularization, the cartilage disks' mechanical properties were determined by stress relaxation testing in confined compression. The tests were repeated after decellularization and again after crosslinking. Aggregate modulus and hydraulic permeability were found by curve fitting of the stress relaxation data to the biphasic model. Disks crosslinked in 0.01% genipin turned from white to gray, whereas those crosslinked in 0.1% genipin were dark blue. To date only the data from the 0.01% genipin group have been analyzed. The aggregate modulus after decellularization was 73% that of fresh tissue, and after genipin crosslinking it was 192%. The hydraulic permeability was increased by decellularization and decreased by crosslinking. Raising the aggregate modulus and lowering the hydraulic permeability increases the tissue's compressive resistance. Therefore, this study suggests that genipin has beneficial effects on the mechanical properties of decellularized OCGs.

O10.18

2:30 USE OF FIBER LOOP RINGDOWN (FLRD) SENSOR FOR HEAVY ELEMENTS DETECTION IN WATER

Maheshwar Ghimire, Malik Kaya, Chuji Wang

Mississippi State University, Starkville, MS, USA

Detection of trace heavy elements like Pb, Mg in water is important because of their role and impact on the environment and health issue. We have shown that Fiber Loop Ringdown (FLRD) spectroscopy, which is the modified form of Cavity Ringdown Spectroscopy (CRDS), can be used for the detection of these elements in water. For this purpose, an etched segment of a single mode optical fiber is used as a sensor head in the optical cavity formed by the optical fiber. When the sensor head is immersed in solution of these elements with 2% HNO₃, refractive index in the evanescent field of the sensor head changes, which in turns changes the respective ringdown time on the acquisition system. This change in ringdown time is compared with the ringdown time of deionized water and different concentration of the element itself. By using this technique, we have achieved a detection limit of 50 ppm for these elements in our laboratory. This work demonstrates

potential of FLRD technique in development of fiber optic sensor for detection and monitoring of trace heavy metals in water.

O10.19

2:45 FIRST-PRINCIPLES CALCULATIONS OF MAGNETIC PROPERTIES OF MnBi DOPED WITH Co

Chandani Nandadasa¹, Vivek Dikshith¹, Sungho Kim¹, Seong-Gon Kim¹, Jihoon Park², Yang-Ki Hong²

¹Mississippi State University, Starkville, MS, USA, ²The University of Alabama, Tuscaloosa, AL, USA, ³Massachusetts Institute of Technology, Cambridge, MA, USA

First principles total-energy calculations were performed to investigate the magnetic and electronic properties of MnBi doped with Co. We used Density Functional Theory (DFT) within the generalized gradient approximation (GGA) with Projector Augmented Wave (PAW) potentials. We found that when MnBi was doped with Co, the magnetization increased as the concentration of Co increased. We also calculated magnetic anisotropy energy (MAE) and magnetic anisotropy constant (KU) of MnBi before and after doping Co.

O10.20

3:00 EXPERIMENTAL INVESTIGATION OF STARTUP BEHAVIOR OF FLAT-PLATE OSCILLATING HEAT PIPES

Zachary Sullivan Aspin, Scott Thompson

Mississippi State University, Starkville, MS, USA

Flat-plate oscillating heat pipes (FP-OHP) are an aspiring technology in the area of thermal management. FP-OHPs rely on unstable, temperature-induced pressure differences to cause two-phase fluid flow within microchannels embedded in a sealed, typically copper, unit. This results in greatly enhanced heat transfer as compared to solid copper heat sinks. The fluid flow is not initiated until enough power, or a sufficient temperature difference, is provided to the system – resulting in the unique ‘startup’ of the FP-OHP. This study focuses on experimentally determining how the startup behavior of two different-designed FP-OHPs are affected by various increments of power input; from gradual 10 W increments up to 600 W sustained input. One of the FP-OHPs investigated possessed a uniform channel length, while the other had unequal channel lengths resulting in an inherently unstable evaporation region. The FP-OHPs were vertically oriented and bottom-heated by voltage-controlled cartridge heaters encased in an aluminum block. The ‘condenser’ regions were cooled by two aluminum water blocks that were firmly affixed to the FP-OHPs. For each FP-OHP, the operating temperature, power input, thermal resistance, and thermal conductivity were all recorded using data acquisition (DAQ). The results indicate that the uniform-channel-length FP-OHP is capable of handling power inputs of 600 W without exceeding 100 °C, while the FP-OHP with unequal channel lengths reaches this temperature at approximately 20% lower power.

March 6, 2014

THURSDAY EVENING

POSTER SESSION

Following Dodgen Lecture

P10.01

SURFACE PREPARATION FOR IMPROVED MOLYBDENUM DISULFIDE NANOELECTRONICS

Sirak Mekonen¹, Hugh Churchill², Pablo Jarillo-Herrero²

¹Jackson State University, Jackson, MS, USA, ²Massachusetts Institute of Technology, Cambridge, MA, USA

Recent advances in nanoscale materials characterization and device fabrication have opened up new opportunities for two-dimensional layers of Transitional metal dichalcogenides (TMDs) in nanoelectronics and optoelectronics. TMDs are a family of materials including the layered semiconductor molybdenum disulfide (MoS₂). TMDs, such as MoS₂, have sizable bandgaps that change from indirect to direct in single layers, allowing applications such as transistors. We proposed AFM contact mode operation to clean the MoS₂ surface for improved electronic transport measurements. The project involved low-temperature measurements of electrical properties in exfoliated monolayer devices. Monolayer MoS₂ based devices were fabricated from bulk MoS₂ by micromechanical cleavage using adhesive tape, which was then applied on highly doped silicon substrates. Monolayer flakes were optically identified by light interference. Device surface topographies were determined via atomic force microscopy (AFM). Electrical contacts (1nm Ti and 50nm Au) were patterned using e-beam lithography. AFM contact mode cleaning was performed to reduce contact resistance and increase carrier mobility. Electrical transport measurements are ongoing to quantify the improvement in the cleaned devices.

P10.02

LORENTZ COVARIANCE OF THE ORDERED QUANTUM VACUUM

George Blaise Smith

University of New Orleans, New Orleans, LA, USA

By introducing order to the production and propagation of polarized virtual particle-antiparticle pairs in the quantum mechanical vacuum, a new conceptual understanding of particles and motion can be obtained which allows particles to be viewed as persistent processes instead of persistent entities and allows motion to be viewed as the collective result of a large number of vacuum exchange scattering events. The Lorentz transformation can be derived from this construction as the enforcer of this proposition. This model leads to the physical mechanism underlying action-at-a-distance.

P10.03

DETERMINING THE PHOTOMETRIC PRECISION OF THE 0.9M CTIO SMARTS TELESCOPE

Angelle Tanner, Cameron Clarke

Mississippi State University, Starkville, MS, USA

Exoplanet detections are becoming more and more frequent as our ability to detect transits and Doppler shifted stellar spectra increases and we are trying to further develop our knowledge of our instrumental capabilities. We report on eight observing nights at the SMARTS 0.9m telescope in Chile at the Cerro Tololo Inter-American Observatory (CTIO), covering 13 nearby stars in the range of 11th to 14th visual magnitude. We use the defocus method to spread the point spread function (PSF) of the star across a larger portion of the CCD to achieve longer exposure times yielding a higher signal to noise ratio and a higher amount of data every night as less time is spent on CCD read-off and data storage per image. Spreading the PSF and increasing exposure time has drawbacks, as it inevitably increases the sky background in each image and makes it difficult to extricate the target star's PSF from a crowded background of neighboring stars. We explore the short term, high time-resolution ability of the 0.9m CTIO telescope to produce stable photometry of M-dwarfs. The results show that the 0.9m telescope is able to produce stable photometry if user error does not introduce artificial noise. We can use this telescope to compare the noise of stars to the predictions of starspot models and we see the value of follow-up observation runs to determine a correlation between photometric and radial velocity noise in stars that could mask or produce false positive exoplanet detections.

P10.04

MISSISSIPPI STATE AXION SEARCH

John Kristian Madsen, Mikhail Gaerlan

Mississippi State University, Starkville, MS, USA

The Mississippi State Axion Search (MASS) is an attempt to improve the mass coupling parameter of the Axion, a massive but weakly interacting boson first proposed in the Peccei Quinn Theory, as a solution to the Strong CP Problem that has also become associated with the model for Dark Matter. The technique that MASS employs is known as the Light Shining through a Wall (LSW) method, which relies on the Primakoff Effect - which, in this case, involves the coupling of axions and photons in the presence of a magnetic field. The setup is designed to scan the micro- to milli eV range, which, as of yet, has been mostly unexplored in the community's efforts. Most of the design and construction of experimental equipment has been completed. The experiment will use a 100W RF signal, propagated through a resonating cavity at 413 MHz. A magnetic field of approximately .5 Tesla is created by a combination of electromagnets and permanent magnets all along the length of the cavity, and a lead wall partitions the cavity. The signal is detected by an antenna inside the cavity; the signal is integrated, subtracted from a reference, and amplified. A DAQ system, operating in coincidence with the interval of integration records the peak voltage: this is the data that will be analyzed by

techniques currently being developed and implemented by the collaboration.

P10.05

MEASUREMENT OF PARTICLE SIZE AND CHARGE DISTRIBUTIONS OF ASTHMA DRY POWDER INHALER AEROSOLS

Marina Ali¹, Mohammed Ali²

¹St. Andrew's Episcopal School, Ridgeland, MS, USA, ²Jackson State University, Jackson, MS, USA

A novel method for analyzing electromechanical properties (e.g., size, electrostatic charge, polarity) of therapeutic aerosols produced by three different commercially available dry powder inhalers (DPIs), including Advair Diskus[®], Spiriva[®], and, Pulmicort[®] is presented. In this method we have shown the application of the principles of laser doppler velocimetry (ESPART analyzer) for simultaneously measuring the aerodynamic diameter and electrostatic charge of each single particle in real time. Prior to each run aerosol sampling chamber (ASC) was cleaned and evacuated (36 cm of Hg) so that a bolus of 4L of aerosol could be drawn from the test DPI upon opening of the inlet valve at 30 L/min for 8 seconds. The chamber's inside walls were lined with a grounded wire mesh. Once the ASC was filled, the port to the ESPART analyzer was opened for characterizing sampled aerosols for 5 minutes. Aerosol particles from all drug delivery devices were found to not only have different size distributions but also varied charge distributions. The drug aerosols inhaled from Advair, Spiriva and Pulmicort were determined to be electropositive. Count and mass distributions were reproducible for all DPIs. These findings can be explained by triboelectrification charging between excipient and active pharmaceutical ingredient, delivery device geometries, and drug/carrier homogeneities. In conclusion, the ESPART provided more detailed charge information about the DPI aerosol particles.

P10.06

STUDY OF MASS DISTRIBUTION OF MATTER IN GRAVITATIONAL LENSING

Ivy Alexander

Tougaloo College, Jackson, MS, USA

With the creation of the LSST telescope, it has opened a number of new research opportunities on deep space allowing further study and clarification of our universe. One particular phenomenon that requires more study is gravitational lenses. These lenses could potentially be the mechanisms we need in order to further understand dark matter than exists in galaxies. Using LSST images as a blueprint we create our own images of gravitational lensing as seen in deep space as the telescope would. With us knowing you input data (mass and distortion algorithms), we reverse engineer out images in hopes to retrieve our original data. If it works, we can apply the same concept on real LSST images. In order to fully achieve this we must create a proper simulated image by being as accurate as possible in our creation of our distortion, detection, resampling programs which will be test by other research groups who have each created their own version of this experiment. This allows

us to all see thing that could effectively improve our programming to reach the desired results in interpreting data.

Keywords: gravitonal lenses, simulation, LSST

P10.07

NEW PRODUCT DEVELOPMENT CHALLENGES FOR HOMELAND SECURITY PROJECTS

Ashley White, Teneka Williams, Jyotirmay Gadewadikar, Steve Adzanu

Alcorn State University, Lorman, MS, USA

New Product Development is one of the most challenging multidisciplinary functions for Technology Organizations. The situation is further complicated when technology products for homeland security are to be developed. In this work will first explain what new product development is by briefly explaining the eight stages of new product development, namely -1) Idea Generation, 2) Idea Screening, 3) Concept Development and Testing, 4) Business Analysis 5) Beta Testing and Market Testing 6) Technical Implementation 7) Commercialization, and 8) New Product Pricing. We then will explain the challenges specific in the context of Homeland Security Projects. Examples of homeland security project learning experiences will be discussed and finally the best practices will be presented. The work will explore engineering and business topics important to the development of innovative homeland security driven engineering products. Finally, design optimization, innovative thinking and the principles and methodologies of product development in the context of homeland security projects will be examined and presented.

March 7, 2014

FRIDAY MORNING

Room: Lamar 2

O10.21

8:30 STRUCTURES OF PROTEINS AND PEPTIDES ASSEMBLY VIA HIERARCHICAL COARSE-GRAINED MODEL

R.B. Pandey

University of Southern Mississippi, Hattiesburg, MS, USA

Investigating the structure and dynamics of protein with computational modeling from atomic scale is an open problem. Coarse-graining is therefore unavoidable in modeling such systems that involve highly interacting residues in a specific sequence with unique response to solvent, temperature, and binding substrates. A multi-grain approach will be presented to show how to investigate structure and dynamics of proteins and binding of peptides to graphene and its self-assembly. This approach involves two steps: (i) all-atom Molecular Dynamics simulations with constitutive units (residues) to estimate appropriate energies and/or knowledge-based residue-residue interactions based on the ensemble of protein structures from the protein data bank as input. (ii) Large-scale Monte Carlo simulations are then carried out with the coarse-grained interactions. Multi-scale structures are examined by analyzing local and global physical quantities including structure functions. Some results of our recent studies on histones (H3.1,

H2AX) [1] and short peptides [2, 3] as examples will be presented in this talk.

[1] R.B. Pandey and B.L. Farmer, PLoS One 8, e76069 (2013)

[2] R.B. Pandey, Z. Kuang, B.L. Farmer, S.S. Kim, and R.R. Naik, Soft Matter 8, 9101 (2012).

[3] R.B. Pandey, Z. Kuang, and B.L. Farmer, PLoS One 8, e70847 (2013)

O10.22

9:00 NUCLEAR LANDSCAPE AND DRIP LINES IN COVARIANT DENSITY FUNCTIONAL THEORY

Anatoli Afanasjev¹, Debisree Ray¹, Sylvaster Agbemava¹, Peter Ring²

¹Mississippi State University, Starkville, MS, USA, ²Technical University of Munich, Munich, Germany

Systematic investigation of location of proton and neutron drip lines in RHB approach has been performed by employing a set of modern covariant density functional parametrizations. Errors are addressed by comparison with non relativistic results as well.

O10.23

9:15 REPORTING ON THE A=74 CHAIN IN THE BETA DECAY OF Z=29-31

James Lee Tracy Jr., Jeffry Winger

Mississippi State University, Starkville, MS, USA

Gamma-rays in the 20-5200 keV range along with $\gamma\gamma$ and $\beta\gamma$ coincidences from the decay chain starting with ⁷⁴Cu parent nuclide have been collected and analyzed. Using $\gamma\gamma$ and $\beta\gamma\gamma$ coincidences, decay schemes have been constructed and compared to existing data at the National Nuclear Database Center. Gaussian fits of the peaks in the data have been performed, yielding centroids and areas, from which energies and intensities have been determined. New transitions and new energy levels have been identified for the decays of ⁷⁴Cu and ⁷⁴Zn. Previous placements of transitions in ⁷⁴Ga are confirmed, and some possible double placements may be clarified through further analysis.

O10.24

9:30 NUCLEAR THERMAL PROPULSION SYSTEMS: EVALUATING PAST AND PRESENT EFFLUENT TREATMENT PROCESSES IN TEST FACILITIES

Melanie Brady

University of Southern Mississippi, Hattiesburg, MS USA

The future of space travel is ultimately dependent upon Nuclear Thermal Propulsion (NTP) technologies. Past studies of NTP rocket engines were done in the early 1960's by the Nuclear Engine for Rocket Vehicle Application (NERVA), but were ultimately abandoned after the NERVA rocket testing was deemed unsafe. To gain greater insight for the advancement of NTP technologies, a current research study of past effluent

treatment systems, lessons-learned, and advances in new/novel technologies is critical. A comprehensive search is currently being conducted primarily through literature searches and communication among area experts. A conceptual understanding of past effluent treatment plans, the present approach of effluent treatment in related areas, potential new/novel reactors/engines, and current research and experimentation in effluent treatment will be discussed. My findings will offer NASA personnel information of new/novel developments that will be instrumental in providing information for help in identifying the best approaches for safe, effective, economical, and most reliable NTP test effluent treatments.

O10:25

9:45 A REVIEW OF MARINE ACOUSTICS PROJECTS UNDERTAKEN BY THE LITTORAL ACOUSTIC DEMONSTRATION CENTER

James Stephens

Southwest Mississippi Community College, Summit, MS, USA

The Littoral Acoustic Demonstration Center (LADC) comprises scientists from several Gulf state universities and Navy agencies. LADC possesses ten Environmental Acoustic Recording System (EARS) electronics modules and associated hydrophone cables. LADC has conducted field surveys to calibrate seismic exploration airguns, detect and localize marine mammals from their vocalizations, and to study ambient sound in the sea. This talk provides an overview of LADC projects over the last several years.

10:00 BREAK

O10.26

10:15 SEARCH FOR THE MYSTERIOUS DARK MATTER

Amin Haque,

Alcorn State University, Lorman, MS, USA

Galaxies and galaxies in clusters spin with such high speed that the gravity generated by their visible matter could not hold them together. Also, the faint after-glow of the Big Bang, and the bending of light travelling through space leads scientists to believe that something invisible is giving these galaxies extra mass, generating the extra gravity. This unknown matter, called "dark matter", make up about 26% and visible matter only 4%, of all the matter in the universe. One assumption is that dark matter are made of "supersymmetric particles" –that are partners to known particles in the Standard Model. The Weakly Interacting Massive Particles (WIMPS) respond to only weak nuclear force and gravity. Astrophysicists look outward, while particle-physicists look inward to find the mysterious dark matter. Most recently, the Large Underground Xenon experiment team, did not find any dark matter. It contradicts evidence from several other experiments. Recently the Cryogenic Dark Matter Search reported three potential WIMP detections. The team of Alpha Magnetic Spectrometer, detecting positrons produced when WIMPS in the Milky Way collide and annihilate each other, announced results consistent with the idea. Experiments at the Large Hadron Collider are looking for

missing chunks of energy in the debris produced by the machine's high-speed particle collisions, which may provide more direct clues about dark matter. If the theories proved to be true, it could help scientists gain a better understanding of the composition of our universe and, in particular, how galaxies hold together.

O10.27

10:30 SEARCH FOR THE MYSTERIOUS DARK ENERGY

Amin Haque

Alcorn State University, Lorman, MS, USA

The Hubble Space Telescope observations of very distant supernovae showed that the Universe is expanding at an accelerating rate. There are three explanations for this: 1. A result of a long-discarded version of Einstein's theory of gravity, which contained a "cosmological constant". 2. There was some strange kind of energy-fluid that filled space. 3. There is something wrong with Einstein's theory of gravity and a modified theory could include some kind of field that causes this cosmological acceleration. The mysterious force is called dark energy and comprises 74 % of the universe. The searches use three basic techniques. Exploding Stars: Plotting the distances and velocities of supernovae. Sound Waves: Looking at the way galaxies are distributed in the early universe to find patterns imprinted in the Big Bang. Distortions: Probing the "clumpiness" of the universe at different epochs by studying the shapes of millions of galaxies. The five-year Dark Energy Survey officially began on Aug. 31, 2013. The aim of the survey is to improve understanding of Dark Energy. The powerful Dark Energy Camera, will be able to detect light from more than 100,000 galaxies up to 8 billion light-years away. Over five years, scientists expect they will collect color images of 300 million galaxies. They also anticipate that they will discover 4,000 new supernovas, including many that burst onto the scene when the universe was half its current size. A combination of observations and experiments will further strengthen our understanding of Dark energy.

O10.28

10:45 EFFECT OF GLOBAL EXPANSION ON GRAVITATIONAL LENSING

Mir Emad Aghili

University of Mississippi, Oxford, MS, USA

Traditionally it had been thought that the cosmological constant played no role in gravitational lensing, but recently it has been shown that the cosmological constant effectively changes the impact parameter and thus does have an effect on lensing. In this paper, we will examine the effects of a Λ FRW cosmology on null geodesics via numerical integration of the geodesics of the McVittie metric.

PSYCHOLOGY AND SOCIAL SCIENCES

Chair: Sheree Watson,
University of Southern Mississippi

Vice-Chair: Pamela Banks,
Jackson State University

March 6, 2014

THURSDAY MORNING

Garden Room

O11.01

9:00 OBESITY IN HIGH SCHOOL STUDENTS IN MISSISSIPPI

Shaila Khan

Tougaloo College, Jackson, MS, USA

Obesity increases health problems and lowers quality of life. Adolescence obesity partly contributes to such problems in adulthood. Mississippi continues to exhibit higher adolescent and adult obesity in the nation. This study evaluated the status of obesity in high school students, and its relationship with level of physical activities, and food intake habit. Demographical, Physical Activities, Clinical, Health, and Diet Readiness questionnaires were given to students (n=405) of a suburban High School in Mississippi. Students of grades Nine (n=131), Ten (n=104), Eleven (n=93), and Twelve (n=77) self-reported the data of this study. Not enough parents responded to questionnaires on food intake at home. Body Mass Index (BMI) were calculated for each student and were used to classify them following CDC's modification for children. Results showed that 35.3% of students are either overweight or obese. For boys, obese percentage increased with higher grades (16% for grade nine, 23.5% in grade twelve) while overweight percentage decreased (from 24% to 14.7%). For girls, overweight and obese percentages fluctuated with grade level. However, the sum of overweight and obese percentages remained about the same for all grades. Average physical activity score (PAQ) remained lower than the middle level for all groups. Correlation between BMI and PAQ was negative but insignificant. BMI was significantly correlated to eating in restaurants or fast food ($r = -.23, p < .001$). Students with normal weight tended to eat more in restaurants or fast food. Some overweight and obese students (20%) reported to be dieting. Correlations with other nutritional variables were statistically insignificant.

O11.02

9:15 WEIGHT GAIN AND TRAIT ANGER: IS THERE A LINK?

Pamela Banks¹, Bouldin, C.¹, Banks, G.², Woodard, T.¹

¹Jackson State University, Jackson, MS, USA, ²University of Memphis, Memphis, TN, USA

Anger is an emotional state that varies in intensity from mild annoyance to aggravation to rage. It has been associated with a variety of psychological problems and physical problems. For example, anger correlates with cardiovascular diseases such as essential hypertension and coronary artery disease (Spielberger,

1988), elevated blood pressure (Julkunen & Korhonen, 1993), a lowered immune system (Kiecolt-Glaser, et. al. 1983), and pain perception, intensity and behaviors (Burns, et. al. 1999). Mueller (2004) reported that in a sample of teenagers, problems with expressing anger translated into eating disorders and weight gain. The purpose of the present study was to examine the relationship between the frequency of weight gain complaints and trait anger in an adult sample and to validate existing findings that anger is damaging to the physical health. The participants were 111 predominantly African American college students (67 females, 35 males) who ranged from ages 18-49 years. Participants completed the State-Trait Anger Expression Inventory (STAXI; Spielberger, 1996) and the Wahler Physical Symptoms Inventory (WPSI; Wahler, 1983). Pearson's r results show a statistically significant correlation between the physical complaints of weight gain and trait-anger scores (Pearson $r = .21, p = .03$). The mean anger score for the High Frequency weight gain group was significantly higher than the scores for the Almost Never gain group ($p < .05$). Two-thirds of the sample reported no complaints of weight gain, and 32% complained of weight gain on a yearly to daily basis. The present study suggests that anger expression problems can lead to weight gain.

O11.03

9:30 EXAMINING RELATIONSHIPS BETWEEN HEALTH-PROMOTING BEHAVIORAL LIFESTYLES AND PSYCHOSOCIAL FACTORS AMONG COLLEGE STUDENTS

Madhu Singh, Wynette Williams

Tougaloo College, Jackson, MS, USA

According to the Centers for Disease Control and Prevention (2013), African-Americans are disproportionately affected by chronic diseases and poor health behaviors (e.g. tobacco use). This study examined potential relationships among health-promotion behavioral lifestyles (HPL), stress, and self-efficacy. Specifically, health promotion behavioral lifestyles included health responsibility, physical activity, nutrition, spiritual growth, interpersonal relations, and stress management. Measures included were: Health-Promoting Lifestyle Profile II (Walker, Sechrist, & Pender, 1995); Perceived Stress Scale (Cohen, Kamarck, & Mermelstein, 1983); General Health Questionnaire (Salama-Younes, Montazeri, Ismail, & Roncin, 2009). There were total of 81 college undergraduate students enrolled in a historically black college. Multiple linear regressions were conducted among the variables of interest. There were significant positive correlations between health responsibility and HPL total ($r = .84, p < .01$). Similarly, physical activity was significantly positively correlated with HPL total ($r = .79, p < .01$). Nutrition was significantly positively correlated with HPL total ($r = .85, p < .01$). Spiritual growth was significantly positively correlated with HPL total ($r = .69, p < .01$). Interpersonal relations were significantly positively correlated with HPL total ($r = .80, p < .01$). Stress management was significantly positively correlated with HPL total ($r = .87, p < .01$). In addition, perceived stress was significantly positively correlated with spiritual growth ($r = .42$) and interpersonal relations ($r = .42$) at the $p < .01$. However, health-promotion behaviors and perceived stress were found to be unrelated to

self-efficacy. The findings suggest maintaining a balanced diet and managing stress by increasing spiritual growth is imperative for college students. **O11.04**

9:45 BREAK

O11.04

10:15 RATES OF TWIN BIRTHS IN A CAPTIVE BUSHBABY COLONY

Sheree Watson, Jennie Christopher, Tiffany Baker,
Kimberly McKissack, Kristen Gamble

University Of Southern Mississippi, Hattiesburg, MS, USA

In the natural environment Garnett's bushbabies (*Otolemur garnettii*) rarely produce twins. However, when food resources are plentiful, many species produce offspring in greater number than when resources are scarce. Unlike the natural environment, in which resources wax and wane, the captive environment consistently provides plentiful food resources. Thus, we predicted that captivity would produce a situation conducive to increased numbers of offspring including an increased number of twin births. To test this hypothesis, we examined birth records of a captive colony of Garnett's bushbaby from 1988 until present. Preliminary examination of the birth records indicate that of 246 infants born, 120 or 49% resulted from twin births. There were 115 male births and 39% ($n = 45$) of those resulted from a twin birth. Moreover, 40 (57%) of the 70 females born were a product of twin births. The high number of twin births in this captive colony support the hypothesis that increased food availability may be related to production of greater numbers of offspring in captive situations as well as in the natural environment.

O11.05

10:30 RELATIONSHIP BETWEEN SEASONAL CORTISOL AND BEHAVIOR IN CHIMPANZEES

Sheree Watson¹, Babette Fontenot², Tiffany Baker¹,
Jennie Christopher¹, Mackenzie Sher¹

¹University of Southern Mississippi, Hattiesburg, MS, USA,

²University of Louisiana at Lafayette, Lafayette, LA, USA

Cortisol is a steroid hormone that is frequently associated with stressful events. It tends to be stable among individuals and may be related to individual differences in behavior. To investigate potential relationships between urinary cortisol levels, physiological variables (e.g., age, gender), and behavior (e.g., Aggressive behavior, Time Alone), we examined 19 male and 9 female chimpanzees for a period of 15 months. The chimpanzees ranged from 3 to 10 years of age. Urine samples were collected weekly between 8 and 11 am. To determine seasonal effects on cortisol, samples were averaged for each subject for five consecutive seasons starting in Spring 2008 and ending in Spring 2009. Repeated measures ANCOVA, co-varying age, revealed a significant effect of season ($F_{(4,104)}=7.91, p < .001$) with cortisol lower in Spring compared to other seasons. There was also a Season X Age interaction ($F_{(4,104)}=8.41, p < .001$) which indicated that juveniles' cortisol decreased over time whereas cortisol levels of adolescents

increased over time. There was no difference in cortisol levels as a function of sex. Despite similarities in cortisol levels for males and females, males engaged in a greater number of Aggressive behaviors compared to females ($t_{(31)}=2.03, p < .05$) and also spent more Time Alone than females ($t_{(31)}=2.83, p < .008$). These results indicate that the relationship between age, gender, and cortisol are insufficient to fully account for sex differences in behaviors.

O11.06

10:45 EFFECTS OF QUESTION ORDER ON EXAM PERFORMANCE

Sheree Watson, Tiffany Baker, Jennie Christopher, Kristen Gamble

University of Southern Mississippi, Hattiesburg, MS, USA

Scrambling the order of question presentation on multiple-choice tests is a tactic that instructors commonly use to discourage cheating. It has been assumed that the difficulty level of the exams remains equivalent if the questions on each version are identical. Attempts to confirm this assumption have yielded inconsistent results. Student characteristics may, in part, explain some of the contradictory findings. For example, males tend to perform better than females on spatial tasks. Given that the content-ordered versions of an exam reflect the layout of the textbook, males may be at a particular disadvantage with scrambled versions. Moreover, for some students, material that is learned in a specific order may be best recalled when the questions are presented in that same order. Thus, the order effects may act as a mnemonic to enhance information retrieval. Although some subsets of students consistently perform well while others perform poorly, the "middle" subset may be most likely to benefit from contextual memory enhancers. Thus, we examined 33 males and 36 females in the middle portion of the grade distribution to determine whether performance on content-ordered and scrambled versions of an exam differed. ANOVA revealed a tendency for these students to perform better on the content-ordered version of the exam ($F_{(3,65)} = 3.66, p = .06$). Males were more likely than females to be influenced by the order of questions ($F_{(3,65)} = 4.47, p = .04$). These results suggest that characteristics of individual students may predict who will perform more poorly on scrambled versions of exams than on content-ordered versions.

11:00 BREAK

O11.07

11:15 STUDY-HABITS AMONG AFRICAN AMERICAN COLLEGE STUDENTS

Brittany Young, Shaila Khan

Tougaloo College, Jackson, MS, USA

The purpose of this study was to see whether study habits differ according to classification, gender and grade point average among African American college students. Previous studies found guidance services to have significant effects on students' study attitude, study habits and academic achievements (Hussain, 2006), and socialized personality traits to be related to better study habits (Alija & Blanch, 2004). In the present study, a study habit questionnaire was given to eighty conveniently

selected participants. The hypothesis was that seniors will have better study habits than freshmen, females will have better study habits than males, and students with higher GPA will have better study habits than students with lower GPA. The independent variables were classification, gender, and GPA. The dependent variable was study habit. The results showed no significant differences between classification and study habit ($t_{(78)} = .79, p = .42$). The mean study habit score for freshmen was 39.97 (SD = 7.43, N=39) and the mean score for the seniors was 38.36 (SD = 8.16, N = 41). ANOVA results showed that there was a significant difference between the study habits and GPA, $F_{(1,76)} = 9.60, p < .000$. Tukey's test showed that students with GPA between 2.0 and 2.5 had a mean study habit score lower than students with GPA between 3.51 and 4.0 and students with GPA between 2.0-2.5 also had a mean lower than those with GPA between 3.1-3.5.

O11.08

11:30 KNOWLEDGE OF GOVERNMENTAL CONSPIRACY AND ITS EFFECTS ON BELIEF

Kmeone Kingdom, Shaila Khan

Tougaloo College, Jackson, MS, USA

The term "conspiracy theory" is often used to describe various areas to identify secret financial, governmental or military actions intended at stealing freedom, wealth, or power from "the people" (Elinoff, 2010). The difficulty of determining their legitimacy makes conspiracy theories controversial. The purpose of this study was twofold. The first purpose was to evaluate the levels of belief in general conspiracy concepts. Secondly, we wanted to determine if having prior knowledge of specific conspiracy topics affects belief in them. These concepts were evaluated by the use of a questionnaire with four sections: Section A had Demographic Information about the participants; Section B consisted of a 15 question pre-evaluation on the belief in conspiracy (**GCB scale**); Section C had Conspiracy Topics where participants read and marked whether they knew about the topic before; and Section D had the same questions on the belief in conspiracy to evaluate changes in scores (**GCB scale**). The belief in conspiracy questions were answered on a five point Likert type scale. Data were conveniently selected from 80 college students at a HBCU (40 males and 40 females). The result confirmed the hypothesis. A paired sample t-test was found to be significant, $t_{(79)} = -3.95, p < .001$. Participants had lower scores (Mean 52.43, SD = 11.29) on the pre-evaluation compared to their post-evaluation (Mean 54.44, SD = 13.56). These results suggest that exposure to specific conspiracy topics may lead to an increase in the likelihood that people will believe in conspiracies in general.

THURSDAY AFTERNOON

11:45 - 1:00 LUNCH

Garden Room

O11.09

1:00 THE EFFECTIVENESS OF COPING WITH SCHOOL-FAMILY CONFLICTS AMONG AFRICAN-AMERICAN COLLEGE STUDENTS

Gary Chong, Gary Johnson

Tougaloo College, Jackson, MS, USA

In school-family conflict, role pressures from school and family domains are mutually incompatible in some respect. Research suggests that unhealthy family relationships lead to specific difficulties for children that can last for many years. Families can be a support and resource for children, or a source of stress, distraction, and maladaptive behavior (Sturge-Apple, 2010). The purpose of this study is to explore which coping styles may be most effective with school-family conflict among African American college students. There were eighty participants in this study. The independent variable was the degree of school-family conflict and the dependent variable was the effectiveness of each coping style. The participants were given survey questionnaires measuring the degree of school-family conflict (Work and Family Conflict Scale: Haslam, D., Morwaska, A. & Sanders, M.R 2012) and the effectiveness of coping with different conflicts (The COPE Inventory: Carver, C.S., Weintraub, J.K., & Scheier, M.F. 1989). It was hypothesized that females would have a higher family to school conflict than males and that there would be a significant difference in coping method effectiveness. The statistical method used to analyze the data was ANOVA to see if there were any ($M = 19.02$, $SD = 8.04$) reported having a higher degree of family to school conflict than males ($M = 18.24$, $SD = 7.48$). However results also showed that there was no one coping method more effective than the other. Keywords: school, family, conflict, coping, gender.

O11.10

1:15 ATHLETIC COPING SKILLS AND PERSONALITY DIFFERENCE AMONG COLLEGE STUDENTS

Catran Johnson, Shaila Khan

Tougaloo College, Jackson, MS, USA

Young athletes account for about 4 million injuries a year in the U.S. according to an article published in the Los Angeles Times (2010). USA Today reported that approximately 1.35 million student athletes' injuries were severe enough to send them to the hospital emergency department. Athletic injuries are and always will be a painful and uncontrollable interruption in an athlete's life. Coping with injuries can be both physical and psychologically challenging. The purpose of this study was to determine whether personality factors influence how athletic college students cope with injuries. It was also hypothesized whether personality factors, age, gender, athletic scholarship, involvement in sports, and having injuries while participating in sports will determine how participants cope with their athletic

injuries. The Myers-Briggs Type Indicator (MBTI) and Athletic Coping Skills Inventory (ACSI) were administered to eighty college students between 18 to 23 years of age. The ACSI contains seven sport specific subscales: coping with adversity, peaking under pressure, goal setting/mental preparation, concentration, freedom from worry, confidence and achievement motivation, and coachability. The MBTI distinguished between 16 distinctive personality types. The ANOVA showed that personality types significantly differed in their coping mechanism, ($F_{(76,3)} = 3.62$, $p < .01$). Age among the participants also varied significantly in their coping mechanisms, ($F_{(2,77)} = 5.90$, $p = .004$).

O11.11

1:30 GENDER DIFFERENCES IN EMPATHY AMONG AFRICAN AMERICAN COLLEGE STUDENTS

Monique Edwards, Shaila Khan

Tougaloo College, Jackson, MS, USA

Empathy is the ability to understand what other people are feeling and thinking (Segal, Wagaman, & Gerdes, 2011) and is a personality trait (Davis, 1996; Rasool et al., 2011). Individuals with higher empathy scores have a better capacity to orient themselves in a variety of interpersonal relationships as well as in contact with individuals from other cultural and ethnic groups (Batson & Ahmed 2001). The ability to empathize appears to be instinctive for most women, however for men it remains unclear. Empathy has a direct influence on the social interactions males and females have with each other. The purpose of this study was to examine gender differences in empathy among African American College Students. The research was conducted using the Balanced Emotional Empathy Scale (BEES; Mehrabian, 2000). The BEES is a 30-item Likert-type scale divided into six subscales: suffering, positive sharing, responsive crying, emotional attention, feel for others, and emotional contagion. The questionnaire was administered to 80 African American college students (40 male and 40 female). Results showed females to be more empathetic than males in overall empathetic score, ($t_{(78)} = 2.55$, $p < .01$). Among the subscales females were significantly more empathetic only for suffering, ($t_{(78)} = 2.00$, $p = .04$), positive sharing, ($t_{(78)} = 3.34$, $p < .001$), and emotional contagion, ($t_{(78)} = 2.54$, $p < .01$).

O11.12

1:45 RELATIONSHIP BETWEEN POSTTRAUMATIC STRESS DISORDER SYMPTOMATOLOGY AND ALCOHOL USE IN A CIVILIAN AND MILITARY POPULATION AT AN HISTORICALLY BLACK UNIVERSITY

Pattie Gregory, Taunjah Bell, Walter Davis

Jackson State University, Jackson, MS, USA

Research examining the comorbidity of posttraumatic stress disorder (PTSD) and alcohol-use disorders (AUDs) in undergraduate college populations is limited; further, no attention has been given to the comorbidity of PTSD and AUDs in students at historically black universities (HBU). In our study, PTSD symptomatology, alcohol use, and situational

drinking were examined as moderators of the relationship between PTSD symptomatology and alcohol usage within a sample of 55 civilian and military students at an HBU. Results indicated that civilians scored higher on the Posttraumatic Stress Disorder Checklist ($M=37.58$, $SD = 12.99$), while the military students scored higher on the Alcohol Use Disorders Identification Test (AUDIT) ($M = 3.27$, $SD = 3.28$). ANOVA results suggested that there was a significant difference between PTSD scores ($F_{(1, 53)} = 20.201$, $p < .001$) of individuals classified as civilians or military personnel. Results of the multiple regression analysis also were significant ($F_{(3,51)} = 6.802$, $p < .001$), with an R^2 of .286, predicting participants' symptomatology based on their personnel status, AUDIT scores, and situation drinking ratings. Personnel status was the only significant predictor in the regression model. Our findings provide evidence to support the idea that specific PTSD criteria may be associated with alcohol-related problems. Assessment of PTSD symptomatology in undergraduates at HBUs may serve as a useful diagnostic tool to determine which students are likely to develop alcohol-related problems due to experiencing some type of traumatic event. Future research should examine the correlation between academic performance and diagnostic criteria in students exhibiting PTSD symptomatology.

011.13

2:00 PERCEPTION OF RESILIENCE TO DISASTER OF THE COASTAL COMMUNITIES OF MISSISSIPPI

Adrienne Erby, Courtney Welch, Kmeone Kingdom,
Shailla Khan

Tougaloo College, Tougaloo, MS, USA

The purpose of this study was to investigate the perception of resilience to disaster of coastal communities of Mississippi. The study investigated several factors that could potentially influence perceptions of resilience: gender, student/non student status, age, education, and previous exposure to natural disasters. The dependent variables studied were perception of vulnerability to disasters, community preparedness and ability to recover from disasters, and performance of local, state, and federal agencies. Seventy-five participants were conveniently chosen from areas near the Gulf Coast. The four section survey included: (A) Demographic Information; (B) Vulnerability to Disasters (15 questions); (C) Community Preparedness and Ability to Recover (14 questions); (D) Disaster Federal Agencies (13 Questions). In sections B through D of this survey, we used a five point rating scale ranging from 1= Strongly Agree to 5= Strongly Disagree. In the 2nd part of the study, three directors were interviewed and asked to participate in a seven-section questionnaire that included Demographic Information, Community Plan Checklist, Risk and Vulnerability Assessment, Public Engagement, Planning Integration, Disaster Preparedness and Recovery, and Hazard Mitigation Implementation. The results were analyzed using t-tests and Analysis of Variance. The results showed that gender, age, education, student status, and previous exposure to natural disasters were all significant factors in how people perceived their vulnerability to disasters ($p < .05$), the preparedness of their communities ($p < .05$), their communities' ability to recover from disasters ($p < .05$), and the performance of local, state, and federal agencies ($p < .05$).

2:15 BREAK

2:30 BUSINESS MEETING

POSTER SESSION

Following Dodgen Lecture

P11.01

EFFECTS OF A SHORT-TERM RECEPTIVE MUSIC-BASED INTERVENTION ON ADULT PARALYZED PATIENTS

Taunjah Bell, Courtney Brookins, Symone' Cleaves, Maurcia Braddy, Diamond Morgan, Tecola Bradley, Melody Tyson, Amber Crawford, Jessica Evans, Ashley Lowery

Jackson State University, Jackson, MS, USA

Receptive music-based interventions involve listening to music that may have either a calming or stimulating effect (Barnason, Zimmerman, & Nieveen, 1995). For example, results of music therapy studies in medicine indicate that slow, quiet, instrumental music lowered physiological responses associated with stress, whereas fast music heightens stress responses. Findings also indicate that music can facilitate the recovery of some dexterity following damage from stroke or seizures resulting in paralysis (Sacks, 2007). Thus, the purpose of the present study was to expose paraplegic and quadriplegic patients to a short-term music listening program to examine the effects of anxiety, depression, cognition, self-esteem, blood pressure (BP) and heart rate (HR), as measured by post-test results of the Beck Anxiety Inventory, second edition of the Beck Depression Inventory, standard version of the second edition of the Mini-Mental State Examination, adult version of the Coopersmith Self-Esteem Inventory, and digital BP and HR monitor readings, respectively. Ten patients (6 males and 4 females) between ages 19 and 72 voluntarily participated in this study. They listened to music for 30 minutes per session once a week for four weeks. Each individual was tested before and after each session. ANOVA indicated a significant reduction in anxiety ($F_{(1,16)} = 15.047$, $p < 0.001$, eta squared = 0.485). However, no other significant main effects were found. Perhaps long-term music listening may positively impact the other psychological indicators as well as the physiological responses measured in our research. Receptive music-based interventions should be studied further to determine their beneficial effects on this patient population.

P11.02

SOCIO-PSYCHOLOGICAL FACTORS ASSOCIATED WITH OBESITY AMONGST AFRICAN AMERICAN WOMEN

Madhu Singh, Lakisha Bell

Tougaloo College, Jackson, MS, USA

African American women have the highest rate of obesity, with 4 out of 5 women being overweight or obese (Human, 2010). People who are obese are more prone to have health issues such as heart disease, diabetes (type 2), hypertension, osteoarthritis, and strokes (surgeongeneral.gov). This study explores some of the factors associated with obesity in African American women, focusing mainly on leisure time activity, eating habits, and body

esteem. The survey method was utilized. The measures used were the Eating Behavior Patterns Questionnaire, The Godin Leisure-Time Exercise Questionnaire and The Body-Esteem Scale. The study was conducted on 80 African American women from a HBCU in Mississippi, who were conveniently selected. The majority of the sample (65%) was between the ages of 18-20. 35 percent had a body mass index that categorized them in the underweight/normal range, and 65 percent as overweight/obese. As expected, snacking and convenience eating and emotional eating ($r = .573, p < .01$), meal skipping and cultural/lifestyle behaviors ($r = .296, p < .01$) are positively correlated. BMI was positively correlated with mild exercise ($r = .255, p < .05$) but not with dietary habits. Body-Esteem was positively correlated with sexual attractiveness ($r = .845, p < .01$), weight concern ($r = .862, p < .01$), and physical condition ($r = .860, p < .01$). The findings of this study indicate that young African American women are highly satisfied with their bodies; however they need to change their eating habits and increase leisure time activities as they are overweight/obese, and this is a recipe for diseases, especially heart disease, diabetes, and hypertension.

March 7, 2014

FRIDAY MORNING

Garden Room

10:00 A SYMPOSIUM ON SILVA, LANDRETH, AND BICKLE'S ENGINEERING THE NEW REVOLUTION IN NEUROSCIENCE (Oxford University Press, 2013)

This symposium is co-sponsored with History and Philosophy of Science (Kenneth Curry is chairman).

This interdisciplinary symposium will bring together a neuroscientist and a philosopher of science for a two hour author-meets-critics session on Alcino Silva, Anthony Landreth, and John Bickle's recent book, with Bickle commenting on both presentations. Possible topics for discussion include the empirical adequacy of Silva, Landreth, and Bickle's Framework for scientific experiments, derived from state-of-the-art research in the field of 'molecular and cellular cognition' (MCC); the varieties and specific roles of distinct Integration procedures they articulate for relating distinct experimental results; the potential and plausibility of automated "research maps" to indicate what has been accomplished experimentally and the data still missing for establishing causal hypotheses linking cognitive functions to specific cellular and molecular mechanisms, and the authors' speculations on the future of a science of experiment planning. Each talk will be 20 minutes, followed by 10 minutes of discussion, leaving 30 minutes at the end of the three presentations for audience discussion. Given the book's distinctive interdisciplinary focus, this symposium will be of interest to practicing research scientists interested in the representation of knowledge in their

SCIENCE EDUCATION

Chair: Renee Clary,
Mississippi State University

Vice-Chair: Sharon Walker,
Institute for Marine Mammal Studies

March 6, 2014

THURSDAY MORNING

Lakeview 2

9:00 INTRODUCTION AND OVERVIEW OF SESSION

O12.01

9:15 EXPERIMENTATION OF THE IMPACT ON SOCIAL MEDIA ON THE COAST

Caleb Crabtree¹, Melissa Scallan²

¹Cooperative Intern Program, Mississippi Gulf Coast Community College-Jackson County Campus Biological Science Students, Gautier, MS, USA, ²Department of Marine Resources, Biloxi, MS, USA

The objective of this project was to compare and analyze the different approaches to social media and devise alternative suggestions for future uses. The hypothesized suggestions for distributed purposes were to contact individuals through ads in newspapers and flyers in the local areas. Another mean for communication was to electronically send information through media websites. Experimentation began with recycling and cleaning sites throughout the Mississippi Gulf Coast, which were controlled by captains of each site. Packets of information were distributed to each captain, ensuring successful application. As a result, the cleaning of the Gulf Coast was made efficacious through the effective communications and collaborations of the organizations.

O12.02

9:30 A PUBLIC INFORMATION ON VIBRIO CHOLERA, A PATHOGENIC BACTERIA IN OYSTERS

Jillian Davis¹, Ruth Posadas²

¹Cooperative Intern Program, Mississippi Gulf Coast Community College-Jackson County Campus Biological Science Students, Gautier, MS, USA, ²Department of Marine Resources, Biloxi, MS, USA

This project was implemented at the Department of Marine Resources in Biloxi, Mississippi. The project focused on spreading the word on the bacterium, *Vibrio cholerae*, found in raw oysters and its dangers. The researcher created a presentation to inform the public on the importance of preserving oysters correctly and how consumers can take precautions to prevent themselves and others from getting ill from these dangerous bacterium. Also, the presentation informed the public of the history of *Vibrio cholerae* with signs and symptoms if infected.



O12.03

9:45 UNDERSTANDING THE DELIVERED CURRICULUM AT A RESIDENTIAL ENVIRONMENTAL LEARNING CENTER

Ryan Mathew Walker¹, Cathy Wissehr², Lisa Wood², Shana McCormick¹

¹Mississippi State University, Starkville, MS, USA, ²University of Arkansas, Fayetteville, AR, USA

Stakeholders' perceptions of the delivered curriculum at a residential environmental learning center inform connections to classroom instruction. Structured interview protocols were used for each group including: school administrators, classroom teachers, education leadership teams and naturalist instructors. Students completed an open-ended questionnaire. These data were coded using a reductionist approach to identify main themes. Administrators and Staff identified that developing an appreciation for learning and discovery was an desired outcome. Although this was confirmed by a significant number of students that identified this construct as the most meaningful aspect of the experience, Teachers did not share this level of support. Students would like to have additional time for science investigations. This component of the experience also identified as causing the students cognitive dissidence, possibly due to lack of experience with science inquiry, and not experiencing the entire process. These results indicate that participant teachers may underestimate the influence of conducting science investigations in the out of doors. By involving all stakeholders, researchers have identified aspects of the formal/informal relationship that encourage an enthusiasm for learning.

O12.04

10:00 REDEFINING THE ROLE OF THE SCIENCE EDUCATOR IN ENVIRONMENTAL EDUCATION

Ryan Mathew Walker, Kenneth Anthony, Sarah Radencic

Mississippi State University, Starkville, MS, USA

A group of 8 science educators participated in a three-week program designed to challenge their perspective of effective science instruction. The students spent a week on Mississippi State University's campus covering the background and history of the field of ecology-based outdoor education. During the second week of the program students participated in an immersion field experience at the Great Smoky Mountains Institute at Tremont. While there, they were asked to participate as both teachers and students reflecting on the practice of instruction. Afterwards, the third week was spent deconstructing the previous course experiences in applying new techniques to the development of curriculum to local areas. Assessments during this weeklong intervention were designed to have students critically analyzed their role as a science instructor. Results show that all students showed growth in their understanding of guiding scientific inquiry in the importance of questioning. This research supports that authentic scientific investigation and modeling of effective pedagogy can be an effective tool for teacher training. Although the primary goals of the program were met, when asked to identify the science educator in The Lorax students identified the Lorax and when

presented with the idea of the Onceler as a teacher they disregarded this idea. The students' identification of the Lorax indicates that they identify science education with prophetic announcements about the impact rather than actions that result in attitude and behavior change. Further study is needed to determine how we conceptualize the idea of effective science instruction that results in societal change.

O12.05

10:15 AN ALIGNMENT OF THE NEXT GENERATION SCIENCE STANDARDS TO A HISTORICALLY SIGNIFICANT CURRICULUM

Shana McCormick, Ryan Walker, Renee Clary, Bethany McKissick,

Mississippi State University, Starkville, MS, USA

During the post-Sputnik era of curriculum development, Science: A Process Approach (SAPA) was designed to engage students in scaffolded scientific investigations to promote critical thinking and problem solving skills. Current curriculum reform found in The Next Generation Science Standards (NGSS) aims to prepare students for college and career readiness. A major unifying theme in NGSS is the identification of science and engineering practices, designed to promote scientific literacy for levels K-12. Unfortunately, many college students have not had the opportunity to develop science process skills, or participate in classrooms that model authentic scientific investigations. This project found that the skills from SAPA aligned with each of the NGSS skills. To evaluate the usefulness of SAPA lessons to develop scientific thinking, science educators were introduced to both SAPA and NGSS then were asked to explore elements of the curriculum they could readily adapt to their classroom. Subjects identified three elements of the curricula, (1) studying the organization helped them better understand their role as a science educator, (2) the lack of content in the SAPA curriculum allowed for lessons to be easily adapted to any content area, and (3) their understanding of how to do inquiry and teach the nature of science was developed. This presentation will provide science educators with information on the importance of including science literacy and process skills while instructing their students.

10:30 BREAK

O12.06

10:45 CRITICAL THINKING IN INTELLECTUALLY GIFTED STUDENTS

Cristin Williams¹, Caroline Knight²

¹Cooperative Intern Program, Mississippi Gulf Coast Community College-Jackson County Campus, Gautier, MS, USA, ²Ocean Springs School District—Oak Park Elementary School, Ocean Springs, MS, USA

The purpose of this project was to explore the manner in which critical thinking skills are employed by intellectually gifted students in a Socratic teaching environment. The students of the Oak Park Elementary gifted program did not receive lectures or answers on the subject of their studies; rather, they were given subjects to study and the tools to find the answers they required.

The students each chose one aspect of a larger project involving multicultural studies and performed research into his or her individual role in order to form a cohesive whole. The students were encouraged to approach the projects from an individual perspective; each student utilized his or her own strengths to accomplish individual and collective goals. The students were observed from the beginning of this project through the end; observations centered on the manner in which students employed unique perspectives to overcome common complications.

012.07

11:00 THE DEMAND FOR ENGINEERS AND WHY IT SHOULD BE ADDRESSED

Emily Nguyen¹, Roma Flowers²

¹Cooperative Intern Program, Mississippi Gulf Coast Community College-Jackson County Campus Biological Science Students, Gautier, MS, USA, ²Ocean Springs Upper Elementary School, Ocean Springs, MS, USA

The purpose of my project was to introduce Mrs. Roma Flower's sixth grade gifted students at Ocean Springs Upper Elementary to engineering concepts related to their grade level with the K'NEX Bridge Building Set. On January 23rd, 2014, the sixth grade class of the gifted program received a grant from Ingalls that included K'NEX Education's Real Bridge Building Set. The building set was designed to assist students in their study of history, function, structural design, geometry, and strength of bridges. Designed to bring STEM (science, technology, engineering, and mathematics) concepts into the classrooms of fifth through ninth graders, the students applied their collective judgment in the placement, design, and construction of the bridges. From this project, the students were able to learn through the process of trial and error. The students were exposed to STEM concepts through problem solving, discovery, exploratory learning, and critical thinking. K'NEX Education offered the students a "hands-on" learning activity that enhanced their skills in scientific inquiry, investigation, and experimentation.

012.08

11:15 CHEMISTRY SAFETY PROTOCOL: A VIDEO PRESENTATION

Kage Laney¹, Jason Poirier²

¹Cooperative Intern Program – Mississippi Gulf Coast Community College – Jackson County Campus Biological Science Students, Gautier, MS, USA, ²The National Aeronautic and Space Administration, Stennis Space Center, MS, USA

A chemistry laboratory involves many risks and experiments can be very dangerous. Students and participants must be informed of the dangers and the methods of reducing risk while conducting experiments. This project focused on using a video to educate students concerning the safety procedures in the lab. A new video was prepared to replace an older lab safety video for introductory chemistry classes at MGCCC. A story board was created outlining each scene in the video which detailed camera angles, the actors' positions and lines, and narration. A schedule was developed during which all parties could meet.

The proper methods and procedures were filmed along with examples of incorrect procedures. The clips were then edited into a short video approximately five minutes in length. Pictures and diagrams were added at certain points between clips. The film was narrated to increase the coherency of each scene.

012.09

11:30 PASCAGOULA WATERSHED PROJECT

Elizabeth Cox Schlosser, Veshell Lewis

University of Southern Mississippi, Hattiesburg, MS, USA

The Pascagoula watershed consists of the five major water ways: the Chunky River, Leaf River, Black Creek, Chickasawhay River, and the Pascagoula River. The watershed provides a crucial habitat for various fish and wildlife. Recently, there has been concern as to the quality of water within the watershed due to pollution produced by corporate industrialization and waste disposal systems. In 2006, Mississippi was cited ten times by the Environmental Protection Agency (EPA) under the Clean Water Act (CWA). Our class conducted a scientific investigation to compare the water qualities of the Pascagoula River, Leaf River, and Chunky River. The water qualities were analyzed using the following tests: turbidity, pH, and temperature. Data were collected and recorded during the timeframe of June 9 -29, 2013. The results of the data showed the Leaf River, which in recent years has become a sewage lagoon, contained higher turbidity reading than the Chunky and Pascagoula Rivers. This river also produced a lower pH level; signifying an increased acidity level within its waters. Based on the results, it is reasonable to conclude that the constant input of sewage pollutants affect the water quality of the Leaf River. The Black Creek produced a high turbidity which led the team to form inconclusive results. However, the results of the Leaf River investigation have led to a concern for the plant and animal life within the rivers ecosystem. It was concluded that further investigation is needed to determine the future impact of these biological factors.

012.10

11:45 ARGUING SCIENCE: USING LEGITIMATE SCIENTIFIC CONTROVERSIES TO ENGAGE STUDENTS IN DISCOURSE AND THE NATURE OF SCIENCE

Renee M. Clary¹, James Howard Wandersee²

¹Mississippi State University, Starkville, MS, USA, ²Louisiana State University, Baton Rouge, LA USA

Because critique and argumentation engage all scientists, we should provide opportunities for students to see that it is normal for scientists to differ, offer alternatives, and resolve conflicts with data and additional research. The history of science contains lively examples in which scientists occasionally chose an incorrect hypothesis, misinterpreted data, battled each other in data interpretation, or more infrequently, manipulated findings. These historical vignettes can pique students' interest, and offer an historical platform through which students can recognize "bad science." Our Historical Controversy Case Study approach incorporates controversies in the classroom through 1)

overview, 2) investigation, 3) argumentation, and 4) resolution.

Students marshal historical evidence used by past scientists to support positions in a controversy, analyze them for flaws and inaccurate reasoning, and effectively argue an opinion. Historical controversies provide the additional advantage of being less prone to politicization than current issues under public scrutiny. This allows students to develop their analysis and argumentation skills in a less distracting environment, before turning their attention to more modern issues. Once students learn to effectively argue a position by scientifically supporting their opinions, the more modern controversies—in which everyone appears to be an expert—are easier to approach in the classroom.

12:00 BUSINESS MEETING

March 6, 2014

THURSDAY AFTERNOON

Lakeview 2

O12.11

1:00 HUMAN POPULATION GROWTH AND EXTINCTION OF LIVING SPECIES

Johnny L. Mattox

Blue Mountain College, Blue Mountain, MS, USA

When comparing the growth of the human population on Earth to the rate of species extinction a direct correlation is evident. There has been an increase in extinction rates seen in species primarily due to destruction of natural habitats resulting from human activities. Increased extinction rates have occurred in plants, invertebrates, fish, amphibians, reptiles, birds, and mammals. Students should be made aware of this correlation as well as the possible reasons that this correlation exists. Students should also be made aware of what humans might do to lessen the effects of an increasing human population on the extinction of species.

O12.12

1:15 COLLECTING GLOBE DATA IN THE PASCAGOULA WATERSHED

Sherry S. Herron

University of Southern Mississippi, Hattiesburg, MS, USA

Between June 9 to June 29, 2013, graduate students in Science Education explored the Pascagoula River Watershed and collected hydrologic, land cover, soil, and atmosphere data for input into the GLOBE database (<http://www.globe.gov/>). The watershed provides critical habitat for fish and wildlife within its boundary and is the largest unimpeded watershed by volume in the continental United States (TNC, 2013). Educators kayaked or canoed stretches of the Chunky and Chickasawhay Rivers, the Leaf River and Black Creek, and the Pascagoula River while camping near or beside the rivers. Water quality assessments included turbidity, pH, temperature, and dissolved oxygen. Cloud cover and type, soil quality, flora and fauna, canopy and ground cover, and tree height and circumference measurements were taken. Educators read "The Sand County Almanac" by Aldo Leopold and watched "Green Fire", a documentary about his life. In addition to presenting the data, selected reflections

from the course will be shared.

The Nature Conservancy, 2013. Retrieved from: <http://www.nature.org/ourinitiatives/regions/northamerica/united-states/mississippi/placesweprotect/pascagoula-river-watershed.xml>

O12.13

1:30 COLLEGE STUDENTS' PERCEPTIONS OF THE RELATIVE IMPORTANCE OF EIGHT OF THE EARTH'S KEY NATURAL RESOURCE CATEGORIES

James Howard Wandersee¹, Renee M. Clary²

¹*Louisiana State University, Baton Rouge, LA, USA,*

²*Mississippi State University, Starkville, MS USA*

Humans benefit from a multitude of natural resources supplied by Planet Earth; but just how aware are college students (N=50) of the top eight terrestrial resource categories™ relative economic importance? Based upon a team of international experts' selection of eight key Earth resource categories, their inventories via direct and remote sensing, and their data-driven economic rankings thereof (Gallagher & Say, 2012), our research questions were as follows: (a) If given a randomly ordered list of eight major, economically important categories of the Earth's natural resources, how will today's college students rank-order that list by estimating the relative economic importance of each of these Earth resource groups, as found in their raw state? (b) What will their free-response rationales be for selecting their top- and bottom-ranked categories? (c) How will their estimated ranks and top/bottom-rationales compare to the data-driven, Earth-inventory-based, calculated value ranks and top/bottom ranking rationales reported by a 2012 team of natural resource experts? and (d) What are some implications of this study's findings for 21st-century geology and biology education? Mixed methods data analyses were completed using the Intel Visual Ranking Tool (2010) and content analysis (Neuendorf, 2001). The results were used to generate four concise science education improvement recommendations.

O12.14

1:45 EFFECT OF THE FLIPPED CLASSROOM ON ACHIEVEMENT IN AN INTRODUCTORY COLLEGE PHYSICS COURSE

Joshua Winter¹, Ryan Walker¹, Lisa Wood², Shana McCormick¹

¹*Mississippi State University, Starkville, MS, USA,* ²*University of Arkansas, Fayetteville, AR, USA*

The flipped or inverted classroom model is one in which the time and place for traditional lecture and homework are reversed. Traditional lecture is replaced by online videos assigned as homework. This frees up time in class to be spent with more student centered activities such as discussion based concept questions and group problem solving. While growing in popularity, research on the effectiveness of this format is sparse. In this quasi-experimental study, two sections of an introductory algebra-based college physics course were examined over a five week period. Each section was taught with either the traditional or flipped model and physics knowledge achieved was compared using independent samples t-tests on both the

instructor's unit exam and the Mechanics Baseline Test pre/posttest normalized gain. Results indicated that there was no statistically significant difference between the flipped model and the traditional lecture format. Avenues for further research are discussed.

012.15

2:00 PERCEPTIONS OF ART AND GRAPHIC REPRESENTATION IN COLLEGE SCIENCE CLASSROOMS

Renee M. Clary, Ryan Walker¹, John Paul Remo¹, James H. Wandersee²

¹Mississippi State University, Mississippi State, MS, USA,

²Louisiana State University, Baton Rouge, LA, USA

University scientists, science educators, and a scientific illustrator investigated perceptions and values of art instruction and graphic representation in science classrooms. A focus group (N=6) identified mechanisms by which visual representations can best be incorporated. Following a brief photosynthesis storyboarding demonstration, participants noted how perceptions changed through active *process* demonstration of a scientific concept. Participants also identified Visual Storytelling and Lesson Plan Development as topics they wished to probe.

For the Visual Storytelling session, the art instructor overviewed visual grammar, visual relationships, and variables to consider in lesson development. Content analysis of reflective survey responses (N=6) revealed three stable themes: importance of planning, effective use of board space, and visual development of a hierarchy of knowledge. Participants (N=5) in Lesson Plan Development focused on visual representations of concepts they regularly taught in introductory college science classrooms. They acknowledged the importance of *process* within visual construction, and predicted positive impacts for their students as a result of these sessions. We propose that although the role of art and visual construction in science classrooms has been neglected, instructional sessions can benefit science instructors and provide them with confidence for effective graphic classroom implementation—to ultimately benefit their students.

2:15 OVERVIEW OF POSTER SESSION

March 6, 2014

THURSDAY EVENING

POSTER SESSION

Following Dodgen Lecture

P12.01

CONSUMER PREFERENCES OF ORGANIC VS. CONVENTIONAL FOODS IN THE MISSISSIPPI GULF COAST REGION

Anna Patterson¹, Rebecca Patterson¹, Barakat Mahmoud²

¹Cooperative Intern Program – Mississippi Gulf Coast Community College – Jackson County Campus Biological Science Students, Gautier, MS, USA, ²Coastal Research and Extension Center, Mississippi State University, Pascagoula, MS, USA

The purpose of this project was to discover the frequency of how often the residents of southern Mississippi purchase organic food products versus conventional food products. The purpose of this project was achieved through accomplishing the creation of a short questionnaire in which approximately 300 people participated. After the questionnaires were returned, the data revealed viable statistics for the Mississippi Gulf Coast. These statistics are vital for food researchers along the Mississippi Gulf Coast and will be shared during the presentation.

P12.02

THE ABILITY TO IDENTIFY HAND-WRITTEN FORGERY: INSTRUCTION OF GIFTED STUDENTS AT MAGNOLIA PARK ELEMENTARY SCHOOL

Blake Whitaker¹, Amanda Goodwin²

¹Cooperative Intern Program, Mississippi Gulf Coast Community Campus Honors Biology Students, Gautier, MS, USA, ²The Ocean Springs School District-Magnolia Park Elementary School, Ocean Springs, MS, USA

The purpose of this project was to promote the awareness of second grade gifted students of Magnolia Park Elementary School of hand-written forgeries, what they may be used for, and to teach them how to identify a piece of forgery. A pre-test was administered to determine the amount of knowledge they had on the subject, and then an interactive activity was conducted that allowed them to identify which hand-written notes were forged and which were not. Afterwards, a post-test was administered to determine if they had gained knowledge of the subject.

P12.03

TERASCAN CURRICULUM DEVELOPMENT AND INTEGRATION OF SEASPACE TECHNOLOGY INTO THE CLASSROOM

Kalyx McDonald¹, Courtney Farmer²

¹Mississippi Valley State University, Itta Bena, MS, USA,

²Elizabeth City State University, Elizabeth City, NC, USA

SeaSpace and Elizabeth City State University (ECSU) signed a Memorandum of Understanding (MOU) in February of 2012. The MOU stated that ECSU would provide a training site for SeaSpace's technology and data products along with integration of the products into classroom curriculum. In return, SeaSpace would provide ground stations for receiving direct broadcast data from various telemetries. The ground stations include a 3.7m X/L band, 3.6m C band, and a 5.0m L band dish, along with accompanying computing hardware. The purpose of this project was to generate a training curriculum focused on the K-12 classroom, along with college courses, and outside governmental agencies. The curriculum contains 15 modules, which as a whole could be presented as a 10-hour course that qualifies as one continuing education unit (CEU) for K-12 teachers and administrators. Example modules for "Introduction to Remote Sensing" and "Introduction to TeraScan" were also created as models for further components.

P12.04

GULF COAST RESEARCH LABORATORY: A COMPENDIUM OF GROWTH AND CHANGE AT TWO CAMPUSES

LaMarcus Brown¹, Joyce Shaw²

¹Cooperative Intern Program, Mississippi Gulf Coast Community College-Jackson County Campus, Gautier, MS, USA, ²The University of Southern Mississippi-Gulf Coast Research Laboratory, Ocean Springs, MS, USA

The Gulf Coast Research Laboratory has two sites in Ocean Springs. The original campus is approximately 45 acres at 703 East Beach Drive at Halstead Road. The second campus is Cedar Point, a 224 acre site located adjacent to the Gulf Islands National Seashore on Gollott Road. The purpose of this project is to document the changes to the buildings and other facilities at both campuses and to create a comprehensive inventory of all buildings, past and present, including dates of construction, architects, photography of interiors and exteriors, and original and current purpose. This project is a continuation of nearly 20 years of collecting, documenting, and preserving the history of the Gulf Coast Research Laboratory.

ZOOLOGY AND ENTOMOLOGY

Chair: Padmanava Dash,
Mississippi State University

Vice-Chair: Julius O. Ikenga,
Mississippi Valley State University

March 6, 2014

THURSDAY MORNING

Executive Conference Room

O13.01

9:00 ASSESSMENT OF WATER QUALITY OF TWO LOTIC BODIES OF WATER IN JEFFERSON COUNTY, MISSISSIPPI

Alex Acholonu, Rosie Hopkins

Department of Biological Sciences, Alcorn State University, Lorman, MS, USA

Water quality standards depend on the type and/or use of the water. This study of Coles and Mud Island Creeks was conducted to assess their physical, chemical and biological profiles, their seasonal distribution of pollutants, and their water quality as compared to 2002 - 2003 study and the Mississippi Water Quality Criteria (MSWQC) / Environmental Protection Agency (EPA) standard. Water was collected in plastic containers 50 meters apart at one week intervals for 3 consecutive times and from three sites in each of the two bodies of water. They were taken to the laboratory and tested according to the manufacturers of LaMotte pollution test kits. The results were tabulated and statistically analysed. The physical profile for both creeks met the MSWQC/EPA standard, namely, the turbidity for Mud Island Creek (59.85/50NTU) and Coles Creek (63.73/50NTU) and the surface water temperature for Mud

Island Creek (25.6/32.2°C) and Coles Creek (20.2/32.2°C). The chemical test results showed that Mud Island Creek's alkalinity (129.06/ 3.08ppm), CO₂ (28.13/ 10ppm) and hardness (104.53/ 50ppm) exceeded the MSWQC/EPA standard. Coles Creek's alkalinity (73.06/ 3.08ppm), CO₂ (17.66/ 10ppm) and hardness (78.4/ 50ppm) exceeded the MSWQC/EPA standard. The seasonal results revealed that Coles Creek's winter hardness (68ppm) was highest while Mud Island Creek's winter alkalinity (140ppm) was highest. Alkalinity, hardness and CO₂ reached levels above the MSWQC standard for both study years. Carbon dioxide rose significantly higher (p=0.05) in the present study. The biological tests indicated the presence of E.coli and coliform bacteria in both creeks. Continued study of these creeks is recommended.

O13.02

9:15 INVESTIGATING THE WATER QUALITY OF FOUR LARGE MISSISSIPPI LAKES AND GRAND BAY, MS-AL GULFCOAST

Padmanava Dash¹, Saurav Silwal¹, Julius Ikenga², James Pinckney³

¹Department of Geosciences, Mississippi State University, Starkville, MS, USA, ²Dept. of Natural Sciences & Environmental Health, Mississippi Valley State University, Itta Bena, MS, USA, ³Marine Science Program and Department of Biological Sciences, University of South Carolina, Columbia, SC, USA

Harmful Algal Blooms (HABs), harmful microorganisms, and toxic metals represent three main water quality deteriorating agents in the water-bodies. The objectives of this research were to take a systems level approach to investigate the water quality of four large Mississippi freshwater lakes including lakes Sardis, Enid, Grenada and Ross Barnett Reservoir and the Grand Bay in Mississippi Alabama gulf coast. Ten field campaigns were undertaken to the freshwater lakes and six sampling trips were organized to the Grand Bay to collect water samples, to measure the physical parameters including temperature, salinity, dissolved oxygen and pH, to measure remote sensing reflectance and backscattering at twelve discrete sites in each of the water bodies. The water samples were collected for high performance liquid chromatography (HPLC) photopigments, colored dissolved organic matter (CDOM), suspended particulate matter (SPM), phycotoxins, nutrients, absorption, bacterial counts, toxic metals, and microscopy analyses. In all these water-bodies, organic SPM surpassed its inorganic counterpart, which indicates that organics have a bigger share in the water quality deterioration in these systems. The photo-pigments derived relative abundances of major algal groups suggested the abundance of cyanobacteria, diatoms and dinoflagellates in all these systems. An investigation of the species composition will reveal the detail community structure. Phycotoxins and several types of bacteria and toxic metals were found in all the water bodies. The observation of these water quality issues warrants continuous operational monitoring of the water quality, investigation of fate and transport of pollutants, and implementation of best management practices for all these water-bodies.



O13.03

9:30 STATE OF WATER QUALITY OF LAKES GRENADA, ENID, SARDIS, AND ROSS BARNETT RESERVOIR IN MISSISSIPPI, USA

Julius O. Ikenga¹, Padmanava Dash², Grace C. Ikenga¹

¹Dept. of Natural Sciences & Environmental Health, Mississippi Valley State University, Itta Bena, MS, USA, ²Department of Geosciences, Mississippi State University, Starkville, MS, USA

The objectives of this research were to assess the state of water quality of Lakes Grenada, Enid, Sardis, and Ross Barnett Reservoir and compare the results with the Mississippi Department of Environmental Quality Standards. Water samples from the four freshwaters were collected in clean, capped 300 ml and 500 ml Nalgene™ bottles and kept in iced-coolers. Water samples were taken to MVSU and JSU laboratories for analyses. On-site water parameters were measured using the HI 769828 meter and probes®. No Cu, Cr, CN, or NO₃-N were detected but trace amounts of NH₄-N, Cl, Fe, Si, and S were detected using the Lab-Aid Water Pollution Test kit™. Mean on-site measurements for pH, temperature, DO, TDS, and salinity were 7.15, 27.9^o C, 6.57 ppm, 43.1 ppm, and, 0.39, respectively. HPLC analyses yielded six HAB groups, including cyanobacteria. Mean microcystin toxin concentration derived from ELISA ranged from 0.27-0.33 ug/L. Six heavy metals contamination were found in Lakes Grenada and Enid and five in Lake Sardis and Ross Barnett Reservoir, as well as Coliform bacteria. Finding of coliforms, heavy metals and microcystin toxin in the four freshwaters is disconcerting. Additional studies are required to elucidate sources of contamination, seasonal nature of HABs, and levels of microcystin in fishes.

O13.04

9:45 ALGAL COMMUNITY STRUCTURE IN FOUR MAJOR MISSISSIPPI LAKES AND IN GRAND BAY, MISSISSIPPI-ALABAMA GULF COAST

Saurav Silwal¹, Padmanava Dash¹, Julius Ikenga², James Pinckney³

¹Department of Geosciences, Mississippi State University, Starkville, MS, USA, ²Dept. of Natural Sciences & Environmental Health, Mississippi Valley State University, Itta Bena, MS, USA, ³Marine Science Program and Department of Biological Sciences, University of South Carolina, Columbia, SC, USA

Harmful Algal Blooms (HABs) pose a significant threat to water quality for several reasons including the fact that they can produce potent toxins. During the summers of 2012 and 2013, ten field campaigns were undertaken to four major Mississippi lakes, Sardis, Enid, Grenada and Ross Barnett Reservoir. Furthermore, one sampling trip in October, 2012 and five sampling trips in summer of 2013 were undertaken to Grand Bay in the Mississippi-Alabama gulf coast. On these trips, water samples were collected and brought back to the lab on ice. In the lab, water samples were vacuum filtered and the filter papers were analyzed for photo-pigments using high performance liquid chromatography (HPLC). ChemTax, a matrix

factorization program, was used to calculate the absolute abundances of major algal groups from concentrations of chemosystematic photopigment biomarkers. ChemTax-derived absolute abundances of major algal groups suggests that cyanobacteria was the dominant algal group in the lakes, however in the Grand Bay diatoms were dominant in the October whereas cyanobacteria was dominant during the summer of 2013. Although ChemTax-derived algal abundances demonstrated relative presence of major algal groups, it was unable to provide the species composition. After the sampling trips, an aliquot of 100 ml of water sample from the twelve sites from each of the water bodies were also fixed in glutaraldehyde and were stored in refrigerator. The algal community structure will be enumerated using an imaging microscope, FlowCAM (Fluid Imaging Technologies) which will reveal the species composition in each of the water bodies.

10:00-10:15 BREAK

O13.05

10:15 STUDIES ON THE PARASITES OF THE COCKROACH, *Periplaneta americana* (Insecta:Blattide) IN LAGOS, NIGERIA

Alex Acholonu, Minabelema Green

Department of Biological Sciences, Alcorn State University, Lorman, MS, USA

A study on the parasites of the cockroach, *Periplaneta americana* in Lagos was carried out between December, 1980 and April 1981. A total of 100 cockroaches were dissected and examined for parasites. Ninety six percent (96%) were found to harbor parasites of one kind or another. Forty six (46%) of the cockroaches were infected with adult *Hammerschmidtella diesingi* (Nematoda: Thelastomidae) and eleven (11%) with 2nd stage larvae. Thirty five (35%) were infected with *Gregarina* sp (Apicomplexa: Eugregarinorida), and thirty four (34%) with the ciliate *Nyctotherus ovalis* (Ciliophora: Nyctotheridae). Eleven (11%) harbored *Moniliformis* sp (Acanthocephala: Moniliformidae) (thorny-headed worms). These are geographic records for Lagos, if not for Nigeria. No pentastomes (tongue worms) expected to be found, were recovered. It is recommended that more of this kind of study be conducted in Nigeria to know the extent to which this household pest serves as a public health problem.

O13.06

10:30 THE EFFECTS OF EMERGENT CONTAINER MOSQUITOES ON SURROUNDING PREDATOR COMMUNITIES

William Glasgow, Donald Yee

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

Although the historical focus of research on isolated container systems (tires, tree holes) has been on the role of terrestrial resource subsidies (leaves) in supporting aquatic insect communities, little is known of the reciprocal contribution of emergent aquatic insects to surrounding predator communities. We predicted that if emergent adult mosquitoes from containers

are an important resource for spiders, then there would be differences in abundance, richness, and composition of spiders around tire piles with emergent mosquitoes compared to piles lacking adults. Likewise, we predicted that as the distance from an established tire pile increases, spider communities would change due to decreasing inputs of prey. We established nine tire piles consisting of ten tires each that were separated into three treatment levels: all tires with water and emergent adults, half with water and emergent adults, and all tires without water. Prior to and six and twelve weeks after establishment, spiders were collected along four transects at four distances from each tire pile and from each tire. In general, tire piles with water in all tires had significantly more spiders than did piles half filled with water, with piles half filled with water having more than piles with no water: abundance did not vary with distance. We also evaluated differences in richness and composition among treatment levels. Our work is the first to consider the effect of emergent adults from aquatic containers on spiders, and is one of the few studies to quantify the specific contribution of mosquito adults to supporting spiders.

O13.07

10:45 FITNESS LINKAGES ACROSS DIFFERENT LIFE STAGES: CONCLUSIONS FROM TEMPERATURE IMPACTS ON FECUNDITY AND SURVIVAL IN A CONTAINER-INHABITING MOSQUITO

Francis Ezeakacha, Donald Yee

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

Mosquitoes have evolved specific responses to variation in environmental conditions that could confer a fitness benefit or cost when carried-over across different life stages. Often, effects of temperature on mosquito population dynamics have focused on only part of their life cycle (e.g., aquatic phase). We investigated the “carry-over” effects of temperature from larval to adult stages in a container-inhabiting mosquito: the Asian tiger mosquito, *Aedes albopictus*. Larvae with a density of 20 individuals were reared across 3 temperatures (21, 27, 34°C) with constant food and photoperiod. Adults emerging from each rearing temperature were transferred and maintained also within temperatures of 21, 27 and 34°C. Adult survival was measured for males and females while fecundity data was also obtained from mated females. There was a significant interaction observed between larval rearing and adult temperatures, with the higher adult temperatures leading to greater differences in fecundity of females from larval rearing temperatures. In addition, adult survival was highest when larval and adult temperatures were similar. Thus, it can be concluded that for *Aedes albopictus*, adult fitness (survival and fecundity) is influenced by interactions of larval and adult temperatures, suggesting that investigations of effects of temperature based on a single life-history stage may be misleading. Future studies aim to address questions on life stage response of other mosquitoes to temperature variation and to other environmental factors.

O13.08

11:00 DIFFERENCES IN CONSUMPTION RATES BETWEEN LARVAL AND ADULT *LACCOPHILUS FASCIATUS RUFUS* (COLEOPTERA: DYTICIDAE) ON LARVAL *CULEX QUINQUEFASCIATUS* (DIPTERA: CULICIDAE)

Carmen Bofill, Donald Yee

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

The United States has approximately 169 species of mosquitoes, with the state of Mississippi home to 53 of those species. As resistance of many mosquitoes to insecticides has become increasingly apparent, other forms of control, including the use of natural predators, has become an important topic for vector control. The purpose of this study was to 1) quantify consumption rates of larvae and adults of the predaceous diving beetle *Laccophilus fasciatus rufus* on the mosquito *Culex quinquefasciatus*, and 2) to test the effect of intraguild predation and cannibalism on those consumption rates. For study 1, based on morphological differences between life stages and the energy requirements of growth for larval stages we predicted that larval *L. f. rufus* will consume prey at a faster rates than adults, whereas for study 2 cannibalism and IGP were predicted to affect the consumption rates of larval and adults compared to each alone. For the consumption trials, nine aquaria were used each crossed with different densities of early or late stage mosquitoes and different densities of plants. Testing predation on mosquitoes under different plant densities has been shown to affect predator-prey interactions. To quantify cannibalism and IGP, we crossed different densities of adult and larval predators with prey and plant densities. In general, adults consumed later instars to a greater extent compared to larvae, whereas larvae consumed earlier instars at a higher rate compared to adults. Studying these interactions improves our understanding of the effect of predation of predaceous diving beetles on mosquito populations.

O13.09

11:15 A COMPARATIVE STUDY ON THE HABITAT PROFILE OF THE LOWER MISSISSIPPI RIVER IN PORT GIBSON AREA AND THE POND NEAR THE FRONT GATE OF ALCORN STATE UNIVERSITY (ASU) CAMPUS DURING THE FALL OF 2014

Alex Acholonu, Amber Tatum, Shannen Price, Dontrell Guy

Department of Biological Sciences, Alcorn State University, Lorman, MS, USA

Water is critical for the survival of living things. Its quality is closely associated with the surrounding environment and the use made of it. It may also depend on whether the water body is lentic or lotic. The purpose of this study was to determine and compare the habitat profile of a river, a lotic body of water and a pond, a lentic body of water. Water samples were collected from the Mississippi River in Port Gibson Area and from the pond near the front gate of Alcorn State University (ASU) Campus in

the fall of 2013. They were tested with the LaMotte water pollution testing kits. The physical characteristics of the river were very similar to the ASU pond, except that the river turbidity was less than that of the pond. The temperature of both bodies of water was similar (18.3 degrees Celsius for the river and 18.7 degrees for the pond). The following parameters were tested: total alkalinity, ammonia-nitrogen, calcium, carbon dioxide, chlorine, copper, dissolved oxygen, magnesium, nitrate, hardness, pH, phosphate, and salinity. For the river, the parameters tested met the Mississippi Water Quality Criteria (MSWQC) with the exception of total alkalinity, hardness, and phosphate which exceeded the criteria. This was the same for the pond. Coliform bacteria were present in both river and pond. After the results were analyzed and compared, it was found that no body of water was strictly better than the other in terms of pollution. Rather some individual parameter readings varied.

11:30 BUSINESS MEETING

12:00 Lunch Break

POSTER PRESENTATIONS

Exhibit Hall C

1:00-2:45

P13.01

TOXICOLOGICAL EFFECTS OF INORGANIC NITROGEN POLLUTION ON AQUATIC ECOSYSTEMS

Md S. Zaman

Department of Biological Sciences, Alcorn State University, Lorman, MS, USA

Before the agricultural and industrial revolution, the rate of nitrogen supply on earth was limited to the rate of bacterial nitrogen fixation. However, increased human activities have caused a massive increase in available inorganic nitrogen leading to global eutrophication. This nitrogen led eutrophication has introduced a widespread degradation of aquatic habitat. Although, various different sources are responsible for such increase in bioavailable nitrogen, synthetic nitrogen fertilizers have been identified as the major source for such eutrophication. Data suggest that over the past few decades, biologically available nitrogen has been doubled. Data also indicate that over one half of the synthetic nitrogen fertilizer ever produced, has been used within the past 15 years. Studies further indicate that between 28% – 54% of lakes around the globe are eutrophic and nitrogen fluxes through rivers have increased by 10 – 15 folds or more. This phenomenon directly or indirectly effects the proliferation of selective primary producers and induces aquatic toxicity, hypoxia or anoxia, and an extensive death of invertebrates and fish, the most dramatic expression of aquatic eutrophication. In general, seawater animals seem to be more tolerant to the toxicity of inorganic nitrogenous compounds than freshwater animals, probably because of the enhancing effect of water salinity on the tolerance of aquatic animals. This paper will address a general overview on eutrophication of fresh water and marine ecosystems and its implications on aquatic ecological conditions.

P13.02

COMPREHENSIVE VIEW OF WATER QUALITY OF ROSS BARNETT RESERVOIR, MS, USA

LaTia Peavy¹, Padmanava Dash², Julius Ikenga³, James Pinckney⁴

¹*Department of Biology, Jackson State University, Jackson, MS, USA,* ²*Department of Geosciences, Mississippi State University, Starkville, MS, USA,* ³*Dept. of Natural Sciences & Environmental Health, Mississippi Valley State University, Itta Bena, MS, USA,* ⁴*Marine Science Program and Department of Biological Sciences, University of South Carolina, Columbia, SC, USA*

Ross Barnett Reservoir, a 32.31 square miles (83.67 km²) freshwater body, serves as the source of drinking water for the greater Jackson area and a major recreational destination in the state of Mississippi. The main objective of this research was to take a comprehensive view at the water quality of the Ross Barnett Reservoir. Two sampling trips were undertaken, on May 5 and July 10, 2013, to Ross Barnett Reservoir to collect water samples from twelve sites. In addition, a Hanna instrument was used to measure temperature, salinity, dissolved oxygen, and pH at each site. After completion of the trips, the water samples were vacuum filtered and the filter papers were processed for high performance liquid chromatography (HPLC) photopigments, cyanobacteria specific pigment phycocyanin (PC), suspended particulate matter (SPM), phycotoxins, bacterial counts, toxic metals, and microscopy analyses. The SPM analyses revealed that the organic SPM concentrations were higher than the inorganic SPM concentrations. The relative abundances of major algal groups suggested that the cyanobacterial concentrations were higher during the second in compared to the first sampling trip. The cyanotoxin, hepatotoxic microcystin, was found at all sites on both the dates. Bacterial counts revealed high concentration of total coliforms and heterotrophic bacteria at all sites and presence of *E. Coli* and *Enterococci* bacteria at few sites. Several toxic metals were also found. The finding of cyanobacteria, microcystin, toxic metals and *E. Coli* and *Enterococci* bacteria calls for continuous monitoring of the Ross Barnett Reservoir.

P13.03

APPLICATION OF MOLECULAR PEDIGREES TO STUDIES OF VARIANCE IN REPRODUCTIVE SUCCESS AMONG CAPTIVE SPOTTED SEATROUT BRED FOR STOCK ENHANCEMENT

Robert Edward Jackson, III¹, Carly Somerset², Eric Saillant³

¹*Cooperative Intern Program, Mississippi Gulf Coast Community College – Jackson County Campus Biological Science Students, Gautier, MS, USA,* ²*Gulf Coast Research Lab, Cedar Point Campus, Ocean Springs, MS, USA,* ³*Dept. of Natural Sciences & Environmental Health, Mississippi Valley State University, Itta Bena, MS, USA,* ⁴*National Aeronautic and Space Administration, Stennis Space Center, MS, USA*

The spotted seatrout is one of the most popular game fish in Mississippi coastal waters. Aquaculture for stocking is being investigated as a tool to increase recruitment and bring

additional fishing opportunities for recreational anglers. Management of genetic diversity is an essential task of a stock enhancement program and aims to avoid negative genetic impacts on wild stocks. Knowledge of the number of breeders contributing to released offspring groups, and the variance in reproductive success among contributing breeders, are required to evaluate and manage effects of the program on genetic diversity. In this work we use molecular pedigrees to determine the parentage of spotted seatrout juveniles produced at the Thad Cochran Marine Aquaculture Center. Tissue samples were obtained from all broodfish present in spawning tanks at the time of spawning and in a sample of 96 juveniles collected at the end of the nursery rearing period. DNA was extracted from tissue samples using a standard phenol-chloroform method and all specimens are currently being assayed at a suite of 15 microsatellite markers previously optimized in our laboratory. Parentage analysis will be used to assign each sampled offspring to their male and female parent among the broodstock. The results will allow determining the contribution of each male and female broodfish to the batch of juveniles, estimating the variance in reproductive success among parents and the effective number of breeders contributing to the population.

P13.04

COMPREHENSIVE VIEW OF WATER QUALITY OF LAKE ENID, MISSISSIPPI, USA

Michael Collins¹, Padmanava Dash², Julius Ikenga³, James Pinckney⁴

¹Department of Biology, Jackson State University, Jackson, MS, USA, ²Department of Geosciences, Mississippi State University, Starkville, MS, USA, ³Dept. of Natural Sciences & Environmental Health, Mississippi Valley State University, Itta Bena, MS, USA, ⁴Marine Science Program and Department of Biological Sciences, University of South Carolina, Columbia, SC, USA

Lake Enid represents one of the best recreational lakes in the state of Mississippi. The main objective of this research work was to take a comprehensive approach to investigate the current state of water quality of Lake Enid. A sampling trip was organized to Lake Enid on June 11, 2013. Prior to the sampling trip, a time-series of satellite data were processed and true color images were generated to examine the past occurrence of algal blooms in the lake. On the sampling trip, water samples were collected in clean Nalgene bottles and physical parameters of water (temperature, salinity, dissolved oxygen and pH) were measured using a Hanna instrument. The collected water samples were analyzed for photo-pigments using high performance liquid chromatography (HPLC), for cyanobacteria-specific pigment phycocyanin (PC), suspended particulate matter (SPM), phycotoxins, bacteria and toxic metals. The “greenness” in the time-series of true color images demonstrated the occurrence of algal blooms in lake in the past. The higher organic SPM than the inorganic counterpart suggested the presence of algal blooms in the lake. The HPLC pigment derived relative abundances of major algal groups suggested the dominance of cyanobacteria. Microcystin, a hepatotoxic cyanotoxin ranged between 0.18-0.39 µg/L. The bacterial counts revealed the dominance of heterotrophic bacteria and total coliform bacteria, but *E. Coli* and *Enterococci* bacteria were also present at many of the sites. Toxic metals were also found at all

sites. All these findings suggest that the water quality of Lake Enid needs to be closely monitored.

P13.05

MOLECULAR DETECTION OF SPOTTED FEVER GROUP *RICKETTSIA* IN *IXODID* TICKS FROM PAKISTAN

Kelsey Carter, Jaclyn Williams, Asma Kausar, Nabanita Mukherjee, Shahid Karim

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

Ticks are obligate hematophagous ectoparasitic members of the class *Arachnida* and order *Ixodida* that affect every class of vertebrate. In Pakistan, ticks transmit more diseases, to livestock and humans than any other arthropod. Among these diseases is rickettsiosis: an illness caused by spotted fever group *Rickettsia* (SFGR). *Rickettsia* spp. are obligate intracellular pathogens responsible for economic and livestock loss in Pakistan. The aim of this project was to detect spotted fever group *Rickettsia* (SFGR) in *Ixodid* tick species from the Kashmir, Punjab, and Sindh regions of Pakistan using an outer membrane protein A (ompA) PCR assay. The data reveals the Kashmir region of Pakistan has the highest number of *Ixodid* tick species infected with spotted fever group *Rickettsia*. This molecular epidemiology survey for SFGR in *Ixodid* ticks from Kashmir also reveals that *Haemaphysalis* spp. of ticks is more commonly infected with *Rickettsia* spp. than either the *Hyalomma* or *Rhipicephalus* spp. The Punjab and Sindh regions show that *Rhipicephalus* spp. of ticks is more likely than *Hyalomma* spp. to be infected with SFGR.

P13.06

WATER QUALITY AND HARMFUL ALGAL BLOOM ANALYSIS OF LAKE SARDIS, MISSISSIPPI, USA

Grant O. Ikenga¹, Padmanava Dash², Julius O. Ikenga¹, James Pinckney³

¹Dept. of Natural Sciences & Environmental Health, Mississippi Valley State University, Itta Bena, MS, USA, ²Department of Geosciences, Mississippi State University, Starkville, MS, USA, ³Marine Science Program and Department of Biological Sciences, University of South Carolina, Columbia, SC, USA

The objective of this study was to investigate the water quality issues of Lake Sardis and to analyze the HABs for toxins. Water samples from 12 different sites were collected in clean Nalgene™ bottles and taken to the lab and analyzed. The averages for pH, temperature, DO, TDS, and Salinity per on-site HI 769826 meter with probes were 7.15, 27.9° C, 6.57ppm, 43.1 ppm, and 0.39, respectively. Other water parameters were tested using Lab-Aid Water Pollution Test kit™. No copper, chromium, cyanide, iron, nitrate nitrogen, or sulfide was detected at any of the sites. A trace of ammonium nitrogen was present at all the 12 sites. Sites 1, 4, and 12 have traces of silica while sites 10-12 have traces of chlorine. A trace of phosphorous was found at the ramp area. All the 12 sites tested positive for total coliform bacteria (20 - 1900 TCC/ml). Five major algal blooms were detected plus the cyanobacteria. Microcystin, a hepatotoxin (0.2-0.4 µg/L), was present at all sites. SPM (1-15 mg/L) was measured at all sites. Five heavy

metals (5-445 mg/L) were found at all sites. Manganese (25 mg/L) was found at site 9 only. The HABs levels found in this study are higher than those of last year. The finding of coliforms, heavy metals and microcystin continues to cause concerns for safe use of Lake Sardis. Additional studies are indicated to elucidate seasonal levels of HABs and their relationship to the contaminants found.

P13.07

INVESTIGATION OF THE WATER QUALITY OF LAKE GRENADA, MS, USA

Tasha Norwood¹, Padmanava Dash², Julius Ikenga³, James Pinckney⁴

¹Department of Biology, Jackson State University, Jackson, MS, USA, ²Department of Geosciences, Mississippi State University, Starkville, MS, USA, ³Dept. of Natural Sciences & Environmental Health, Mississippi Valley State University, Itta Bena, MS, USA, ⁴Marine Science Program and Department of Biological Sciences, University of South Carolina, Columbia, SC, USA

Lake Grenada (33.8196, -89.7737), located near the city of Grenada, MS, is one of the largest lakes in Mississippi. The main objective of this research was to investigate the water quality of Lake Grenada. First, a time-series of true color satellite images were generated and examined for the occurrence of algal blooms in the past. The lake was sampled on June 2, 2013. Clean Nalgene bottles were used to sample water at the twelve selected sites. A portable Hanna Instrument (HI769828) was used to measure temperature, salinity, dissolved oxygen and pH at each site. High Performance Liquid Chromatography (HPLC) analysis was performed to obtain algal pigment concentrations. The collected samples were also analyzed for cyanobacteria specific pigment phycocyanin (PC), Suspended Particulate Matter (SPM), phycotoxin, toxic metal and microscopy. The organic SPM was higher at seven sites out of the total twelve sites. The relative abundances of major algal groups revealed the dominance of euglenophytes in the lake with the presence of cryptophytes and cyanobacteria. Microcystin a hepatotoxic cyanobacterial toxin was found in the lake with concentration ranging from 0.18-0.43 µg/L. Among the four types of bacteria counted, total coliforms and heterotrophic bacteria were present at all the sites in high concentrations, but *E. Coli* and *Enterococci* bacteria were also present at few sites. Several toxic metals were also found. These findings suggest the need of continuous monitoring of the water quality of Lake Grenada.

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Agee, Joshua	Bullard, Rebekah	Gubert, Catherine
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Anderson, John F.	Carter, Kelsey	Haque, Zahur
Anglin, Sarah Lea	Chang, Sam	Heda, Ghanshyam D.
Apanaskevich, Dmitry	Christy, Megan	Heinhorst, Sabine
Appukutti, Nadeema	Coleman, Kayla	Hou, Yuxuan
Arnold, Matthew Grant	Cooley, Amanda	Howard, Lacey Rachel Lee
Auton, Matthew	Crossley, Davida	Huang, Faqing
Aylward, Madeline	Denkins, Pamela	Huang, Jun
Bai, Fengwei	DeRussy, Bernadette	Humphrey, Samantha
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Bengtén, Eva	Fan, Zhen	Jones, Bradley
Bhuiyan, Shakhawat	Feng, Manliang	Karim, Shahid
Blancett, Logan	Finch, Ariel	Kibet, Daniel,
Bolden, Chris	Gates, Linda	Kolli,Udhghatri
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Lowery, Jordan Elizabeth	Samanta, Dhritiman	Taylor, Erin
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Osborne, Amanda	Sherpa, Tshering Dolma Lama	Wilson, Melanie
Pacurari, Maricica	Shi, Youngliang	Wood, Jamie L
Pande, Manju	Smith, Erin Michelle	Xu, Hao
Parker, Terra Leigh	Soma, Shiva	Yan, Jingyi
Paul, Amber	Spangler, Joseph	Yang, Chunli
Peeples, John	Spell, Casey Andrew	Zhou, Wu
Raucher, Drazen	Stec, David E.	Zhu, Hong
Ray, Paresh	Subba, Barsha	
Roberts, Evan	Sundaresan, Alamelu	

CHEMISTRY AND CHEMICAL ENGINEERING

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Ahmed, Lucky	Burch, William	Crowley, Aaron
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Allred, Anna	Byun, Youngjoo	Das, Prasanta
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Arslan, Zikri	Celik, Ahmet	Djouda, Hyppolite
Ates, Mehmet	Cho, Sijin	Donahue, Matthew
Banerjee, Souvik	Choi, Seunghyun	Dong, Ruipeng
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Bornscheuer, Uwe	Copeland, Kari	Fronczek, Frank R.

Gana, Abdallah	Khansari, Maryam Emami	Ondera, Thomas
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Goetz, James	Kotapati, Harikiran	Park, Johnhyun
Golebiowski, Marek	Kramer, Wolfgang	Paszkiewicz, Monika
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Gorb, Leonid	Lassiter, Brooke	Patton, Derek
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Hamme, Ashton	Lee, Ken	Perales, Selene
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Heusser, Hannele	Magers, David	Rasulev, Bakhtiyor
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Hoth, Lauren	McNatt, Michael	Rhaman, Mhahabubur
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Hwang, Huey-Min	Miao, Wujian	Robinson, Jamarii
Imamoglu, Husniye	Mohan, Dinesh	Rogers, Christian
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Jeon, Young	Mullins, Courtney	Saloni, Julia
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Khawaja, Muzamil	Odom, Katie	Setzer, William
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Kendrick, Laken	Omollo, Ann	Sherpa, Tshering Lama



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Sitole, Lungile	Tu, Chingkuang	Wong, Bryan
Smith, Maureen	Valente, Edward	Wusimanjiang, Yiliyasi
Smith, Shelley	Venkatraman, Ramaiyer	Xiong, Li
Smothers, Greyson	Vogel, Emily	Yi, Jiang
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Sridhar, Siddarth Arun	Ward, Denise	Yilmaz, Vedat
Stepnowski, Piotr	Watts, John	Yu, Hongtao
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Strange, Greg	White, Jeremy	

ECOLOGY AND EVOLUTIONARY BIOLOGY

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Coleman, Andrew	Keating, Michael P.	Ochs, Clifford A.
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Diehl, Robert	Mann, Debora	Seymour, W. Randy
Giglio, Ellie	Mann, Tom	Toyota, Cory
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GEOLOGY AND GEOGRAPHY

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Ayers, Michael	Heitmuller, Frank	Starnes, James
Bass, Joby J.O.	Henry, Catherine	Steponaitis, Vincas P.
Bograd, Michael B.E.	Howell, John T.	Thompson, David
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Dockery III, David T.	Musselman, Zachary A.	Zale, Joslyn
Galicki, Stan	Peacock, Keith	
Hanes, David	Phillips, George Edward	

HEALTH SCIENCES

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Alexander, Chakiras S.	Bodkins, Stacey	Brown, Meghan E.
Austin, Mark	Bouchette, Tanya	Buntyn, Robert
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Campbell, Graeme	Kent, James Jr.	Rucker, Carlos
Campbell, Nathan	Krasin, Matthew	Sampson, Laquandres
Cason, Zelma	Krause, Denise	Sanders, Brittany
Castillo, Javier	LaMarca, Babbette	Shen, Shuo
Clarkson, Maggie	Landreth, Ron	Sigmon, Katelynn
Cornelius, Denise	Lawyer, Tracye	Sikes, Jessica
Deaton, Ally	Lee, Jonathan	Slaughter, J.
Drayton, Q'taria	Leonard, Hilliary	Slaughter, Tiffani
Duhe, Roy	Lester, Gladys	Smith, Marion
El-Khattouti, Abdelouahid	Ma, Tangeng	Spires, Denisha
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Farah, Ibrahim	May, Warren	Tardy, Felicia M.
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Freeman, Kevin	Meade, John C.	Thomas, Alexia
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Goswami, Dharmendra	Muhammad, Maria	Wallace, Kedra
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Grimes, Jay	Nichols, Elizabeth	Wang, Xuexiang
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Groves, Melanie	Paige, Adrienne	White, Tiffani
Guthrie, K.	Parish, J	Wilkins, Renee
Harmon, Ashlyn	Paul, Ian	Williams, Chase
Harpole, Jennifer	Pennington, Alyssa	Williams, Ebony
Hassan, Mohamed	Porter, John	Williams, Jan
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Heda, Rajiv P.	Reese, Jayla	Womack, Judson
Holt-Gray, Carlene	Riaz, Somair	Wuerdeman, M
Ingram, K.	Rigney, Debbie	Wuerdeman, W.
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HISTORY AND PHILOSOPHY OF SCIENCE

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Curry, Kenneth J.	Morton, Arthur L.	Woods, Anthony William
Dodge, Michael	Rainer, Georgia Rae	
Hamilton, Adam	Smilo, Rachel	

MARINE AND ATMOSPHERIC SCIENCES

Abdullah, Warith	Jiang, Yi	Russo, Corey D.
Bergeron, Joshua Stephen	Klinck, John M	Shiller, Alan
Bidegain, Gorka	Korty, Robert	Torralba, Manolito
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Brunner, Charlotte	Longwith, Hope	White, Loren
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Cruz, Valerie	Nelson, Karen E.	Wilson, Christopher
Gerard, Alan	Perry, Joseph	Yeager, Kevin
Gilbert, Melissa	Powell, Eric N.	Zamora, Ryan
Grimes, D. Jay	Reddy, Suseela Remata	Zhang, Zhenbu
Ho, Peng	Roberts, Hannah	
Hofmann, Eileen E.	Roberts, Jerryl	

MATHEMATICS, COMPUTER SCIENCE AND STATISTICS

Aditya, Krishna	Jackson, Jacqueline	Taylor, Jonathan
Adzanu, Steve	Johnson, William D.	Tian, Haiyan
Ali, Kamal	Keys, Jasmine D.	Tiwari, Tapan
Bishop, Charles	Kim, Hyunju	Toole, Cornelius
Bridgers, Ya'Shonti	Kumar, Namarta	Trivedy, Chunmun
Brumfield, Marcus	Leszczynski, Jerzy	Turner, Leonard
Clark, Joseph	Matthews, Alvin	Vanderpuye, Richard
Fitch-Randolph, Casey	Mohammed, Mohammed	Wan, Xiu-Feng
Franklin, Patricia	Ni, Xianglong	Warre, Lawrence
Gadewadikar, Jyotirmay	Onyenweaku, Ifeanyi	Wilson, Dameisha L.
Hamadain, Elgenaid	Simmons, Jarrett C.	Yang, Jialiang
Han, Hongmei	Robinson, Canary	Zhang, Dachuan
Hassan, Wissam Ahmed	Sarigul, Erol	Zhang, Lei
Ibrahim, Jamil	Shih, H.R.	
Jackson, Alvin	Smith Brandi	

PHYSICS AND ENGINEERING

Adhikari, Narayan	Datta, Alakabha	Park, Jihoon
Adhikari, Anil	Dikshith, Vivek	Rashed, Ahmed
Adikaram, Saminda	Elder, Steven	Raspet, Richard
Adzanu, Steve	Gadewadikar, Jyotirmay	Ray, Debisree
Afanasjev, Antaoli	Gaerlan, Mikhail	Ring, Peter
Agbemava, Sylvaster	Gao, Caixia	Sharma, Preet
Aghili, Mir Emad	Ghimire, Maheshwar	Shivashankara, Shanmuka
Alexander, Ivy	Haque, Amin	Singh, Anant K.
Ali, Marina	Hickey, Craig	Smith, George Blaise
Ali, Mohammed	Hong, Yang-Ki	Stephens, James
Aspin, Zachary Sullivan	Jarillo-Herrero, Pablo	Subedi, Nava Raj
Berg, Matthew	Jones, Y.	Tanner, Angelle
Biswas, Parthapratim	Kandula, Bharath	Thompson, Scott
Brady, Melanie	Kaya, Malik	Tillman, Terika
Brandenberger, Robert H.	Kim, Seong-Gon	Tracy, James Lee Jr.
Buck, Jessica	Kim, Sungho	Vera, Michael
Cai, Yifu	Labuda, Cecille	Wang, Chuji
Chatterjee, Chandrima	Madsen, John Kristian	White, Ashley
Chen, Pisin	Mekonen, Sirak	Wilder, Brenda
Church, Charles	Naderyan, Vahid	Williams, Ro'chelle
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Clarke, Cameron	Nusierat, Ola	Winger, Jeffry
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Cramaldi, Lucien	Ostrovskii, Igor	
Das, Himangshu S.	Pandey, R.B.	

PSYCHOLOGY AND SOCIAL SCIENCES

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Bell, Lakisha	Crawford, Amber	Johnson, Gary
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Braddy, Maurcia	Erby, Adrienne	Lowery, Ashley
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Sher, Mackenzie	Watson, Sheree	Woodard, T.
Singh, Madhu	Welch, Courtney	Young, Brittany
Tyson, Melody	Williams, Wynettee	

SCIENCE EDUCATION

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Clary, Renee M.	McCormick, Shana	Shaw, Joyce
Crabtree, Caleb	McDonald, Kalyx	Walker, Ryan Mathew
Davis, Jillian	McKissick, Bethany	Wandersee, James H.
Farmer, Courtney	Nguyen, Emily	Whitaker, Blake
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Laney, Kage	Radencic, Sarah	
Lewis, Veshell	Remo, John Paul	

ZOOLOGY AND ENTOMOLOGY

Acholonu, Alex	Ikenga, Grace C.	Price, Shannon
Bofill, Carmen	Ikenga, Grant O.	Saillant, Eric
Carter, Kelsey	Ikenga, Julius O.	Silwal, Saurav
Collins, Michael	Jackson III, Robert Edward	Somerset, Carly
Dash, Padmanava	Karim, Shahid	Tatum, Amber
Ezeakacha, Francis	Kausar, Asma	Williams, Jaclyn
Glasgow, William	Mukherjee, Nabanita	Yee, Donald
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The College of Science and Technology consists of 13 degree granting schools and departments and offers programs at the university's campuses and teaching sites in Hattiesburg (main campus), Ocean Springs (Gulf Coast Research Laboratory), Biloxi (Keesler AFB), Long Beach (Gulf Park Campus), Gulfport (Student Services Center), and Stennis Space Center.

The largest college in the Southern Miss system, the College of Science and Technology had an enrollment of 2,955 undergraduates and 575 graduate students in fall of 2012, served by 174 full-time faculty members.

In fiscal year 2010, the annual budget of the college was more than \$60 million.

Between 2008 and 2012, the college received more than \$194 million in grants and contracts.



**Mississippi IDeA Networks of Biomedical Research Excellence
and the Mississippi Functional Genomics Network, USM**

<http://msinbre.org/>

<http://www.usm.edu/research/biological-sciences>

The Mississippi-INBRE network seeks to enhance research competitiveness in the State and engage talented investigators and students in biomedical research projects that will impact the health of the citizens of Mississippi. The scientific focus of the MS-INBRE is obesity, cancer, and sexually transmitted diseases.

Based at Southern Miss in Hattiesburg, the Mississippi Functional Genomics Network is a collaboration with other research institutions in Mississippi with the goal of enhancing biomedical research and training in the state. A central feature of the project is to foster collaboration between laboratories at undergraduate institutions (newly established in the early stages of the project) and experienced NIH investigators at the research institutions in Mississippi, particularly at the University of Mississippi Medical Center in Jackson and at Southern Miss.

UMMC
Office of Research

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Department of Electrical and Computer Engineering

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- BS in Computer Engineering
- BS in Telecommunications Engineering

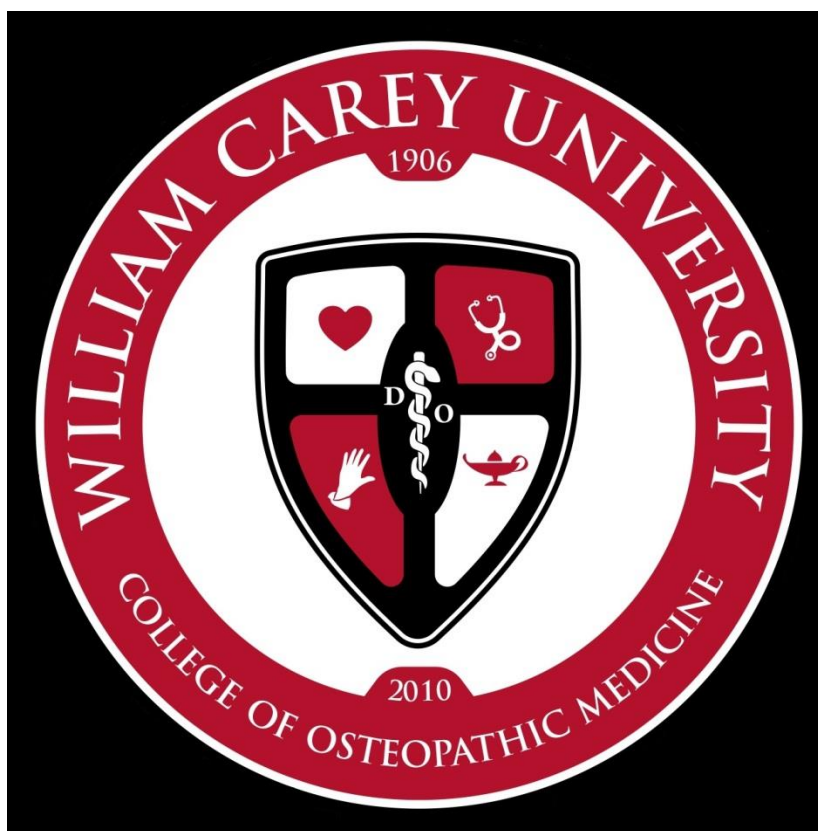
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UMMC
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<http://www.umm.edu/graduateschool/>

The mission of the School of Graduate Studies in the Health Sciences is to (1) train highly qualified researchers who will make significant contributions to the scientific literature; (2) educate those who will train the next generation of biomedical scientists and health care professionals; (3) foster the spirit of scientific inquiry; and (4) promote an environment that embraces diversity and cultural differences.



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UMMC
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The state's flagship nursing school, the University of Mississippi School of Nursing proudly offers bachelor's, master's and doctoral nursing programs. Located on the state's only academic health science campus, the School of Nursing provides students with a variety of unparalleled clinical and classroom learning experiences; an interactive, student-focused technology education; and an extensive opportunity for interdisciplinary collaboration in clinical practice and research.