

**MISSISSIPPI
ACADEMY OF SCIENCES**



SEVENTY-SIXTH ANNUAL MEETING

February 23-24, 2012

**Lake Terrace Convention Center,
Hattiesburg, MS**

**Supported by
University of Mississippi Medical Center**

Journal of the Mississippi Academy of Sciences

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GENERAL SCHEDULE
MISSISSIPPI ACADEMY OF SCIENCES
Seventy-Sixth Annual Meeting
 February 22-24, 2012

WEDNESDAY, FEBRUARY 22, 2012

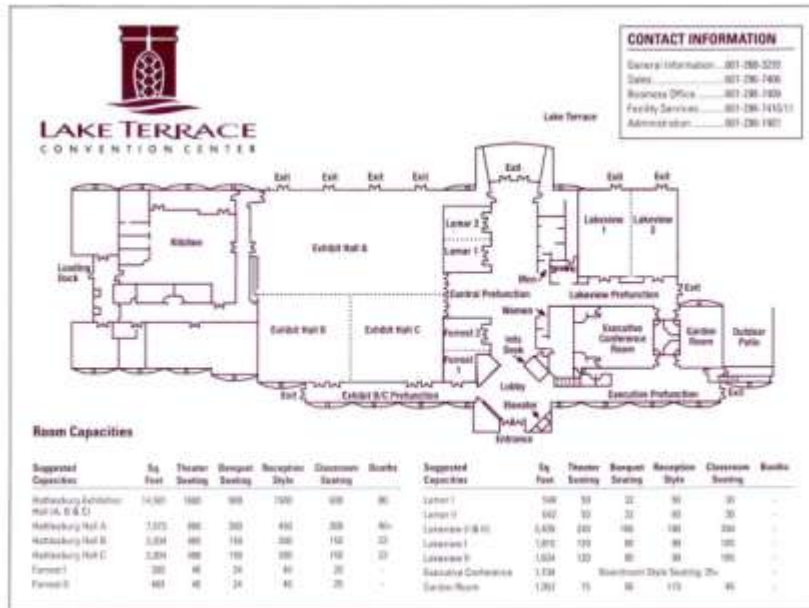
TIME	EVENT	LOCATION
5:00 PM to 7:00 PM	Board of Directors Meeting	TBA

THURSDAY, FEBRUARY 23, 2012

TIME	EVENT	LOCATION
7:30 AM to 5:00 PM	Registration	Lobby
8:00 AM to 4:00 PM	Exhibits & Health Fair	Lobby
8:30 AM to 9:00 AM	Dr. Michael Ryan (Opening Presentation)	Exhibit Hall A
	What To Do With Your Science Degree.....	
9:00 AM to 4:15 PM	Divisional Programs	See Specific Division Info
10:15 AM to 12:00 PM	STAT For DATA Management, Statistical Analysis, and Graphics	Lamar II
Noon to 1:00 PM	Justice Jess Dickinson	Exhibit Hall A
	Was Shakespeare Wrong about Killing All the Lawyers?	
1:00 PM-2:00 PM	TIPS AND TRICKS FOR iPad	Lamar II
2:00 PM to 4:00 PM	Innovative Health Professional Education: The Challenges of Integration	Conference Room
2:15-PM to 4:15PM	Symposium-NSF Career Awardees	Exhibit Hall B
4:30 PM to 6:00 PM	Presentation of Awards, and 2012 Dodgen Lecture -Dr. Daniel Jones Health Challenges in Mississippi: Opportunities and Responsibilities for Science	Exhibit Hall A
6:00PM to 8:00 PM	Reception and Graduate Poster Session	Exhibit Hall C

FRIDAY, FEBRUARY 24, 2012

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	TBA
9:00 AM to 11:30 AM	Health Fair	TBA
Noon to 1:00 PM	Michael Jones, Debra Minor, Rick DeShazo	Exhibit Hall A
	Community Health Advocate Program	
3:00PM	MAS Buisness Meeting	Exhibit Hall A



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If Coming from the South on I-59:

Take Exit 67A
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 At first traffic light turn left

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8. Regions Bank
9. Mississippi Functional Genomics Network , MS INBRE, USM
10. Robert Wood Johnson Foundation New Careers in Nursing Scholarship Program

2012 Dodgen Lecture

Thursday

4:30 PM

February 23, 2012

HEALTH CHALLENGES IN MISSISSIPPI: OPPORTUNITIES AND RESPONSIBILITIES FOR SCIENCE

given by



Dan Jones, M.D.

Daniel W. Jones, M.D. is the 16th Chancellor of the University of Mississippi. As Chief Executive Officer he is responsible for the operation and management of a four campus comprehensive university. The University includes nine schools at Oxford, five at the Medical Center in Jackson, an Advanced Education Center in Tupelo and the Desoto County Center in Southaven. Through these four campuses, the University provides extraordinary educational opportunities for more than 19,000 students.

Prior to his appointment July 1, 2009, Dr. Jones was Vice Chancellor for Health Affairs, Dean of the School of Medicine and Herbert G. Langford Professor of Medicine at the University of Mississippi Medical Center (UMMC) in Jackson. He served as the institution's chief executive officer for six years overseeing the five schools and the health system. Active in the American Heart Association (AHA), Dr. Jones was the 2007 2008 national president and served on the National Board of Directors for several years. Previously he chaired the strategic planning task force and the association's International Committee. He is also a member of AHA's Council for High Blood Pressure Research, and serves the association as a national spokesperson on high blood pressure.

A native Mississippian, he graduated from Mississippi College in 1971, earned his M.D. in 1975 at the University of Mississippi Medical Center and completed his residency in internal medicine there in 1978. He had a private practice in Laurel, Mississippi. In 1985, he went to Korea as a medical missionary. A fellow of the American College of Physicians, Dr. Jones is certified by the American Board of Internal Medicine and is designated as a specialist in clinical hypertension by the American Society of Hypertension Specialists. He has been named one of the "Best Doctors in America" from 1996 -2008. He is a member of Alpha Omega Alpha national honor medical society.

Special Presentation

Thursday

8:30 AM

February 23, 2012

WHAT TO DO WITH YOUR SCIENCE DEGREE. IT'S ALL ACADEMIC?

given by

Michael Ryan



Michael Ryan is currently an Associate Professor of Physiology & Biophysics at the University of Mississippi Medical Center in Jackson. He earned a Bachelor of Science in Biology at the State University of New York at Cortland and his Ph.D. in Physiology at the University at Buffalo in New York. After completing his graduate training, Dr. Ryan conducted postdoctoral work at the University of Iowa before joining the faculty in Jackson in 2004. His research is funded by the National Institutes of Health and is focused on understanding integrative mechanisms that cause hypertension. In addition to his research program, Dr. Ryan is active in undergraduate and graduate education both at the medical center and nationally where he serves on the Education Committee of the American Physiological Society. He has given a talks about science careers and mentoring to students and fellows at local, regional, and national meetings and while visiting other universities.

Special Presentation

Noon Thursday
February 23, 2012

WAS SHAKESPEARE WRONG ABOUT KILLING ALL THE LAWYERS?

Given by

Justice Jess Dickinson



Justice Jess H. Dickinson was born in Charleston, Mississippi, in 1947. After graduation from East Tallahatchie High School in 1965, he attended Mississippi State University, receiving his Bachelor of Science degree in 1978. He received his Juris Doctor cum laude from the University of Mississippi School of Law in 1982, where he served on the editorial board of the Mississippi Law Journal.

After practicing law for one year in Jackson, and 20 years in Gulfport, Justice Dickinson served as a Forrest County Circuit Court Judge, by special appointment of the Mississippi Supreme Court. His service on the Supreme Court began in January 2004. His first year on the Court, Justice Dickinson was awarded the Chief Justice Award for his work in advancing the administration of justice. He again received the Chief Justice Award in 2010 for his work on improving access to justice for the poor in Mississippi. In 2009, the Mississippi Volunteer Lawyers Project awarded Justice Dickinson its Pro Bono Pioneer Award.

Justice Dickinson has served on the adjunct faculty of William Carey College and Mississippi College School of Law where, in 2009, he was elected by the law students as Adjunct Professor of the Year. He served two terms on both the Ethics Committee and the Professionalism Committee of the Mississippi Bar. He also serves as the Supreme Court's liaison to organizations providing legal services to the poor, and is a charter member of the Mississippi Access to Justice Commission

In his spare time, he enjoys music and plays over 30 musical instruments – he has released 2 CDs – and he plays in a bluegrass band. One of his 5 children, Sam Dickinson, will graduate this summer from the advanced nursing program at the UM Med. Center



**Special Presentation
Noon Friday
February 24, 2012**

COMMUNITY HEALTH ADVOCATE PROGRAM
given by

Michael Jones



Deborah Minor



Richard D. deShazo



Michael Jones is the Chief Community Health Officer for the University of Mississippi Medical Center's Office of External Affairs. In this role, Michael is responsible with linking the medical center with various community-based partners to improve the health status of Mississippians. Specifically, he heads up the Mississippi Healthy Linkages Initiative, which is collaboration between the University of Mississippi Medical Center, the Mississippi State Department of Health, and the 21 Federally Qualified Health Centers in the state of Mississippi. The ultimate goal of Healthy Linkages is to address the various causes of health care problems experienced by some of Mississippi's most vulnerable citizens. Michael also directs the University of Mississippi Medical Center's Community Health Advocate program which is designed to partner with the faith-based community and other partners to train lay people to assist individuals in their communities to adopt healthy lifestyles. In addition to his duties at the University of Mississippi Medical Center, Michael serves on various committees including the leadership board for the Mississippi chapter of the American Diabetes Association, the state Community Health Worker work group, the Mississippi Health Insurance Exchange "Educated Health Care Consumers" subcommittee, and various other community-based and state committees. Michael is currently a member of the 2011-2012 Leadership Development Program for the University of Mississippi Medical Center. This program is designed to assist leaders in improving his or her skills essential to leading teams within an academic health sciences center. Michael received his formal nursing education at Meridian Community College and the University of Mississippi Medical Center's School of Nursing. He is currently pursuing a doctoral degree in Family Nursing through Hampton University (Hampton Virginia). Michael is a member of Sigma Theta Tau (National Honor Society of Nursing) Theta Beta and Omicron Delta Chapters.

Debbie received her Doctor of Pharmacy degree from the University of Mississippi in 1997, a B.S. degree in Pharmacy in 1982, and a B.S. in Psychology from Millsaps College in 1978. Debbie is currently employed at the University of Mississippi Medical Center (UMMC) as a Professor and Executive Vice Chair for the School of Medicine's Department of Medicine. She also has faculty appointments in the Departments of Pharmacy Practice and Family Medicine. Debbie has worked in the areas of community, institutional, consultant, academic and clinical pharmacy over the past 30 years. Debbie's clinical practice is at the UMMC Hypertension where she serves as a preceptor for pharmacy and medical students and also participates as a mentor for high school and undergraduate college students through the NIH Jackson Heart Study and Howard Hughes Medical Institute. She has been the recipient of numerous awards and among her recent honors are the 2009 American Heart Association Volunteer Advocate of the Year award, the Mississippi Pharmacists Association's 2009 Bowl of Hygeia Community Service Award, and the 2009 University of Mississippi School of Advanced Pharmacy Practice Experience Preceptor of the Year. In 2008, Debbie received the University of Mississippi Medical Center Department of Medicine's Community Service Award of Excellence and a State of Mississippi Commendation for Public Policy Processes from the Office of Governor Haley Barbour. Debbie is the author/co-author of many publications and abstracts, and co-editor of the book, *Hypertension Pearls*. She is a regular manuscript and abstract reviewer for the leading hypertension journals as well as for several other health care related journals and organizations. Debbie was recently honored by appointment to the Editorial Board for the Journal of Clinical Hypertension. She has served as an investigator or co-investigator for numerous studies surrounding hypertension, diabetes and cardiovascular disease risk factors. Health literacy is a particular interest for her and she was the co-developer of the statewide "Know Your Numbers" campaign, adopted and disseminated by the Mississippi State Department of Health and many other organizations.

Dr. Richard D. deShazo, MD, practices adult and pediatric allergy & immunology and rheumatology in Jackson, Mississippi. A graduate of the University of Alabama at Birmingham School of Medicine in 1971, Dr. deShazo, completed an internship in pediatrics at the Children's Hospital of the University of Alabama at Birmingham, residency in internal medicine, and fellowship in adult and pediatric allergy/immunology at the Walter Reed Army Medical Center, and a research fellowship at the Walter Reed Army Institute of Research in Washington, DC. He is the author or co-author of more than 200 scientific publications in the areas of clinical immunology and has served on the editorial boards of four scientific journals. He presently serves as Associate Editor of the American Journal of Medicine. Dr. deShazo served 12 years with distinction as chair of the Department of Medicine at University of Mississippi Medical Center. During this time, he served on the American Board of Internal Medicine, American Board of Allergy and Immunology, American Board of Medical Specialists, and as President of the Association of Professors of Medicine. He is a strong advocate for a healthy Mississippi and widely known for his weekly Southern Remedy radio program and the quarterly Southern Remedy health documentary series television series featured on Mississippi Public Broadcasting. Through these health literacy programs, as well as his activity in the community, his goal is to help Mississippi citizens improve their personal health.



OVERVIEW OF DIVISIONAL PROGRAMS

General Symposiums

Thursday, February 23

Location: Exhibit Hall A

8:30 WHAT TO DO WITH YOUR SCIENCE DEGREE. IT'S ALL ACADEMIC?
12:00 WAS SHAKESPEARE WRONG ABOUT KILLING ALL THE LAWYERS?

Thursday, Evening

Location:

5:15 THE DODGEN LECTURE:" HEALTH CHALLENGES IN MISSISSIPPI: OPPORTUNITIES
AND RESPONSIBILITIES FOR SCIENCE

6:00 DODGEN RECEPTION AND DIVISIONAL POSTER SESSIONS

General Symposiums

Friday, February 23

Location:Exhibit Hall A

12:00 COMMUNITY HEALTH ADVOCATE PROGRAM

AGRICULTURE AND PLANT SCIENCE

Friday, February 23

FRIDAY MORNING

Room: Conference Room

8:30 OPENING PRESENTATION
9:00 EFFECTS OF CHELATING AGENT'S APPLICATION ON SOYBEAN MINERAL COMPOSITION
AND SEED PROTEIN, OIL, AND FATTY ACIDS
9:15 EFFECT OF FOLIAR VS SOIL APPLICATION OF POTASSIUM ON SOYBEAN SEED
COMPOSITION
9:30 VACCINATION EFFICIENCY OF F-STRAIN DERIVED LIVE ATTENUATED MYCOPLASMA
GALLISEPTICUM VACCINES IN LAYERS
9:45 EFFECT OF CASEIN HYDROLYZATE ON COLIFORM GROWTH ON BEEF
10:00 BREAK
10:15 EXAMINATION OF A PUTATIVE ORGANELLE IN POLLEN GERMINATION
10:30 DEVELOPMENT OF DETECTION METHOD FOR *ESCHERICIA COLI* O157:H7 AND NON O157:H7
IN CATFISH
10:45 DIVISIONAL BUSINESS MEETING
Student Awards Sponsored by:
Mississippi State Poultry Science Department
Mississippi Sate Food Science Nutrient Health Promotion Department
11:45 LUNCH



DIVISION POSTER PRESENTATIONS

Authors should be available with their posters to answer questions 1:30-2:45 PM

1. EFFECTS OF LEAD EDTA AMENDMENTS ON THE GROWTH OF *WAUTERSIA METALLIDURANS* IN LIQUID NUTRIENT MEDIUM
2. GROWTH AND HEAVY METAL ACCUMULATION OF PLANTS GROWN IN METAL-CONTAMINATED STERILE AND NONSTERILE SOIL
3. DISTINCTIVE SEQUENCE FEATURES OF *CANDIDA ALBICANS* UNIVERSAL STRESS PROTEINS
4. COMPARISON OF Highbush and Rabbiteye Blueberries under Scanning Electron Microscope
5. RELATIONSHIP OF INDICATOR AND PATHOGENIC MICROORGANISMS ON CATFISH PRODUCTS

CELLULAR, MOLECULAR AND DEVELOPMENTAL BIOLOGY

Thursday, February 23

THURSDAY MORNING

Room: Lakeview I

- 8:30 DIFFERENTIAL EFFECTS OF CHAPERONE PROTEIN EXPRESSION ON THE RATES OF SPONTANEOUS *IN VIVO* FORMATION OF THE YEAST PRION [URE3]
- 8:45 DISCOVERY OF THE NOVEL SHELL PROTEIN CSOS1D COMPLICATES THE CURRENT MODEL OF THE CARBOXYSOME
- 9:00 NON-ESTERIFIED FATTY ACIDS GENERATED DISTINCT LOW-MOLECULAR WEIGHT AMYLOID- β (A β 2) OLIGOMERS ALONG PATHWAY DIFFERENT FROM FIBRIL FORMATION.
- 9:15 IDENTIFICATION OF READER PROTEINS OF HISTONE POST TRANSLATIONAL MODIFICATIONS
- 9:30 HUMAN GRANULIN-A PROTEIN INTERACTS WITH AMYLOID-B42 (AB42) PEPTIDE INVOLVED IN ALZHEIMER'S DISEASE IN A CONCENTRATION-DEPENDENT MANNER
- 9:45 IMMUNO-PROTEOME OF PROLONGED TICK ATTACHMENT ON THE HOST
- 10:00 Break
- 10:15 THE CROSS-TALK BETWEEN INTEGRIN AND GROWTH FACTOR SIGNALING REGULATES THE DIFFERENTIATION OF FETAL CORTICAL NEURONS
- 10:30 THE USE OF ENDOGENOUS DNA SUBSTRATES TO MEDIATE THE EXTRACELLULAR FUNCTION OF THE DNA BINDING PROTEINS
- 10:45 THE T-BOX TRANSCRIPTION FACTOR MIDLINE COLLABORATES WITH THE INSULIN-REGULATED DFOXO TRANSCRIPTION FACTOR TO REGULATE CELL-FATE SPECIFICATION IN THE DEVELOPING EYE OF *DROSOPHILA MELANOGASTER*
- 11:00 IDENTIFICATION OF LIPID TRANSFER PROTEINS AS TARGETS OF A COTTON FIBER RING-TYPE UBIQUITIN LIGASE
- 11:15 EDUCATIONAL USE OF STRUCTURE VISUALIZATION IN THE MOLECULAR BIOSCIENCES

11:30 Business Meeting

12:00 – 1:15 Lunch



THURSDAY AFTERNOON

Room: Lakeview I

- 1:15 EFFECTS OF MIRNA ON BETA TUBULIN ISOTYPES
1:30 DETERMINATION OF COPY NUMBER OF HISTONE H2B IN *HISTOPLASMA CAPSULATUM*
1:45 THE EFFECTS OF STATINS ON LARVAL SHEEPSHEAD MINNOW AND ZEBRAFISH
2:00 IMMUNOSTIMULANT SIRNA TO TARGET CANCER CELLS

Thursday 6:30– 8:00 Poster Session---Exhibit Hall C

1. THE VTI FAMILY OF SNARE PROTEINS IS ESSENTIAL FOR TICK FEEDING AND MEDIATES SALIVA SECRETION
2. ADVANCING RFLP TECHNIQUE IN IDENTIFYING *RICKETTSIAL* SPECIES
3. RESPONSE OF CYTOCHROME P450 1A AND VASCULAR ENDOTHELIAL GROWTH FACTOR IN *CYPRINODON VARIEGATUS* WHEN EXPOSED TO SOURCE/DISPERSED OIL AND HYPOXIA.
4. STRUCTURAL AND FUNCTIONAL CHARACTERIZATION OF AQUAPORIN 7
5. THE ROLE OF THE CARBOXYSUME SHELL PORES IN METABOLITE FLUX
6. DO TRANSFER NUCLEIC ACIDS (tRNAs) HAVE A MAJOR ROLE TO PLAY IN THE DEVELOPMENT OF PEPTIDOMIMETICS?
7. EXTRACTION, CLONING AND SEQUENCING OF THE GAPDH GENE
8. THE ROLE OF REACTIVE OXYGEN SPECIES (ROS) IN INDUCING PUMA(P-53 UP REGULATED MODULATOR OF APOPTOSIS) DEPENDENT APTOSIS IN NEUTROPHILS
9. GLYCEROL AND OSTEOBLAST CELLS
10. EXPRESSION OF A VIRAL LYTIC SWITCH PROTEIN IN YEAST *KLUYVEROMYCES LACTIS*
11. DO AMINOACYL-TRNA SYNTHETASES HAVE A MAJOR ROLE TO PLAY IN THE DEVELOPMENT OF PEPTIDOMIMETICS?
12. GLUCOCORTICOID RECEPTOR EXPRESSION ON CD4+ T CELL POPULATIONS: POSSIBLE PREDICTORS OF STRESS-INDUCED IMMUNE DYSREGULATION
13. EFFECT OF METHYL PARATHION EXPOSURE ON ANTIOXIDANT EXPRESSION LEVELS IN HUMAN LIVER CARCINOMA CELLS
14. EFFECT OF PARATHION EXPOSURE ON ANTIOXIDANT EXPRESSION LEVELS IN HUMAN LIVER CARCINOMA CELLS
15. ISOLATION OF GAPDH GENE FROM *EPIPREMNUM AUREUM*

CELLULAR, MOLECULAR AND DEVELOPMENTAL BIOLOGY

Friday, February 24

FRIDAY MORNING

Room: Lakeview I

- 8:30 THE NATURAL PRODUCT BETULINIC ACID PROMOTES AMYLOID-BETA FIBRILIZATION AT THE EXPENSE OF OLIGOMERS
9:00 INVESTIGATING THE FUNCTION OF THE MOLD- SPECIFIC GENE *M46*, IN THE PATHOGENIC DIMORPHIC FUNGUS *HISTOPLASMA CAPSULATUM*
9:15 REGULATION OF VANCOMYCIN RESISTANCE IN *STAPHYLOCOCCUS AUREUS*
9:30 MSA REGULATES BIOFILM DETACHMENT IN *STAPHYLOCOCCUS AUREUS*
9:45 RECOMBINANT EXPRESSION OF *HALOTHIOBACILLUS NEAPOLITANUS* GENES PUTATIVELY INVOLVED IN FORMATION OF CARBOXYSUMES FOR BIOTECHNOLOGICAL APPLICATIONS.
10:00 BREAK
10:15 ANTIOXIDANT FUNCTION OF SELENOPROTEIN K AND M IN THE SALIVARY GLANDS OF GULF-COAST TICK, *AMBLIOMMA MACULATUM*
10:30 ESSENTIAL ROLES OF AMSNAP-25 AND AMNSF IN *AMBLIOMMA MACULATUM* SALIVARY GLANDS



- 10:45 MOLECULAR IDENTIFICATION OF SPOTTED FEVER GROUP RICKETTSIA (SFGR) IN EXOTIC TICK SPECIES INFESTING MIGRATORYSONG BIRDS.
- 11:00 CHARACTERIZATION OF *RICKETTSIA PARKERI* IN THE GULF COAST TICK, *AMBLIOMMA MACULATUM*
- 11:15 CREATING A CSOS1A-GREEN FLUORESCENT PROTEIN EXPRESSION CONSTRUCT
- 11:30 OXALATE-INDUCES EXPRESSION OF YHJX, YFDU, YFDW IN *ESCHERICHIA COLI*
- 11:45 EVALUATING THE MECHANISM OF ACTION OF A MARINE ANTIFUNGAL COMPOUND BY SCREENING A COLLECTION OF YEAST MUTANTS

12:00 – 1:45 Lunch

FRIDAY AFTERNOON

Room: Lakeview I

- 1:15 MIDLINE AND ROADKILL GENES COLLABORATE TO REGULATE BRISTLE FORMATION IN THE DROSOPHILA EYE
- 1:30 INHIBITION OF CELL PROLIFERATION DOES NOT COMPROMISE SELF-RENEWAL OF MOUSE EMBRYONIC STEM CELLS
- 1:45 THE EFFECTS OF bFGF ON PROLIFERATION AND DIFFERENTIATION OF MESENCHYMAL STEM CELLS
- 2:00 MOUSE EMBRYONIC STEM CELLS CAN SENSE AND RESPOND TO DOUBLE STRAND RNA-INDUCED IMMUNOGENIC STIMULUS
- 2:15 TRANSCRIPTOME ANALYSIS OF MSA DELETION MUTANT IN THE COMMUNITY-ACQUIRED MRSA STRAIN USA300
- 2:30 PROTEOMIC ANALYSIS OF PHOSPHOPROTEINS INVOLVED IN ABA SIGNALING PATHWAY IN THREE *ARABIDOPSIS* MUTANTS: *srk2-2*, *srk2-3* and *srk2-2/srk2-3*

CHEMISTRY AND CHEMICAL ENGINEERING

Thursday, February 23

THURSDAY MORNING

Exhibit Hall B

8.15 – 8.30

OPENING REMARKS

8:30 - 10:00 AM

PLENARY SESSION I

INORGANIC AND PHYSICAL CHEMISTRY

SESSION CHAIR: Dr. Ramaiyer Venkatraman

8:30

Dr. Alvin Holder

Department of Chemistry and Biochemistry

University of Southern Mississippi

Title: Inorganic Pharmaceuticals: A concise perspective of my research at Southern Miss

8:45

Dr. William P. Henry

Department of Chemistry and Biochemistry

Mississippi State University

Title: Non-covalent Interactions in Chromium and Manganese Complexes of Dibenocycocotatetraene





- 9:00 **Dr. Fengxiang Han**
Department of Chemistry and Biochemistry
Jackson State University
Title: Biogeochemistry of Mercury in the Ecosystem of Oak Ridge, TN (USA)
- 9:15 **Dr. Joseph Emerson**
Department of Chemistry and Biochemistry
The University of Mississippi
Title: Exploring Substrate Selectivity in Non-heme Metalloenzymes
- 9.30 **Dr. Bidisha Sengupta**
Division of Natural Science
Tougaloo College
Title: Interactions of Plant Flavonoids with Biological Targets: An Optical Spectroscopy and Molecular Modeling Approach
- 9:45 – 10:00 AM BREAK**
- 10.00 - 11:30 AM PLENARY SESSION - II**
ORGANIC AND BIOCHEMISTRY
- SESSION CHAIR: **Dr. Karl Wallace**
- 10:00 **Dr. Ashton Hamme**
Department of Chemistry and Biochemistry
Jackson State University
Title: Studies toward the Synthesis of Spiroisoxazolines and Spiropyrazolines
- 10:15 **Dr. Douglas Masterson**
Department of Chemistry and Biochemistry
University of Southern Mississippi
Title: A Novel Synthesis of α -Methyl- β -Proline via an unexpected selective Cyclization
- 10:30 **Dr. Arthur Chu**
Division of Biological and Physical Sciences
Delta State University
Title: Polycations as novel Anticoagulants Block Tissue Factor-dependent FVII Activation: **A possible mechanism**
- 10:45 **Dr. Jiben Roy**
Department of Sciences and Mathematics
Mississippi University for Women
Title: Pharmaceuticals & the Pharmaceutical Industry: The evolution continues in all directions
- 11:00 **Dr. Takashi Tomioka**
Department of Chemistry and Biochemistry
The University of Mississippi
Title: Design, synthesis, and applications of a novel organoboron reagent for organic synthesis
- 11:15 **Dr. Wolfgang H. Kramer**
Department of Chemistry and Biochemistry
Millsaps College
Title: Decarboxylative Photocyclization of Cationic Phthalimide and Quinoline/Isoquinoline ω -Carboxylic Acids



11:30 – 12.:50 PM

LUNCH BREAK

1.00 - 2:15 PM PLENARY SESSION - III

SUPRAMOLECULAR CHEMISTRY AND NANOTECHNOLOGY

SESSION CHAIR: **Dr. Hongtau Yu**

1:00

Dr. Karl Wallace

*Department of Chemistry and Biochemistry
University of Southern Mississippi*

Title: Pyrene based molecular receptors

1:15

Dr. Pasesh Ray

*Department of Chemistry and Biochemistry
Jackson State University*

Title: Multifunctional Nanomaterial for Targeted Imaging and
Photothermal Killing of Cancer & Antibiotic-Resistant Bacteria

1:30

Dr. Frances. C. Hill

US Army Crop of Engineers, Vicksburg

Title: A Computational Study of the Interactions of Citrate with the Surface of Silver
Nanoparticles

1:45

Dr. Zikri Arslan

*Department of Chemistry and Biochemistry
Jackson State University*

Title: Synthesis of Thiol-capped PbSe Nanoparticles in Aqueous Solution – Cap versus
Stability

2:00 – 2.15 PM

BREAK

Refreshments *will be served (sponsored by USM)*

2.15 – 4.15 PM PLENARY SESSION – IV – SYMPOSIUM WORKSHOP

*NSF CAREER AWARDEES' SYMPOSIUM (HIGHLIGHTING INTELCTUAL MERIT AND
BROADER IMPACTS)*

SESSION CHAIR: **Dr. Douglas Masterson**

2:15

Dr. Paige Buchanan

*Department of Chemistry and Biochemistry
University of Southern Mississippi*

Title: Fullerene-Polymer Nanocomposites: Unexpected Things that you can do with a
Fullerene

2:35

Dr. Nathan Hammer

*Department of Chemistry and Biochemistry
The University of Mississippi*

Title: Spectroscopically Tracking the Evolution of Noncovalent Interactions from the single
Molecule Level to the Condensed Phases



- 2:55 **Dr. Derek Patton**
Department of Polymer Science
University of Southern Mississippi
Title: CAREER: Functional Polymer Surfaces and Networks via Thiol-Click Chemistry
- 3:15 **Dr. Md. Alamgir Hossain**
Department of Chemistry and Biochemistry
Jackson State University
Title: Chemosensors for Anions
- 3:35 **Dr. Douglas Masterson**
Department of Chemistry and Biochemistry
University of Southern Mississippi
Title: Bioorganic Chemistry at USM. Development of novel Somatostatin and Neurotensin Analogues
- 3:55 **Dr. Wujian Miao**
Department of Chemistry and Biochemistry
University of Southern Mississippi
Title: Biosensors based on Electrogenerated Chemoluminescence

4.15 –4.30 PM **ELECTIONS:** Nomination and selection of new divisional head(s)

Thursday, February 23, 2012

6:30 –8:00 PM **Poster Session I, Chemistry and Chemical Engineering**
(Student presentation award sponsored by JSU Department of Chemistry and Biochemistry)

- 1. SYNTHESIS, CHARACTERIZATION AND STRUCTURE OF BIS(2-AMINOPYRIMIDINE)TETRAKIS(μ -LEVULINATO-O,O')DICOPPER**
- 2. OPTIMIZING ISOTHERMAL FRONTAL POLYMERIZATION: PRODUCING THE DEEPEST COPOLYMER GRADIENT REFRACTIVE-INDEX LENGTH FOR A MMA/BZMA SYSTEM**
- 3. SPECTROSCOPIC AND COLORIMETRIC STUDIES OF A NEW TREN-DERIVED THIOUREA RECEPTOR FOR ANIONS**
- 4. BINDING OF ANTI TUMOR DRUG 'DIADZEIN' WITH HUMAN HEMOGLOBIN USING OPTICAL SPECTROSCOPY AND MODELING STUDIES**
- 5. MOLECULAR DYNAMICS AND DOCKING STUDY OF BINDING OF DIADZEIN WITH HUMAN HEMOGLOBIN**
- 6. INTERACTION OF THE NATURAL CARRIER HEMOGLOBIN WITH DRUGS HESPERITIN AND GENISTEIN: A CRITICAL STUDY**
- 7. INFLUENCE OF DIFFERENT DNA STRUCTURES ON THE BINDING OF PLANT FLAVONOIDS FISETIN AND DIADZEIN WITH DNA**
- 8. SPECTROSCOPIC AND COLORIMETRIC INVESTIGATIONS OF ACYCLIC CHEMOSENSORS FOR ANIONS**
- 9. MONOTOPIC VS DITOPIC BINDING OF ANIONS BY A THIOPHENE-BASED MONOCYCLE**
- 10. DNA CLEAVAGE ACTIVITIES WITH DINUCLEAR COPPER (II) AND COBALT (II) COMPLEXES OF TWO POLYAZAMACROCYCLES**
- 11. SYNTHESIS AND ANION BINDING STUDIES OF A NEW THIOPHENE-BASED POLYAZAMACROCYCLES IN WATER**
- 12. A NOVEL P-CYANO BASED TRIPODAL UREA RECEPTOR FOR ANION COMPLEXATION**
- 13. BINDING OF NUCLEOTIDES WITH A MACROCYCLIC DINUCLEAR COPPER (II) COMPLEX IN WATER AT PHYSIOLOGICAL pH**



14. FABRICATION OF PLASMONICALLY SENSITIZED PHOTO-ELECTROCHEMICAL CELLS
15. A pH-RESPONSIVE NANO-SILICA-ATTACHED SENSITIZER FOR PHOTODYNAMIC THERAPY IN THE TREATMENT OF CANCER CELLS
16. OXYGEN AND WATER BARRIER OF POLYIMIDE NANOCOMPOSITES CONTAINING SILICATE TYPE OF NANOTUBES
17. A PYRENE BASED MOLECULAR CLEFT FOR THE DETECTION OF $ZnCl_2$
18. MONITORING A COORDINATION DISPLACEMENT REACTION BY ESI MASS SPECTROMETRY
19. COMPUTATIONAL STUDY OF FULLERENE ANALOGUES AS POTENTIAL HIV-1 PR INHIBITORS: MOLECULAR DOCKING AND QUANTUM-MECHANICAL ANALYSIS.
20. EFFECT OF THE LIQUID CRYSTALLINE PHASE ON CO₂ BARRIER PROPERTIES IN UV CURED NETWORKS
21. DEVELOPMENT OF HIGH BARRIER LAYERED SYSTEMS USING PARTICULATES
22. DECARBOXYLATIVE PHOTOCYCLIZATION OF CATIONIC ω -CARBOXYLIC ACIDS
23. BIFUNCTIONAL DNA-CLEAVING REAGENTS: DNA CLEAVING EXPERIMENTS
24. BIFUNCTIONAL DNA-CLEAVING REAGENTS: SYNTHESIS, PHOTOCHEMISTRY AND DNA GROUND STATE ASSOCIATION
25. PLASMID DESIGN FOR AN ASSAY TO STUDY THE ROLE OF DNA-MEDIATED CT IN-VIVO
26. PREPARATION OF BIODIESEL: PRETREATMENT OF WASTE VEGETABLE OIL
27. SYNTHESIS OF SPIRO-ISOXAZOLINES VIA INTRAMOLECULAR CYCLIZATION
28. POTENTIAL ALTERNATIVE FUEL SOURCES FROM AGRICULTURAL CROPS AND PLANT COMPONENTS
29. STUDY ON INFLUENCE OF THE PRESENCE OF SWCNTs DURING OXIDATION OF PHENOL BY HYDROGEN PEROXIDE
30. A DINUCLEAR AZAMACROCYCLE FOR ANION SENSING

CHEMISTRY AND CHEMICAL ENGINEERING

Friday, February 24, 2012

Exhibit Hall B

8.15 – 8.30

OPENING REMARKS

8:30 - 10:00 AM

PLENARY SESSION - V

COMPUTATIONAL AND QUANTUM CHEMISTRY

SESSION CHAIR: **Dr. Alamgir Hossain**

8:30

Dr. Jerzy Leszczynski

Department of Chemistry and Biochemistry

Jackson State University

Title: **How to Investigate Properties of Nerve Agents When the Main Concern is Safety of Students?**

8:45

Dr. Steven Gwaltney

Department of Chemistry

Mississippi State University

Title: Saving Computational Time through optimally chosen Basis Function Subsets and Correlated Methods

9:00

Dr. David Magers

Department of Chemistry and Biochemistry

Mississippi College

Title: Computing Acidities with Isodesmic Reactions



- 9:15 **Dr. Joseph A. Bentley**
Division of Biological and Physical Sciences
Delta State University
Title: The accurate Calculation of Ro-vibrational Eigenenergies of Hydrogen Cyanide
- 9:30 **Dr. Manoj Shukla**
US Army Crop of Engineers, Vicksburg
Title: Alkaline Hydrolysis of Nitrocellulose: A Computational Investigation.
- 9:45 **Dr. Glake Hill**
Department of Chemistry and Biochemistry
Jackson State University
Title: Bridging the two Worlds: Connecting Computational Techniques with Chemical Intuition in DNA
- 10:00 – 10:10 AM** **BREAK**
- Lakeview II**
8:30 - 10:00 AM **PLENARY SESSION – VI (CONCURRENT SESSION)**
CHEMICAL ENGINEERING AND ANALYTICAL CHEMISTRY
SESSION CHAIR: **Dr. Wolfgang Kramer**
- 8:30 **Andrea Scott**
ERDC, USA
Title: Can Gibbs free energy of adsorption be predicted efficiently and accurately: an M05-2X DFT study
- 8:45 **Dr. Anthony J. Bednar**
US Army Crop of Engineers, Vicksburg
Title: Speciation of metals in natural matrices using advanced hyphenated techniques.
- 9:00 **Dr. Xiaoxia Li**
Department of Sciences and Mathematics
Mississippi University for Women
Title: Quantitative Determination of the SERS Hotness of Nanoparticle Junctions in aggregated Gold Nanoparticle Clusters
- 9:15 **Dr. Ruomei Gao**
Department of Chemistry and Biochemistry
Jackson State University
Title: Synthesis and Characterization of Imidazole-modified Porphyrin for selective Photodynamic Therapy
- 9:30 **Dr. Aimee. R. Poda**
US Army Crop of Engineers, Vicksburg
Title: Aggregation and Deposition of Silver Nanoparticles on Silica Surfaces under Environmentally relevant Conditions
- 9:45 **Dr. Dongmao Zhang**
Department of Chemistry
Mississippi State University
Title: Quantitative Surface Enhanced Raman Spectroscopy.



Exhibit Hall B

10.10 - 11:30 PM STUDENT ORAL PRESENTATIONS - 1

Student award sponsored by jsu department of chemistry and biochemistry

SESSION CHAIR: **Dr. Ruomei Gao**

10:10

Maureen Smith

Department of Chemistry and Biochemistry

University of Southern Mississippi

Title: Investigation of the Selectivities of PLE Isozymes using various Substrates

10:20

Yongliang Shi

Department of Chemistry and Biochemistry

University of Southern Mississippi

Title: Self-assembled Gold Nanoplexes for Cancer-targeted siRNA Delivery

10:30

John Durant

Department of Chemistry and Biochemistry

University of Southern Mississippi

Title: The Effects of Tin and Germanium on Cancer Cell Lines

10:40

Shana Stoddard

Department of Chemistry and Biochemistry

The University of Mississippi

Title: **In silico Generation and Evaluation of Carboxylesterase Inhibitor Scaffolds**

10:50

Sashie Weerasinghe

Mississippi State University, USA

Title: Effect of pH and Glucomannan on Antioxidative Properties of Thermized Cheddar Whey Protein Concentrate-Based Edible Coating Dips for Catfish Fillet

11:00

John Freeman

University of Southern Mississippi, USA

Title: Synthesis of Glutathione Analogue using 2-alpha-methyl-beta-cysteine

11:10

William Seawell

University of Southern Mississippi

Title: **Synthesis of novel hydrolysable coatings containing biocidal additives**

11:20

Aixiang Wang

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

Title: **An Investigation into the Interactions between Polycations and Factor VII and Factor VIIa Using a Quartz Crystal Microbalance**

Lakeview II

10.10 - 11:40 PM STUDENT ORAL PRESENTATIONS – 1I

(CONCURRENT SESSION)

Student award sponsored by jsu department of chemistry and biochemistry

SESSION CHAIR: **Dr. Zikri Arslan**

10:20

Emily Matthews

University of Southern Mississippi, USA

Title: Polymerization of Thiol-ene Microbeads via an Emulsion Technique



- 10:30 **Guizheng Zou**
Department of Chemistry and Biochemistry, The University of Southern Mississippi, USA
Title: Electrode Surface Charge Effect on the Electron-transfer Behavior of Redox Species
- 10:50 **Sadia Khan**
Jackson State University, USA
Title: Multifunctional Nanoparticle for Targeted Sensing of Multi Drug Resistant Bacteria
- 11:00 **Souvik Banerjee**
UNIVERSITY OF SOUTHERN MISSISSIPPI, USA
Title: A straightforward Approach making diverse optically enriched α -methyl-lysine Analogues in Heteronucleary protected Form for SPPS
- 11:10 **Teresa Demeritte**
Jackson State University, USA
Title: Plasmonic Blackbody Absorber using Carbon Nanotube coated Gold Nanomaterial
- 11:20 **Henry Ewing**
University of Southern Mississippi, USA
Title: Physical and electrical Properties of C₆₀ Thiol-ene Networks

11:40 – 12:50 PM

LUNCH BREAK



Exhibit Hall C

1:00 – 2:30 PM

Poster Session II, Chemistry and Chemical Engineering

(Student presentation award sponsored by JSU Department of Chemistry and Biochemistry)

31. ENVIRONMENTAL IMPACT OF CARBON NANOMATERIALS ON COMMON CONTAMINANTS IN AQUEOUS MEDIA EXPOSED TO OXIDATION WITH CHLORINE
32. TOWARDS DELINEATING THE BIOCHEMICAL PATHWAY TO THE ANTI-CANCER MEDICINAL PODOPHYLLOTOXIN IN *PODOPHYLLUM HEXANDRUM* USING NEXT GENERATION SEQUENCING
33. TWO-DIMENSIONAL CALCULATION OF THE VIBRATIONAL MODES OF AMMONIA
34. SEPARATION OF ZINC IONS FROM DEGRADATION OF ZINC OXIDE NANOPARTICLES – PROBING NANOPARTICLE TOXICITY
35. CONVENTIONAL STRAIN ENERGIES OF AZETIDINE, PHOSPHETANE, THE DIHYDROAZETES, AND THE DIHYDROPHOSPHETES
36. THE CONVENTIONAL STRAIN ENERGIES OF BICYCLO[1.1.1]PENTANE, BICYCLO[2.1.1]HEXANE, BICYCLO[2.2.1]HEPTANE, BICYCLO[3.1.1]HEPTANE, AND BICYCLO[2.2.2]OCTANE
37. EFFECT OF CAPPING AND ACIDITY ON SOLUBILITY OF SILVER NANOPARTICLES IN WATER/OCTANOL SYSTEM
38. EXPOSURE OF ALUMINUM OXIDE NANOPARTICLES TO BRINE SHRIMP LARVAE –SIZE, SHAPE AND DOSE DEPENDENT EFFECTS
39. SYNTHESIS AND CHARACTERIZATION OF RIGID MACROMOLECULES WITH EXTENDED CONJUGATION
40. PHOTOCURABLE THIOL-ENE NETWORKS: INFLUENCE OF NETWORK COMPOSITION ON PHYSICAL PROPERTIES AND STRATEGIES TO ENHANCE THEIR FIRE BEHAVIORS
41. NOVEL CHEMOTHERAPEUTIC AGENTS OF COPPER(II) WITH THIOSEMICARBAZONES AS LIGANDS: STRUCTURAL AND IN VITRO STUDIES
42. A pH-RESPONSIVE NANO-SILICA-ATTACHED PORPHYRIN FOR PHOTODYNAMIC THERAPY IN CANCER TREATMENT
43. ACUTE EFFECTS FROM NANOPARTICLES OF ZINC OXIDE (ZnO) AND ZINC (Zn) ON BRINE SHRIMP LARVAE



44. SEPARATION OF TRACE METALS FROM OTOLITHS BY COPRECIPITATION AND DETERMINATION BY ICP-MS
45. MULTIELEMENT HYDRIDE/VAPOR GENERATION FOR ARSENIC, CADMIUM, LEAD, MERCURY, SELENIUM DETECTION BY ICP-MS
46. SOLID PHASE EXTRACTION OF TRACE ELEMENTS USING A NOVEL CHELATING POLYMERIC RESIN
47. COMPARING PHENOLIC CONCENTRATION USING FOLIN-CIOCALTEU AND FAST BLUE BB DIAZONIUM SALT
48. ANALYSIS OF THE PHOTOCHEMISTRY OF NITROGEN ONIUM SALTS³
49. POLYHEDRAL OLIGOMERIC SILSESQUIOXANE (POSS) NANOCOMPOSITES: SOLUBILITY PARAMETER CALCULATIONS VIA MOLECULAR DYNAMICS SIMULATIONS AND GROUP CONTRIBUTION METHODS
50. FINGERPRINTING OF FARM-RAISED CATFISH USING ELEMENTAL PROFILES DETERMINED BY INDUCTIVELY COUPLED PLASMA MASS SPECTROMETRY AND CHEMOMETRICS
51. DIRECT ANALYSIS OF HERBAL SUPPLEMENTS FOR TRACE ELEMENTS BY LASER ABLATION-ICPMS
52. CE-MS ENHANCED ENZYMATIC ASSAY OF D-AMINO ACIDS

Exhibit Hall B

2:45 PM ANNOUNCEMENT OF STUDENTS' AWARDS

Students Poster Session I (Student presentation award sponsored by JSU Department of Chemistry and Biochemistry)
Students Poster Session II (Student presentation award sponsored by JSU Department of Chemistry and Biochemistry)
Students Oral Session I (Student award sponsored by JSU Department of Chemistry and Biochemistry)
Students Oral Session II ((Student award sponsored by JSU Department of Chemistry and Biochemistry)

3:00 PM CONCLUSION REMARKS

ECOLOGY AND EVOLUTIONARY BIOLOGY

Thursday, February 23

THURSDAY MORNING

Room: Conference Room

- 9:45 OPENING PRESENTATION**
- 10:00 CHARACTERIZING THE DEMISE AND RECOVERY OF THE MACROBENTHIC COMMUNITY AT A KEY SITE LOCATED IN THE CENTER OF THE 2008 COASTAL MISSISSIPPI HYPOXIC ZONE**
- 10:15 GOOGLE IMAGES AS A MEANS OF DETERMINING GEOGRAPHIC DISTRIBUTION OF *LEPOMIS MEGALOTIS* AND SUBSPECIES**
- 10:30 POST-PLEISTOCENE EXPANSION OF TWO NORTH AMERICAN TARANTULA SPECIES IS SUPPORTED BY ECOLOGICAL NICHE MODELS AND MITOCHONDRIAL DNA**
- 10:45 DIVISIONAL BUSINESS MEETING**
- 11:45 LUNCH**



Exhibit Hall C

DIVISION POSTER PRESENTATIONS

Authors should be available with their posters to answer questions 1:30-2:45 PM

1. HEAVY METALS IN VEGETABLE CROPS GROWN IN CONTAMINATED SOILS
2. ISOLATION OF DIVERSE MICROBES FROM ORGANICALLY GROWN FRUITS AND VEGETABLES
3. MORPHOLOGICAL COLOR FORMS OF *LEOPOMIS MEGALOTIS* FOUND IN MISSISSIPPI
4. THE USE OF RADIOMETRIC ASSAYS TO INVESTIGATE THE STRINGENCY OF tRNA CHARGING

GEOLOGY AND GEOGRAPHY

Friday, February 24

FRIDAY MORNING

Room: Forrest II

- 9:00 Welcome
- 9:15 RECOVERY AND NEW NORMALCY OF THE MISSISSIPPI COASTAL COUNTIES: KATRINA +6 YEARS – David Holt
- 9:30 LAND USE AND LAND COVER CHANGE ALONG THE MISSISSIPPI GULF COAST: 1985–2009 – George Roedl
- 9:45 DECREASING VULNERABILITY OF COASTAL POPULATION WITH INCREASING INLAND DISTANCE – Bandana Kar
- 10:00 LEVEEMAPS: A WEB-BASED GIS APPROACH FOR EFFICIENT ASSESSMENT OF FLOOD-CONTROL LEVEES – Franklin Heitmuller, George Raber, David Patrick, Joseph Dunbar, and David Biedenharn
- 10:15 CLAY FABRIC AND MASS PHYSICAL PROPERTIES OF SURFICIAL MARINE SEDIMENT NEAR THE DEEPWATER HORIZON OIL SPILL – Andrew Head, Richard H. Bennett, Jessica R. Douglas, Kenneth J. Curry
- 10:30 BREAK
- 10:45 QUANTITATIVE ANALYSIS OF THREE-DIMENSIONAL CLAY NANO- AND MICROFABRIC – Jessica Douglas, Kenneth J. Curry, Richard H. Bennett, Matthew H. Hulbert
- 11:00 THE BRANDYWINE STONE WALL – David T. Dockery III
- 11:15 FREDERIC F. MELLEN AND THE MISSISSIPPI GEOLOGICAL SURVEY – Michael B. E. Bograd
- 11:30 LUNCH

FRIDAY AFTERNOON

Room: Forrest II

- 1:00 A GRAIN SIZE ANALYSIS OF THE PASCAGOULA RIVER SYSTEM – Allison Tarbox, Zachary A. Musselman
- 1:15 EXTREME NONPOINT SOURCE SEDIMENT RUNOFF, DESOTO COUNTY, MISSISSIPPI – Sloan Click, Stan Galicki
- 1:30 URBAN HEAT ISLAND EFFECT IN JACKSON, MISSISSIPPI – Anna Crousillac, Stan Galicki
- 1:45 GROUNDWATER AVAILABILITY ASSESSMENT OF UPPER CRETACEOUS AQUIFERS IN NORTHEAST MISSISSIPPI – John Banks
- 2:00 BREAK
- 2:00 ZIRCON PLACER DEPOSITS OF THE MISSISSIPPI EMBAYMENT – David Thompson
- 2:15 SIOUX QUARTZITE OF THE PRE-LOESS GRAVELS IN MISSISSIPPI – James E. Starnes
- 2:45 HEXACORALLIAN AND OCTOCORALLIAN ANTHOZOANS (CORALS) FROM THE UPPER CRETACEOUS OF MISSISSIPPI – George Phillips
- 3:00 Geology and Geography Divisional Business Meeting



HEALTH SCIENCES

Thursday, February 23

THURSDAY MORNING

Exhibit Hall A

Drug Delivery Symposium

- 8:50 Dr. Benghuzzi WELCOME AND OPENING REMARKS**
- 9:00 REPRODUCTIVE SYSTEM BEHAVIOR FOLLOWING EXPOSURE OF SUSTAINED DELIVERY OF NPY ANTAGONIST IN OVARECTOMIZED (OVX) RATS**
- 9:15 HYDROXYAPATITE DRUG DELIVERY DEVICE CAPABLE OF RELEASING HYDROGEN PEROXIDE IN VITRO**
- 9:30 ANDROGENIC HORMONES INFLUENCE ANGIOGENESIS IN THE TISSUE IMPLANT RESPONSE**
- 9:45 EVALUATION OF CHONDROCYTE GROWTH AND FUNCTION SUBJECTED TO 21% AND 6% OXYGEN LEVELS**
- 10:00 OPTIMIZATION OF 3D LIVER CELL SPHEROID FORMATION ON ELASTIN-LIKE POLYPEPTIDE-POLY VINYL DIMETHYL AZLACTONE-POLYELECTROLYTE (ELP-PVDMA-PE) COPOLYMER SURFACES**
- 10:15 Break**
- 10:30 RATIONALE, DESIGN, AND SAMPLE CHARACTERISTICS OF A STATEWIDE COMPREHENSIVE SURVEY TO ASSESS ACCESS TO CARE, HRQOL AND SERVICE NEEDS OF PLWHA**
- 10:45 PROFESSIONAL PORTAL PROGRAM: REDESIGN OF A RURAL HEALTH CARE TRAINEE PIPELINE**
- 11:00 SUMMER FOOD SERVICE PROGRAM DEMONSTRATION TO DECREASE FOOD INSECURITY, INCREASE HEALTHY BEHAVIOR IN CHILDREN**
- 11:15 SERVICE NEEDS REPORTED BY PLWHA: RESULTS OF A STATEWIDE SURVEY**

12:00- 1:00 PLENARY SPEAKER

THURSDAY AFTERNOON

Conference Room

2:00- 4:00 Invited Symposium

INNOVATIVE HEALTH PROFESSIONAL EDUCATION: THE CHALLENGES OF INTEGRATION

Exhibit Hall C

POSTER SESSION 1

Authors should be available with their posters to answer questions 1:15-3:15 PM

- 1. QUANTITATIVE EVALUATION OF BRAIN TISSUE DAMAGE IN MULTIPLE SCLEROSIS WITH GRADIENT ECHO PLURAL CONTRAST IMAGING TECHNIQUE**
- 2. ADVANCED CT IMAGE ANALYSIS OF DIFFUSE LIVER DISEASE**
- 3. OXALATE MEDIATES ACID RESISTANCE IN *E. COLI***
- 4. STEM CELL DERIVED FACTORS REGULATES THE DIFFERENTIATION OF HUMAN FIBROBLASTS**
- 5. ANALYSIS OF TOBRAMYCIN RELEASE FROM HYDROGELS, TRICALCIUM PHOSPHATE CAPSULES AND TCP PASTE**
- 6. DICHLOROACETATE INDUCES APOPTOSIS IN MELANOMA CELLS**
- 7. THE ROLES OF LEPTIN AND IGF-1 IN MELANOMA CELL MIGRATION**
- 8. THE ROLES OF LEPTIN AND IGF-1 IN MELANOMA PROLIFERATION BY**
- 9. LEPTIN AND IGF-1 SIGNALING IN MELANOMA CELLS**
- 10. THE ROLE OF LEPTIN IN MELANOMA CELL SURVIVAL**



11. CHARACTERIZATION AND ANALYSIS OF A RANAVIRUS THAT AFFECTS ECOLOGICALLY IMPORTANT NORTH AMERICAN SALAMANDERS: AMBYSTOMA TIGRINUM VIRUS
12. CHARACTERIZATION AND ANALYSIS OF A RANAVIRUS THAT AFFECTS ECOLOGICALLY IMPORTANT SILURIFORMES: EUROPEAN CATFISH VIRUS
13. CHARACTERIZATION AND ANALYSIS OF A RANAVIRUS THAT AFFECTS ECOLOGICALLY IMPORTANT SILURIFORMES: EUROPEAN SHEATFISH VIRUS
14. CHARACTERIZATION AND ANALYSIS OF A RANAVIRUS THAT AFFECTS ECOLOGICALLY AND ECONOMICALLY IMPORTANT PERCIFORMES: LARGEMOUTH BASS VIRUS
15. CHARACTERIZATION AND ANALYSIS OF A RANAVIRUS THAT AFFECTS ECONOMICALLY IMPORTANT AQUACULTURED ANURANS: RANA CATESBEIANA VIRUS - Z
16. CHARACTERIZATION AND ANALYSIS OF A RANAVIRUS THAT AFFECTS ECOLOGICALLY IMPORTANT SALMONNIFORMES: EPIZOOTIC HEMATOPOIETIC NECROSIS VIRUS
17. CHARACTERIZATION AND ANALYSIS OF THE REPLICATION TRAITS OF A TEMPERATURE SENSITIVE MUTANT STRAIN OF THE TYPE SPECIES RANAVIRUS: CLASS I
18. CHARACTERIZATION AND ANALYSIS OF THE REPLICATION TRAITS OF A TEMPERATURE SENSITIVE MUTANT STRAIN OF THE TYPE SPECIES RANAVIRUS: CLASS II
19. CHARACTERIZATION AND ANALYSIS OF THE REPLICATION TRAITS OF A TEMPERATURE SENSITIVE MUTANT STRAIN OF THE TYPE SPECIES RANAVIRUS: CLASS III

Exhibit Hall C

POSTER SESSION II

6:30-8:00 PM (Following Dodgen Lecture)

20. THE EFFECT OF THREE COMMONLY USED RESTORATIVE DENTAL ADHESIVES ON THE CELLULAR STRUCTURE AND FUNCTION OF HUMAN GINGIVAL FIBROBLASTS
21. ACCESS TO CARE AND HEALTH-RELATED QUALITY OF LIFE IN PLWHA
22. REVIEW OF THE EFFECTS OF LOW-LEVEL LASER THERAPY ON WOUND HEALING: CHRONIC ULCERATIONS
23. THE EFFECTS OF BONE MORPHOGENETIC PROTEINS ON MESENCHYMAL STEM CELL VIABILITY AND DIFFERENTIATION
24. EFFECT OF PLATELET DENSE GRANULE CONTENTS UPON OSTEOBLAST VIABILITY
25. THE EFFECT OF REFERRING PROVIDER PROXIMITY ON CARDIOVASCULAR DISEASE STATE FOR UNIVERSITY HEART INVASIVE PROCEDURES AT THE UNIVERSITY OF MISSISSIPPI MEDICAL CENTER
26. LOW LEVEL LASER THERAPY VS EXERCISE FOR TREATMENT OF CHRONIC LOW BACK PAIN: A SYTEMATIC REVIEW

HEALTH SCIENCES

Friday, February 24

FRIDAY MORNING

TBA

8:30 -10:30 HEALTH FAIR – BLOOD PRESSURE, GLUCOSE TESTING, BODY MASS INDEX, ETC.

Room: Exhibit Hall A

Oral Presentations

- 9:00 EVALUATION OF POLYMERASE CHAIN REACTION ASSAY FOR DETECTION OF METHICILLIN Resistant *Staphylococcus aureus* IN A HOSPITAL SETTING.
- 9:30 QUANTITATION OF IMMUNOGLOBULIN E USING FLUORESCENCE ASSAY
- 9:45 EXPRESSION PROFILE OF INFLAMMATORY MARKERS AFTER KIDNEY TRANSPLANTATION IN ASSOCIATION WITH GFR.
- 10:00 PERIVASCULAR ADIPOSE TISSUE RELAXATION OF RAT THORACIC AORTA IS PARTIALLY EDNO-MODULATED.



10:15 POLYCATIONS AS NOVEL ANTICOAGULANTS BLOCK TISSUE FACTOR-DEPENDENT FVII ACTIVATION: A POSSIBLE MECHANISM

Break

Exhibit Hall C

Poster III (10:45-12:00)

27. EXPRESSION OF INFLUENZA PROTEINS IN *Saccharomyces cerevisiae*
28. THE INVOLVEMENT OF MATRIX METALLOPROTEINASES DURING THE PROGRESSION RENAL INJURY IN TYPE-II DIABETIC NEPHROPATHY RATS
29. CONTROLLING PLASMA GLUCOSE LEVELS REDUCES RENAL INJURY IN DIABETIC DAHL SALT-SENSITIVE RATS
30. HYPOXIA STIMULATED ENDOTHELIN-1 SECRETION FROM UTERINE LIEOMYOMAS; LINKING HYPERTENSION WITH FIBROID DEVELOPMENT.
31. CD4+T CELL BLOCKADE PRIOR TO PLACENTAL INSULT ATTENUATES HYPERTENSION AND SFLT-1 IN RESPONSE TO PLACENTAL ISCHEMIA
32. A GEOGRAPHIC INFORMATION SYSTEMS (GIS) ANALYSIS TO DETERMINE WHETHER LOW ACCESS TO MEDICAL CARE RESULTS IN HIGHER CANCER STAGING DUE TO INADEQUATE CANCER SCREENING IN MISSISSIPPI
33. A STINGING HEALING TO PROSTATE CANCER
34. PHENOTYPIC CHARACTERIZATION OF *cydDC* MUTANTS OF *MYCOBACTERIUM SMEGMATIS*.
35. EFFECTS OF ASTRAGALUS ROOT ON RHESUS MONKEY KIDNEY CELLS
36. THE EFFECTS OF EGCG ON BLOOD COAGULATION
37. INHIBITION OF *STAPHYLOCOCCUS AUREUS* AND METHICILLIN-RESISTANT *STAPHYLOCOCCUS AUREUS* USING EPIGALLOCATECHIN GALLATE
38. THE ANTIMICROBIAL EFFECTS OF NIGELLA SATIVA
39. THE EFFECTS OF BONE REGULATORS ON OSTEOCLAST CELLS
40. THE EFFECTS OF BONE REGULATORS ON OSTEOBLAST CELLS
41. THE EFFECTS OF SUGAR PHOSPHATES IN REDUCING HIF-1 α UNDER HYPOXIC CONDITIONS
42. THE EFFECTS OF SUSTAINED DELIVERY OF ALENDRONATE ON THE KIDNEY IN OVARECTOMIZED FEMALE RATS
43. THE EFFECTS OF GENISTEIN ON PROSTATE CARCINOMA CELLS

FRIDAY AFTERNOON

Plenary Speaker 12:00-1:00

Garden Room

1:15 Student Awards And Business Meeting

HISTORY AND PHILOSOPHY OF SCIENCE

Thursday, February 23

THURSDAY MORNING

Room: Forrest II

- 8:50 WELCOME AND OPENING REMARKS
- 9:00 ON THE GENERAL LINEAGE CONCEPT OF SPECIES
- 9:30 THE FECUNDITY OF HOMEOSTATIC PROPERTY CLUSTERS FOR DEMARCATING BIOLOGICAL SPECIES
- 10:00 BREAK
- 10:15 THE QUANTUM MECHANICAL BASIS FOR HUMAN FREE WILL



10:45 AN EXPLORATION OF THE RANGE OF VALUES IN THE MORAL LANDSCAPE

11:15 KANT ON BIOLOGICAL TELEOLOGY

THURSDAY AFTERNOON

Room: Forrest II

1:45 BUSINESS MEETING

2:00 ANTI-REALISM, OBSERVATION, AND ANALOGY

2:15 SCIENCE: WORLD UNDER CONSTRUCTION

2:30 BREAK

2:45 HOW DO YOU DEFINE THE NUMBER ONE? PART III

3:15 A CONSTRUCTIVIST INTERPRETATION OF GÖDEL'S INCOMPLETENESS THEOREMS

MARINE AND ATMOSPHERIC SCIENCES

Thursday, February 23

THURSDAY EVENING

Room: Exhibit Hall C

DIVISIONAL POSTER PRESENTATIONS

Authors should be available with their posters to answer questions 6:00-8:00 PM

1. QUANTIFYING THE IMPACT OF THE GULF OF MEXICO OIL SPILL ON THE HEALTH AND PRODUCTIVITY OF LOUISIANA AND MISSISSIPPI SALT MARSHES
2. HOW DISSOLVED OXYGEN AND SALINITY LEVELS AFFECT PHYTOPLANKTON POPULATION AND DENSITY IN THE GULF OF MEXICO
3. PROJECT ii SAMPLE ORGANIZATION, TABULATING, AND RECORDING OF SHARKS IN ORDER TO DETERMINE EFFECTS OF THE BRITISH PETROLEUM (BP) OIL SPILL UPON MARINE LIFE
4. SIMULATION AND PREDICTION OF HURRICANE LILI DURING LANDFALL OVER THE GULF OF MEXICO USING MESOSCALE MODELING (MM5) SYSTEM
5. AN EMPIRICAL EVALUATION OF HETEROLOGOUS MICROSATELLITE MARKERS FOR PEDIGREE RECONSTRUCTION AND STUDIES OF REPRODUCTIVE SUCCESS
6. A SURVEY OF FISH PARASITES COLLECTED FROM LOCATIONS IN THE MISSISSIPPI SOUND

MARINE AND ATMOSPHERIC SCIENCES

Friday, February 24

Room: Forrest I

8:50 WELCOME AND OPENING REMARKS

9:00 OIL SPILL AND SEA SURFACE EFFECTS OVER GULF OF MEXICO USING WRF AND SATELLITE DATA

9:15 MEASUREMENT OF RADON CONCENTRATION IN THE PEARL RIVER, MISSISSIPPI

9:30 THE DELIVERY, SPECIATION AND FATE OF TOXIC METALS IN ST. LOUIS BAY, MS

9:45 SEASONAL VARIATIONS OF DISSOLVED AND PARTICULATE CARBOHYDRATE IN THE MISSISSIPPI SOUND/BIGHT

10:00 GENE EXPRESSION AND GROWTH AS INDICATORS OF EFFECTS OF THE BP DEEPWATER HORIZON OIL SPILL ON *CYNOSCION NEBULOSUS*

10:15 BACKGROUND LEVELS OF METHANE IN THE VICINITY OF THE DEEPWATER HORIZON SITE

10:30 BREAK AND DIVISIONAL BUSINESS MEETING

10:45 ASSEMBLAGES OF LIVE BENTHIC FORAMINIFERA NEAR THE DEEPWATER HORIZON OIL SPILL IN THE NORTHERN GULF OF MEXICO



- 11:00 BENTHIC FORAMINIFERA IN BARATARIA, LA MARSHES RESPOND TO THE 2010 DEEPWATER HORIZON OIL SPILL
11:15 LITHOSTRATIGRAPHY OF JUMBO PISTON CORES FROM THE WOOLSEY MOUND, THE NORTHERN GULF OF MEXICO
11:30 LITHOSTRATIGRAPHY OF A HOLOCENE TRANSGRESSIVE BARRIER ISLAND NEAR SPRING BAYOU, EAST MATAGORDA BAY, TX
11:45 USING AUTONOMOUS VEHICLES IN EXTREME ENVIRONMENTS: NATURAL HYDROCARBON SEEPS IN THE GULF OF MEXICO AND THE ROSS SEA, ANTARCTICA

MATHEMATICS, COMPUTER SCIENCE AND STATISTICS

Thursday, February 23, 2012

THURSDAY MORNING

Room: Lamar II

- 8:30 Welcome
- 8:40 VORONOI REDUCTION OF QUADRATIC FORMS
9:00 CROSS-LAYER PROTOCOLS FOR MULTIMEDIA COMMUNICATIONS OVER WIRELESS NETWORKS
9:20 DISPELLING THE MYTHS: USING AN INNOVATIVE STRATEGY TO INCREASE IN COMPUTING
9:40 EXCEL AS A VISUALLY LEARNING TOOL FOR CALCULUS CONCEOTS
- 10:00 BREAK
- 10:15 SYMPOSIUM: STATA FOR DATA MANAGEMENT, STATISTICAL ANALYSIS, AND GRAPHICS

PRESENTERS:

Dr. Elgenaid Hamadain (Symposium Coordinator)
Dr. Michael Griswold, Allan Penman, Imran Sunesara

12:00 Lunch

THURSDAY AFTERNOON

ROOM: Lamar II

- 1:30- TIPS AND TRICKS FOR IPAD
2:30 INFORMATION HIDING THROUGH COVER GENERATION: USING CONTEXT-FREE GRAMMAR
2:50 A SECURE ONLINE STUDENT-ADVISOR APPOINTMENT AND REGISTRATION SYSTEM
3:10 SIMULATION OF A SECURE TOUCH-SCREEN KIOSK SYSTEM FOR AMUSEMENT PARK PLANNING

3:30 Division Business Meeting

POSTER SESSION- 6:30 to 8:00 PM

1. A COMPARISON OF PATIENT OUTCOMES (MORBIDITY, MORTALITY, AND AVERAGE LENGTH OF STAY) IN AMONG ACADEMIC MEDICAL CENTERS WITH AND WITHOUT VALUE ANALYSIS PROGRAMS USING THREE SERVICE LINES
2. COMPARATIVE STUDY OF DIRECT AND ITERATIVE METHODS OF SOLVING LINEAR SYSTEMS
3. NUMERICAL EXPERIMENTS WITH FEW UNIVARIATE POLYNOMIAL ROOT FINDING ALGORITHMS



PHYSICS AND ENGINEERING

Thursday, February 23

THURSDAY MORNING

Room: Garden Room

- 8:45 CONSEQUENCES OF NOT FINDING HIGGS**
- 9:00 THE TOP FORWARD BACKWARD ASYMETRY WITH GENERAL Z' COUPLING**
- 9:15 MYSTERIOUS ANTIMATTER**
- 9:30 MODELING THE HORIZONTAL PROPAGATION OF SOUND FROM AIRGUN SOURCES**
- 9:45 INVESTIGATING THE ACCURACY OF AN EQUIVALENT-FLUID APPROXIMATION FOR ACOUSTIC REFLECTION FROM THE SEAFLOOR**
- 10:00 PHOTOIONIZATION CROSS SECTION MEASUREMENT OF RB 5P_{3/2}**

- 10:15 BREAK**

- 10:30 VOIDS AND MOLECULAR HYDROGEN IN HYDROGENATED AMORPHOUS SILICON**
- 10:45 CAVITY ENHANCED ABSORPTION SPECTROSCOPY: NEAR INFRARED ABSORPTION BY WATER USING A LED (LIGHT EMITTING DIODE)**
- 11:00 EQUILIBRIUM CONFIGURATIONS OF C₆H₆, C₆H₅Cl, C₆H₅N₂ MOLECULES AND C₆H₆-C₆H₅Cl COMPLEX**
- 11:15 CREEP TESTING OF VINYL ESTER POLYMER USING DIGITAL IMAGE CORRELATION TECHNIQUE**
- 11:30 INVESTIGATION OF VIBRATION CHARACTERISTICS OF COMPOSITE BEAMS AT ELEVATED TEMPERATURES**
- 11:45 STRUCTURAL RESPONSE OF A CARBON-COMPOSITE WING USING FIBER BRAGG GRATING**

- 12:00 LUNCH**

THURSDAY AFTERNOON

Room: Garden Room

- 1:20 OVERVIEW OF NASA-STENNIS ACTIVITIES**
- 2:00 ERROR PERFORMANCE OF DECODE-AND-FORWARD COOPERATIVE SYSTEMS WITH CO-CHANNEL INTERFERENCE IN NAKAGAMI-M FADING CHANNELS**
- 2:15 SIMULATION OF SPIRAL BASED ANTENNA FOR GROUND PENETRATING RADAR**
- 2:30 FLIGHT MECHANICS AND PUTATIVE AUDIO RECORDINGS OF THE IVORY-BILLED WOODPECKER (*Campephilus principalis*)**

- 2:45 BREAK**

- 3:00 RADIOLOGICAL EMERGENCY PREPAREDNESS**
- 3:15 AUTONOMOUS UNDERWATER VEHICLES IN HOMELAND SECURITY AND OTHER APPLICATIONS**
- 3:30 INTERPOLATION-BASED TECHNIQUE WITH REDUCED COMPLEXITY OF MIMO-OFDM SYSTEMS**

3:45 BUSINESS MEETING

THURSDAY EVENING

Room: Exhibit Hall C

POSTER SESSION 6:30-8:00

- 1. DEVELOPMENT OF A DUST DROPPER FOR DUSTY PLASMA EXPERIMENTATION**



PHYSICS AND ENGINEERING

Friday, February 24

FRIDAY MORNING

Room: Lamar II

- 9:00 TEMPERATURE AND HUMIDITY MEASUREMENT IN A PHOTO-CATALYTIC CHAMBER**
- 9:15 NUCLEAR MAGNETIC RESONANCE SPECTRA OF HYDROGENATED AMORPHOUS SILICON: A MOMENT-BASED APPROACH**
- 9:30 MAINTAINING ACCURATE MEASUREMENTS WITH PHOTOIONIZATION DETECTOR IN A VOC FLOW STREAM**
- 9:45 DESIGN OF HIGH PRESSURE INSTRUMENTED TEST FIXTURE**
- 10:00 ELECTRODE DESIGN CONSIDERATIONS FOR SURFACE AND VOLUMETRIC RESISTIVITY MEASUREMENTS OF SMALL SAMPLES OF THIN FILM POLYMERS**
- 10:15 CONCERNING THE EFFECT OF WATER VAPOR ON THE OSCILLATION OF AN AIR BUBBLE**

PSYCHOLOGY AND SOCIAL SCIENCES

Thursday, February 23

THURSDAY MORNING

Room: Lamar I

- 9:00 PTSD SYMPTOM SEVERITY AND ITS RELATIONSHIP WITH LOCUS OF CONTROL AND GENDER**
- 9:15 THE INFLUENCE OF SINGLE, DIVORCE, AND DUAL FAMILY STRUCTURE ON INTIMATE RELATIONSHIPS.**
- 9:30 THE LISTENING PREFERENCES OF HIGH SCHOOL AND COLLEGE STUDENTS BASED ON PERSONALITY, MUSICAL TASTE AND MUSICAL TRAINING**
- 9:45 EXAMINING THE RELATIONSHIP BETWEEN SOCIAL ENVIRONMENT AND DELINQUENCY**
- 10:00 BREAK**

- 10:15 SEXUAL BIAS: PHYSICAL ATTRACTIVENESS PREFERENCES**

- 10:30 A COMPARATIVE STUDY: RACIAL IDENTITY AWARENESS AMONG AFRICAN AMERICAN BABY BOOMERS AND GENERATION Y**
- 10:45 ATTITUDES AND BELIEFS OF ABORTION AMONG AFRICAN AMERICAN MOTHERS AND YOUNG ADULT WOMEN**
- 11:00 TIPS FOR GETTING ADMISSION IN GRADUATE SCHOOL**
- 11:15 DE-MYSTIFYING MYTHS: CREATION AND FIRST MAN-WOMAN MYTHS**
- 11:30 MENTAL HEALTH AND PERCEIVED MEANING AS PREDICTORS OF LIFE SATISFACTION**
- 11:45 A STUDY OF THE ROLE OF THE GENDER OF AFRICAN-AMERICAN COLLEGE STUDENTS AND THEIR ATTITUDES TOWARDS MATHEMATICS**

- 12:00 LUNCH**



THURSDAY AFTERNOON

Room: Lamar I

- 1:30 WICKED WEATHER: HURRICANE IRENE TO TROPICAL STORM**
- 1:45 GOVERNMENT ROLE: PREPAREDNESS AND RESPONSE TO NATURAL DISASTER**
- 2:00 THE EFFECTS OF MUSIC FOR HEALING OF GULF COAST RESIDENTS FOLLOWING HURRICANE KATRINA**
- 2:15 BEST PRACTICES TO INCREASE PREPAREDNESS AND RESILIENCE OF AT _ RISK POPULATIONS**
- 2:30 AN EVALUATION OF THE CURRENT ASSESSMENTS OF RESILIENCE TO DISASTERS FOR THE COASTAL COMMUNITIES OF MISSISSIPPI**
- 2:45 PANEL DISCUSSION ON NATURAL DISASTER TOPICS**
- 3:00 POSTER SESSIONS**

- 4:00 DIVISIONAL BUSINESS MEETING**

FRIDAY, FEBRUARY 24

FRIDAY MORNING

Room Lamar I

- 9:00 DOMINANCE BEHAVIORS IN GARNETT'S BUSHBABIES (OTOLEMUR GARNETTII)**
- 9:15 MECHANISMS UNDERLYING RISKY BEHAVIOR IN POSTTRAUMATIC STRESS DISORDER**
- 9:30 GRIT AS A PREDICTOR OF POSTTRAUMATIC STRESS DISORDER**
- 9:45 VARIATIONS IN INTERACTION WITH ENRICHMENT DEVICES IN GARNETT'S BUSHBABY (OTOLEMUR GARNETTII)**
- 10:00 BREAK**
- 10:15 RELATIONSHIP BETWEEN GROOMING AND SELF INJURIOUS BEHAVIOR IN GARNETT'S BUSHBABY (OTOLEMUR GARNETTII)**
- 10:30 MENTAL HEALTH AND PERCEIVED MEANING AS PREDICTORS OF LIFE SATISFACTION**
- 10:45 EXAMINING STANDARDS AND THEIR IMPACT ON EXPECTATIONS OF STUDENTS , DEMONSTRATIONS OF UNDERSTANDING , AND EQUITABLE PROGRAMS**
- 11:00 EXAMINING PREDATORY LENDING: MAKING CONNECTIONS IN SECONDARY MATHEMATICS EDUCATION BETWEEN CONTENT AND EQUITY ISSUES**

- 11: 30 LUNCH**

SCIENCE EDUCATION

Thursday, February 23

THURSDAY MORNING

Room: Lakeview II

- 8:00 RESTORATION OF THE NOAA LIBRARY AT THE NATIONAL MARINE FISHERIES SERVICE LABORATORY**
- 8:15 STEM CELL RESEARCH: THE HOLY GRAIL OF MEDICINE FOR END-STAGE RENAL FAILURE PATIENTS**
- 8:30 EXPANDING CHEMISTRY LAB BOOK EXPERIENCE**
- 8:45 CREATING INFORMATIVE BROCHURES FOR THE PUBLIC VISITING THE INSTITUTE FOR MARINE MAMMAL STUDIES**



- 9:00** **STUDENTS OF THE ROBOTICS PROGRAM**
- 9:15** **DEVELOPMENTAL ETHICS: A MODULE FOR PROSPECTIVE NURSING PROFESSIONALS**
- 9:30** **MARINE MAMMAL AND REPTILE ARTIFACT DISPLAYS**
- 9:45** **CAN STUDENT OUTCOMES FOR A COMMUNITY COLLEGE MICROBIOLOGY COURSE BE AFFECTED BY SCHEDULING?**
- 10:00** **BREAK**
- 10:15** **BIOLOGICAL CONTROL OF CHYTRID FUNGUS**
- 10:30** **DESIGN AND TESTING OF THE LEONARDO ONLINE DISCUSSION BOARD STRATEGY FOR COLLEGE SCIENCE TEACHING**
- 10:45** **PETRIFIED WOOD IN MISSISSIPPI'S K-12 SCIENCE CLASSROOMS: AN EFFECTIVE PORTAL FOR MISCONCEPTION IDENTIFICATION AND INTERDISCIPLINARY SCIENCE STUDY**
- 11:00** **“GREEN” WATER BOTTLES: CREATIVE SOLUTIONS FOR OUR PLANET**
- 11:15** **INTEGRATING PLANTS IN THE SCIENCE CLASSROOM THROUGH OUR HUMAN-FLOWER CONNECTION**
- 11:30** **Division Business Meeting ----**

THURSDAY AFTERNOON

Room: Lakeview II

- 1:00** **CREATING COMMON CONNECTIONS AND STEWARDSHIP OF MARY WALKER BAYOU PRESERVE**
- 1:15** **MARINE LITTER DECAY TIMELINE**
- 1:30** **DEEPWATER HORIZON OIL SPILL: THE BEGINNING OF THE STORY**
- 1:45** **DEEPWATER HORIZON OIL SPILL TIMELINE: THE STORY CONTINUES...**
- 2:00** **MISSISSIPPI HIGHWAY LITTER DECAY TIMELINE**
- 2:15** **MISSISSIPPI GULF COAST COASTAL WATERS AND BARRIER ISLANDS MURAL**
- 2:30** **MISSISSIPPI RIVER WATERSHED EDUCATIONAL MURAL**
- 2:45** **BREAK**
- 3:00** **TRIAL PLANT BROCHURES FOR THE INSTITUTE OF MARINE MAMMAL STUDIES NATURE TRAIL**
- 3:15** **DEEPWATER HORIZON OIL SPILL TRI-FOLD BROCHURES**
- 3:30** **TEACHING SECOND GRADERS TAXONOMIC CLASSIFICATION**
- 3:45** **LEARNING STRATEGIES FOR THE INTELLECTUALLY GIFTED**



Exhibit Hall C

DIVISION POSTER PRESENTATIONS

6:30-8:00 pm

1. **TEACHER TRAINING, METHODS AND INTENT TO PERSIST**
2. **IMPROVING THE FOOD SAFETY KNOWLEDGE, ACCORDING TO HACCP, AMONG INTERNATIONAL RESTAURANT FOOD HANDLERS IN THE MISSISSIPPI GULF COAST REGION**
3. **EVALUATION OF CHEMOTHERAPY PATIENT EDUCATION**
4. **HOW TO STOP THE SPREAD OF GERMS WITHIN OCEAN SPRINGS ELEMENTARY SCHOOLS**
5. **DR. WILLIAM E. HAWKINS AND HIS CONTRIBUTION TO MARINE SCIENCE**
6. **TEACHING STUDENTS ABOUT NEWTON'S LAWS OF MOTION**
7. **ANALYZING DATA FOR POTENTIAL CHANGES IN HOSPITAL TECHNIQUES AT SINGING RIVER HEALTH SYSTEM (SRHS)**
8. **THE RISE OF THE APPS: IMPLICATIONS OF MOBILE APP ECOSYSTEMS FOR EARLY CHILDHOOD READING AND MATH LEARNING**
- 9.

SCIENCE EDUCATION

Friday, February 24

FRIDAY MORNING

Room: Garden Room

ORAL PRESENTATIONS

- 9:00** **SCIENCE CURRICULUM THROUGH ART OF THE WALTER ANDERSON MUSEUM**
- 9:15** **CAN SCIENCE OLYMPIAD AND THE SES REDUCE ANXIETY AND IMPROVE ATTITUDES TOWARD TEACHING SCIENCE**
- 9:30** **REPORT AND REFLECTIONS FROM YEAR ONE OF THE NSF GK-12 PROGRAM AT USM**
- 9:45** **A REVIEW OF SCIENCE, TECHNOLOGY AND SOCIETY (STS) CURRICULAR IDEAS AND STRATEGIES SINCE 2000 IN THE MIDDLE GRADES**
- 10:00** **INCOROPRATION OF EXAMPLES OF CONTRIBUTIONS TO THE SCEINCES MADE BY MINORITY ETHNIC GROUPS INTO THE SCIENCE CLASSROOM**
- 10:15** **BASR PAIR: 20 YEARS OF ENHANCING INQUIRY-BASED SCIENCE EDUCATION IN MISSISSIPPI**
- 10:30** **USING FRACTALS AND SELF-SIMILARITY TO ENGAGE STUDENTS IN SCIENCE**



ZOOLOGY AND ENTOMOLOGY

Thursday, February 23

THURSDAY MORNING

Room: Forrest I

8:50 WELCOME AND OPENING REMARKS

- 9:00 CHANGES IN CRANE VIGILANT BEHAVIOR DURING RELEASE ACCLIMATION**
9:20 URINARY SCHISTOSOMIASIS AND BACTERIAL COINFECTION AMONG SCHOOL CHILDREN IN NDONI LOCAL GOVERNMENT AREA OF RIVERS STATE, NIGERIA
9:40 SALMONELLA AVRA EFFECTOR INHIBITS THE ANTI-APOPTOTIC NF-KB PATHWAY
10:00 WATER QUALITY STUDIES OF MUD ISLAND GREEK IN JEFFERSON COUNTY, MS
10:20 MACROZOOBENTHIC ASSEMBLAGES IN THE MARINE MAASTRICHTIAN (UPPER CRETACEOUS) OF MISSISSIPPI
10:40 BREAK
11:00 MONITORING CHLOROPHYLL BIOMASS AS BIOINDICATOR OF WATER QUALITY IN THE COLES CREEK WATERSHED.
11:20 SPIDERS FOUND IN RIPARIAN COMMUNITIES WITHIN THE COCKSCOMB BASIN WILDLIFE SANCTUARY, BELIZE
11:40 POLLUTION STUDIES ON THE BIG SUNFLOWER RIVER AND THE YAZOO RIVER IN MISSISSIPPI

THURSDAY AFTERNOON

Room: Forrest I

- 1:15 DIVISIONAL BUSINESS MEETING**
1:35 POLLUTION STUDIES ON A POND IN ALCORN STATE UNIVERSITY, MS.
1:55 HEALTH-RELATED TESTS ON SORGHUM BICOLOR

2:15 HEMATOLOGICAL, ANTI-INFLAMMATORY AND ANTIOXIDANT PROPERTIES OF A SORGHUM-BASED COMMERCIAL HERBAL PREPARATION, JOBELYN®

Exhibit Hall C

DIVISION POSTER PRESENTATIONS

3:00-4:00 pm

- 1. ESTROGEN VERSUS PHYTOESTROGEN: THE EFFECTS OF GENISTEIN ON SPATIAL AND NON-SPATIAL COGNITION IN THE MALE ZEBRA FINCH**
- 2. DISTINCTIVE SEQUENCE FEATURES OF *SCHISTOSOMA JAPONICUM* UNIVERSAL STRESS PROTEINS**
- 3. URIC ACID AND SOLUBLE PROTEIN CONTENT OF FECES FOR THREE SPECIES OF SUBTERRANEAN TERMITES**
- 4. SEQUENCE FEATURES OF TOXOPLASMA GONDII UNIVERSAL STRESS PROTEINS**
- 5. EFFECT OF NON-TRADITIONAL LANDSCAPE MULCHES ON FORMOSAN SUBTERRANEAN TERMITE (ISOPTERA: RHINOTERMITIDAE) CONSUMPTION AND MORTALITY**
- 6. DISTINCTIVE SEQUENCE FEATURES OF *ALVINELLA POMPEJANA* UNIVERSAL STRESS PROTEINS**



NOTE PAGE


AGRICULTURE AND PLANT SCIENCE

Chair: E. David Peebles
Mississippi State University
Vice Chair: William Kingery
Mississippi State University

01.01
9:00 EFFECTS OF CHELATING AGENT'S APPLICATION ON SOYBEAN MINERAL COMPOSITION AND SEED PROTEIN, OIL, AND FATTY ACIDS

Mudlagiri Goli¹, Manju Pande¹, Nacer Bellaloui¹
¹Mississippi Valley State University, Itta Bena, MS, USA, ²Mississippi Valley State University, Itta Bena, MS, USA, ³United States Department of Agriculture, Stoneville, MS, USA

In a greenhouse experiment, three-week-old soybean seedlings were exposed to various individual chelating agents of citric acid (CA), disodium EDTA (DSEDTA), salicylic acid (SA) and ferrous ion (Fe), and to the first three chelating agents combined with ferrous ion. After the chemical applications, the plants were allowed to grow from May 15, 2010 until physiological maturity (first week of October). Seeds were analyzed for protein, oil, palmitic, stearic, oleic, linoleic, and linolenic acids, and macro- and micro-elements. The treatments Fe, CA, DSEDTA, and SA, had a major influence on seed composition by increasing the concentration of oleic acid (18:1) from 13 to 33.5%. These four treatments were found to decrease linolenic acid (18:3) content. The decrease of linolenic acid ranged from 17.8 to 31%. Treatments CA and SA increased protein content from 2.9 to 3.4 %. Treatments DSEDTA+Fe and SA+Fe increased the oil content from 6.8 to 7.9%. For long shelf life of the oil, the increased content of relatively stable monounsaturated fatty acid such as oleic (18:1) acid rather than less stable polyunsaturated linolenic (18:3) or linoleic (18:2) acids in the soybean oil is desirable. The results of our study indicated that the CA, SA, DSEDTA and Fe treatments can alter seed composition, shifting the protein, oil, and fatty acids in seed. This may give opportunity for farmers and industry for producing specific seed constituents, depending on the need of the industry or consumers.

01.02
9:15 EFFECT OF FOLIAR VS SOIL APPLICATION OF POTASSIUM ON SOYBEAN SEED COMPOSITION

Tyeinseca Epps, Viscardi Christina, Mudlagiri Goli, Manju Pande
Mississippi Valley State University, Itta Bena, USA

Potassium (K) is necessary for carbohydrate and protein metabolism, which is essential for growth, pod and seed formation. The objective of this research was to study the effectiveness of soil and foliar application of K on seed protein, oil and fatty acid content. Soybean cultivar (Pioneer 95470) of maturity group 5.7 was grown in pots in a repeated experiment in a randomized complete block design. Treatment consisted of two different concentrations of K₂SO₄ of foliar and soil applications. The foliar application had two K concentrations (T1, 1.75%; T2, 2.5%). For soil application, K was also applied at two concentrations (T3, 190mg/kg; T4, 380mg/kg). The two applications were performed at V3 (vegetative) and R3 (beginning of seed pod initiation) stages. Mature seeds were analyzed for protein, oil and fatty acid contents. Seed protein concentration in T3 (soil application with 190mg K/kg) had a significant increase (3.09%) in protein compared to control. Seed oil percentage showed a general decrease in all the treatments except for in T4 (soil application with 380mg K/kg), where a significant increase in oil percentage (19.36%) was found compared to control (18.76%). In conclusion, K application to soil or foliar can alter seed composition. The increase of protein occurred at the expenses of oil. Further research is needed to understand the mechanisms of K effects on seed composition in soybean. This research is beneficial for soybean growers; it may provide them with the possible effect of K management on seed quality.

01.03
9:30 VACCINATION EFFICIENCY OF F-STRAIN DERIVED LIVE ATTENUATED MYCOPLASMA GALLISEPTICUM VACCINES IN LAYERS

Roy Jacob¹, E. David Peebles¹, Spencer Leigh², Scott Branton², Jeff Evans²
¹Mississippi State University, Mississippi State, MS, USA, ²USDA/ARS Poultry Research Unit, Mississippi State, MS, USA

F-strain Mycoplasma gallisepticum (MG) derived live attenuated vaccines (LAVs) are commonly utilized within the table egg industry to limit economic losses associated with virulent MG

outbreaks. In the present study, commercially available LAVs were compared for their ability to elicit seroconversion, persist in-vivo, and protect against virulent MG-induced airsacculitis. A randomized control study design was used, in which 150 mycoplasma-free Hyline W-36 layers were housed in biological isolation units (10 birds per unit) through 18 wk of age. At 10 wk of age, birds of each biological isolation unit were vaccinated via eye-drop with one of 3 LAVs, at one of 5 levels (1X, 10^{-1} X, 10^{-2} X, 10^{-3} X, or 0X). At 6 wk post-vaccination (p.v.), in-vivo MG populations were estimated via palatine fissure swabs and subsequent quantitative Taqman[®]-based RealTime PCR assays. In addition, ELISA assays were also performed 6 wk p.v. Virulent MG (strain Rlow) challenge occurred via intra-tracheal inoculation 7 wk p.v. Necropsies were performed at the end of the study to assess challenge associated airsacculitis. For each F-strain derived vaccine applied at 1X and 10^{-1} X, 100% seroconversion as measured by SPA was demonstrated by 6 wk p.v. The incidence of detectable in vivo MG increased with higher dosages, but MG population estimates did not correlate directly with dosage. Following challenge, airsacculitis was observed in 67% of 0X-treated birds, but not in any 1X or 10^{-1} X-treated bird independent of applied F-strain derivative. The results indicate a minimum threshold dosage for the LAVs, beyond which the dilutions result in inconsistent colonization.

01.04

9:45 EFFECT OF CASEIN HYDROLYZATE ON COLIFORM GROWTH ON BEEF

Dipaloke Mukherjee, Yin Zhang, Sashie Weerasinghe, Byron Williams, Zahur Haque
Mississippi State University, Miss. State, USA

The coliforms comprise a broad class of bacteria, whose presence in food and drinking water can serve as an indication of potential health hazards, due to their roles in producing a number of serious diseases in various vertebrate species. Consumption of meat products, especially if raw or under cooked - can result in severe health related problems in humans due to coliform infections - as these products are typically contaminated with such bacteria. In the current work, we have studied the antibacterial effects of casein hydrolyzate (CH) against coliform growth on beef samples, with an objective of improving meat quality and reducing the potential health hazards resulting from such organisms. Beef steak samples of equal weight were treated with edible coating solutions, with varying concentrations of CH (ranging from 0.05 to 0.4 g/100 ml). The treated beef samples were separately incubated for 48

and 72 hours, respectively. Finally the coliform counts in each sample were estimated by plate count method. Linear regression analysis was performed to assess whether there is a significant effect of the CH concentrations on coliform growth. In both samples incubated for different periods of time, increasing concentrations of CH had adverse effect on coliform growth up to a certain concentration, after which increasing the CH concentration had no effect on coliform counts.

10:00 BREAK

01.05

10:15 EXAMINATION OF A PUTATIVE ORGANELLE IN POLLEN GERMINATION

Torri Thomas¹, Changbin Chen², Stefanie Dukowicz-Schulze², Junhua Li², Julius Ikenga¹

¹Mississippi Valley State University, Itta Bena, MS, USA, ²University of Minnesota, St. Paul, MN, USA

The purpose of this project was to investigate the dynamics of the G-body. Eukaryotic cells within certain transgenic *Arabidopsis* plants express green fluorescent protein (GFP) in their meiotic cells. Expression of the GFP proteins resulted in the discovery of a putative organelle called the "Green Spot" or "G-body". This organelle is presumably of import to the *Arabidopsis* plant cell, but its actual functions are not known. This putative - novel organelle, the G-body, is found during the male gametophyte development. Some pollens of the transgenic *Arabidopsis* plant were allowed to germinate and DNA was extracted from mature male gametophytes. PCR protocols were subsequently carried out and the stained gels examined under a fluorescence microscope. Certain G-body dynamics and experimental process problems were observed. Microscopic examination of test preparations found most of the green spots to be very weak. But the best plant and yield, however was still selected. The promoters used in the study were specifically for the meiocytes and not perfect for the pollens. The pollen tubes were also found to break easily, if the cover slips were not put on very carefully. DAPI stain was found to provide incomplete staining sometimes. This latter problem could be solved or improved by allowing more time for incorporation into the cells. The rate of the pollen germination was also a problem but this could be mitigated by switching to over-night germination.

**01.06****10:30 DEVELOPMENT OF DETECTION METHOD FOR *ESCHERICHIA COLI* O157:H7 AND NON O157:H7 IN CATFISH**

Qian Gu, Juan L Silva, Tae Jo Kim
Mississippi State University, Mississippi State, MS,
USA

Escherichia coli detection has focused mainly on DNA/PCR or immunoassay methods. An investigation of different pathogenic *Escherichia coli* in catfish farms and processing plants, enable to evaluate the possible prevalence of *Escherichia coli* O157:H7 on catfish. Finally, a reliable and accurate test for the presence of *Escherichia coli* O157:H7 in catfish has not been reported. Based on the survey of *Escherichia coli* O157:H7 in catfish farms and catfish processing plants, no *Escherichia coli* O157:H7 was detected in summer, fall and winter 2010. From a total of 362 samples collected in 2010, four *Escherichia coli* O55:H7 and three Shiga-like toxin *Escherichia coli* were isolated in water and sediment samples of catfish farms but not on live fish and fish fillets. *Pseudomonas* and generic *Escherichia coli* are the main false positive bacteria, interfering with the conventional detection methods. Improvement of methodology to minimize false positives while decreasing detection time and difficulty/cost of detection can provide benefits to on-site detection. Improvements in detection were accomplished by adjusting the detection procedures and media based on the sensitivity of different strains of *Escherichia coli* O157:H7. This methodology can be used to detect *Escherichia coli* on food products and other samples.

10:45 BUSINESS MEETING**POSTER SESSION****P1.01****EFFECTS OF LEAD EDTA AMENDMENTS ON THE GROWTH OF *WAUTERSIA METALLIDURANS* IN LIQUID NUTRIENT MEDIUM**

Yasmin Partee, Ronnecia Mackey, Gloria Miller,
Maria Begonia and Gregorio Begonia

Department of Biology, College of Science,
Engineering and Technology, Jackson State
University, Jackson, MS 39217

Lead (Pb) is one of the heavy metals responsible for soil pollution. Reports have shown

that long and short-term response to toxic metals can cause a large reduction in microbial activities. The objective of this study was to investigate the effects of Pb and ethylenediaminetetraacetic acid (EDTA) on the growth of bacterium *Wautersia metallidurans* in lead-and EDTA-amended nutrient broth medium (NBM). Flasks containing NBM, previously amended with different concentrations of Pb and EDTA, were inoculated with cells of *W. metallidurans* and grown in the shaker for 3 days at 35°C. Broth cultures were sampled periodically and analyzed for bacterial growth (absorbance and plate counts). Our results showed that growth of *W. metallidurans* increased with increasing incubation periods across all metal concentrations. In the absence of Pb, growth was higher in the medium lacking EDTA than with EDTA, indicating the lethal effect of EDTA to the bacterial cells when used alone. Plate counts were not significantly different at 10 and 40 ppm Pb but significantly different at 72 hours for 70 ppm. In the presence of EDTA, growth was generally higher in the NBM amended with 10, 40, and 70 ppm Pb than in the medium lacking EDTA. These data indicate that EDTA can alleviate the toxic effect of Pb to the bacterial cells due to the formation of Pb-EDTA complex which is less toxic than a free protonated Pb.

P1.02**GROWTH AND HEAVY METAL ACCUMULATION OF PLANTS GROWN IN METAL-CONTAMINATED STERILE AND NONSTERILE SOIL**

Rachel Knott, LeoAlexander Harris, Gloria Miller,
Maria Begonia and Gregorio Begonia

Department of Biology, College of Science,
Engineering and Technology, Jackson State
University, Jackson, MS 39217

Microorganisms are ubiquitous in soils to which heavy metal (HM) accumulating plants are native, even in those soils containing high concentrations of HM. It is known that some microorganisms can mobilize some metals in soil and can enhance the accumulation of some HM in roots of non accumulator plants. The objective of this study was to evaluate the growth and HM accumulation and translocation of plants (tall fescue and/or wheat) grown in sterile and nonsterile soils. Plants were grown in the greenhouse for six weeks in sterile and nonsterile growth media that had been amended with different concentrations of lead (Pb) or cadmium (Cd). After harvest, dry biomass and metal concentrations in root and shoot tissues were quantified. Our results revealed that the root and

shoot dry biomass of both fescue and wheat plants grown in sterile soil were higher than those grown in nonsterile soil across all Pb and Cd concentrations. Cadmium concentrations in roots and shoots were higher in nonsterile soil amended with 500 ppm Cd, than at 0 and 250 ppm. Lead concentrations in root and shoot tissues were higher in Pb-amended non sterile soil, compared to the sterile soil. These results suggest that the native populations of microorganisms in soil can enhance the HM accumulation in plants.

P1.03

DISTINCTIVE SEQUENCE FEATURES OF *CANDIDA ALBICANS* UNIVERSAL STRESS PROTEINS

Daniel Kibet¹, Ousman Mahmud², Raphael Isokpehi², Julius Ikenga¹, Kafui Edusei², Andreas Mbah², Wellington Ayensu²

¹Mississippi Valley State University, Itta Bena, MS, USA, ²Jackson State University, Jackson, MS, USA

The protein sequences of genes encoding the USP domain in *Candida albicans* were retrieved from Uniprot database and examined using a variety of bioinformatics tools and methods to discern any distinctive sequence features. Genes that code for proteins containing the universal stress protein (USP) domain are known to provide bacteria, archaea, and eukarya (such as, fungi, protozoa, and plants) with the ability to respond to a plethora of environmental stresses. *Candida albicans* is one of the most important human fungal pathogens causing candidiasis. USPs are predicted to be found in the genome of *Candida albicans*. Based on finding the conserved ATP binding consensus sequence [G2XG9XGS/T], the *Candida albicans* USPs can be class as putative ATP binding and putative non ATP binding classes. Highly conserved region (motifs) was found on *Candida albicans* USP protein sequences with one of them containing the putative ATP-binding signature sequence. Motif scan was used to confirm the presence of the USP domain in the all the *Candida albicans* protein sequences analyzed. The biological significance of the motifs identified in this research should be examined in future studies.

P1.04

COMPARISON OF Highbush AND Rabbiteye Blueberries Under Scanning Electron Microscope

Antonio Garcia

Mississippi State University, Mississippi State, MS, USA

Highbush blueberries (*V. corybosum* and *V. darrowii*) are the most commercially utilized species of blueberries in the United States. Rabbiteye blueberries (*V. ashei*) are grown primarily in the southeastern United States, and are believed to be of inferior quality with regard to skin toughness and seediness. Fresh, frozen and osmotically-dried highbush and rabbiteye blueberries were analyzed under a scanning electron microscope (SEM) to observe any differences in epidermal and subepidermal cell layer thickness between the two species. After fixation, samples were viewed under a Jeol JSM-6500F Field Emission SEM. Rabbiteye blueberries of both fresh, frozen and osmotically dried treatments were shown to have thicker epidermal and subepidermal cell layers than that of their highbush counterparts. Measurement of the epidermal and subepidermal cell layers shows that the rabbiteye blueberries had an overall average epidermal thickness of 67.1 micrometers (μm) whereas highbush blueberries demonstrated an overall average epidermal thickness of 45.5 μm . A difference was also noted when comparing fresh, frozen and osmotically-dried fruit within the same species. The epidermal thickness of highbush blueberries decreased by 16.3% upon further processing by osmotically drying the berries. Rabbiteye epidermal thickness also decreased but by a much smaller degree at 4.9%. This suggests that despite being slightly tougher than highbush blueberries, rabbiteye blueberries are more suitable for advanced processing methods that would cause the skins of highbush blueberries to rupture.

P1.05

RELATIONSHIP OF INDICATOR AND PATHOGENIC MICROORGANISMS ON CATFISH PRODUCTS

Norman N. Arroyo-Llantín, Taejo Kim, Juan L. Silva
Mississippi State University, Mississippi State, MS, USA

Indicator microorganisms in the food industry are used as indicators of effective cleaning and sanitation procedures. An indicator microorganism should be widely distributed, survive preservation procedures and be easy to isolate. There are discrepancies among the scientific community of the species of indicator microorganisms to be used. The purpose of this study was to find the relationship between aerobic plate counts, total coliforms and *Escherichia coli* and pathogenic bacteria such as *Salmonella* spp. and *Listeria* spp. Sampling was done on catfish farms (whole fish) and processing plants (catfish fillets) following a modified isolation procedure of the microbiology laboratory guidelines



(MLG) from the USDA-FSIS. *Salmonella* spp. and *Listeria* spp. positive samples were identified and confirmed using polymerase chain reaction and serotyped. There appears to be no significant relationship between the counts of indicator microorganisms and the pathogens in this study. On the other hand, there was a significant difference ($p < 0.05$) on bacterial counts between seasons. In addition, various serotypes of *Salmonella* were found within farm and processing plant and were more predominantly during the warmer months. Variances in *Salmonella* species among the seasons indicated preference for high temperature growth conditions on the farm and in the plant.

**CELLULAR, MOLECULAR AND
DEVELOPMENTAL BIOLOGY**

Chair: Vijay Rangachari,
University of Southern Mississippi

February 23

THURSDAY MORNING

02.01

**8:30 DIFFERENTIAL EFFECTS OF
CHAPERONE PROTEIN EXPRESSION
ON THE RATES OF SPONTANEOUS
IN VIVO FORMATION OF THE YEAST
PRION [URE3]**

Tshering Lama Sherpa, Kaleel Wainwright, Stefanie Zegowitz, Khristina Booth, Ross Whitwam

The [URE3] prion of *Saccharomyces cerevisiae* is a model for mammalian prions. It is the misfolded, infectious form of the Ure2 protein. Like mammalian prions, [URE3] can form spontaneously *in vitro* or *in vivo* when the Ure2 protein misfolds in the absence of its infectious conformer. The *in vivo* spontaneous formation of the [URE3] prion state is notably faster than the *in vitro* formation. The rates of *in vivo* [URE3] spontaneous formation fluctuate during growth of yeast cultures. We hypothesized that chaperone proteins known to affect propagation of the prion state were also effecting how readily misfolded Ure2 protein established the prion state. Levels of these proteins would then correlate with periods of high or low rates of spontaneous [URE3] formation. We used real-time PCR to quantify expression levels of several proteins known to affect prion propagation. HSP104 and BTN2 expression levels were highest when spontaneous *in vivo* [URE3] formation is highest, while YDJ1, SSA1, and SSA2 expression levels tend to be highest when spontaneous *in vivo* [URE3] formation is lowest.

This suggests that chaperone and other proteins influence the establishment of the prion state after the Ure2 protein has initially misfolded, with Hsp104 and Btn2 proteins assisting prion formation, and Ydj1, Ssa1, and Ssa2 proteins antagonizing prion formation.

02.02

**8:45 DISCOVERY OF THE NOVEL SHELL
PROTEIN CSOS1D COMPLICATES
THE CURRENT MODEL OF THE
CARBOXYSOME**

Evan Roberts, Fei Cai, Anna Veldkamp, Cheryl Kerfeld, Gordon Cannon, Sabine Heinhorst

University of Southern Mississippi, Hattiesburg, MS

Cyanobacteria and many chemoautotrophs contain icosahedral protein microcompartments, known as carboxysomes, that encapsulate multiple copies of the CO₂-fixing enzyme Ribulose-1,5-bisphosphate Carboxylase/Oxygenase (RubisCO). RubisCO is responsible for the conversion of atmospheric CO₂ into a usable organic form, a process that is enhanced by its encapsulation within the carboxysome shell in a manner that is not well understood. Until recently, it was believed all proteins necessary for carboxysome structure and function were encoded by genes located within a highly conserved *csn* operon. However, successful isolation and characterization of carboxysomes from the marine cyanobacterium *Prochlorococcus marinus* MED4 (PMM) revealed the presence of the novel shell protein CsoS1D. The fact that the gene encoding CsoS1D is located outside the canonical *csn* operon in PMM warranted the investigation of other potential carboxysome components, leading to the classification of six types of cyanobacterial carboxysome "super-operons" based on their gene complement. Extending this investigation to chemoautotrophs led to the discovery of CsoS1D as a carboxysome shell component in *Halothiobacillus neapolitanus*, the model organism for carboxysome research. Phenotype characterization of a *csnS1D* gene deletion mutant in *H. neapolitanus* demonstrated that CsoS1D is required for cell growth and is thus essential to carboxysome function. Although the exact role of CsoS1D in the carboxysome is currently unknown, our findings suggest a more comprehensive model of the carboxysome that includes CsoS1D is warranted.

02.03

9:00 NON-ESTERIFIED FATTY ACIDS GENERATED DISTINCT LOW-MOLECULAR WEIGHT AMYLOID- β (A β 42) OLIGOMERS ALONG PATHWAY DIFFERENT FROM FIBRIL FORMATION.

Amit Kumar, Lea C.Pasley, Daniel Lyons, Sarah E. Morgan, Jack J. Correia, Vijay Rangachari

University of Southern Mississippi, Hattiesburg, MS

The low-molecular weight soluble oligomers of Amyloid- β peptide (A β) are increasingly believed to be the primary neurotoxic agents responsible for memory impairment in Alzheimer's disease (AD). Here, we report the effects of interfaces formed by medium-chain (C9-C12), saturated non-esterified fatty acids (NEFAs) on A β 42 aggregation. NEFAs uniquely affected A β 42 aggregation rates that depended on both the ratio of A β :NEFA as well the critical micelle concentration (CMC) of the NEFAs. More importantly, irrespective of the kind of NEFA used, we observed that two distinct oligomers, 12-18mers and 4-5mers were formed via different pathway of aggregation under specific experimental conditions: (i) 12-18mers were generated near the CMC in which NEFAs augment the rate of A β 42 aggregation towards fibril formation, and (ii) 4-5mers were formed above the CMC, where NEFAs inhibit fibril formation. The data indicated that both 12-18mers and 4-5mers are formed along an alternate pathway called 'off-pathway' that did not result in fibril formation and yet have subtle structural and morphological differences. These observations, (i) reflect the possible mechanism of A β aggregation in physiological lipid-rich environments, and (ii) reiterate the fact that all oligomeric forms of A β need not be obligatory intermediates of the fibril formation pathway. Furthermore, these oligomers were isolated using size exclusion chromatography (SEC) and we are now in the process of exploring the physicochemical properties of these isolated oligomers using biophysical techniques like thioflavin-T (ThT) fluorescence, immunoblotting, atomic force microscopy (AFM), circular dichroism (CD), dynamic light scattering (DLS) and analytical ultracentrifuge (AUC).

02.04

9:15 IDENTIFICATION OF READER PROTEINS OF HISTONE POST TRANSLATIONAL MODIFICATIONS

Udhghatri Kollji, Jiayu Li

The nuclear DNA in chromatin is associated with basic proteins called histones. Histones undergo

different post translational modifications. One such modification, histone lysine methylation influences many biological processes involving the chromatin template, like transcriptional regulation, DNA repair and genome integrity. Lysine (K) residues of histone H3 can be methylated at positions 4, 9, 27, 36 and 79. The lysines can be methylated in three different (mono-, di-, and tri-) methylation states and recruit chromatin associated proteins in a position and state specific way by serving as binding/ docking sites. The recruited proteins serve as readers of post translational modifications. The lysine methylation of histones is highly complex and is associated with both activation and repression of transcription depending on the position and state of methylation. We applied peptide pull-down assay, an unbiased biochemical approach using biotinylated modified/unmodified peptides to identify the proteins that bind to histone H3 lysine methyl groups in Arabidopsis and rice. Results from the pull down assay indicate that di-methyl modification of lysine 36 (M2K36) reduces the interaction/ binding of histones H2A and H2B with histone H3. The identification of effector proteins of histone methylation would aid in understanding the role and evolutionary importance to histone lysine methylation.

02.05

9:30 HUMAN GRANULIN-A PROTEIN INTERACTS WITH AMYLOID-B42 (AB42) PEPTIDE INVOLVED IN ALZHEIMER'S DISEASE IN A CONCENTRATION-DEPENDENT MANNER

Michael Samel, Amit Kumar, Vijayaraghavan Rangachari

University of Southern Mississippi, Hattiesburg, MS

Alzheimer's disease (AD) is the most common form of dementia affecting people over the age of 60, yet a detailed understanding of the molecular changes involved in AD remains a significant challenge to modern medicine. The hallmarks of an AD brain include the presence of senile plaques formed by a protein called amyloid- β (A β), along with inflammation of the brain. A β self-associates to form clumps of protein called "aggregates" which are known to be the primary toxic agents in AD pathology; however, several other proteins have also been implicated in this pathology. One such protein called progranulin (PGRN), which under normal physiological conditions plays a role in inflammation, has been shown to be present at higher concentrations in many neurodegenerative diseases including AD. The smaller fragments of PGRN are



proinflammatory proteins known as granulins (Grn) that, interestingly, have a molecular structure similar to the one observed in A β aggregates. Due to this structural similarity and the colocalization of PGRN and A β in an AD brain we are investigating the interaction between the most common Grn, human Granulin-A (hGrn-A), and A β through several biochemical methods. Our results indicate that hGrn-A specifically interacts with A β in a concentration-dependent manner to effect both inhibition as well as augmentation of aggregate formation. This unique modulation of A β aggregate formation allows for an entirely new perspective on the mechanisms of AD pathology.

02.06

9:45 IMMUNO-PROTEOME OF PROLONGED TICK ATTACHMENT ON THE HOST

Lacey Sipsey, Shahid Karim

University of Southern Mississippi, Hattiesburg, MS

The Lone Star tick, *Amblyomma americanum*, is a common North American tick and a vector of many diseases including Ehrlichiosis, tularemia, Southern tick-associated rash illness (STARI), and is thought to cause an allergic reaction to red meat. Of more notable concern, *A. americanum* has recently been implicated as a possible vector of *Rickettsia rickettsii* and *Rickettsia parkeri*, the causative agent of spotted fever rickettsiosis, and *Borrelia burgdorferi*, the etiological agent of Lyme's disease. These diseases spread to larger mammals present a drastic sociological and economic impact on human healthcare. Tick salivary glands play an important role in prolonged tick feeding, and are thought to facilitate pathogen transmission by secreting hemostatic, immunosuppressive and anti-inflammatory proteins into the host. Ticks secrete glycine rich proteins that create a cement-like cone that attaches from the tick's mouth part to the host, enabling the tick to remain attached during extended feeding. Our research laboratory is focused on identifying salivary cement proteins, with the goal of disrupting tick attachment or feeding, and possibly preventing tick-borne pathogen transmission. In order to identify specific cement proteins tick cement cones were collected from *A. americanum*, proteins were extracted in a solubilizing buffer, and then separated by SDS-PAGE. Stained bands were excised, digested with trypsin and identified using LC MS/MS. The cement proteins were then injected into a host animal in order to determine their immunogenicity. In identifying immunogenic tick cement proteins, it may be

possible to produce an anti-tick vaccine which may block tick attachment on the host.

10:00 Break

02.07

10:15 THE CROSS-TALK BETWEEN INTEGRIN AND GROWTH FACTOR SIGNALING REGULATES THE DIFFERENTIATION OF FETAL CORTICAL NEURONS

Ujjwal Rout, Nishant Rout

University of Mississippi Medical Center, Jackson, MS 39216

At the culmination of migration, the neurons in the fetal brain differentiate and make connections with other neurons. Normal differentiation of neurons is required for the optimum synaptogenesis and lamination of cerebral cortex. Disorders in this process may cause abnormal functioning of the brain in the offspring. The mechanisms of neuron differentiation and the trigger/s that initiate this differentiation process are not completely understood. In the present study, roles of integrin receptors and intracellular signaling molecules that transmit the integrin signaling are examined in neurons isolated from fetal (gestation days 16.5) rat brains. An *in vitro* model of neuron differentiation (neuritogenesis) was used to estimate the differentiation of rat fetal cortical neurons. Effects of monoclonal antibodies against integrin subunits and pharmacological agents that inhibit the function of intracellular molecules required for the integrin signaling and MEK were examined on the differentiation of neurons. Results show that the differentiation of neurons require normal functioning of the integrin subunit beta1 and alpha3, that form alpha3beta1 receptor, and the signaling mediated by Src-kinase, PLC, PKC, IP3 induced intracellular calcium-release and the calcium. Results show that MEK that transmits Growth factor signaling is also required for the differentiation of neurons.

02.08

10:30 THE USE OF ENDOGENOUS DNA SUBSTRATES TO MEDIATE THE EXTRACELLULAR FUNCTION OF THE DNA BINDING PROTEINS

William Thompson, Anthony Bell

University of Southern Mississippi, Hattiesburg, MS

High-mobility group B (HMGB1) proteins have long been considered DNA-binding proteins

that function by bending DNA to promote the binding of transcription factors to their respective binding sites to facilitate transcription. Recent research has shown that the HMG protein, HMGB1, also functions as a pro-inflammatory cytokine. In this new capacity, HMGB1 binds to the receptor for advanced glycation end products (RAGE). Regulation of this interaction could provide a method of controlling many inflammation-associated diseases. Our long-term goal is to determine if endogenous DNA substrates can be used as an effective means to disrupt the deleterious binding interactions between HMGB1 and RAGE receptors. Wild type and mutant HMGB1 proteins were expressed and electrophoretic mobility shift assays (EMSAs) using fluorescently labeled DNA substrates were conducted. To date, EMSAs have relied on the radioactive isotope ^{32}P to monitor protein-DNA interactions. Our preliminary results indicate that fluorescently labeled substrates could serve as a safer and potentially more reliable method to monitor protein-DNA binding interactions. Moreover, this approach will be used to further elucidate the role of HMG proteins in transcription regulation as well as inflammation.

02.09

10:45 THE T-BOX TRANSCRIPTION FACTOR MIDLINE COLLABORATES WITH THE INSULIN-REGULATED DFOXO TRANSCRIPTION FACTOR TO REGULATE CELL-FATE SPECIFICATION IN THE DEVELOPING EYE OF DROSOPHILA MELANOGASTER

02.10

11:00 IDENTIFICATION OF LIPID TRANSFER PROTEINS AS TARGETS OF A COTTON FIBER RING-TYPE UBIQUITIN LIGASE

Shiva Soma, Din-Pow Ma

Mississippi State University, MS

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). Using a cotton E2 (GhUBC1) as bait in a bacterial two-hybrid system, we had previously cloned a unique cotton fiber cDNA, *GhRING1*, encoding a RING type E3 ubiquitin ligase. GhRING1 is expressed in cotton fiber in a developmentally regulated manner,

suggesting that the ubiquitin-proteasome pathway may regulate fiber growth and development. The over-expressed GhRING1 in *E. coli* was shown to have the E3 ligase activity and was capable of catalyzing the formation of polyubiquitin chains via in vitro auto-ubiquitination. The *GhRING1* was further cloned into pBT and used as bait to clone cDNA coding for interacting/target protein(s). A cDNA encoding lipid transfer protein (LTP4) was pulled out from the 10 DPA fiber cDNA library using the bacterial two-hybrid system. A swap of the two vectors with pTRG carrying *GhRING1* and pBT harboring *Ltp4* also indicated a positive interaction between GhRING1 and LTP4. Multiple LTP isoforms have been reported to be present in fiber, and LTP3 and LTP4 are two LTP proteins that are most abundantly expressed in cotton fiber among other LTPs. The yeast two-hybrid system, which uses multiple reporters in reducing false positives, is utilized in this study to test whether both LTP3 and LTP4 proteins interact with GhRING1.

02.11

11:15 EDUCATIONAL USE OF STRUCTURE VISUALIZATION IN THE MOLECULAR BIOSCIENCES

Robert Bateman, Lea Michel, Paul Craig

William Carey University, Hattiesburg, MS

As educators in the molecular biosciences, one of our most captivating teaching tools is the use of molecular visualization. Many instructors have incorporated some aspect of molecular visualization into their classrooms, labs or online course materials to better illustrate structural biology concepts. In order to investigate common educational practices in using molecular visualization, we administered an online survey, soliciting responses through biochemistry education publications and molecular visualization listservs. In addition, we conducted a series of video interviews with faculty who have published in this area. We used a series of questions about user experiences, with a particular emphasis on assessment of student learning. Results of the survey ($n > 100$) and the interviews ($n \geq 10$) will be presented, as well as an educational perspective on a few of the most commonly used molecular visualization software packages.

11:30 Business Meeting

12:00 – 1:15 Lunch

**02.12****1:15 EFFECTS OF MIRNA ON BETA TUBULIN ISOTYPES**

Kevin Morris, Sharon Lobert

University of Mississippi Medical Center, Jackson, MS

A common active ingredient in chemotherapy drugs, taxane, has been shown to have limited effectiveness in treating tumors that are initially resistant or become resistant to taxanes after repeated cycles of chemotherapy. The basic mechanism by which taxanes function is in their binding interaction with the β -subunit of the $\alpha\beta$ -tubulin heterodimer. By using β -tubulin isotypes as tumor biomarkers, we can create better prognosis for cancer treatments and counteract drug resistance after repeated chemotherapy treatments. Because changes in the drug receptor may be linked to drug resistance, we investigated changes in β -tubulin isotypes in response to paclitaxel treatment in MCF7 breast cancer cells. We found that paclitaxel induced a 2-3 fold increase in mRNA for *TUBB2A* and *TUBB3* genes. The increase in β -tubulin IIA mRNA was due to both enhanced stability and increased transcription, unassociated with G2/M arrest. We used micro-RNA superarrays to look for changes in families of micro-RNAs that might be linked to drug-induced changes in β -tubulin isotype mRNA and/or protein. We found a significant decrease in the tumor suppressor, miR-100 and a significant increase in miR-200c in MCF7 cells in response to paclitaxel treatment. Transfection of MCF7 cells with miR-200c significantly reduced β -tubulin III, I and IVB mRNA. Transfection of MCF7 cells with miR-100 significantly reduced β -tubulin I, IIA, IIB and V mRNA and prevented paclitaxel-induced increases in β -tubulin isotypes.

02.13**1:30 DETERMINATION OF COPY NUMBER OF HISTONE H2B IN *HISTOPLASMA CAPSULATUM***

Lacey Howard, Glen Shearer

University of Mississippi Medical Center, Jackson, MS

Histoplasmosis, one of the most common respiratory mycoses in humans, is caused by the dimorphic fungus *Histoplasma capsulatum* (*Hc*), which can be found in the mold (M) form in some soils (particularly those fertilized by bird excrement, or in lab culture at 25°C) or in the pathogenic yeast (Y) form in infected mammals (or in lab culture at 37°C). Study of the genes involved in the mold-to-yeast shift may shed light on this de-differentiation

process which is required for the disease to occur. Genes involved in *Hc* mold-to-yeast dimorphism are highly regulated by mechanisms that have yet to be elucidated. Histone proteins are found in eukaryotic nuclei and are involved in DNA packaging. In *Histoplasma capsulatum*, one of the histone genes, histone H2B, is hypothesized to function in gene regulation by packaging DNA into nucleosomes. We hypothesize that this gene may play a role in mold-to-yeast phase transition by allowing access to certain genes useful to the mold phase while sequestering genes useful to the yeast phase and vice versa. To test this hypothesis, we have isolated the *HcH2B* homolog from strain G186AS. Southern blot analysis indicates that *HcH2B* appears to be a single copy gene. Differential expression using Northern blot analysis of 4 strains of *Histoplasma capsulatum* mold and yeast phases indicates that *HcH2B* is more highly upregulated in the yeast phase. Work is ongoing to create allelic replacement mutants. This work was supported by the Mississippi INBRE (P20RR016476) funded by the National Center for Research Resources, NIH.

02.14**1:45 THE EFFECTS OF STATINS ON LARVAL SHEEPSHEAD MINNOW AND ZEBRAFISH**

Stephanie Taylor, Robert Griffitt

University of Southern Mississippi, Hattiesburg, MS

Statin drugs are powerful inhibitors of HMG CoA reductase, a key gene involved in steroidogenesis. Given the increasing utilization of statin drugs, it is of interest to assess the potential for statins to alter steroidogenesis in exposed fish. 24 hour post hatch zebrafish (*Danio rerio*) and sheepshead minnow (*Cyprinodon variegatus*) larvae will be exposed at various concentrations to a statin for 24 and 96 hours starting with a relevant environmental concentration around 57ng/L, the maximum quantified river concentration as of 2006. The expression of HMG CoA reductase, as well as several genes also known to be involved in steroidogenesis (retinoid X receptor (rxr), peroxisome proliferators activated receptors (pparg), steroidogenic acute regulatory protein (star), 3-beta hydroxysteroid dehydrogenase (hsd3b, hsd 17b, hsd20b), and cytochrome P450 (cyp 17a, cyp11b, cyp19a1a)) will be monitored by qPCR. Plasma 11 KT ketotestosterone) and cholesterol levels will be confirmed with appropriate bioassays. These data should provide useful information about the ability of statins to disrupt steroidogenesis in small fish species.

02.15

2:00 IMMUNOSTIMULANT SIRNA TO TARGET CANCER CELLSChengwen Teng, Yanlin Guo, Faqing Huang

University of Southern Mississippi, Hattiesburg, MS

Combination of immunotherapy and RNAi can lead to new ways to treat cancer. We are conducting research on the design and construction of RNA molecules that combine both immunostimulation and gene knockdown together, termed immunostimulant siRNA (isRNA). In principle, isRNA can inhibit cancer cell growth and trigger apoptosis through immune response and knockdown of survival genes and inhibitor of apoptosis (IAP). Survivin is an IAP which can be the gene target. 5'-Triphosphate dsRNA can bind to RIG-I and trigger immune response. Experimental results show that 5'-triphosphate-survivin-siRNA triggers the increase of IFN- β in KB cells, a reduction in survivin mRNA level, and a decrease in cell density, indicating that 5'-triphosphate-survivin-siRNA can suppress cancer cell growth. We are trying to increase the cellular toxicity of isRNA by several ways. One approach is to chemically modify 5' end of siRNA such as modifying the phosphate group to achieve a higher binding affinity to RIG-I in order to increase its immunostimulant potential. Another approach is to combine several isRNAs together to knock down a panel of survival genes and IAPs together, such as CASP8AP2, XIAP, CIAP1 and CIAP2, so that apoptotic process can be promoted. Experimental results have shown that long dsRNA or analogs such as Poly(I:C) are very strong immunostimulants. Therefore long dsRNA can also be designed to immunostimulant effects. In addition, we are developing novel nanoplex systems for efficient cancer-targeted RNA delivery. Our long term goal is to develop potent RNA-based therapeutic agents and nanotechnology delivery systems to significantly improve anticancer therapeutics.

Thursday 6:30– 8:00**Poster Session****P2.01****THE VTI FAMILY OF SNARE PROTEINS IS ESSENTIAL FOR TICK FEEDING AND MEDIATES SALIVA SECRETION**Ashley Villarreal, Steve Adamson, Rebecca Browning, Shahid Karim

University of Southern Mississippi, Hattiesburg, MS

The pathogen *Rickettsia parkeri* is carried by the gulf coast tick, *Amblyomma maculatum*. Both

prolonged tick feeding and pathogen transmission are promoted by salivary secretions, which is the focus of our research investigations. In this study, we examine the role of VTI family of SNARE proteins, Vti1A and Vti1B. Consistent with previous studies, AmVti1A and AmVti1B have 28% amino acid identity with each, but much higher amino acid identity to other homologs. These two proteins appear to play different roles in vesicular trafficking and exhibit distinct localization. Transcriptional gene expression using qRT-PCR revealed elevated expression of Vti1A and Vti1B during early phase of tick feeding. Knockdown analysis was performed by injecting adult female *A. maculatum* ticks with dsRNA for AmVtiA, AmVti1B or both genes to further elucidate their function. Vti1A knockdown ticks did not seem to produce a significant phenotype, with no noted differences in attachment, engorgement weights, or oviposition. Previous research suggests that Vti1b may be able to partially compensate for the loss of Vti1A. Data is currently being collected for Vti1B knockdown and Vti1A/Vti1B knockdown ticks in order to further assess the functional roles of Vti1A and Vti1B in *A. maculatum* ticks.

P2.02**ADVANCING RFLP TECHNIQUE IN IDENTIFYING RICKETTSIAL SPECIES**Kylee Dueitt, Shahid Karim

University of Southern Mississippi, Hattiesburg, MS

Ticks are extraordinary animals that are also vectors for a variety of diseases that can be detrimental to animals and humans such as Lyme disease, Tularemia, Ehrlichiosis, Heartwater, and Crimean-Congo hemorrhagic fever. Ticks can also carry various *Rickettsial* species, which are collectively referred to as Spotted Fever Group *Rickettsia*. We have positively identified a number of *Rickettsia* species in migratory birds travelling through the southern US and are concerned with the impact these ticks may have on the US population. We used PCR amplification of the OmpA (outer protein membrane) gene that has previously been shown to positively identify the presence of *Rickettsia*, though more specific determination of the *Rickettsia* species is desired. Previous research has shown that RFLP analysis can be used to distinguish between some *Rickettsial* species. The RFLP technique allows us to cleave the DNA using the endonucleases *AluI*, *PstI*, and *RsaI* to reveal unique patterns specific to certain strains of *Rickettsial* species. We are attempting to advance this technique to differentiate between a larger number of *Rickettsial* species which were identified from sequence analysis.

**P2.03**
RESPONSE OF CYTOCHROME P450 1A AND VASCULAR ENDOTHELIAL GROWTH FACTOR IN *CYPRINODON VARIEGATUS* WHEN EXPOSED TO SOURCE/DISPERSED OIL AND HYPOXIA.

Bryan Hedgpeth

University of Southern Mississippi, Hattiesburg, MS

The Deepwater Horizon incident released 60,000 gallons of oil per day into the surrounding water. In an attempt to combat this, a dispersant was released. These two elements, along with reoccurring hypoxia in the Gulf of Mexico, provide unique parameters that should be examined.

Polycyclic Aromatic Hydrocarbons (PAHs) are components of oil and a known inducer of Cytochrome P450 1A (CYP1A). CYP1A is a Xenobiotic Response Elements (XRE) that turns highly lipophilic PAHs, such as oil, into more hydrophilic compounds that are readily excreted. A shared response protein between the XRE and the Hypoxia Response Elements (HREs) could create a synergistic response when exposure to both occurs. This project will explore the destination of a shared protein between XREs and HREs. The hypotheses are, after exposure to oil and hypoxic conditions where will the shared protein be distributed? Additionally, since there is a possible shared protein between HREs and XREs, is there a synergistic response when there is exposure to both conditions?

Sheepshead minnow (*Cyprinodon variegatus*), an abundant species throughout the Mississippi Gulf Coast, will be used for testing. *C. variegatus* will be exposed to multiple oil concentrations and varying hypoxic conditions, along with combining these conditions to see a response. Response element induction will be measured by extracting RNA, converting RNA to cDNA, and performing Real-Time PCR. Exposing *C. variegatus* to oil and hypoxia simultaneously will determine where the shared protein is used, and if the lack of the protein causes an increase in mortality.

P2.04
STRUCTURAL AND FUNCTIONAL CHARACTERIZATION OF AQUAPORIN 7

Charmia Hall, Raphael Isokpehi, Erdogan Memili

¹Hall C, ²Wang X, ³Trocquet D, ³Grant K

¹Cohly H, ¹Wellington KA, ³Hennington BS, ¹Isokpehi R, ²Memili E

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³Department of Biology, Tougaloo College, MS

Mammalian fertilization depends heavily on the capability of spermatozoa to fertilize an oocyte. The objectives of this study were to determine functional and structural characteristics in Aquaporin 7 (Aqp7) protein across mammals, and determine levels of Aqp7 protein expression in spermatozoa from bulls of varying fertility. To accomplish our objectives, we used web bioinformatics servers, genomics approaches, and computational tools and found six conserved motifs across 4 species. Primary structure analysis suggests that this protein is hydrophobic in nature, due to higher percentages of nonpolar residues, and basic, due to high pI. High aliphatic indexes and low instability indexes infer high thermostability of the protein. The low prediction score of disulfide bonds suggests that the stability of the protein relies mainly on extensive hydrogen bond formation. The 1D and 2D Western blotting techniques revealed that the expression of bovine Aqp7 protein in was not significantly different between spermatozoa from high fertility and low fertility bulls. In conclusion, the role of Aqp7 as a biomarker in male fertility could not be clarified, however, the bioinformatics analyses provides inferences for further investigation and hypothesis generation on the function of Aqp7 in male fertility.

P2.05
THE ROLE OF THE CARBOXYSOME SHELL PORES IN METABOLITE FLUX

Jenifer Milam, Balaraj B. Menon, Fei Cai, Seth Axen, Cheryl Kerfeld, Gordon Cannon, Sabine Heinhorst

University of Southern Mississippi, Hattiesburg, MS

All cyanobacteria and many chemoautotrophs contain specialized polyhedral protein microcompartments, called carboxysomes, that are filled with ribulose-1,5-bisphosphate carboxylase/oxygenase (RubisCO). This enzyme catalyzes the fixation of a CO₂ molecule onto ribulose-1,5-bisphosphate and produces two molecules of 3-phosphoglycerate. It has been suggested that the carboxysome shell acts as a diffusion barrier for RubisCO metabolites, but how the metabolites diffuse across the shell is unknown. It is speculated that the central pores formed by the hexameric assemblies of the major carboxysome shell proteins play a role in metabolic flux. To assess whether the pores serve as ports for RubisCO metabolites, structural models were used to determine key residues in the semi-conserved pore motif of

CsoS1A as targets for mutagenesis. The resulting mutant CsoS1A hexamers are predicted to form pores with a different surface charge or size. Mutants of *Halothiobacillus neapolitanus* have been generated in which the wild type *csoS1A* gene has been replaced with a mutant allele. Growth curves were performed to determine the effect of the mutation on the ability of the cells to grow at ambient. The *H. neapolitanus* mutant with narrower CsoS1A hexamer pores grew at a significantly slower rate than wild type cells when grown in air. In contrast, the mutant with pores of opposite surface charge grew at a rate comparable to that of the wild type under these conditions. These results suggest that pore diameter, rather than surface charge, may be important for metabolite transfer across the carboxysome shell.

P2.06

DO TRANSFER NUCLEIC ACIDS (tRNAs) HAVE A MAJOR ROLE TO PLAY IN THE DEVELOPMENT OF PEPTIDOMIMETICS?

Crystal Serrano, Anthony Bell

University of Southern Mississippi, Hattiesburg, MS

Peptides have long been sought after as drugs and *in vivo* diagnostics due to their potency, high target binding specificity and low toxicity profile. Despite these advantages, peptides have not been widely used *in vivo* because they are rapidly degraded by proteases and eliminated by the gastrointestinal tract. One approach to improve the biological stability of peptides is to incorporate unnatural (non L-)amino acids into the peptide backbone. The PURE System is a recombinant cell-free expression system composed of purified components (aminoacyl-tRNA synthetases, translation factors, ribosomes, etc.). Unlike the majority of expression systems, the PURE system can incorporate unnatural residues. Several research labs have exploited this feature to introduce unnatural amino acids into proteins and peptides. One major limitation of the PURE system is the use of commercial tRNAs substrates that contain varying levels of individual tRNAs. Certain tRNAs within this mixture are present at very low abundances, which may severely limit the translation efficiency of certain unnatural residues. Therefore, the development of methods to generate large amounts of individual tRNA is important.

To date, individual tRNAs are prepared via T7-polymerase transcription followed by T4-polyphosphatase processing. Each stage of preparation requires purification via polyacrylamide gel electrophoresis, drastically reducing the yield of tRNAs to concentrations too low to use with the PURE system. We are currently

developing/optimizing the transcription and processing reaction conditions to run "one-pot" reactions that will increase the yield of tRNA synthesis. Ultimately large batches of tRNAs will be "pre-charged" with unnatural residues and added to the PURE system.

P2.07

EXTRACTION, CLONING AND SEQUENCING OF THE GAPDH GENE

Abigail Newsome, Nelson Ugobor

Mississippi Valley State University, Itta Bena, MS

The significance of the glyceraldehyde 3-phosphate dehydrogenase (GAPDH) gene in plants and animals cannot be overemphasized. This gene plays a vital role in glycolysis as well as in apoptosis (programmed cell death). A mutation of this gene has been related to a number of diseases and functional abnormalities in plants and animals. For example, cell cycle arrest, Alzheimer's disease and Huntington's disease have all been linked to a mutation of this gene. An understanding of the structure of this gene as well as its nucleotide sequence can be very helpful in preventing or managing some of the diseases and functional abnormalities associated with this gene.

DNA was extracted from the tissues of peace lily and spinach. After extraction, the DNA was amplified by performing nested PCR. The amplified DNA segment containing the gene was then ligated into the vector pJET1.2. This construct was then used to transform *E. coli*. After isolation of the amplified genes, bioinformatics analysis was performed to predict the nucleotide sequence of the isolated GAPDH gene of both the peace lily and the spinach tissue. The proper understanding of the structure of this gene may help us understand how to manage or control some of the diseases and functional abnormalities associated with this gene.

P2.08

THE ROLE OF REACTIVE OXYGEN SPECIES (ROS) IN INDUCING PUMA(P-53 UP REGULATED MODULATOR OF APOPTOSIS) DEPENDENT APOPTOSIS IN NEUTROPHILS

Justin Thornton, Perceus Mody

Introduction: Neutrophils are an important part of our innate immune system. They engulf pathogens and kill them through the production of reactive oxygen species (ROS) prior to undergoing a form of programmed cell death called apoptosis. The lab I worked in has previously found an important role for the pro-apoptotic protein PUMA (P-53 up regulated modulator of apoptosis) in protection against *Streptococcus pneumoniae* infection. Since



induction of neutrophil apoptosis is essential for resolution of inflammation we investigated whether ROS may be inducing this beneficial apoptosis via PUMA.

Methods: Flow Cytometry- Characterizes apoptosis induction in response to ROS and DNA damaging agents. We also used this method to demonstrate reduced apoptosis in presence of ROS inhibitor NAC(N-Acetyl Cystein). This indicated PUMA induced apoptosis. For this method we used AnnexinV / P.I. (propidium iodide) staining to determine the amount of apoptosis and necrosis. **Comet Assay**- Allowed for single cell electrophoresis which demonstrated the extent of DNA damage induced by *S. pneumoniae* and DNA damaging (H₂O₂ and Etoposide) agents which served as controls.

Results: Our hypothesis was that PUMA-induced apoptosis is induced by ROS which could damage DNA. We found that bacteria can induce DNA damage in neutrophils. Additionally ROS inhibitors were able to protect wild type (W.T.) neutrophil progenitor cells from apoptosis induced by *S. pneumoniae*. This implicates ROS as a potential trigger for DNA damage which can induce beneficial PUMA- dependent apoptosis. Future experiments will determine if ROS produced by the neutrophils or hydrogen peroxide (H₂O₂) by *S. pneumoniae* is responsible for this PUMA-induced cell death.

P2.09

GLYCEROL AND OSTEOBLAST CELLS

Marquissa Anderson, Keysha Rose, Joseph Cameron, Michelle Tucci, Ham Benguzzi

Jackson State University, Jackson, MS

Glycerol has been shown in the literature to activate cellular signaling pathways that are linked to cellular proliferation and differentiation. From osteoporosis to spinal fusion to implant fixation to fracture healing, bone grafting research is orthopedic future. The use of biological factors to augment bone healing has come under recent scrutiny. Interest is rooted in the notion that Glycerol will not affect cell viability, cell function and morphology. To investigate this notion that Glycerol will not affect these cellular attributes Glycerol was integrated into an osteoblast cell line named MG 63 and tested for cellular damage and cellular healthiness with MDA(mitochondrial dehydrogenase assay) and Glutathione assay respectively. Experimental data continues to be collected by determining the amount of collagen type produced over time in each of the treatment and control groups and to evaluate the SMAD signaling pathway leading to bone formation.

P2.10

EXPRESSION OF A VIRAL LYTIC SWITCH PROTEIN IN YEAST *KLUYVEROMYCES LACTIS*

Stephanie Ander, Jiguo Chen

Mississippi State University

A hallmark of human herpesvirus infection is the establishment of latency and reactivation upon stimulation. The switch from latent to lytic infection of Kaposi's sarcoma-associated herpesvirus (KSHV, also called Human Herpesvirus 8) is initiated by a number of stimuli that induce the expression of the key viral lytic switch protein, RTA, or Replication and Transcription Activator. The expression of RTA is necessary and sufficient to trigger the full lytic replication of KSHV. RTA is a viral DNA binding transcription factor that functions through binding to the regulatory elements of its downstream genes. To study the RTA binding sequence and generate RTA binding consensus, we aim to over-express RTA in the yeast protein expression system. The *Kluyveromyces lactis* expression system was chosen due to the rapid high cell density growth, easy and fast cell transformation procedure and high-level protein expression. We have successfully cloned the RTA gene into the pKLAC2 expression vector downstream of the α -mating factor domain (α -MF), which created an α -MF fusion protein that was then processed by the Golgi allowing for the secretion of the native form of RTA to the outside of yeast cell. PCR results indicate that RTA gene is integrated into the *K. lactis* genome at the LAC4 locus by homologous recombination. We have screened hundreds of yeast clone and selected a clone with the most abundant expression of RTA. We are further characterizing this clone by various functional assays.

P2.11

DO AMINOACYL-TRNA SYNTHETASES HAVE A MAJOR ROLE TO PLAY IN THE DEVELOPMENT OF PEPTIDOMIMETICS?

Jessica Vital, Anthony Bell

University of Southern Mississippi, Hattiesburg, MS

The PURE system, developed by Yoshihiro Shimizu et al., is a cell-free expression system that is composed of recombinant elements (i.e. aminoacyl-tRNA synthetases, factors, ribosomes etc.). One major advantage of the PURE system is its compatibility with unnatural (i.e. non-L or analog) amino acids. This feature enables the expression of peptides composed of L- and analog residues. The resulting peptidomimetics could be used as for in vivo diagnostic applications or general peptide

aptamers. We are interested in developing short (3-5mer) peptide aptamers composed of analogs that act as neurotransmitters. The first step in this process is to screen potential analog neurotransmitters at the first stage of translation: amino acid activation. We are currently using a modified version of the assay developed in the Perona laboratory. This method uses ^{32}P - α -ATP to radiolabel the substrate, an amino acid. The activation of the substrate is enzymatically carried out in the presence of aminoacyl-tRNA synthetase (AARS). TLC can be used to separate the different components, AMP and [^{32}P]AA-AMP, produced in the reaction. The readout indicates whether the substrate was able to be activated by the specified AARS. An "activated" substrate will be further evaluated in later stages of translation. Several neurotransmitters including caffeic acid, homovanillic acid (HAV), 3,4-Dihydroxy-L-phenylalanine (L-DOPA), 3,4-Dihydroxy-D-phenylalanine (D-DOPA), and L-threo 3,4-Dihydroxyphenylserine (L-DOPS) were screened in the presence of tyrosyl-tRNA synthetase (TyrRS) and phenylalanyl-tRNA synthetase (PheRS). Of the substrates screened, L-DOPA was activated and will be investigated further in the later stages of translation.

P2.12

GLUCOCORTICOID RECEPTOR EXPRESSION ON CD4+ T CELL POPULATIONS: POSSIBLE PREDICTORS OF STRESS-INDUCED IMMUNE DYSREGULATION

Kristina Rehm, Denise Montgomery, Gailen Marshall, Jr.

University of Mississippi Medical Center, Jackson, MS

CD4+ T cells express the glucocorticoid (GCR) and beta-2 adrenergic receptor (beta2AR) and can be influenced by corticosteroids and catecholamines, respectively. Two types of CD4+ T cells are involved in classical adaptive immunity. Anti-viral Th1 cells produce IFN-gamma, while IL4-producing Th2 cells are involved in allergic responses. We have previously shown that incubation of human peripheral blood mononuclear cells (PBMC) with the corticosteroid Dexamethasone (DEX) decreased the production of the IFN-gamma while increasing the production of IL4, but individual differences in this response were observed, although specific mechanisms of stress-induced immune dysregulation are unclear. We therefore hypothesized that an individual's response to the stress hormone DEX could be correlated with the amount of GCR present on T cell subpopulations. PBMC were

incubated with the increasing doses of DEX (10⁻⁹-10⁻⁷ M) for 24 hours. IFN-gamma, IL4, and GCR were quantified using multi-color flow cytometry. Consistent with our previous data, DEX decreased IFN-gamma production and increased IL4. At 10⁻⁸ M DEX, the amount of GCR on Th1 cells was negatively correlated with the IFN-gamma production, while GCR expression on Th2 cells had no correlation with IL4. This suggests that a DEX-induced increase of GCR-positive Th1 cells increases their sensitivity to corticosteroids, while Th2 cells may be less directly affected by DEX. This approach may prove useful in identifying those individuals that are most susceptible to the immune-altering effects of stress.

P2.13

EFFECT OF METHYL PARATHION EXPOSURE ON ANTIOXIDANT EXPRESSION LEVELS IN HUMAN LIVER CARCINOMA CELLS

Amber Shaffer, Falcia Edwards

Tougaloo College, Tougaloo, MS

Methyl parathion (C₈H₁₀NO₅PS) is a restricted use organophosphate compound that is widely. This agricultural insecticide has yielded studies which indicate that human exposure to these compounds may result in adverse effects on nervous, hematopoietic, cardiovascular, and reproductive systems. This chemical is among the class of organophosphates that are known for their ability to irreversibly inhibit acetylcholinesterase, leading to profound effects on the nervous system of exposed organisms. Studies have linked exposure of methyl parathion to degenerative diseases such as Parkinson's, Alzheimer's, and amyotrophic lateral sclerosis (ALS). This linkage has been associated with increased oxidative stress (OS) damage. Although clinical manifestations associated with methyl parathion exposure are well documented, the toxicological consequences of exposure to HepG₂ cells, particularly on antioxidants remain to be elucidated. Therefore, the aim of the present investigation is to use HepG₂ cells as a test model to assess effect methyl parathion exposure on biomarkers of oxidative stress. To achieve this goal, we will measure catalase, superoxide dismutase (SOD), and total glutathione activities in exposed cells. HepG₂ cells will be exposed to various concentrations of methyl parathion for 48h at 37°C. Data regarding antioxidant expression levels are forthcoming.

**P2.14****EFFECT OF PARATHION EXPOSURE ON ANTIOXIDANT EXPRESSION LEVELS IN HUMAN LIVER CARCINOMA CELLS**

Diva Whalen, Falcia Edwards

Tougaloo College, Tougaloo, MS

Parathion is a restricted use organophosphate compound that is widely. This agricultural insecticide has yielded studies which indicate that human exposure to these compounds may result in adverse effects on nervous, hematopoietic, cardiovascular, and reproductive systems. Chronic exposure to parathion has been found to result in persistent weakness and impaired memory. This chemical is among the class of organophosphates that are known for their ability to irreversibly inhibit acetylcholinesterase, leading to profound effects on the nervous system of exposed organisms. Studies link exposure of organophosphates to degenerative diseases such as Parkinson's, Alzheimer's, and amyotrophic lateral sclerosis (ALS). This linkage has been associated with increased oxidative stress (OS) damage. Although clinical manifestations associated with parathion exposure are well documented, the toxicological consequences of exposure to HepG₂ cells, particularly on antioxidants remain to be elucidated. Therefore, the aim of the present investigation is to use HepG₂ cells as a test model to assess effect parathion exposure on biomarkers of oxidative stress. To achieve this goal, we will measure catalase, superoxide dismutase (SOD), and total glutathione activities in exposed cells. HepG₂ cells will be exposed to various concentrations of parathion for 48h at 37°C. Data regarding antioxidant expression levels are forthcoming.

P2.15**ISOLATION OF GAPDH GENE FROM *EPIPREMNUM AUREUM***Abigail Newsome, Shanesse Spratt

Mississippi Valley State University

The DNA that encodes the gene which catalyzes the sixth step of glycolysis to aid in the break down of glucose for energy and carbon molecules, GAPDH, was isolated from *Epipremnum aureum*, Devil's Ivy. Genomic DNA(gDNA) was extracted and its presence verified via electrophoresis. The extracted gDNA was then amplified via nested PCR followed by electrophoresis after each round of PCR. Electrophoresis identified one distinct band of ~1200 bp. This PCR product was then ligated into the plasmid pJet1.2. *HB101 E.*

coli cells were transformed using this plasmid construct. DNA from the resultant transformants was extracted and electrophoresed to verify the presence of the ~1200 bp size. The remaining DNA was stored at -20°C until further use. The continuation of this project requires DNA sequencing and genomic analysis of the extracted plasmid construct.

Friday**February 24, 2012****02.16****8:30 THE NATURAL PRODUCT BETULINIC ACID PROMOTES AMYLOID-BETA FIBRILIZATION AT THE EXPENSE OF OLIGOMERS**

Matthew Planchard, Michael Samel, Vijayaraghavan Rangachari

The University of Southern Mississippi, USA

Amyloid-beta (A β) protein has been implicated in the pathology of Alzheimer's Disease, aggregating to form neurotoxic, soluble oligomers and insoluble senile plaques. Betulinic acid (BA) is a component of traditional Ayurvedic remedies for cognitive decline and is also used to treat gliomas and other brain cancers. We hypothesized that BA would inhibit the formation of fibrillar aggregates in vitro. A variety of methods were used to investigate the interaction of BA and A β , including ThioflavinT (ThT) fluorescence, turbidity assays, circular dichroism (CD), western blotting, size exclusion chromatography (SEC), and binding assays. Contrary to our hypothesis, BA caused an instantaneous increase in both ThT fluorescence and turbidity. CD confirmed that BA caused the formation of beta-sheet secondary structure required for aggregation to occur. Western blotting and SEC further confirmed that BA increased the rate of transition of monomeric to fibrillar A β , and BA displayed strong binding to A β . However, western blotting also confirmed that this transition occurred concurrently with the disappearance of the more toxic, oligomeric forms, suggesting that BA may reduce the severity of AD symptoms through reducing the amount of neurotoxic, soluble aggregates via the formation of larger, insoluble fibrils.

02.17

9:00 INVESTIGATING THE FUNCTION OF THE MOLD- SPECIFIC GENE *M46*, IN THE PATHOGENIC DIMORPHIC FUNGUS *HISTOPLASMA CAPSULATUM*Davida Crossley, Glenmore Shearer

University of Southern Mississippi, Hattiesburg, MS

Histoplasma capsulatum (*Hc*) is the etiologic agent of the respiratory infection histoplasmosis. The dimorphic fungus grows in the soil as a multi-cellular mold. Once the soil is disturbed, spores are released and are inhaled into the lungs where the organism converts to the uni-cellular yeast morphotype. This yeast-to-mold conversion is a requirement for pathogenesis. To understand the molecular basis of dimorphism, we have isolated several mold-specific and yeast-specific genes. The subject of this study is the mold-specific *M46* gene. The function of *M46* is unknown. Three genera of fungi in the GenBank database possess an *M46* homolog, but the function(s) is likewise unknown. Northern blot analysis has shown that *M46* is expressed in two strains (G186AS and Downs), but is transcriptionally silent in two other strains (G184AS and G217B). The reason for lack of transcription in the latter strains implies that *M46* is not involved in dimorphism. Recently, we constructed an *M46* knockout strain. This knock out has been confirmed by Polymerase Chain Reaction (PCR), Southern blot, and by Northern blot analysis. The knock out has shown to have no effect on the yeast phase morphology or growth rate when compared to the morphology and growth rate of wild type. Investigation of the mold morphology and growth rate is on going. If there is a change in morphology or growth rate in the mold, then future work will consist of complementing the knock out strain back to wild type.

02.18

9:15 REGULATION OF VANCOMYCIN RESISTANCE IN *STAPHYLOCOCCUS AUREUS*Dhritiman Samanta, Mohamed O. Elasri

University of Southern Mississippi, Hattiesburg, MS

Staphylococcus aureus is an important pathogen that causes infection in both hospital and community. Vancomycin has been used against MRSA strains, however vancomycin resistant Staphylococci were reported from Japan in 1997. Vancomycin resistance in enterococci is due to the expression of *van* genes. But some strains of *Staphylococcus aureus* show significant resistance to

vancomycin despite the absence of *van* genes. Some possible mechanisms of the resistance include thick cell wall caused by excessive production of peptidoglycan; increased percentage of intact D-Ala-D-Ala units that acts as false target for vancomycin, reduced number of non-amydated mucopeptides, downregulation of carboxypeptidase genes. Mu50 is most studied among vancomycin resistant *S. aureus* strains, and has a significantly high minimum inhibitory concentration for vancomycin. In this study, we used a genetic screen to identify the genes involved in vancomycin resistance in Mu50. Transposon *Tn10* was used for random mutagenesis and for the isolation of a library of cells with inserted transposon. These cells were screened for the vancomycin sensitivity. The genes disrupted by the transposon will be identified and their role in resistance will be determined.

02.19

9:30 MSA REGULATES BIOFILM DETACHMENT IN *STAPHYLOCOCCUS AUREUS*Maria Basco, Gyan Sahukhal, Mohamed O. Elasri

University of Southern Mississippi, Hattiesburg, MS

Detachment of cells from a biofilm plays an important role in biofilm development and dissemination of infection. We studied the effect of *msa* deletion on biofilm in the community-acquired MRSA strain USA300. Effluents from the *msa* mutant biofilm, showed an increase in the rate of cell detachment relative to the wild type. The *msa* mutant showed increased protease activity (eg. aureolysin and serine proteases), which has been shown to contribute to cell detachment from biofilm. This suggests that *msa* regulates detachment through protease activity. Extrapolymeric substances like PNAG, eDNA and proteinaceous matrix are essential components of a stable, mature biofilm. In order to investigate the influence of *msa* on each of these factors, the biofilm formed by the Δ *msa* was subjected to specific destabilizing agents: sodium metaperiodate, DNaseI and proteinase K. Results from these studies suggest that deletion of *msa* affects the eDNA and protein matrix of biofilm but not PNAG.



02.20

**9:45 RECOMBINANT EXPRESSION OF
HALOTHIOBACILLUS
NEAPOLITANUS GENES
PUTATIVELY INVOLVED IN
FORMATION OF CARBOXYSOMES
FOR BIOTECHNOLOGICAL
APPLICATIONS.**

Gaurav Ghag, Avijit Biswas, Douglas Iverson,
Gordon Cannon, Sabine Heinhorst

University of Southern Mississippi, Hattiesburg, MS

All cyanobacteria and some chemoautotrophs sequester the CO₂-fixing enzyme ribulose-1,5-bisphosphate carboxylase/oxygenase (RubisCO) in specialized protein organelles known as carboxysomes. The thin, self-assembling icosahedral protein shell of carboxysomes is of particular interest for potential biotechnological applications. Genes required for the assembly of carboxysomes are arranged as a conserved operon, annotated as *cso* operon. To examine their role in carboxysome assembly, the carboxysomes genes of *Halothiobacillus neapolitanus* were expressed in *Escherichia coli*. Previous expression studies had revealed that the proteins encoded by the canonical *cso* operon assembled into irregularly shaped carboxysome-like structures in *E. coli*. Recently, the gene for the novel shell protein CsoS1D was detected downstream from the *cso* operon by comparative genomic analysis. To investigate the effect of this protein on heterologous assembly of carboxysomes, the *cso* operon and *csoS1D* were co-expressed in *E. coli* under the control of a common promoter. Preliminary studies suggest that CsoS1D has no major effect on shape and composition of carboxysome-like structures in *E. coli*. However, its role in carboxysomes function in *H. neapolitanus* necessitates further investigation.

10:00 BREAK

02.21

**10:15 ANTIOXIDANT FUNCTION OF
SELENOPROTEIN K AND M IN THE
SALIVARY GLANDS OF GULF-
COAST TICK, *AMBLIOMMA
MACULATUM***

Sarah Nobles, Steven Adamson, Rebecca Browning,
Shahid Karim

University of Southern Mississippi, Hattiesburg, MS

Ticks are obligate ecto-parasites and are one of the most important disease vectors worldwide. Tick salivary proteins are critical for successful attachment and feeding on host, but can also enhance pathogen transmission. Ticks secrete a variety of proteins to manipulate the host homeostatic response, including a group of selenoproteins, which have well-established roles in protection against oxidative stress, heavy metal detoxification, and selenium delivery/storage. In this study, we sought to elucidate the functional roles of selenoprotein K and selenoprotein M in the Gulf Coast tick, *Amblyomma maculatum*. Both of these selenoproteins contain a putative signal peptide for secretion and were identified in a *A. maculatum* sialotranscriptome shotgun assembly. QRT-PCR demonstrated that over the course of 9 days of feeding, SelM transcription peaks at approximately 36 hours, while SelK steadily declines to 50% of the original level by day 9. Ticks injected with dsRNA-SelK or dsRNA-SelM showed at least 99.5% reduction in transcript levels as determined by QRT-PCR. No significant phenotype was observed in tick attachment or engorgement, but egg masses were considerably smaller and eggs were brown in color, suggesting that oviposition or vitellogenesis were impacted by the deficiency in these two selenoproteins. In addition, saliva collected from these knockdown ticks containing significantly elevated levels of total antioxidant activity, suggesting a strong compensatory mechanism for maintaining antioxidant activity exists within tick salivary glands.

02.22

**10:30 ESSENTIAL ROLES OF AMSNAP-25
AND AMNSF IN *AMBLIOMMA
MACULATUM* SALIVARY GLANDS**

Rebecca Browning, Shahid Karim, Steven Adamson
University of Southern Mississippi, Hattiesburg, MS

Amblyomma maculatum, the Gulf Coast Tick, is a hard tick found mainly along the southeastern coast of the United States, ranging from Virginia to Louisiana. *A. maculatum* is currently being studied as it is the vector for *Rickettsia parkeri*, one of the causes of Spotted Fever Group Rickettsiosis. Pathogen transmission is thought to occur through a transcytotic mechanism in which the pathogen utilizes the protein machinery involved in vesicle docking. Tick salivary gland exocytosis processes appear to be essential to tick feeding success and may be important for pathogen trafficking. Vesicle transport has been shown to be mediated, in part, by SNARE (Soluble NSF Attachment Protein Receptor) complexes ranging

from invertebrates to vertebrates. The SNARE Complex is composed of three proteins: SNAP-25, syntaxin, and synaptobrevin. After cellular membrane fusion is complete, α SNAP and NSF (N-ethylmaleimide sensitive fusion protein) work to disassemble the SNARE complex, thereby recycling the individual components. In this study, we used a combination of transcriptional gene expression, RNAi-mediated gene silencing and confocal microscopy to investigate the functional role of AmSNAP25 and AmNSF. Transcriptional gene expression indicates that SNAP-25 is down regulated during the slow feeding phase and then is up-regulated as the fast feeding phase begins while NSF is down-regulated 18 hours post attachment. Gene silencing analysis demonstrates that NSF and SNAP25 play an important role in feeding, since engorged tick weight was lower in both cases than in control ticks. Salivary glands were then examined for structural abnormalities using confocal and transmission electron microscopy.

02.23

10:45 MOLECULAR IDENTIFICATION OF SPOTTED FEVER GROUP RICKETTSIA (SFGR) IN EXOTIC TICK SPECIES INFESTING MIGRATORY SONG BIRDS.

Nabanita Mukherjee, Steve Adamson, Frank Moore, Shahid Karim

University of Southern Mississippi, Hattiesburg, MS

Ticks are an example of efficient ectoparasites that blood-feed on variety of hosts including humans, domestic and wild animals. Migrating birds are known to play an important role as long distance vectors for many microbial pathogens. Ticks transmit a variety of disease causing agents including Spotted fever group rickettsia (SFGR). In 2010, northward migrating song-birds were captured and inspected for attached ticks. A total of 112 exotic ticks were removed from 29 song birds. The collected exotic ticks were identified to genus level and DNA was extracted from ticks and the blood samples of selected bird blood samples. The presence of SFGR was determined using ompA gene specific primers in nested PCR. Furthermore, all amplified tick samples were sequenced to confirm the presence of SFGR. Out of 112 tick samples, 96 tick samples, and 25 bird blood samples contained SFGR DNA. The DNA sequences were compared with those deposited in GenBank by using BLAST analysis. The tick samples revealed nucleotide sequence homology with *Rickettsia* endosymbiont of *Amblyomma tuberculatum*, *R. amblyommi*, *Rickettsia africae*, and *Rickettsia* endosymbiont of *Amblyomma maculatum*.

The bird-blood samples showed nucleotide homology with *Rickettsia* endosymbiont of *Amblyomma maculatum*. We conclude that exotic ticks arriving by migrating song-birds may be epidemiologically significant vectors of new SFGR.

02.24

11:00 CHARACTERIZATION OF RICKETTSIA PARKERI IN THE GULF COAST TICK, AMBLYOMMA MACULATUM

Khem Raj B.C., Shahid Karim

The Gulf Coast tick, *Amblyomma maculatum* (AM) transmits *Rickettsia parkeri*, the bacteria responsible for a newly identified spotted fever Rickettsiosis in the southern United States. To identify the rickettsial infection in the Gulf Coast ticks from field condition and to show evidence of pathogen transmission, we collected 35 female and 13 male AM ticks from the SandHill Crane refuge National Wildlife Reserve, located on the Mississippi Gulf Coast. The ticks were fed on New Zealand white rabbits for eight days, after which eight female ticks were dissected and DNA was extracted from mid gut tissues. A nested PCR reaction was performed to amplify the *Rickettsia* ompA gene. The amplicon was sequenced in order to identify the species of *Rickettsia* present in each tick. Seven out of eight samples tested positive for *Rickettsia* including *Rickettsia parkeri*, *Rickettsia amblyommi* and *Rickettsia mongolotimonae*. The species level identification was done using blast tool at NCBI with the obtained sequences as the query. To study pathogen transmission rabbit blood samples were taken at fourteen and twenty-one day post-tick infestation and genomic DNA was extracted. Using rabbit blood DNA as a template, nested PCR showed positive results for *Rickettsia* ompA gene for the rabbit infested with Sand Hill AM ticks at fourteen and twenty one day post infection. Our data exhibit *Rickettsia parkeri*, *Rickettsia amblyommi* and *Rickettsia mongolotimonae* presence in naturally found ticks on the Gulf Coast.

02.25

11:15 CREATING A CSOSIA-GREEN FLUORESCENT PROTEIN EXPRESSION CONSTRUCT

Nickolas Whitehead, Sabine Heinhorst

University of Southern Mississippi, Hattiesburg, MS

Carboxysomes are protein organelles that are found in cyanobacteria and many chemoautotrophic bacteria. Most of the carbon dioxide fixation in a cell takes place within the carboxysome, which acts as a carbon concentrating device. The small pores located at the center of the



protein hexamers and pentamers that make up the carboxysome shell are thought to allow bicarbonate to diffuse into the carboxysome interior, where a carbonic anhydrase converts the bicarbonate to carbon dioxide. Because carbon dioxide cannot diffuse easily through the carboxysome shell, it is trapped inside and is fixed by ribulose-1,5-biphosphate carboxylase/oxygenase (RuBisCO) onto ribulose 1,5-bisphosphate to yield two molecules of 3-phosphoglycerate. The goal of this project is to create a fusion of the carboxysome shell protein CsoS1A and Green Fluorescent Protein (GFP) that can be used to locate the CsoS1A on the carboxysome shell. A potential application that depends on the success of the project is to create a solar cell coating with the CsoS1A-GFP fusion protein that may enhance the efficiency of the device. Solar cells do not use all wavelengths of light. Green Fluorescent Protein is excited by ultraviolet light and emits a wavelength of light that a solar cell can use.

02.26

11:30 OXALATE-INDUCES EXPRESSION OF YHJX, YFDU, YFDW IN *ESCHERICHIA COLI*

Teal Brechtel, Elise Fontenot, Cory Toyota
Millsaps College, Jackson, MS

The *Escherichia coli* gene *yhjX* encodes a putative oxalate:formate antiporter known to be upregulated by expression of the response regulator EvgA and the RpoS transcription factor σ^S . *YhjX* is proposed to be involved in an oxalate metabolism system along with *YfdU*, an oxalyl-CoA decarboxylase and *YfdW*, an oxalate:formyl-CoA transferase. This system is analogous to the oxalate metabolism system involving OxIT, OXC and FRC in *Oxalobacter formigenes*, and similar to the amino-acid dependent acid resistance mechanisms of AR2 and AR3 which also involve antiporters and decarboxylases. Previous papers have shown that *yhjX* is upregulated by EvgA and RpoS, signal factors involved in *E. coli* acid resistance. The genes *yfdU* and *yfdW* have also been shown to be upregulated by *evgA* expression, suggesting that *YhjX*, *YfdU* and *YfdW* are involved in *E. coli* acid resistance. Analysis by qRT-PCR was used to determine the expression levels of target genes under acidic conditions at time points (up to 30 min) after the addition of oxalate. The genes *yhjX*, *yfdU* and *yfdW* are upregulated upon the addition of oxalate suggesting that these genes are involved in acid resistance. Thus, *YhjX*, *YfdU* and *YfdW* may contribute to a new oxalate-dependent acid resistance system in *E. coli*.

02.27

11:45 EVALUATING THE MECHANISM OF ACTION OF A MARINE ANTIFUNGAL COMPOUND BY SCREENING A COLLECTION OF YEAST MUTANTS

Amber Ward, Qin Feng, Alice Clark, Ameeta Agarwal

University of Mississippi, University, MS

Background: Opportunistic fungal infections have become problematic in recent years. There has been an emergence of new fungal pathogens, development of antifungal resistance, and increasing prevalence. In addition, toxicity, resistance, and lack of efficacy as a single agent limit the effectiveness of current antifungal drugs. Therefore, drugs targeting new pathways are greatly needed. An analog derived from the marine natural product, phloeodictine analog PHL5-34A, was identified as having strong in vitro antifungal activity. In this study, we investigated its mechanism of action (MOA) in the model yeast, *S. Cerevisiae*. **Methods:** We used a collection of 166 yeast mutants carrying transcription factor deletions, which function as master regulators of cellular processes. Using the parent strain BY4742, we determined the PHL5-34A sub-inhibitory concentration that reduced cell growth on agar plates. After assay conditions were optimized, the mutant collection was screened to identify mutants with altered sensitivity to PHL5-34A. Drop-test assays and PCR analysis confirmed the identified mutants. **Results:** Of the 166 deleted mutants tested, 20 were found to be hypersensitive to PHL5-34A when compared to the parent. Drop-test assays confirmed the hypersensitivity of 10 mutants. Of these confirmed, 4 mutants were found to carry deletions in genes required for cell cycle functions. These 4 mutations were then analyzed by PCR to confirm that they were in the correct genes. **Conclusions:** We have demonstrated that the cell cycle may be one of the pathways affected by PHL5-34A. This work will serve as an important step in determining the exact MOA of this compound.

12:00 – 1:45 Lunch

02.28**1:15 MIDLINE AND ROADKILL GENES COLLABORATE TO REGULATE BRISTLE FORMATION IN THE DROSOPHILA EYE****02.29****1:30 INHIBITION OF CELL PROLIFERATION DOES NOT COMPROMISE SELF-RENEWAL OF MOUSE EMBRYONIC STEM CELLS**Ruoxing Wang, Yan-Lin Guo

University of Southern Mississippi, Hattiesburg, MS

Embryonic stem cells (ESCs) have unlimited capacity for self-renewal and can differentiate into various cell types when induced. They also have unusual cell cycle control mechanism driven by constitutively active cyclin dependent kinases (Cdks). In mouse ESCs (mESCs), it is proposed that the rapid cell proliferation is a necessary part of mechanisms that maintain mESC pluripotency, but this hypothesis is not supported by the findings in human ESCs (hESCs) in which the length of the cell cycle is similar to somatic cells. We provide further insight into this uncertainty through chemical intervention of mESC cell cycle. We report here that inhibition of Cdks with olomoucine II can dramatically slow down cell proliferation of mESCs with concurrent down regulation of cyclin A, B and E, and the activation of the Rb pathway. However, mESCs display remarkable recovery capacity from cell cycle arrest upon the removal of olomoucine II and are able to resume the normal cell proliferation rate without losing self-renewal and pluripotency, as demonstrated by the expression of ESC marker genes, colony formation, and the ability to form embryoid bodies. We provide mechanistic explanation for these observations by demonstrating that Oct4 and Nanog, two major transcription factors that confer pluripotency are unregulated via de novo protein synthesis when the cells are exposed to olomoucine II. Also we down regulated cdk1 through RNAi to check its role in cycle control and self-renewal in mESCs. Together, our data suggest that short-term inhibition of cell proliferation does not compromise self-renewal of mESCs.

02.30**1:45 THE EFFECTS OF bFGF ON PROLIFERATION AND DIFFERENTIATION OF MESENCHYMAL STEM CELLS**William D'Angelo, YanLin Guo

University of Southern Mississippi, Hattiesburg, MS

Mesenchymal stem cells (MSCs) have the capacity to differentiate into various mesodermal lineages, including vascular cells such as pericytes, smooth muscle cells, and endothelial cells. However, the molecular mechanisms involved and the factors that control cell proliferation and differentiation are not clearly understood. C3H10T1/2 cells are mouse embryonic tissue-derived MSCs. Basic fibroblast growth factor (bFGF) is a local signaling molecule that serves as a physiological signal which regulates a wide variety of cellular processes, including proliferation, differentiation, migration, or apoptosis in different cell types. Our data revealed that bFGF stimulates proliferation of C3H10T1/2 cells while inhibiting differentiation, since treatment of the cells with bFGF increased cell number with concurrent down-regulation of smooth muscle α -actin expression (a marker of smooth muscle cell differentiation). We speculate that the Notch signaling pathway may play a role in mediating these effects, as its involvement has been reported in both up- and down-regulation of SMC genes.

02.31**2:00 MOUSE EMBRYONIC STEM CELLS CAN SENSE AND RESPOND TO DOUBLE STRAND RNA-INDUCED IMMUNOGENIC STIMULUS**JUNDI WANG, YANLIN GUO

University of Southern Mississippi, Hattiesburg, MS

Embryonic stem cells (ESCs) have an unlimited capacity for self-renewal and can differentiate into various cell types when induced. These unique properties of ESCs have led to intensive efforts to develop ESCs as a source for cell therapy to treat human diseases. However, we have limited knowledge about ESCs at the basic cellular level. ESCs, normally residing in the blastocyst, would develop into embryos in the sterile environment of the womb. An important question is whether or not ESCs have developed the ability to respond to immunological stimuli as in fully differentiated somatic cells. In this study, we used poly (IC), a synthetic double strand RNA (dsRNA) that is known to induce strong immune responses, mimicking the effect of dsRNA in virus infection. Our preliminary studies showed that poly (IC) can induce apoptosis and inhibit proliferation of ESCs. Importantly, it also induces the expression of type I interferons (IFN α and IFN β), which is a typical immunogenic response elicited by innate immunity mechanisms. Together, these results suggest that ESCs are able to sense and respond to dsRNA-induced immunogenic stimuli. Since dsRNA viruses can be detected by several cellular sensors, including TLR3, MDA5, and RIG-I,



we are currently focusing on identifying which molecule is responsible for mediating the effects of dsRNA.

02.32

2:15 TRANSCRIPTOME ANALYSIS OF MSA DELETION MUTANT IN THE COMMUNITY-ACQUIRED MRSA STRAIN USA300

Guyan Sunder Sahukhal, Reem Dawoud

University of Southern Mississippi, Hattiesburg, MS

We have defined the transcriptome of the msa deletion in the community-acquired MRSA strain USA300 (LAC) by using DNA-microarrays. The msa gene was identified by its role in modulating the expression of the global regulator sarA, we therefore hypothesized that its mutation will have a global effect. Deletion of msa altered the expression of 1494 genes by 2 fold or higher and 215 genes by 3 fold or higher. msa regulates several genes that are involved in biofilm formation, virulence, cell wall synthesis, anaerobic respiration and antibiotic resistance. In addition, msa also regulates the expression of several global regulators including agrA, arlR, clpP, hemB, lexA and SaeRS. These results confirm prior findings from our laboratory and suggest that msa plays a key role in *Staphylococcus aureus* pathogenesis.

02.30

2:33 PROTEOMIC ANALYSIS OF PHOSPHOPROTEINS INVOLVED IN ABA SIGNALING PATHWAY IN THREE ARABIDOPSIS MUTANTS: *srk2-2*, *srk2-3* and *srk2-2/srk2-3*

Jie Song, Jiayu Li

Abscisic acid (ABA) is a very important plant hormone regulating many aspects of plant growth and development, such as stress tolerance, seed dormancy and germination. The whole pathway of ABA signal transduction is very complicated, containing many regulators involved in. The phosphorylation of regulatory proteins or enzymes plays a key role in ABA signal transduction pathway. *Arabidopsis* SNF1-related protein kinases 2 (SnRK2s) are thought to be positive regulators in ABA signaling pathway. However, the function mechanism of these kinases in ABA signaling is still unknown. So, the objective of our project is to identify the target phosphoproteins that interact with SnRK2s in *Arabidopsis* ABA signaling pathway. We analyzed the total proteins in three *Arabidopsis* knockout mutants: *srk2-2*, *srk2-3* and *srk2-2/srk2-3* double mutant in presence of water or ABA

treatment. After comparing the phosphorylation of proteins with different treatment among these mutants by 2-DE proteomic approaches, we found some candidate proteins are involved in *Arabidopsis* ABA signaling pathway.

CHEMISTRY AND CHEMICAL ENGINEERING

Chair: MD Alamgir Hossain

Jackson State University

Vice-Chair: Wolfgang H. Kramer,

Millsaps College

Thursday, February 23

THURSDAY MORNING

8.15 OPENING REMARKS

03.01

8:30 **INORGANIC PHARMACEUTICALS: A CONCISE PERSPECTIVE OF MY RESEARCH AT SOUTHERN MISS**

Alvin Holder

The University of Southern Mississippi, USA

The American Cancer Society estimates that in 2011 about 141,210 people will be diagnosed with colorectal cancer; and that about 49,380 people will die of colorectal cancer in the U.S.A. In both men and women, colorectal cancer is the third most commonly diagnosed cancer and the third leading cause of cancer death. The limited efficacy of current treatments for advanced colon cancer serves an impetus for a concerted effort to identify chemopreventive agents for treatment. This process has always involved metal complexes. Cisplatin is widely used for the treatment of many cancers despite its undesirable side effects, due to high toxicity, and problems with drug resistance in primary and metastatic cancers. These limitations have spurred a growing interest in novel non-platinum metal complexes that can show anti-cancer properties. Traditionally, there has been a strong dependency on medicinal plants to treat illness or to build strength in the Caribbean. As a Caribbean National, my research group at Southern Miss, has been utilizing natural products as ligands for the synthesis of inorganic pharmaceuticals for the fight against colorectal cancer through *in vitro* studies. A concise perspective of my research findings will be discussed in this presentation.

O3.02
8:45 NON-COVALENT INTERACTIONS IN CHROMIUM AND MANGANESE COMPLEXES OF DIBENZOCYCLOOCTATETRAENE

Nilantha Bandara, Chinthaka Ratnaweera, Steven Gwaltney, William Henry
 Mississippi State University, USA

Both chromiumtricarbonyl and cationic manganese tricarbonyl groups can be coordinated to the arene rings of dibenzo[*a,e*]cyclooctatetraene (DBCOT). The mono-Cr(CO)₃ complex has the metal oriented *anti* to the interior of the DBCOT in the crystal while the corresponding [Mn(CO)₃]⁺ derivative has a *syn* conformation. Calculated minimum energy geometries agree with those with those found by crystallography and suggest a non-covalent intramolecular interaction between the carbonyls and uncoordinated arene in the manganese complex. An analogous interaction is responsible for the high enthalpy of activation for ring inversion in *syn,anti*-DBCOT[Cr(CO)₃]₂. Intermolecular C-H...O hydrogen bonds predominate in crystals of the chromium complexes. In manganese complexes, C-H...F interactions are present between the DBCOT hydrogen atoms and the BF₄⁻ counterions. An interesting dimeric motif with C-H...π interactions is found for DBCOTCr(CO)₃ while the manganese complex forms a linear arrangement with π...π interactions between the coordinated ring of one compound and uncoordinated ring of another. The interactions will be described more fully during this presentation. In addition, other compounds showing similar motifs will be described as related to the results found during this work. Lastly, the factors that allow for the motifs observed in the crystal structure will be discussed.

O3.03
9:00 BIOGEOCHEMISTRY OF MERCURY IN THE ECOSYSTEM OF OAK RIDGE, TN (USA)

Fengxiang Han¹, Yi Su², David Monts², Yunjun Xia², Valerie Philips²
¹Jackson State University, USA, ²Mississippi State University, USA

Historically as part of its national security mission, the U.S. Department of Energy's Y-12 National Security Facility in Oak Ridge, TN acquired a significant fraction of the world's supply of elemental mercury. During the 1950s and 1960s, a large amount of elemental mercury escaped confinement and is still present in the watershed surrounding the Y-12 facility. The objectives of this study were to investigate the current status of

mercury distribution and speciation and determination of mercury bioavailability to native earthworms in floodplain soils of East Fork Poplar Creek (EFPC) after decades of U.S. Department of Energy's remediation. The present study clearly shows that the total mercury in a tested floodplain field of EFPC was significantly below the US Department of Energy target 400 mg Hg/kg. The major mercury form in the current floodplain soils of EFPC is mainly the non-cinnabar mercury bound form in soil silicates (4M HNO₃-extractable residual fraction). The results show strong linear relationships between mercury concentrations in native earthworms (both mature and immature groups) and the non-cinnabar mercury form, while cinnabar mercury is less bioavailable to native earthworms. Native earthworms may be used as a potential mercury ecological bio-indicator (bio-marker) for demonstrating mercury bioavailability and ecotoxicity in the ecosystem. The major mercury form in the coarse particles such as sand particles of floodplain soils and sediments is non-cinnabar mercury while cinnabar mercury was the major mercury form in fine clay particles of the site. The Hg evaporation from sampling preparation will be also discussed.

O3.04
9:15 EXPLORING STRUCTURE-FUNCTION RELATIONSHIPS IN HOMOPROTOCATECHATE 2,3-DIOXYGENASE

Joe Emerson
 Mississippi State University, USA

Homoprotocatechuate 2,3-dioxygenase (HPCD) catalyzes the dioxygen-dependent cleavage of homoprotocatechuate (3,4-dihydroxyphenylacetate) using a non-heme iron, manganese, or cobalt center. It has also been shown to react with a range of other substrates, including 4-nitrocatechol, that contain an enediol moiety. Herein we discuss our recent efforts using isothermal titration calorimetry (ITC) to study substrate binding in HPCD and related variants. This study provides new data supporting the current mechanism of substrate binding in HPCD, while affording us new insight into the relationship between structure and function in this class of metalloenzymes.

**O3.05**

9.30 **INTERACTION OF PLANT FLAVONOIDS WITH BIOLOGICAL TARGETS: OPTICAL SPECTROSCOPIC AND MOLECULAR MODELING APPROACH**

Bidisha Sengupta
Tougaloo College, USA

We have explored the interaction of plant flavonoids diadzein¹ and fisetin¹ along with their synthetic model compounds 3-hydroxyflavone and 7-hydroxyflavone with their biological targets like protein and DNA. Diadzein and fisetin are ubiquitous bioactive flavonoids, abundant in citrus fruits, known to possess antioxidant,^{2i,ii} anti-carcinogenic, vasoprotective and other important therapeutic properties. Normal human hemoglobin (HbA) is the natural carrier of drugs in physiological systems. Flavonoids are known to bind with DNA either by intercalation or by binding in the groove³. Fluorescence and far UV CD spectroscopy, combined with molecular modeling approaches were used to study the interaction of flavonoids with HbA and DNA. We found that Diadzein binds between the subunits, close to β -Trp 37 of HbA. Distinctive two color fluorescence signature of fisetin reveal its binding to HbA and DNA. We used calf-thymus DNA as model for B-form DNA. Furthermore we studied the effect of the flavonoids in the stabilization of G-quartet, a non Watson-Crick DNA structure present in the telomeric regions of human chromosomal DNA⁴. UV melting studies indicated that the flavonoids stabilize quadruplex structures to a significant extent.

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9:45 – 10:00 AM BREAK**O3.06**

10:00 **STUDIES TOWARD THE SYNTHESIS OF SPIROISOXAZOLINES AND SPIROPYRAZOLINES**

Ashton Hamme¹, Erick Ellis¹, Sureshbabu Dadiboyena¹, Jiangping Xu¹, Edward Valente²

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

A series of natural products isolated from the sponge of *Verongida* have been intensively studied due to the presence of alkaloids with one, or more bromotyrosine residues. Many of these alkaloid metabolites show interesting bioactivity and cytotoxic properties in tumor cell lines. 11-Deoxyfistularin-3 is cytotoxic against human breast carcinoma cell line MCF-7. Many of these bromotyrosine natural products possess the spiroisoxazoline moiety. The purpose of this project was to find a synthetic methodology that will be applied towards the synthesis of the spirocyclic isoxazolines and pyrazolines. The syntheses of a variety of spiroisoxazolines and spiropyrazolines were achieved through intramolecular cyclization/methylation reactions of functionalized 5,5-disubstituted isoxazolines and pyrazolines in one reaction vessel. Aromatic ring containing nitrile oxides and nitrile imines reacted with disubstituted geminal alkenes in a 1,3-dipolar fashion to afford the analogous 5,5-isoxazolines and 5,5-pyrazolines respectively. The synthesis, mechanistic details, and isolated yields for the reported spirocyclic isoxazoline and pyrazoline compounds will be discussed.

The project described was supported by Award Numbers SC3GM094081 and G12RR13459 (NMR and Analytical CORE facilities) from the National Institute of General Medical Sciences. The content is solely the responsibility of the authors and does not necessarily represent the official views of the National Institute of General Medical Sciences, the National Institutes of Health, or the National Science Foundation

O3.07

10:15 **A NOVEL SYNTHESIS OF ALPHA-METHYL-BETA-PROLINE VIA AN UNEXPECTED SELECTIVE CYCLIZATION**

Douglas Masterson, Souvik Banerjee, Jillian Smith, Justin Smith

University of Southern Mississippi, USA

Alpha-methyl-beta-proline has been synthesized from an appropriately substituted

malonate ester using a selective cyclization to provide the needed 5-member heterocyclic ring. The cyclization occurred during the hydrazine promoted deprotection of a phthalimide protected primary amine. The free amine then cyclized to form the 5 membered ring with a high level of selectivity. We have extensively studied the cyclization selectivity and found that the selectivity correlates strongly with the normal Hammett constants for the leaving group. We have also demonstrated that we can invert the selectivity of the cyclization by incorporating bulky esters into the starting malonate ester. The ester amide that is formed from the cyclization is then converted to the beta proline derivative in good yield by selective reduction of the amide over the ester. Experimental details and potential uses will be provided.

O3.08

10:30 POLYCATIONS AS NOVEL ANTICOAGULANTS BLOCK TISSUE FACTOR-DEPENDENT FVII ACTIVATION: A POSSIBLE MECHANISM

Arthur J. Chu¹, Wujian Miao¹
¹Delta State University, USA, ²University of Southern Mississippi, USA

Background: Tissue factor (TF), an initiator of the extrinsic blood coagulation, is often susceptible to upregulation by tissue injury, advanced glycation end-product, or diverse inflammation/infection. TF hypercoagulability is often associated with many pathological conditions including cancer, obesity, etc. Apart from thrombotic consequence, elevated coagulant mediators (e.g., FVIIa, FXa, and thrombin) and fibrin production are proinflammatory; protease-activated receptors or Toll-like receptors, respectively, mediate such proinflammation. In this laboratory, we have previously shown the modulation of extrinsic hypercoagulation by intervening TF-dependent FVII activation at post-translational level. *Results:* (1) Assessing rabbit brain thromboplastin (rbTF) procoagulant activity (PCA) in vitro by a single-stage clotting assay, polycations including compound 48/80, polybrene, and cationic polyamino acids substantially prolong clotting time. (2) These polycations preferentially suppress FVIIa formation, which is also shown as non-competitive inhibition on FVIIa amidolytic activity by a chromogenic assay. (3) Quartz Crystal Microbalance (QCM) demonstrates high affinities of polycations for rbTF. Moreover, such affinities are significantly correlated with rbTF-PCA and inhibition constants (K_i) in the presence of polycations in the respective assays. Our

data suggest that polycation binding to rbTF could serve as a mechanism by which polycations block rbTF-dependent FVII activation. *Conclusions:* Such unique upstream downregulation of blood coagulation could present polycations as a new class of anticoagulants. In view of coagulation-dependent inflammation and a new paradigm of blood coagulation-inflammation-thrombosis circuit, polycationic anticoagulants could contribute to antiinflammation, antithrombosis, and cardioprotection. Further development of effective anticoagulants is of biopharmaceutical significance in broadly easing diverse disease conditions.

O3.09

10:45 THE PHARMACEUTICALS AND THE PHARMACEUTICAL INDUSTRY: THE EVOLUTION CONTINUES IN ALL DIRECTIONS

Jiben Roy
Mississippi University for Women, USA

Many of the giant pharmaceutical companies of today started as small pharmacy shops at street corners, known as 'apothecaries'. The current pharmaceutical giants Pfizer, Merck, GSK, Sanofi-Aventis, and Roche- all owe their size to mergers and acquisitions. These and other pharmaceutical industries are constantly developing newer pharmaceuticals i.e., medicines every year. Do these medicines help in increasing our longevity? Research data suggest there is a correlation between life expectancy and the newer medicines. Is there any development in the market sizes and technology? What about the types of medicines and the method of treatments? The evolution continues in all directions. The synthetic drugs developed in the early twentieth century were simple in structure, but nowadays medicines are more complex, and recently more complex synthetic biologics have been introduced. Similarly, the treatment or appropriate medicines can be selected to provide the optimum therapeutic value for an individual patient according to their genomic makeup. The development of biologics in comparison to chemical medicines and the treatment option will also be discussed in this presentation.

**O3.10**
11:00 DESIGN, SYNTHESIS, AND APPLICATIONS OF A NOVEL ORGANOBORON REAGENT FOR ORGANIC SYNTHESIS

Takashi Tomioka, Yusuke Takahashi, Rambabu Sankranti, Trey Vaughan, Takayoshi Yanase, Toshihide Maejima
University of Mississippi, USA

α -Boryl carbanion is a unique organoboron species which may promote a variety of useful chemical transformations in organic synthesis; however, due to its limited accessibility and handling difficulty, further exploration of this chemical species has not been conducted in recent years. We assumed that combining a mildly Lewis acidic & sterically hindered diaminoboryl group and an appropriate anion stabilizing group would enable easy access to a stable α -boryl carbanion species. Our recent study of a diaminoboryl acetonitrile, $(R_2N)_2BCH_2CN$, successfully established a facile one-pot procedure to produce a novel bisfunctionalized carbanion for use in acrylonitrile synthesis.

O3.11
11:15 DECARBOXYLATIVE PHOTOCYCLIZATION OF CATIONIC PHTHALIMIDE AND QUINOLINE/ISOQUINOLINE ω -CARBOXYLIC ACIDS

Wolfgang Kramer¹, Eli Smith¹, Philip Schwartz¹, David Sandlin¹, Axel Griesbeck²
¹*Millsaps College, USA*, ²*University of Cologne, Germany*

The decarboxylative photocyclization is an elegant photochemical way to synthesize small to medium sized heterocycles. The photochemical starting material is a phthalimide chromophore and a ω -carboxylic acid. The product is a pyrrolizidine annelated structure. Several functional groups are tolerated and ring sizes up to 36 members have been isolated with appropriate precursors. An interesting Memory of Chirality effect via a 1,7-triplet biradical has been observed during the course of the photochemical cyclization to yield pyrrolo-[1,4]-benzodiazepines. The synthetic potential of the reaction is diminished by the incorporation of the phthalimide nitrogen into the product. To expand the versatility of the decarboxylative photocyclization we are using cationic precursors as well as different chromophores. Cationic precursors have the regular phthalimide as the chromophore but contain an

alkylated pyridinium moiety. We are also exploring the use of quinoline, isoquinoline and phenanthridine as new chromophores for the decarboxylative photocyclization. It has been shown that electron transfer fluorescence quenching does take place in quinoline betaines compounds. This indicates the potential for photochemical cyclization reactions which also would give access to new classes of compounds. The synthesis of the precursors as well as the photochemical transformations will be discussed.

11:30 LUNCH BREAK**O3.12**
1:00 PYRENE-BASED FLUORESCENT SENSORS

Erendra Manandhar¹, J. Hugh Broome¹, Justin Hurst¹, Jalin Myrick¹, Whitney Lagrone¹, Peter Cragg², Karl Wallace¹
¹*University of Southern Mississippi, USA*, ²*University of Brighton, UK*

The design and synthesis of fluorescent molecular sensors that are able to detect cations and anions via changes in fluorescence intensity either by a fluorescence "turn on," e.g., excimer formation or by a "turn off" i.e., excimer quenching, is an area of current interest. There has been a plethora of work dedicated to the development of fluorescent chemosensors in the field of supramolecular chemistry. Molecular receptors containing pyrene functional groups that have been incorporated into the design of the molecular framework will be discussed. Specifically, molecular receptors that can switch on a fluorescence signal by metal-induced self-assembly and host:guest recognition. Two specific systems will be discussed, the first is pyrene-based triazole receptor which has been synthesized and shown to self-assemble in the presence of $ZnCl_2$ in an exclusively 2:1 ratio, whereas a mixture of 2:1 and 1:1 ratios are observed for other Zn^{2+} salts. The pyrene units are syn in orientation; this is supported by a strong excimer signal observed at 410 nm in the presence of $ZnCl_2$ in acetonitrile. DFT calculations and 2D NMR support the proposed structure and the second is the synthetic modular approach to design molecular "tweezers" for metal salts.

O3.13**1:15 MULTIFUNCTIONAL NANOMATERIAL FOR TARGETED IMAGING AND PHOTOTHERMAL KILLING OF CANCER & ANTIBIOTIC-RESISTANT BACTERIA**Paresh Ray*Jackson State University, USA*

Cancer and antibiotic resistant bacteria present greatest challenge in health care in today's world. Recent advancement in nanoscience and nanotechnology has expanded our ability to design and construct nanomaterials with targeting, therapeutic, and diagnostic functions. These multifunctional materials have attracted our attention to be used as promising tool for selective bio sensing and therapy without the current drugs. In this talk, I will provide the basic concepts and critical properties of different multifunctional nanostructures that have been designed in our group and shown to be useful for cancer and antibiotic resistant bacteria detection and photothermal therapy applications.

O3.14**1:30 A COMPUTATIONAL STUDY OF THE INTERACTIONS OF CITRATE WITH THE SURFACE OF SILVER NANOPARTICLES**Frances Hill, Manoj Shukla*US Army ERDC, USA*

The nature of the interactions of coatings with the surfaces of metallic nanoparticles is poorly understood. Citrate is a common electrostatic-stabilizing material used to coat metallic nanoparticles. The citrate layer is generally believed to carry a small negative charge that interacts with the small positive charge present on the surface of metallic nanoparticles, creating a stable particle. Experimental evidence suggests that citrate coatings are not continuous, thus allowing solutions to have direct interaction with the surface of a metallic nanoparticle, which may have an impact on the fate of these materials in the environment. The purpose of this research is to use *ab initio* quantum chemical approaches to understand the nature of the interactions between silver nanoparticles and a citrate coating. Density Functional Theory (DFT) methodologies were used along with a robust basis set to predict the interactions between citrate and the surface of silver nanoparticles. Binding energies for citrate-silver nanoparticle interactions were calculated for common crystallographic surfaces of face centered cubic (FCC) silver to investigate

changes in the strength of the citrate-silver interactions. Multiple citrate molecules were sorbed to the test surfaces to assess the extent of the coating of citrate on surfaces of metallic silver.

O3.15**1:45 SYNTHESIS OF THIOL-CAPPED PbSe NANOPARTICLES IN AQUEOUS SOLUTION – CAP VERSUS STABILITY**Zikri Arslan, Oliva Premira-Pedrozo, BakhtiyorRasulev, Jerzy Leszczynski*Jackson State University, USA*

Synthesis of PbSe nanoparticles in aqueous solution is problematic. Studies reporting stable PbSe NPs are based on organometallic methods yielding water-insoluble NPs that have limited applications. To promote water solubility, ligand exchange can be performed on the NP surface with hydrophilic ligands. However, optical properties of NPs are inevitably altered. We developed an aqueous route of synthesis for PbSe NPs. Several ligands, including, thioglycolic acid (TGA), 3-mercaptopropanoic acid (MPA), 6-mercaptophexanoic acid (MHA), thioglycerol (TGC), 2-mercaptopropanoic acid hydrochloride (MEA), and L-cysteine (L-cys) were used for stabilization of PbSe NPs. The stability was evaluated for one month at room temperature and at 4 °C in dark. The most stable NPs were TGA-capped with stability over 30 days at room temperature and 45 days at 4 °C. TGA, MPA and MEA capped PbSe NPs were successfully purified either with acetone or dimethyl sulfoxide (DMSO). PbSe NPs had a very susceptible surface giving a poor stability for about 45 minutes after re-dispersion in water. An excess of free ligand was necessary to increase the stability for 3 days (TGA-capped, pH 7.19), 9 days (MPA-capped, pH 7.45) and 45 days (MEA-capped, pH 7.14). XRD pattern results showed that the NPs were a cubic rock salt structure with the most intense peaks located at $2q = 25.3$ (200) and $2q = 29.2$ (100). TEM images showed that the size was between 5-10 nm. ICP-MS results revealed that Pb:Se ratio was 1.28, 1.26 and 1.18 for MPA, TGA, and L-Cys respectively

2:00 BREAK



2.15 – 4.15 **PMSYMPOSIUM WORKSHOP: NSF CAREER AWARDEES' SYMPOSIUM (HIGHLIGHTING INTELLECTUAL MERIT AND BROADER IMPACTS)**

S3.01

2:15 **FULLERENE-POLYMER NANOCOMPOSITES: UNEXPECTED THINGS THAT YOU CAN DO WITH A FULLERENE**

J. Paige Buchanan

University of Southern Mississippi, USA

Fullerenes, including metallic nitride fullerenes, have offered the possibility of many exciting applications, especially in the electronic device and select medical fields. Due to the all-carbon cage, fullerenes are in general very hydrophobic materials and possess minimal solubility in common organic solvents, monomers, and polymers. Although a number of interesting and potentially useful fullerene derivatives have been reported, the inevitable need to combine the fullerene dopant with a carrier support matrix exists, which must provide the necessary mechanical properties required of commercial device processing and use. Our lab has pursued a multi-faceted approach to the preparation of fullerene-polymer composite materials using a variety of techniques such as the primary functionalization of the cage to produce more compatible derivatives for direct blending and the production of polymerizable monomers, which results in the incorporation of the fullerene covalently into the sample matrix. Little is known about the chemistry, photochemistry, physical attributes, and practical engineering properties of many of these new fullerene-polymer nanocomposites, and our work represents a first exploration into several interesting systems.

S3.02

2:35 **SPECTROSCOPICALLY TRACKING THE EVOLUTION OF NONCOVALENT INTERACTIONS FROM THE SINGLE MOLECULE LEVEL TO THE CONDENSED PHASES**

Nathan Hammer

University of Mississippi, USA

When molecules interact noncovalently through hydrogen bonding or other electrostatic interactions, their physical properties change. These interactions are studied in a variety of chemical environments using vibrational spectroscopy and computational modelling to enhance our fundamental

understanding of noncovalent interactions in the condensed phases. Such weak interactions play important roles in a range of chemical and biological systems and are emerging as central themes in understanding complex biological processes. In particular, the biological building block pyrimidine is strongly affected by weak CH...N and OH...N interactions. Charge transfer results between pyrimidine and water and leads to blue shifts in some of pyrimidine's normal modes, having important consequences on macroscopic biological interactions. The normal modes of the important osmolyte TMAO are also strongly affected by hydrogen bonding with water. TMAO plays important roles in stabilizing proteins but the exact mechanism remains unknown. By studying the effects that water has on the normal modes of TMAO, the hydrogen-bonded network in the direct vicinity of TMAO is elucidated.

S3.03

2:55 **CAREER: FUNCTIONAL POLYMER SURFACES AND NETWORKS VIA THIOL-CLICK CHEMISTRY**

Derek Patton

University of Southern Mississippi, USA

Thiol-click reactions have emerged as an invaluable synthetic tool for the preparation of functional polymeric materials and surfaces. This presentation will focus on our recent efforts to utilize a series of thiol "click" reactions, including the thiol-yne, thiol-ene, and thiol-isocyanate reactions for the fabrication of functional polymer surfaces. These reactions enable the rapid generation of a diverse library of functional surfaces, utilize a structurally diverse range of commercially available or easily attainable reagents and proceed rapidly to quantitative conversions under mild reaction conditions. In this work, we demonstrate thiol click reactions as a modular platform for the fabrication of highly functional, patterned, and multicomponent polymer brushes for a variety of applications including stimuli responsive and bio-related surfaces.

S3.04

3:15 **CHEMOSENSORS FOR ANIONS**

Md. Alamgir Hossain, Musabbir Saeed, John Mendy
Jackson State University, Department of Chemistry and Biochemistry, USA

Because anions play a key role in both chemistry and biology, supramolecular chemistry of anions has been developed significantly during the last two decades. In particular, selectivity of common

anionic pollutants has received significant interests in recent days. Although, a variety of synthetic receptors have been reported showing high binding affinity for inorganic anions, synthetic chemosensors for anions are still limited in the literatures. In this presentation, several types of chemosensors and their affinity toward environmental and biological important anions will be discussed. (MAH was supported by a NSF-CAREER award, CHE-1056927).

S3.05

3:35 BIOORGANIC CHEMISTRY AT USM. DEVELOPMENT OF NOVEL SOMATOSTATIN AND NEUROTENSIN ANALOGUES

Douglas Masterson

University of Southern Mississippi, USA

This talk will outline the intellectual merit and broader impacts of a CAREER proposal dealing with bioorganic chemistry. The talk will include achievements to date in the synthesis of various unnatural amino acids from a common synthetic intermediate and their incorporation into peptides. The talk will also discuss the progress to date in the area of broader impacts. The broader impacts that are addressed in the project are the development of a new mini-session course in mass spectrometry and the use of the ACS project SEED to encourage economically disadvantaged high school students to pursue a career path in chemistry.

S3.06

3:55 BIOSENSORS BASED ON ELECTROGENERATED CHEMILUMINESCENCE

Wujian Miao

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

Electrogenerated chemiluminescence (ECL) is the process whereby species generated at electrodes undergo high energy electron-transfer reactions to form excited states that emit light. Essentially, ECL is a combination of electrochemistry and luminescence spectroscopy, and it offers several inherent features, which include high sensitivity, good selectivity, and excellent reproducibility. These advantages are desirable attributes of any system for detecting specific molecules of interest with many components. As a result, development of ECL based detecting schemes benefits society as the related research has various applications including clinical diagnostics, forensic chemistry, environmental investigations, pharmaceutical studies, and sensitive detection of

high explosives and biological warfare agents—which are pertinent issues in global security. Some recent experimental data from our lab on fundamental studies and applications of ECL based biosensors will be reviewed and discussed. Financial support from the NSF CAREER Award (CHE-0955878) is gratefully acknowledged.

4.15 BUSINESS MEETING AND ELECTIONS

6:30 –8:00 PM Poster Session I, Chemistry and Chemical Engineering

P3.01 SYNTHESIS, CHARACTERIZATION AND STRUCTURE OF BIS(2-AMINOPYRIMIDINE)TETRAKIS(μ-LEVULINATO-O,O')DICOPPER

Ramaier Venkatraman¹, Sri Ranjini Arumugam¹, Samuel Dasary S.R.¹, Fronczek Frank R.², Andrew Ozarowski³, Jackson Brittany¹, Hongtao Yu¹
¹Jackson State University, USA, ²Louisiana State University, USA, ³Florida State University, USA

The derivative of copper(II) levulinate with 2-aminopyrimidine, $\text{Cu}_2(\text{C}_5\text{H}_7\text{O}_3)_4 \text{C}_4\text{H}_5\text{N}_3$, has been synthesized and characterized. The crystal structure is polymeric, with zigzag chains of $\text{Cu}_2(\text{lev})_4$ units, bridged by 2-aminopyrimidine. The copper dimers lie on inversion centers in the crystal. Each copper atom has a square pyramidal coordination, with four oxygen atoms in a plane, at an average distance of 1.9694 Å, the fifth coordination positions are occupied by pyrimidine nitrogen atoms, with Cu-N distances 2.2026(12) and 2.2333(12) Å. The Cu...Cu distances are 2.6431(4) and 2.6629(4) Å. The amino nitrogen of the pyrimidine is involved in intramolecular hydrogen bonding with levulinate carboxylate O, bridging between Cu dimers. Conductivity measurements indicate the non-ionic nature of the complex as well.

P3.02 Optimizing Isothermal Frontal Polymerization: Producing the Deepest Copolymer Gradient Refractive-Index Length for a MMA/BzMA System

Molly Tyner, Anne Waldrop, Lydia Lee Maggio
Millsaps College, USA

Isothermal Frontal Polymerization (IFP) is a directional polymerization process producing Gradient Refractive-INDEX materials (GRINs). IFP systems contain a polymer seed in the bottom of the reaction vessel with a monomer solution (monomer, thermal initiator, and dopant) on top. The system is heated at a constant temperature. With time, the monomer solution diffuses into the polymer seed creating a viscous region. The Trommsdorff, or gel



effect, occurs in this viscous region, and, thus, the viscous region has a higher polymerization rate than the monomer solution. As the viscous region polymerizes, more monomer solution diffuses into this newly-formed polymer driving the polymerization. The viscous region creates a front traveling up the reaction vessel leaving the newly-formed polymer and consuming the monomer solution. GRINs are produced because the dopant (e.g. a second monomer or a dye) diffuses more slowly than the monomer into the viscous region. In the monomer solution, the dopant's concentration relative to the monomer's concentration increases with time allowing a higher dopant concentration to be incorporated into the front. We performed trials of varied MMA/BzMA ratios and initiator concentration of Azobisisobutyronitrile (AIBN). The trials provided evidence for our hypothesis that the GRIN length increases with increasing concentrations of BzMA and decreasing AIBN concentration.

P3.03 SPECTROSCOPIC AND COLORIMETRIC STUDIES OF A NEW TREN-DERIVED THIOUREA RECEPTOR FOR ANIONS

Maryam E. Khansari, Avijit Pramanik, Md. Alamgir Hossain

Department of Chemistry and Biochemistry, Jackson State University, USA

During last four decades, much attention has been given to synthetic receptors which are primary polyamine-based molecules. However, the binding of such receptors requires protonation to the amine functional groups; therefore the binding is depended on the pH of a solution. Molecules with H-bond donors, such urea and thiourea are known to bind anions by hydrogen-bonding interactions under neutral conditions. In an effort to design thiourea receptors with multiple binding sites for hosting anionic guests, we have synthesized a tripodal 4-nitrophenylthiourea receptor with three thiourea groups. The host has been studied for a number of anions by ^1H NMR and UV-Vis spectroscopy in DMSO. We have also performed naked-eye colorimetric studies of this compound for anions, showing a distinct color change for fluoride in solution.

Acknowledgement: 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 (CHE-0821357).

P3.04 BINDING OF ANTI TUMOR DRUG 'DIADZEIN' WITH HUMAN HEMOGLOBIN USING OPTICAL SPECTROSCOPY AND MODELING STUDIES

Maurice Crawford¹, Jasmine Taylor¹, Sandipan Chakraborty², Bidisha Sengupta¹

¹Tougaloo College, Usa, ²saroj Mohan Institute Of Technology, India

We have explored the interactions of diadzein with normal human hemoglobin (HbA), using steady state fluorescence spectroscopy, far UV circular dichroism (CD) spectroscopy, combined with molecular modeling computations. Diadzein^{1,ii,iii}, a ubiquitous bioactive flavonoid abundant in citrus fruits is known to possess antioxidant^{2i,ii}, anti-carcinogenic, hypolipidemic, vasoprotective and other important therapeutic properties. Specific interaction of the flavonoid with HbA is confirmed from flavonoid-induced quenching which is evident from steady state fluorescence, change in absorbance as well fluorescence anisotropy. Far UV CD studies indicate no significant change in the secondary structure of HbA upon diadzein binding indicating the usefulness of this flavonoid in medicinal biology. Both temperature dependent fluorescence measurements and molecular docking studies reveal that apart from hydrogen bonding and van der Waals interactions, electrostatic interactions also play crucial role in diadzein-HbA interactions. This observation is further corroborated by electrostatic surface potential calculations which indicate that the diadzein binding site in HbA is intensely positive due to the presence of several lysine and histidine residues.

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P3.05 MOLECULAR DYNAMICS AND DOCKING STUDY OF BINDING OF DIADZEIN WITH HUMAN HEMOGLOBIN

Dejarvis Bush¹, April Gerald¹, Sandipan Chakraborty², Pradip Biswas¹, Bidisha Sengupta¹
¹Tougaloo College, Usa, ²saroj Mohan Institute Of Technology, India

We have explored the interactions of Diadzein with normal human hemoglobin (HbA), using molecular dynamics and docking approaches. Diadzein, a ubiquitous bioactive flavonoid, abundant in citrus fruits is known to possess antioxidant, anti-carcinogenic, hypolipidemic, vasoprotective and other important therapeutic properties. GROMACS 3.3 was employed to carry out MD simulations on free hemoglobin and its complex with diadzein. AutoDock4 was further employed to gain an insight into the Diadzein binding with HbA. 3-D atomic coordinates of the receptor was obtained from the Brookhaven Protein Data Bank (PDB ID 2D60) and prepared for docking. Hemoglobin was considered as a tetramer. After initial away movement during 3ns of MD simulation, diadzein positioned itself at the center of the HbA central cavity and stabilize where its phenyl ring ~ 8 Å away and the Chromone ring ~12-15 Å away from the beta-Trp 37 residue of HbA. Thus Trp 37 can be used as an optical probe to monitor diadzein binding to HbA. We calculated the minimum distances between diadzein and the Fe atom of the four heme groups during 5ns of MD simulation. Diadzein is sufficiently apart from all the four heme group of HbA as is evident from the MD results. Thus diadzein binding do not alter the functionality of the heme group HbA.

P3.06 INTERACTION OF THE NATURAL CARRIER HEMOGLOBIN WITH DRUGS HESPERITIN AND GENISTEIN: A CRITICAL STUDY

Jordan Henley¹, Jasmine Taylor¹, Sandipan Chakraborty², Bidisha Sengupta¹
¹Tougaloo College, Usa, ²saroj Mohan Institute Of Technology, India

Steady state and time resolved fluorescence spectroscopy, combined with molecular modeling computations, have been used to explore the interactions of two therapeutically important flavonoids, genistein and hesperetin, with normal human hemoglobin (HbA). Binding constants estimated from the fluorescence studies were $\approx 3.98 \times 10^4 \text{ M}^{-1}$ and $2.24 \times 10^3 \text{ M}^{-1}$ for genistein and hesperetin respectively. Specific interactions with HbA were confirmed from flavonoid-induced static quenching of the protein tryptophan fluorescence as

indicated by: (a) bimolecular quenching constant $K_q \gg$ diffusion controlled limit (b) closely matched values of Stern-Volmer quenching constant and binding constant (c) $\tau_0 / \tau \approx 1$ (where τ_0 and τ are the unquenched and quenched tryptophan fluorescence lifetimes respectively). Molecular docking and electrostatic surface potential calculations reveal contrasting binding modes of genistein and hesperetin with HbA.

P3.07 INFLUENCE OF DIFFERENT DNA STRUCTURES ON THE BINDING OF PLANT FLAVONOIDS FISETIN AND DIADZEIN WITH DNA

Laura Blackmon, Bidisha Sengupta
 Tougaloo College, USA

Fisetin (3,7,3',4'-tetrahydroxyflavone) is a bioactive plant flavonoid of immense importance as a potentially useful therapeutic drug, for various free radical mediated as well as other diseases. We have exploited dual luminescence property of fisetin to examine its interactions with relevant macromolecular targets, namely double stranded (from calf thymus, CT), and quadruplex DNA. We have also studied fluorescent plant isoflavonoid diadzein in both types of DNA microenvironments. Like fisetin [1], diadzein [2] is also known to possess antioxidant, anti-carcinogenic, hypolipidemic, vasoprotective and other important therapeutic properties. In the presence of CT DNA dramatic changes are observed in the intrinsic fluorescence behaviour of fisetin. These, along with other relevant supporting spectroscopic data, suggest that fisetin binds intercalatively between the base pairs of DNA. Diadzein has significant difference in the emission wavelength with and without CT DNA, suggesting diadzein intercalate with B-DNA too. Significant change in melting temperatures of G-quartet DNA with and without fisetin and diadzein were observed, suggesting the stability of quadruplex structures with plant flavonoids.

References:

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P3.08 SPECTROSCOPIC AND COLORIMETRIC INVESTIGATIONS OF ACYCLIC CHEMOSENSORS FOR ANIONS

Toyketa Horne, Alamgir Hossain
Jackson State University, USA

Anions play a vital role in the many biological processes and in the environment. The development of effective receptors to retract harmful anions from the environment has been a popular area of research. A series of acyclic receptors containing propylene and ethylene chains were synthesized with dansyl fluorophores attached. ¹H NMR, fluorescence, and colorimetric studies were employed to investigate the binding ability of the sensors towards a series of ionic systems in solution. Results suggest that the host is capable of binding various anions through hydrogen bonding and electrostatic interactions.

Acknowledgement: 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 (CHE-0821357).

P3.09 MONOTOPIC VS DITOPIC BINDING OF ANIONS BY A THIOPHENE-BASED MONOCYCLE

Musabbir A. Saeed¹, Frank R. Fronczek², Douglas R. Powell³, Md. Alamgir Hossain¹

¹*Department of Chemistry and Biochemistry, Jackson State University, USA,* ²*Department of Chemistry, Louisiana State University, USA,* ³*Department of Chemistry and Biochemistry, University of Oklahoma, USA*

A macrocycle with thiophene spacers has been synthesized and studied for anions in solution. Several complexes of the macrocycle in presence of inorganic anions have been isolated and analyzed by X-ray crystallography. Structural analysis of the sulfate complex shows that the encapsulation of sulfate inside the cavity through multiple hydrogen bonds to form a monotopic complex. However, ditopic binding was found for halides and perchlorates. As investigated by the ¹H NMR titrations in D₂O at pH 2.0, the ligand was found to form a 1:1 complex for each anion investigated where higher selectivity was found for sulfate. In this poster the details of synthesis, binding studies in solid and solution states will be presented.

Acknowledgement: 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 (CHE-0821357).

P3.10 DNA CLEAVAGE ACTIVITIES WITH DINUCLEAR COPPER (II) AND COBALT (II) COMPLEXES OF TWO POLYAZAMACROCYCLES

Marcy Pilate, John Mendy, Musabbir Saeed, Naomi Campbell, Hongtao Yu, Md. Alamgir Hossain
Jackson State University, USA

Tumor cancer cells grow very rapidly and aggressively. One mechanism used to treat cancer is to cleave the DNA in tumor cancer cells and kill the cell. Here we have successfully synthesized two dinuclear copper complexes, a dinuclear thiophene macrocycle and a p-xylyl macrocycle. These compounds have shown excellent DNA cleavage activity and were synthesized via a high dilution condensation reaction. Copper(II) bromide and Cobalt(II) chloride were added in a two to one ratio of the copper to the azamacrocycle. Gel electrophoresis was used to determine if cleavage of DNA was taking place. DNA cleavage was quantified using ImageJ imaging software. The results indicate that each compound was able to cleave DNA and that the amounts of cleavage were dependent on the exposure time and concentration of metal complexes. Fluorescence studies were also conducted to determine the binding constant of each ligand to the DNA. The fluorescence emission intensity decreased upon increasing concentration of the metal complexes demonstrating that the two complexes are binding to the DNA. In conclusion, both complexes have demonstrated DNA cleavage activity.

Acknowledgement: NSF is acknowledged for a CAREER award (CHE-1056927) to MAH. The work was supported by the NIH (G12RR013459). The NMR instrument used for this work was funded by the NSF (CHE-0821357). MLP was supported for her master's program by NSF LSAMP Bridge to the Doctorate Program (HRD-1026590).

P3.11 SYNTHESIS AND ANION BINDING STUDIES OF A NEW THIOPHENE-BASED POLYAZAMACROCYCLES IN WATER

Syed Ataul Haque¹, Musabbir. A. Saeed¹, Douglas R. Powell², Md. Alamgir Hossain¹

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Design and synthesis of receptors for anions are important from the view of both of environment

and biological aspects. Protonated polyamines are attractive receptors for binding of a variety of anions in both solution and solid states. Although a significant progress has been achieved in the synthesis of simple polyamines using ethylene chains, however reports on the synthetic receptors with a propylene chain are inadequate in the literature. Such compounds are potential to bind larger and even multiple anions in a single cavity. During the course of our studies, we synthesized two monocyclic amines with thiophene from Schiff base condensation of primary amines and corresponding aldehydes followed by reduction. These compounds have been investigated for simple inorganic anions in water. Details of the synthesis, solution binding studies, and crystal structures with different anions will be presented in the poster.

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P3.12 A NOVEL *P*-CYANO BASED TRIPODAL UREA RECEPTOR FOR ANION COMPLEXATION

Avijit Pramanik, Douglas R. Powell, Md. Alamgir Hossain

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Anion coordination chemistry has become one of the most topical and challenging areas of current research in supramolecular chemistry. Anion recognition is important in biological, environmental and chemical processes. The development of highly efficient systems capable of selectively binding anions is recognized as being key to solving a number of fundamentals. These fundamentals include anion sensing, extraction and separation. Because of the ability to act as H-bond donors, urea and thiourea subunits are currently used in the design of neutral receptors for anions. These classes of receptors bind anions strongly through NH...anion interactions in aprotic solvent, thus proving useful as extracting agents. In the present study a new tripodal *tris*-urea receptor based on with *p*-cyano functional groups was synthesized. This receptor was studied to evaluate its binding ability in both solution and solid states. In solid state hydrogen bonding interactions prevent the encapsulation of an anion in the cavity. However, the ligand was found to form a 1:1 complex with each anion in solution. Herein, we will present the detailed solution (¹H NMR, 2D NOESY, and Job's plots) and solid state binding of oxo-anions and halides.

Acknowledgement: 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 (CHE-0821357).

P3.13 BINDING OF NUCLEOTIDES WITH A MACROCYCLIC DINUCLEAR COPPER (II) COMPLEX IN WATER AT PHYSIOLOGICAL PH

Md Mhahabubur Rhaman, John S. Mendy, Md. Alamgir Hossain

Jackson State University, USA

Although a great deal of work has been done on simple anion binding in recent days; nonetheless research on nucleotide binding with synthetic receptors is still at its preliminary level. During the course of our ongoing research on anion coordination chemistry, we have been enthusiastic to use polyazamacrocyclic chelates for binding of nucleotides. A neutral macrocycle has been converted into its dicopper complex with two equivalents of Copper (II) bromide, and its structure has been characterized by X-ray crystallography, showing two distinct binding sites for anion. The newly synthesized compound has been studied for several nucleotides based on indicator displacement assay (IDA) using a commercially available dye in water at physiological pH. In this poster, the synthesis and fluorescence titration studies of the dinuclear complex for nucleotides will be presented.

Acknowledgement: 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 (CHE-0821357).

P3.14 FABRICATION OF PLASMONICALLY SENSITIZED PHOTO-ELECTROCHEMICAL CELLS

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The amount of solar energy reaching the surface of the earth far exceeds the amount of energy globally consumed and that required for human applications. One fine way of exploiting this abundant energy is by utilizing sunlight for photo-induced dissociation of water to produce chemical fuels such as H₂ and O₂. Although many semiconductor materials have been tried for solar water splitting, the matching rules (the need for the valence band and conduction band edges of



semiconductors to include the standard reduction potentials of H^+/H_2 and O_2/H_2O and their stability in aqueous solvents have limited their use to wide band gap semiconducting oxide materials such as TiO_2 and ZnO , which operate efficiently only under ultra-violet light; unfortunately this accounts for only a small percentage of the irradiated sunlight. Recently however, surface plasmons created in plasmonic nanostructures have been used to efficiently harvest and photosensitize wide band gap semiconductors in the visible light regime. In this study, we propose a novel approach for solar water splitting in the visible light by sensitizing the wide band gap semiconductors using plasmonic nanostructures. Electrochemical and chemical approaches have been explored for fabricating highly ordered TiO_2 and ZnO nanostructures. Photo-induced chemical reduction has been used for decorating the above wide band gap semiconductors with Au and Ag nanoparticles. The study of the ability of such composite structures for solar water splitting is currently under progress.

P3.15 A pH-Responsive Nano-Silica-Attached Sensitizer for Photodynamic Therapy in The Treatment of Cancer Cells

Brandon Newton, Ruomei Gao, Aisha Reed, Paresh Ray, Wentong Lu, Wenbing Li, Yazhou Zhang, Shavelle Courtney, Papireddy Tiyyagura, Shufang Li, Ebonie Butler, Xianchun Zhu, Hongtao Yu, Zhen Fan
Jackson State University, USA

The synthesis and characterization of bare silica (4 nm in diameter) nanoparticle-attached to sensitizer (SiO_2 -TMPyP, 6 nm in diameter) are described for pH-controllable photosensitization. SiO_2 nanoparticles were functionalized as a potential quencher of triplet TMPyP and singlet oxygen at alkaline pH, thereby turning off sensitizer photoactivities. In weak acidic solutions, TMPyP was released from SiO_2 surface for efficient production of singlet Oxygen. By monitoring singlet oxygen luminescence at 1270 nm, quantum yields of singlet oxygen production were found to be pH-dependent, dropping from ~ 0.35 in a pH range of 3-6 to 0.05 at pH 8-9, which is consistent with pH-dependent adsorption behavior of TMPyP on SiO_2 surface. These features make bare SiO_2 -attached cationic porphyrin a promising candidate for use in PDT for cancer treatment in which efficient singlet oxygen production at acidic pH and sensitizer deactivation at physiological pH are desirable. The enhanced therapeutic selectivity was confirmed by 3-(4,5-dimethylthiazol-2-yl)-2,5-diphenyltetrazolium bromide (MTT) tests in breast cancer cell lines. Bimolecular quenching rate constants of singlet

oxygen by free TMPyP, SiO_2 and SiO_2 -TMPyP nanoparticles were also determined.

P3.16 OXYGEN AND WATER BARRIER OF POLYIMIDE NANOCOMPOSITES CONTAINING SILICATE TYPE OF NANOTUBES

Yingji Wu¹, Brian Olson¹, Sergei Nazarenko¹, Vladimir Yudin², Joshua Otaigbe¹, E. Korytkova², V. Gusarov²

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Synthesized chrysotile ($Mg_3Si_2O_5(OH)_4$) nanotubes (ChNTs) can be dispersed in the polyimide matrix without surfactant modification and improve barrier properties of the polyimide. Polyimide nanocomposites containing ChNTs were prepared via solvent mixing/casting method. Thermostability of the nanocomposites does not change much by adding ChNTs to the matrix. Oxygen permeability, diffusivity, solubility and water vapor permeability have been determined for polyimide/ChNT nanocomposites with 0 wt% to 20wt% filler loading. It was found that decrease of the permeability by adding nanotubes caused by both the diffusivity and solubility coefficient changes, although diffusivity (tortuous factor) is main reason of permeability deduction. Water vapor permeability decreased by 58 % and oxygen permeability decreased by 64 % for polyimide nanocomposite with 4.5 vol% ChNT. At higher ChNT loading, permeability and diffusivity increased because of the aggregation and random orientation of the nanotubes. Fredrickson and Shaqfeh's model gives good correlation with experimental findings.

P3.17 A PYRENE BASED MOLECULAR CLEFT FOR THE DETECTION OF $ZnCl_2$

Erendra Manandhar¹, J. Hugh Broome¹, Justin Hurst¹, Jalin Myrick¹, Whitney Iagrone¹, Peter Cragg², Karl Wallace¹

¹*University of Southern Mississippi, USA*, ²*University of Brighton, UK*

Three benzene derived molecular receptors (*ortho*, *meta* and *para*), incorporating a sensing moiety in the form of a pyrene functional group, a metal binding site and an anion binding site (a triazole moiety and an amide functional group respectively) have been tethered to a benzene scaffold in a shape of a molecular cleft. The host:guest recognition between the three molecular clefts towards different metal salts (KCl , $MgCl_2$, $AlCl_3$, $NiCl_2$, $HgCl_2$, $CuCl_2$, $FeCl_2$, $FeCl_3$, and $CdCl_2$) have been studied. A model compound was also

synthesized, but showed a greater binding affinity towards $ZnCl_2$ than the three molecular clefts prepared which showed an exclusively 2:1 binding ratio. Among the molecular clefts, the *meta* isomer has the greatest affinity for $ZnCl_2$ than the other isomers. Extensive 2D NMR together with molecular modeling calculations support the host:guest interactions.

P3.18 MONITORING A COORDINATION DISPLACEMENT REACTION BY ESI MASS SPECTROMETRY

William Jones, Karen Orcutt, Karl Wallace

University of Southern Mississippi, USA, ²University of Brighton, UK

A molecular nanosensor that incorporates a siderophore moiety tethered to a fluorophore has been synthesized. Here we report a displacement approach using ESI mass spectroscopy. Eu^{3+} has been chosen over Tb^{3+} for this experiment due to its unique isotopic distribution that allows for quick identification of complexes containing the Eu^{3+} ion. Due to the paramagnetic nature of Eu^{3+} NMR can not be used to track the displacement of the exchange reaction, thus two methods by ESI will be presented. The Eu^{3+} ion is an excellent mass spec handle due to its unique distribution of $^{151}Eu^{3+}$ (47.8%) and $^{153}Eu^{3+}$ (52.2%). Method 1 is an *in situ* method, whereby separate solutions of the nanosensor that is coordinated with a Eu^{3+} ion and a Fe^{3+} salt are simultaneously injected and mixed in the DLI line itself in varying proportions (0eq to 10eq of Fe^{3+}). Method 2 (*in vitro*) is a titration series prepared beforehand with varying amounts of Fe^{3+} salt added, then injected by autosampler. For both methods the ion peaks are monitored in SIM mode to show the ratio between the Eu^{3+} complex (845.33 *m/z*) and the Fe^{3+} complex (748.35 *m/z*). The purpose of testing these *in situ* and *in vitro* methods against one another is to check the accuracy of the easier and quicker *in situ* method as opposed to the more stable and reliable *in vitro* method.

P3.19 COMPUTATIONAL STUDY OF FULLERENE ANALOGUES AS POTENTIAL HIV-1 PR INHIBITORS: MOLECULAR DOCKING AND QUANTUM-MECHANICAL ANALYSIS.

Lucky Ahmed, Bakhtiyor Rasulev, Jerzy Leszczynski
Department of Chemistry and Biochemistry, Jackson State University, USA

Fullerene and its derivatives have been important species for many areas of science and technology, particularly in drug design. Inhibitor HIV-1 PR is an important target enzyme for anti-

acquired immunodeficiency syndrome (AIDS) drug design. The aim of this study is to investigate various fullerene derivatives that could be docked in the cavity of the HIV-1 PR inhibitor with high binding affinity. This might provide information about catalytic sites of the inhibitor as well as conformational changes of the derivatives. In order to find out the binding sites with optimal binding affinity of fullerene derivatives with HIV-1 PR inhibitor quantum-mechanical and protein-ligand docking studies are performed. The obtained results are presented and discussed.

P3.20 EFFECT OF THE LIQUID CRYSTALLINE PHASE ON CO₂ BARRIER PROPERTIES IN UV CURED NETWORKS

James Goetz, Sergei Nazarenko

The University of Southern Mississippi, USA

Barrier materials are used in various applications ranging from electronic coatings to clothing and food packaging. UV curing provides a rapid and energy efficient means of preparing polymer films and coatings without the use of a solvent. Liquid crystalline morphologies have been known to have low solubility contributing to high barrier properties. Two chemically similar materials, one displaying the liquid crystalline phase and the other having an amorphous morphology, were prepared through UV polymerization to analyze the contribution of the liquid crystalline phase to transport properties. The length of a perfluoroalkyl acrylate side chain was increased from C6F13 to C8F17, and polymerization resulted in amorphous and liquid crystalline phases respectively. Phases were confirmed using differential scanning calorimetry (DSC), showing a distinct thermotropic transition, and wide angle x-ray diffraction (WAXD) showing spacing of smectic layering in the liquid crystalline sample. CO₂ permeation was measured using a constant volume variable pressure apparatus at temperatures from 23°C to 85°C. The amorphous film showed a constant increase in permeability and diffusivity with temperature as expected with an increase in free volume. The liquid crystalline phase showed lower permeability as a function of temperature prior to the thermotropic transition due to the low solubility of CO₂ in the liquid crystalline phase. Through the thermotropic transition, the liquid crystalline film showed an exponential increase in permeation as a result of an increase in diffusivity. This work therefore shows the ability to improve barrier properties through the introduction of the liquid crystalline phase in UV cured networks.



P3.21 DEVELOPMENT OF HIGH BARRIER LAYERED SYSTEMS USING PARTICULATES

Sergei Nazarenko¹, Jeremy Decker¹, Kevin Meyers¹, Yinji Wu¹, Donald Paul², Anne Hiltner³

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Macromolecular Science and Engineering, Case

Western Reserve University, USA

Interdiffusion of polymers in microlayers can be utilized to increase the concentration of inorganic particles in one of the component layers. When microlayers of linear low density polyethylene (LLDPE) and low density polyethylene (LDPE) are annealed into the melt, a moving boundary effect is observed as the more mobile linear LLDPE chains diffuse more quickly into the slowly diffusing branched LDPE chain layers resulting in an asymmetric concentration profile about the initial polymer-polymer interface. The result of this moving boundary is the thickening of the LDPE layers and shrinkage of the LLDPE layers. By adding particulates to the more mobile LLDPE phase, interdiffusion is not noticeably hindered and the layer shrinkage results in substantial increase in particulate concentration. This particle concentration effect was observed, while utilizing high aspect ratio platelets dispersed in LLDPE, to increase the gas barrier properties of the polymer system through an increase in path tortuosity for the diffusing penetrant. Through this process it was apparent that multilayered systems with a small amount of high aspect ratio filler can be engineered to reflect gas barrier properties of systems with much larger filler content. By taking advantage of the particle concentration that coincides with the moving boundary effect, oxygen barrier properties were attained for materials that would have otherwise needed 10 times more filler to achieve the same barrier properties. Layer morphology and particle dispersion were analyzed with Scanning Electron Microscopy (SEM) and Transmission Electron Microscopy (TEM) with permeability analysis from an OX-TRAN[®] 2/20 (Mocon Inc.) diffusion apparatus.

P3.22 DECARBOXYLATIVE PHOTOCYCLIZATION OF CATIONIC ω -CARBOXYLIC ACIDS

Philip Schwartz, Eli Smith, David Sandlin, Wolfgang Kramer

Millsaps College, USA

The decarboxylative photocyclization has been used to synthesize heterocyclic ring systems allowing several functional groups and ring sizes up to 36 members. The synthetic potential of the reaction is diminished by the incorporation of the phthalimide nitrogen into the product. To expand the versatility of the decarboxylative photocyclization we are using cationic precursors as well as different chromophors. Cationic precursors are not expected to interfere with the cyclization reaction which involves electron transfer from the donor to the excited acceptor. The use of different chromophors will allow the synthesis of multiple target molecules while the cationic character might enable us to use chiral auxiliaries. It has been shown that electron transfer fluorescence quenching does take place in quinoline betaines compounds. The synthesis of the precursors as well as the photochemical transformations are discussed.

P3.23 BIFUNCTIONAL DNA-CLEAVING REAGENTS: DNA CLEAVING EXPERIMENTS

Lauren Hoth, Priya Patel, Malika Shettar, Emily Stewart, Woods Curry, Wolfgang Kramer
Millsaps College, USA

Current Photodynamic therapy uses a sensitizer 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. We use nitrogen onium salts based on heteroaromatic compounds to photochemically generate transient species that can destroy biomolecules such as DNA. The heteroaromatic compounds are oxidized to produce the N-oxides and then O-alkylated. The resulting N-alkoxy compounds contain a fragmentable N-O bond with a bond dissociation energy of about 300 kJ/mol. The bond homolytically fragments upon excitation and yields an alkoxy radical and a heteroaromatic radical cation. Both of these species have been shown to induce DNA cleavage, each with a different mechanism. To increase the DNA cleaving efficiency by enhancing ground-state association we synthetically attached a known DNA-binder, 1,8-naphthalimide. To evaluate DNA cleaving concentrations and irradiation times are varied to obtain information about the most efficient structural elements of a variety of nitrogen onium salts. CD spectroscopy is used to identify DNA cleavage. Several steps have to be taken to separate dissociation of the drug and actual DNA cleavage.

P3.24 BIFUNCTIONAL DNA-CLEAVING REAGENTS: SYNTHESIS, PHOTOCHEMISTRY AND DNA GROUND STATE ASSOCIATION

Lee Wink, Adi Sabharwal, Austin Baker, Emily Stewart, Woods Curry, Wolfgang Kramer
Millsaps College, USA

Combination of a known DNA binder, 1,8-naphthalimide, with N-alkoxy aromatic heterocycles (onium salts) yields a bifunctional DNA cleaving reagent. Photochemical activation of the onium salt moiety leads to a homolytic N-O bond cleavage and gives rise to two transient species, an alkoxy radical and a heteroaromatic radical cation. Each of these species is known to cleave DNA by a different mechanism. While the formed radical cation targets the DNA bases, the methoxy radical damages the DNA backbone via hydrogen abstraction. The efficiency of this reaction has been analyzed by the determination of the quantum yield of ion formation. Each transient species is produced with a yield of about 0.6, the energy wasting step being geminate pair recombination to yield methoxy-substituted heterocycles.. Initial DNA cleaving experiments showed only a marginal cleaving efficiency. Weak ground state association might lead to generation of the reactive species outside the vicinity of DNA which led to the attachment of the DNA binder. To measure DNA binding UV/Vis, CD and fluorescence spectroscopy titrations are performed. The data is then fit and apparent binding constants are obtained. Structural elements are identified that lead to increased binding and are correlated to DNA cleaving experiments. The results are used to optimize the synthesis of further bifunctional onium salts.

P3.25 PLASMID DESIGN FOR AN ASSAY TO STUDY THE ROLE OF DNA-MEDIATED CT IN-VIVO

Keshia Dykes¹, Helen Segal², Pam Sontz², Jacqueline Barton¹

¹*Jackson State University, USA*, ²*California Institute of Technology, USA*

Base excision repair (BER) proteins repair damaged or mismatched bases in the DNA. BER proteins that contain [4Fe-4S] clusters are able to send and receive charge, which aids in locating damage. Endo III and MutY are DNA glycosylases, which are enzymes that specifically aid in the recognition of damage within the genome. In this study, we have constructed a reporter (LacZ CC104) and control (LacZ MG1655) plasmids to examine MutY activity in vivo. The plasmids were designed as reporters utilizing the LacZ gene. If the LacZ gene (CC104) is mutated, it causes β -gal to be inactive. If

the BER protein MutY is not functioning properly and unable to recognize the LacZ mutation, it will lead to transversion to of A:8-oxo-G to an A:T base pair. To make the reporter plasmid, the first step was to perform a miniprep plasmid extraction on strain DKN199 to get the plasmid pBBR1MCS-5. The insert was made by PCR amplification from strains CC104 (inactive lacZ) and MG1655 (active lacZ). The plasmid and insert were cut with restriction enzymes BamHI and HindIII. A PCR check was performed on both restriction enzymes which indicated that restriction enzymes were working effectively. Then, the plasmid and vector were ligated together followed by the transformation of cells. The transformants were plated onto gentamicin plates, and checked for colonies. The results indicated that the plasmid and insert were successfully isolated and ligated together. Out of the ten samples that were tested, we had an 80% success rate of plasmid to vector.

P3.26 PREPARATION OF BIODIESEL: PRETREATMENT OF WASTE VEGETABLE OIL

Angela McClendon, Bruce Wenzel, Ken Lee
Jackson State University, USA

Biodiesel is a fuel that can substitute petroleum diesel. It is also known as FAME (fatty acid methyl esters). There are several motivations for using biodiesel, including environmental and economic reasons. It emits fewer pollutants than petroleum fuels, and is produced from environment-friendly sources. These sources include oils from algae, vegetable oils, and animal fats. Because of its abundance, waste vegetable oil (WVO) would serve as excellent raw material for this purpose - if the free fatty acids can be removed or treated off. Therefore, the goal of our project is to use an easy, economical technique to remove the free fatty acids and other impurities from the WVO. This can be achieved if the WVO is treated with Alumina. It would remove the impurities and could be regenerated for repeated usage. Our results show that treatment with Alumina significantly reduces the acidity of WVO. Also, the alumina is able to handle large quantity of WVO, which is approximately five times of its mass. The purified WVO underwent transesterification to produce the biodiesel. The biodiesel was analyzed by NMR and GC.



P3.27 SYNTHESIS OF SPIRO-ISOXAZOLINES VIA INTRAMOLECULAR CYCLIZATION

Prasanta Das¹, Ann Omollo¹, Eric McClendon¹, Lungile Sitole¹, Edward Valente², Ashton Hamme¹
¹Jackson State University, USA, ²University of Portland, USA

Psammaphysins A-E are a family of natural products that were isolated from marine sponges of the order Verongida. Many of these natural products display antiviral and antineoplastic activities. The most interesting structural motifs of the psammaphysins are the oxepin and isoxazoline moieties which are connected in a spirocyclic array. The synthesis of this type of ring system was accomplished in two steps. These synthetic processes involve a 1,3-dipolar cycloaddition and an intramolecular ring closure of a pendant alcohol or carboxylic acid onto an activated isoxazole. The 1,3-dipolar cycloaddition of an alkyne with an α -chlorobenzaldoxime derivative afforded the desired isoxazole. Intramolecular cyclization was achieved through the reaction of the isoxazole ring with a pyridinium tribromide (PTB) and potassium carbonate in dichloromethane. The proposed mechanism of intramolecular cyclization involves the activation of the isoxazoline ring with PTB to form a bromonium ion. Neighboring group participation of the oxygen can cause an opening of the bromonium ion intermediate and thereby give rise to an oxonium ion. Intramolecular attack of the alkoxide or carboxylate oxygen onto the oxonium ring system and loss of a proton can then afford the spiro-isoxazoline. Details pertaining to the synthesis, mechanistic details, and isolated yields for the reported spiro-isoxazoline compounds will be discussed.

The project described was supported by Award Numbers SC3GM094081, G12RR13459 (NMR and Analytical CORE facilities) from the National Institute of General Medical Sciences.

P3.28 POTENTIAL ALTERNATIVE FUEL SOURCES FROM AGRICULTURAL CROPS AND PLANT COMPONENTS

Jon Clement¹, Gretchen Sassenrath², Hugh Broome³, Subhi Talal Younes¹, Laila Younes¹, Tyree Ratcliff¹, Marcus Steele¹

The changing landscape of agricultural production is placing unprecedented demands on farmers as they face increasing global competition and greater natural resource conservation challenges. However, shrinking profit margins due to increasing input costs, particularly of fuel and fertilizer, can

restrict the incorporation of potentially beneficial management practices. Research in progress at the USDA Agricultural Research Service in Stoneville, MS, is designed to improve crop productivity, sustainability and profitability for the humid growing environment of the Lower Mississippi River Alluvial Flood Plain. The portion of the research presented here is examining biomass accumulation and energy content of various plant parts, to determine the potential for their use as alternative fuel sources. The caloric value of all portions of the crop product was measured individually to evaluate its potential as an energy source. Rice, corn, soybeans, cotton, wheat, rye, and sweet potatoes were included in this study. All crops were grown and harvested under the care of scientists at the USDA-ARS Research Center in Stoneville, MS. The experimental procedure was based on that used by Núñez-Regueira et al. [*Thermochimica Acta* Volume 371, Issues 1-2, 26 April 2001, Pages 23-31]. Additional parameters evaluated were moisture content, density, and ash content. The experimental results, with caloric values exceeding 16 kJ g⁻¹, make it feasible to use these materials as alternative fuels. The research will give us information on potential new uses for agricultural crops, and crop waste. It will contribute to the growing biofuel industry in Mississippi.

P3.29 STUDY ON INFLUENCE OF THE PRESENCE OF SWCNTs DURING OXIDATION OF PHENOL BY HYDROGEN PEROXIDE

A.B.M Zakaria¹, Corneliu Bogatu², Anna Rabajczyk³, Dina Yegorowa⁴, Danuta Leszczynska⁵
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The influence of single-walled carbon nanotubes in the process of phenol oxidation with hydrogen peroxide was estimated in this paper. The experimental runs were undertaken with the following conditions: concentration of phenol=20mg/L, hydrogen peroxide=55mg/L, pH=4.0±0.12, uv light with wavelength 254nm, reaction time 90 minutes, the absence and the presence of SWCNTs, 60mg/L. SWCNTs was not functionalized with purity more than 90%, OD 1-2nm, length 5-30µm. The reaction progress was followed by the analysis of UV-spectra and the quantification of formed by-products was determined

using the third order derivatives of their individual spectra. The rate of phenol oxidation was higher in the presence of nanocarbons; in the same time, catechol and hydroquinone were formed in greater concentrations after 1 hour of oxidation when nanocarbons were present. After adding single-walled nanocarbons to the process of oxidation with hydrogen peroxide, we recorded various changes in FT IR spectra. Collected data reveals some exchanges in the structure of single nanocarbons and suggests the formation of C-O bond at 1078.9cm^{-1} during oxidation process. The analysis of formed by-products, revealed the influence of SWCNTs during reaction of phenol with hydrogen-peroxide.

P3.30 A DINUCLEAR AZAMACROCYCLE FOR ANION SENSING

Nabhan Karim¹, Jonathan Coleman², Musabbir Saeed³, Alamgir Hossain³

¹Jackson Preparatory School, USA, ²Jim Hill High School, USA, ³Jackson State University, USA

Sensing of anions with synthetic receptors is one of the most emerging areas in supramolecular chemistry. Because anions play an important role in chemistry and biology, a considerable interest has been given for past few years. In particular, dinuclear metal complexes are versatile systems for the binding and detection of anions. The two metal centers in a macrocycle form strong and reversible bonds with anions. This class of receptors is not only effective for anion binding but also capable of displaying visual color change upon complexation. In this poster, the synthesis of a new thiophene-based dinuclear copper macrocycle, and its affinity on anion sensing will be presented.

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Friday February 24, 2012

O3.16

8:30 HOW TO INVESTIGATE PROPERTIES OF NERVE AGENTS WHEN THE MAIN CONCERN IS SAFETY OF STUDENTS?

Jerzy Leszczynski
JSU, USA

Due to the lethal effects on humans computational studies are the method of choice in investigation the details of structures and molecular

level processes involving Nerve Agents (NA). The mechanism of the toxic action of these compounds has been interpreted as the blockage of hydrolysis of the neurotransmitter molecule ACH. Since ACH adopts a specific conformation while binding with the active cholinesterase site, it could be imagined that the nerve gases would adopt similar conformation during the competitive binding process. The toxic effect of the nerve gases could be deactivated through hydrolysis on metal oxide surfaces. Quantum chemical analysis provides a wide array of powerful tools that have been underutilized in deciphering the complex reactions affecting warfare agents. The efficient detection of nerve agents has been always a challenging task. The results of the recent calculations provide basis for construction of detectors that could detect very small concentrations of compounds with the P=O group. The talk addresses all the above aspects of the nerve agents. These investigations provide new insight into the studied phenomena and reveal efficient ways of decomposition of nerve agents as well as their detections.

O3.17

8:45 SAVING COMPUTATIONAL TIME THROUGH OPTIMALLY CHOSEN BASIS FUNCTION SUBSETS AND CORRELATION METHODS

Steven Gwaltney
Mississippi State University, USA

The primary limiting factor in the widespread application of high-accuracy electronic structure theory is the very long time the calculations take. The most accurate quantum chemistry methods in routine use scale as the seventh power of the number of basis functions used in the calculation. In this talk we present some of our recent work on reducing the time the calculations run by intelligently and automatically choosing subsets of the basis functions for use in the calculation. While similar approaches have been used before, the current work is unique in its use of energetic criteria for choosing the best subsets and in its use of computational methods specifically designed to account for the energy contribution of the unused basis functions. We find that, as long as we properly account for the energy contributions of the discarded basis functions, we need to include only a minimal sized subset of functions to achieve chemical accuracy.

**O3.18****9:00 COMPUTING ACIDITIES WITH ISODESMIC REACTIONS**David Magers*Mississippi College, USA*

For a series of organic acids, the pKa of each is computed using an isodesmic reaction with a reference acid. Isodesmic reactions conserve bond number and bond type. Results are presented for different levels of theory and for different basis sets to determine what level of computation is needed for consistent results. Support from the NSF (EPS-0903787 and MRI-0321397) and the W.M. Keck Foundation is gratefully acknowledged.

O3.19**9:15 THE ACCURATE CALCULATION OF RO-VIBRATIONAL EIGENENERGIES OF HYDROGEN CYANIDE**Joseph Bentley*Delta State University, USA*

A methodology is developed to calculate the quantal ro-vibrational ($J \geq 0$) energies of the light-heavy-heavy (LHH) class of triatomic molecules. The emphasis is on accuracy (vibrational levels converged to $\approx 1 \text{ cm}^{-1}$) as well as efficiency. As a test case, we calculate the ro-vibrational energies of the ground electronic state of the hydrogen cyanide (HCN/HNC) system. The Jacobi coordinate system is used. The discrete variable representation [J. C. Light and T. Carrington, Jr., *Adv. Chem. Phys.* **114**, 263 (2000)] is used as a primitive basis set for both radial (r and R) Jacobi coordinates; this leads to a sparse Hamiltonian matrix. An angular basis set is used which diagonalizes the rotational ($J \geq 0$) part of the total kinetic energy; subsequently, this basis is contracted through a series of diagonalizations of smaller 1D Hamiltonian matrices. Thereafter, a series of 2D Hamiltonian matrices are constructed and diagonalized, thus producing a set of contracted 2D functions. Then, the final 3D basis set for the full Hamiltonian consists of a direct product of these new 2D functions and a primitive radial DVR (along the R coordinate). The eigenvalues are obtained by using the Implicitly Restarted Lanczos Method (IRLM) which is part of a numerical package (ARPACK) designed to solve large scale sparse eigenvalue problems. These are compared with earlier calculations and very recent experimental results by Methau. The code can be parallelized to make greater use of the MCSR supercomputers. This will be the subject of future work.

O3.20**9:30 ALKALINE HYDROLYSIS OF NITROCELLULOSE: A COMPUTATIONAL INVESTIGATION**Manoj Shukla, Frances Hill*US Army Engineer Research and Development Center, USA*

Nitrocellulose, which has also been nicknamed as "gun cotton", is an energetic material. It has been actively used in both civilian and military applications. Nitrocellulose is insoluble in water and resistant to natural degradation and therefore can linger for a long period of time in the environment. It is a potential environmental contaminant and has been found to be persistent on military ranges. Alkaline and acidic hydrolyses have been used for the destruction of nitrocellulose but the former technique has been found to be more effective. The main objective of the present investigation was to explore reaction pathways for denitration of nitrocellulose in the alkaline medium using *ab initio* and DFT quantum chemical methods by considering the monomer, dimer and trimer forms of the molecule. It was predicted that denitration through addition-elimination reaction will take place at either of the C3 and C6 sites and that C2 site will be the last to be denitrated. Further, it was also predicted that β -elimination at the C4 carbon atom will require significantly larger amount of energy than the denitration of various sites. Thus, peeling off reaction will take place after the denitration of C2, C3 and C6 sites. However, the ring cleavage leading to decomposition reaction will start after the peeling off reaction.

O3.21**9.45 BRIDGING THE TWO WORLDS: CONNECTING COMPUTATIONAL TECHNIQUES WITH CHEMICAL INTUITION IN DNA**Yuliya Pakku, Glake Hill*Jackson State University, USA*

Computational methods can offer great insight into the mechanisms at play in many different chemical systems. The mechanism of DNA ionization and charge mobility has been one that has eluded researchers. Computational techniques can provide valuable insight into the development of chemical understanding in these DNA systems. Electron affinities, ionization potentials, and redox potentials for DNA bases, base pairs, and N-methylated derivatives are computed at the DFT/M06-2X/6-31++G(d,p) level of theory. Redox properties of a guanine-guanine stack model are explored as well. Reduction and oxidation potentials

are in good agreement with the experimental ones. Electron affinities of base pairs were found to be negative. Methylation of canonical bases affects the ionization potentials the most. Base pair formation and base stacking lower ionization potentials by 0.3 eV. Pairing of guanine with the 5-methylcytosine does not seem to influence the redox properties of this base pair much. A discussion about potential determination of pKa will also be included.

10:00 AM BREAK

CONCURRENT SESSION

O3.22

8:30 CAN GIBBS FREE ENERGY OF ADSORPTION BE PREDICTED EFFICIENTLY AND ACCURATELY: AN M05-2X DFT STUDY

Andrea Scott³, Leonid Gorb², Frances Hill³, Jerzy Leszczynski¹

¹Jackson State University, USA, ²Badger Technical Services, USA, ³ERDC, USA

An understanding of adsorption and solvation properties of organic contaminants at the atomistic level is vital for the development of methods and technologies for decontamination. Despite the existence of a number of experimental studies to measure K_D values and the application of various strategies to estimate K_D of contaminants in the water/soil interface, this parameter has not yet been clearly characterized. This study can help to solve these problems and bring important innovation into the clean-up techniques of contaminants. This paper presents new insight into the prediction of partitioning of organic compounds between a carbon surface (soot) and water. It provides details about the structure and interactions of benzene, polycyclic aromatic hydrocarbons and aromatic nitrocompounds with a carbon surface modeled by coronene using a density functional theory approach. The adsorption was studied in vacuum and from water solution. The molecules studied are physisorbed on the carbon surface. While the intermolecular interactions of benzene and hydrocarbons are governed by dispersion forces, nitrocompounds are adsorbed also due to quite strong electrostatic interactions with all types of carbon surfaces. We conclude that the method of prediction presented in this study allows one to approach the experimental level of accuracy in predicting thermodynamic parameters of adsorption on a carbon surface from the gas phase.

O3.23

8:45 SPECIATION OF METALS IN NATURAL MATRICES USING ADVANCED HYPHENATED TECHNIQUES

Anthony Bednar, Aimee Poda, Frances Hill, Jennifer Seiter, Fiona Crocker, Mark Chappell, Alan Kennedy
US Army ERDC, USA

Determination of total and dissolved metal concentrations in environmental media is insufficient for a complete biogeochemical characterization of metal fate. To fully understand such complex systems, an in-depth characterization of the physiochemical state of metals in complex environmental matrices must be performed. This presentation will describe the development and use of hyphenated HPLC-ICP-MS and related techniques for speciation of metals at parts-per-billion levels. These techniques have been applied to the determination of arsenic, selenium, chromium, tungsten, and uranium speciation from a variety of environmental studies, and helped explain mobility and toxicity of these metals in environmental systems.

O3.24

9:00 QUANTITATIVE DETERMINATION OF THE SERS HOTNESS OF NANOPARTICLE JUNCTIONS IN AGGREGATED GOLD NANOPARTICLE CLUSTERS

Xiaoxia Li¹, Siyam M. Ansar², Dongmao Zhang², Wenfang Hu³, Shengli Zou³

¹Mississippi University for Women, USA, ²Mississippi State University, USA, ³University of Central Florida, USA

In gold and silver nanoparticle (AuNP and AgNP) based surface enhanced Raman spectroscopic (SERS) measurement, NP is usually aggregated into sub nm to nm sized clusters before spectral acquisition. Using combination of sequential isotope substituted ligand adsorption, ratiometric SERS and computational modeling, reported here is the first quantitative study of SERS characteristics in the NP junction areas in AuNP aggregated by KCl. While for all the investigated AuNP (13, 30, 50 and 70 nm in diameters), the molecules located in the junction areas exhibits higher intensity, their net SERS contribution in most cases, is significantly smaller than the molecules in the surrounding areas. This conclusion is in stark contrast with common belief that SERS signal is predominantly from the molecules located in the junction areas.

**O3.25**
9:15 SYNTHESIS AND CHARACTERIZATION OF IMIDAZOLE-MODIFIED PORPHYRIN FOR SELECTIVE PHOTODYNAMIC THERAPY

Xianchun Zhu, Wentong Lu, Yazhou Zhang, Aisha Reed, Brandon Newton, Zhen Fan, Hongtao Yu, Paresh C. Ray, Ruomei Gao
Jackson State University, USA

The synthesis and characterization of a pH-responsive sensitizer 5,10,15,20-tetrakis(N-(2-(1H-imidazol-4-yl)ethyl)benzamide)porphyrin (TIEBAP) are described, aiming to improve the selectivity of photodynamic therapy (PDT) in cancer treatment. The imidazole moieties of this cationic porphyrin are separated from the porphyrin ring by ethylbenzamide chain spacers, thus preventing the influence of imidazole protonation on the porphyrin chromophore. This pH-stimuli sensitizer produced twice as many singlet oxygen ($^1\text{O}_2$) molecules at pH 5.0 than at pH 7.4, whereas the overall quenching rate of $^1\text{O}_2$ by TIEBAP was reduced by a factor of 2.5 when the pH was decreased from 7.4 to 5.0. The quantum yield of $^1\text{O}_2$ production was determined to be 0.53 ± 0.01 at pH 5.1. For the *in vitro* 3-(4,5-dimethylthiazol-2-yl)-2,5-diphenyltetrazolium bromide (MTT) tests, SK-BR-3 breast cancer cells were pre-incubated with TIEBAP at pH 6.1 and 7.4 and then irradiated with visible light (> 500 nm) for up to 20 minutes. An enhanced photosensitization was observed at acidic tumor pH and was marked by an increase in cell death. We attributed this therapeutic selectivity to the improved solubility of TIEBAP and its inertness toward $^1\text{O}_2$ in acidic solutions due to the protonation of the imidazoles. The sensitizer aggregation occurred upon deprotonation of the imidazoles at slightly alkaline pH levels, which led to the inefficient formation and the potential quenching of the triplet state and/or $^1\text{O}_2$. The total quenching rate constants of $^1\text{O}_2$ removal (k_T) by imidazole rings decreased from $(5.8 \pm 0.9) \times 10^7 \text{ M}^{-1} \text{ s}^{-1}$ at pH 7.4 to $(5.1 \pm 0.7) \times 10^5 \text{ M}^{-1} \text{ s}^{-1}$ at pH 5.1 as measured with histamine.

O3.26
9:30 AGGREGATION AND DEPOSITION OF SILVER NANOPARTICLES ON SILICA SURFACES UNDER ENVIRONMENTALLY RELEVANT CONDITIONS

Aimee Poda
US Army Corps of Engineers, USA

Increasing use of nanomaterials in commercial products has led to widespread concerns

about their potential environmental and health impacts. To better understand the transport, fate and behavior of nanoparticles in aquatic systems, it is essential to understand their interactions with different components of natural waters including natural organic matter (NOM) over a broad range of physicochemical conditions. Deposition and aggregation rates and the effects of NOM on particle deposition, as well as transport behavior of Ag nanoparticles onto a silica surface were evaluated using quartz crystal microbalance with dissipation (QCM-D) over a broad range of solution conditions.

O3.27
9:45 QUANTITATIVE SURFACE ENHANCED RAMAN SPECTROSCOPY

Dongmao Zhang, Siyam Ansar, Karthikeswar Vangala, Michael Yanney, Andrzej Sygula
Mississippi State University, USA

With its ultrahigh sensitivity for selected molecules such as Rhodamine 6G, crystal violet, etc., surface enhanced Raman spectroscopy (SERS) has attracted tremendous attention for its potential in analytical and bioanalytical applications. Up to date, however, reliable prediction of analyte concentration on the basis of its SERS signal has not been possible due to a series of sample-, SERS substrate- and Raman instrument- related issues. Presented here is a novel ratiometric SERS method that uses an isotope substituted version of the analyte as the internal reference. Because isotope-substitution has no detectable effect of the analyte adsorption onto the SERS substrates, ratio of the amount of analyte and its internal reference adsorbed and their SERS intensity ratio are strictly proportional to their concentration ratio, regardless of the variations in activity of the SERS substrate, the composition of the sample matrix, and instrument performance. After discussing the principle, two example applications of this isotope-substituted, ratiometric SERS method will be presented. The first application is a SERS-based comparative carbohydrate quantification scheme that uses a pair of isotope-substituted Rhodamine B derivative as the SERS tags. The second one is for quantitative ligand adsorption to determine the structure, binding affinity and orientation of mercaptobenzimidazole on gold nanoparticles.

10:00 AM BREAK

10.10 - 11:30 PM STUDENT ORAL PRESENTATIONS - 1
O3.28
10:10 INVESTIGATION OF THE SELECTIVITIES OF PLE ISOENZYMES USING VARIOUS SUBSTRATES

Maureen Smith¹, Souvik Banerjee¹, Marlen Schmidt², Uwe Bornscheuer³, Douglas Masterson¹

¹*The University of Southern Mississippi, USA,*

²*Enzymicals, AG, Germany,* ³*Greifswald University, Germany*

Hydrolases, such as Pig Liver Esterase, are widely used in organic synthesis due to their low cost, stability, and ability to accept a wide range of substrates. It is well known that PLE is composed of at least 6 isoenzymes, which have recently been recombinantly produced. However, the role of each individual isoenzyme in the PLE mixture has not yet been explored completely. 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 compound (**1**) from 23 %ee to 85 %ee. Additionally, several of the isoenzymes (3-6) displayed a solvent induced inversion of chirality from the (S)-enantiomer to the (R)-enantiomer. However, we have also found that this increase in enantioselectivity is highly substrate specific. For example, addition of varying amount of co-solvent to compound (**2**) showed only moderate increases in enantioselectivity, and addition of co-solvent to compound (**3**) did not show any effect. These results and the results of varying the isoenzymes with these substrates will be discussed in detail.

O3.29
10:20 SELF-ASSEMBLED GOLD NANOPLEXES FOR CANCER-TARGETED siRNA DELIVERY

Yongliang Shi, Faqing Huang

University of Southern Mississippi, USA

Small interfering RNA (siRNA) has been proposed as the next generation therapeutic agent to treat various diseases, including cancer. Yet its unfavorable physicochemical properties make its delivery *in vivo* a great challenge. Recently AuNPs (gold nanoparticles) have emerged as the siRNA delivery agent due to their ease of synthesis and modification, nontoxicity and high biocompatibility. However, current AuNP systems are mostly

nonspecific to tumor cells. Here we report preparation of novel cancer cell-targeted siRNA delivery systems via layer-by-layer approach. The core of the system is PEI (polyethyleneimine)-modified AuNPs, which is further coated with siRNA via electrostatic interactions and folic acid conjugated PEI-PEG (polyethylene glycol) copolymers. Folic acid serves as the tumor-targeting molecule based on overexpression of folate receptors on certain types of cancer cells. The final gold nanoplex and all the intermediates can be demonstrated by UV-vis spectrometry, dynamic light scattering and zeta potential. We have successfully synthesized AuNPs/PEI and AuNPs/PEI/tRNA (tRNA as a model molecule). Regardless of the type of each layer, the maximum of the AuNP surface plasmon resonance peaks increases by 3-4 nm; the hydrodynamic diameter of AuNPs increases ~7 nm, and the zeta potential is reversed after each coating. We are optimizing the PEI-PEG copolymer coating step and replacing tRNA with siRNA. To further demonstrate the transfection efficiency and specificity of the nanoplexes, we will treat cancer cells with the nanoplexes and investigate siRNA delivery efficiency, cancer cell specificity gene knockdown efficiency. Furthermore, we will examine the effects on cancer cell growth and cell death.

O3.30
10:30 THE EFFECTS OF TIN AND GERMANIUM ON CANCER CELL LINES

John Durant, Alvin Holder, Camille Cooper, Joshua Phillips

The University of Southern Mississippi, USA

The purpose of this subject was to test various tin and germanium complexes on cancer cell lines to test their cytotoxicity. Multiple compounds were created with tin and germanium as the focal point of the complexes, which were then used to test. The various complexes were tested against the already used drug, cisplatin, to see the effectiveness of the compounds. They were tested in gels that were created in the lab to ensure they were what was needed. The results showed that the compounds created were cytotoxic, but to varying degrees. The tin compounds were the most cytotoxic, which was to be expected.

**O3.31**

10:40 **IN SILICO GENERATION AND EVALUATION OF CARBOXYLESTERASE INHIBITOR SCAFFOLDS**

Shana Stoddard¹, Philip Potter², Randy Wadkins¹
¹University of Mississippi, USA, ²St. Jude Children's Research Hospital, USA

Carboxylesterases (CEs) perform hydrolysis reactions breaking down xenobiotics, and metabolizing drugs. For example, the anticancer drug CPT-11 is metabolized by CEs and converted to its active form by the isozymes human carboxylesterase one (CES1), found in the liver, and human intestinal carboxylesterase (CES2), found in the small intestine. CES2 converts CPT-11 200 times faster than the CES1, resulting in drug toxicity to the gut. Selective inhibition of the CES2 would promote better CPT-11 distribution, increase CPT-11 lifetime, and decrease its toxicity. We used *in silico* design to generate new candidates for selective inhibitors of CES2. Quantitative structure activity relationship (QSAR) models were developed using a data set of 210 inhibitors using the program Quasar. The training set for the QSAR model included 133 inhibitors, and the test set included 77 inhibitors. The q^2 and r^2 generated were both 0.835. The K_i values for inhibitors were determined using an *o*-nitrophenylacetate (oNPA) hydrolysis assay. The QSAR model was later used as a hypothetical pocket site for *de novo* design. Using the program LigBuilder1.2v, 2400 new compounds were generated from 4 initial seed structures. We predicted the K_i score using the original QSAR model developed. The solubility of these compounds were predicted using the ALOGPS 2.1 program; to eliminate compounds with low solubility. Five new scaffolds were predicted to have good solubility and potency. Testing of a sulfonamide scaffold from this procedure produced 40% inhibition at 100 μ M for CES2. Our results suggest that solubility can be increased while maintaining inhibitor potency.

O3.32

10:50 **EFFECT OF pH AND GLUCOMANNAN ON ANTIOXIDATIVE PROPERTIES OF THERMIZED CHEDDAR WHEY PROTEIN CONCENTRATE-BASED EDIBLE COATING DIPS FOR CATFISH FILLET**

Sashie Weerasinghe, Dipaloke Mukherjee, Byron Williams, Zahur Haque
 Mississippi State University, USA

The objective of this study was to

investigate effect of pH and glucomannan in improving the antioxidative properties of thermized Cheddar whey against protein oxidation of catfish fillet. Fresh Cheddar whey was skimmed, pasteurized and batch heated, "thermized" at 70oC for 5min. The resulting batch was concentrated by vacuum evaporation (between 68-72oC) to about 30% solids, lactose seeded and spray dried to obtain whey protein concentrate (WPC). Coating dips were made by dissolving 5% (w/v) WPC, 2.5% (w/v) sorbitol (plasticizer), 0.125% (w/v) CaCl₂, 0.25% (w/v) casein hydrolyzates (CH), with and without an additional 0.2% (w/v) glucomannan in McIlvaine's iso-ionic buffer (pH 6.5, 7.0, 7.5, and 8.0). Solutions were degassed, heated at 90oC for 30 min., homogenized, filtered, cooled to room temperature and stored in refrigerator. Catfish fillet samples were cut into 2 cm cubes, briefly rinsed in distilled water, coated with the dip, drained, air dried and refrigerated (4oC) until analysis. Control samples were prepared by dipping fillet in distilled water and in buffer solutions (pH 6.5 - 8.0) containing all other ingredients except WPC, CH, and glucomannan. Protein oxidation was measured by measuring the carbonyl content of fish fillet. Coating solutions with pH 7.0, 7.5, and 8.0 showed better ($P < 0.05$) protective effects against protein oxidation as expressed by carbonyl formation. Samples treated with coating solutions containing glucomannan had lower ($P < 0.05$) carbonyl formation compared to other treatments and controls after 7 days of storage. Neutral and higher pH samples with glucomannan and whey were significantly antioxidative.

O3.33

11:00 **SYNTHESIS OF GLUTATHIONE ANALOGUE USING 2-ALPHA-METHYL-BETA-CYSTEINE**

John Freeman, Douglas Masterson
 University of Southern Mississippi, USA

One of the most common infectious diseases in the world is the malaria parasite. Resistance to antimalarial treatments and the recent discovery that elevated levels of glutathione lead to increased treatment resistance while glutathione depletion restores treatment sensitivity has opened up research into development of glutathione reductase inhibitors as antimalarial treatments. Glutathione (GSH) functions to protect cells in the body from free radicals and reactive oxygen species. Glutathione reductase (GR) is an enzyme that catalyzes the reduction of glutathione disulfide (GSSG) to GSH. The high ratio of [GSH]/[GSSG] allows for protection from free radicals and reactive oxygen

species, which protects the malaria parasite from oxidative damage. By inhibition GR, the ratio will decrease, and less GSH will be present, thereby improving treatment sensitivity. Therefore, we have developed a GSH analogue [1] in order to serve as a GR inhibitor. In order to create the GSH analogue, we used an unnatural amino acid, 2- α -methyl- β -cysteine to serve as the cysteine residue in the peptide. Glycine was coupled to the amino terminal and glutamic acid was coupled to the carboxy terminal using the coupling agent bromotripyrrolidinophosphonium hexafluorophosphate (PyBroP). By using PyBroP as the coupling agent, we greatly increased our product yield (71%) as compared to previous coupling reactions using N,N-dicyclohexylcarbodiimide (DCC, 52%).

O3.34

11:10 SYNTHESIS OF NOVEL HYDROLYSABLE COATINGS CONTAINING BIOCIDAL ADDITIVES

William Seawell¹, Nicole Mackey¹, Paige Buchanan¹, James Wynne²

¹University of Southern Mississippi, USA, ²Naval Research Lab, USA

A multifunctional coating formulation was investigated to create novel hydrolyzing networks containing biocidal polymer. Tetra-functional hydrolysable monomers were prepared from a combination of tetraethyl orthosilicate and 2-allyloxyethanol in a 1:4 stoichiometric ratio respectively to create an ene-terminated, hydrolyzable monomer. A radical step-growth polymerization reaction was used to crosslink the hydrolysable monomer with either trimethylpropane tetrakis(3-mercaptopropionate) (tri-thiol) or pentaerythritol tetrakis(3-mercaptopropionate) (tetra-thiol) creating homogenous thiol-ene networks. Multifunctional formulations were prepared through the synthesis and incorporation of a diallyl quaternary ammonium salt (QAS) additive capable of homopolymerization in the presence of the thiol-ene reactions. Formulations were optimized to tailor the rate of hydrolysis while maintaining mechanical stability through the lifetime of the coating. All formulations were characterized using standard techniques for physical, thermal, and surface properties using differential scanning calorimetry, thermal gravimetric analysis, and bulk tack texture analysis. The resulting formulations showed excellent thermal stability, and hardness. Coating hydrolysis was tailored by the relative amount of hydrolytically unstable bonds incorporated into the network as well as manipulating surface energy of the sample through

the addition of hydrophobic and hydrophilic moieties

O3.35

11:20 AN INVESTIGATION INTO THE INTERACTIONS BETWEEN POLYCATIONS AND FACTOR VII AND FACTOR VIIA USING A QUARTZ CRYSTAL MICROBALANCE

Aixiang Wang¹, Lin Li¹, Arthur Chu², Wujian Miao¹
¹Department of Chemistry and Biochemistry, The University of Southern Mississippi, USA, ²Biological and Physical Sciences, Delta State University, USA

Factor VII (FVII) and factor VIIa (FVIIa) are believed to be essential constituents in the extrinsic coagulation pathway. For this study the interactions between five selected polycations (poly-L-lysine, poly-L-ornithine, compound 48/80, poly-L-arginine, and polybrene) and FVII or FVIIa were examined using quartz crystal microbalance on the basis of the Langmuir isotherm equation. A self-assembled monolayer of 3-mercaptopropionic acid was formed on the surface of a Au-coated quartz crystal, which was then used for covalent immobilization of FVII or FVIIa proteins. Except for polybrene, all four other polycations were found to chemically bind with FVII or FVIIa with a binding constant (K_b) in the range of $2\sim 11 \times 10^5 \text{ M}^{-1}$. Interactions between the five individual polycations and bovine serum albumin (BSA) were also conducted, which indicated that poly-L-lysine and poly-L-arginine can strongly bind to BSA with a K_b value of 9.3×10^5 and $2.5 \times 10^5 \text{ M}^{-1}$, respectively, whereas the remaining three polycations were found to interact physically with BSA. Additionally, weak interactions between BSA and FVII or FVIIa were noticed (K_b $0.2\sim 0.4 \times 10^5 \text{ M}^{-1}$). It concludes that poly-L-ornithine and compound 48/80 could be used as potential anticoagulants.

Financial support from the NSF CAREER Award (CHE-0955878, WJM), Shandong Provincial Scholarship for Overseas Studies (2010, AXW), and the International Exchange Foundation of Linyi University (2010, LL) is gratefully acknowledged.

10.20 - 11:40 PM (CONCURRENT SESSION)

O3.36

10:20 POLYMERIZATION OF THIOL-ENE MICROBEADS VIA AN EMULSION TECHNIQUE

Emily Matthews, Michelle Grimm, Paige Buchanan
 University of Southern Mississippi, USA

“Click chemistry” established a new branch of synthetic organic chemistry that focuses on



reactions that are easy to perform, produce near quantitative yields, and give little to no byproducts. Recently these efficient reactions have been utilized in the polymer industry to create high performance cross-linked and grafted polymer films. The highly efficient reaction between a thiol group and carbon-carbon double bonds have become increasing popular due to high reaction rates and tolerance to molecular oxygen. Although these materials have been used in a multitude of applications ranging from adhesives to high endurance materials, to date there have been no reports of thiol-ene microbead synthesis via an emulsion technique. Our examinations have yielded micro-particles that are between 1 and 3 μm , with a narrow range in particle size. Subsequent efforts have focused on utilizing more rigid thiol and ene monomers to increase the glass transition temperature of these materials.

O3.37

10:30 ELECTRODE SURFACE CHARGE EFFECT ON THE ELECTRON-TRANSFER BEHAVIOR OF REDOX SPECIES

Guizheng Zou, Wujian Miao
Department of Chemistry and Biochemistry, The University of Southern Mississippi, USA

By utilizing carboxyl or amino terminated monolayer modified glass carbon electrode (GCE) as models, the effects of electrode surface charge on electron transfer (ET) behavior of negatively charged redox species ($[\text{Fe}(\text{CN})_6]^{3-/4-}$) or neutral redox species (ferrocenemethanol, FcMeOH) have been investigated. Due to the various charge states of carboxyl or amino terminated monolayer can be achieved under different pH values, the redox reactions were examined in a series of pH buffered solutions. The carboxyl terminated monolayer at GCE was prepared by electrochemical oxidation of 4-aminobenzoic acid (ABA), and the amino terminated monolayer was obtained by grafting the above obtained ABA monolayer with ethylenediamine. It is found that the carboxyl terminated ABA monolayer can dramatically block the ET of $[\text{Fe}(\text{CN})_6]^{3-/4-}$, which suggests that the negative charge of the carboxyl species can act as a repulsive site with respect to the redox species with negative charge. At GCE with amino terminated monolayer, however, the ET ability of $[\text{Fe}(\text{CN})_6]^{3-/4-}$ was notably increased with the decrease of solution pH. This is because at low pH values, the surface charge of the monolayer becomes positive, which is favorable to the ET of negatively charged redox species. As expected, essentially no effect on the ET behavior of the neutral

redox species, FcMeOH, was observed at carboxyl or amino terminated monolayer under various pH solutions. These results indicate that the electrostatic force between redox species and electrode surface charge plays an important role in the ET processes.

Financial support from the NSF CAREER Award (CHE-0955878) is gratefully acknowledged.

O3.38.

10:50 MULTIFUNCTIONAL NANOPARTICLE FOR TARGETED SENSING OF MULTI DRUG RESISTANT BACTERIA

Sadia Khan, Anant Singh, Zhen Fan, Dulal Senapati, Paresh Ray
Jackson State University, USA

Multiple drug resistant bacteria (MDRB) *Salmonella enterica* serovar Typhimurium definitive type 104 is one of the greatest challenges in public health care. It is a food borne pathogen detected from different food samples. Outbreak of food poisoning by MDRB *Salmonella* is very common in USA and Europe. Current technology can detect the presence of bacteria usually after growth in culture medium which takes more than 24 hr. Accordingly, the development of fast, highly sensitive methods for the detection of MDRB *Salmonella* are in high demand. Driven by the need, herein, we present monoclonal antibody-conjugated popcorn shape gold nanotechnology driven approach to selectively detect ampicillin, chloramphenicol, streptomycin, sulfonamides, and tetracycline drug resistant *Salmonella typhimurium DT104* bacteria from infected romaine lettuce. Our experiments have shown the use of a simple label free colorimetric assay using antibody-conjugated popcorn shape gold nanoparticles for targeted detection of drug resistant *Salmonella typhimurium DT104* from infected lettuce sample with low detection limit (10^4 CFU/ml) and high selectivity over other pathogens. We have also shown that, M3038 antibody conjugated popcorn shape gold nanoparticle based SERS assay can detect MDRB *Salmonella typhimurium* at 10 CFU/ml. We believe this nanotechnology based assay might have a huge application in food industry.

O3.39

11:00 STRAIGHTFORWARD APPROACH MAKING DIVERSE OPTICALLY ENRICHED α -METHYL-LYSINE ANALOGUES IN HETERONUCLEARY PROTECTED FORM FOR SPSS

Souvik Banerjee, Maureen Smith, Douglas Masterson
University Of Southern Mississippi, Usa

In recent years there has been extensive research on the synthesis of α , α -disubstituted non-proteinogenic amino acids, because quaternary non-proteinogenic amino acids confer extra stability to the peptide secondary structure by rigidifying the backbone. However, there has been little research on the synthesis of α , α -disubstituted lysine analogues, as appropriate protection of two nitrogen atoms to get lysine ready for SPPS has come out as a real challenge. Our synthetic strategy aims at construction of optically pure α -methyl lysine analogues from a common synthon. Enzymatic hydrolysis (using PLE) of achiral diethyl 2-methyl-2-alkyl phthalimido malonate gives us ethyl 2-methyl-2-alkyl phthalimido acid-ester with high optical purity. Our synthetic strategy allows us to vary the "R" group of lysine from 1-6 methylene units and backbone of lysine as well from " α "-" γ ", from the same common synthon. We obtained high optical purity in case of enzymatic hydrolysis of α -methyl lysine diesters with 2, 3 and 4 methylene groups in the side chain. The lysine half-esters containing 1 to 6 methylene units are predominantly with (*R*) enantiomers. We have also been able to obtain enantiomerically enriched t-Boc-Fmoc protected 1 and 4 carbon α -methyl- α -Lysine and heteronuclear protected α -methyl- β -Lysine ester from the same common synthetic intermediate.

O3.40

11:10 PLASMONIC BLACKBODY ABSORBER USING CARBON NANOTUBE COATED GOLD NANOMATERIAL

Teresa Demeritte, Lule Beqa, Paresh Ray
Jackson State University, USA

A black body is any object that is a perfect emitter and a perfect absorber of radiation. These features make black body an ideal source for many valuable for applications for energy conservation. Our group has developed plasmonic blackbody absorber of Au coated nanostructure carbon films by the synthesis of modified SWCNTs using chemical functionalization to enhance solubility and produce novel hybrid materials to be used as potential plasmonic absorbers. The CNT/Gold hybrid was used to make thin film using spray technique. The thin films were characterized using absorption, TEM, IR and Raman Spectroscopy. We have shown that GNP decorated CNTs can be very good plasmonic optical absorber and the absorption property can be tuned by changing the shape of nanoparticle.

O3.41

11:20 PHYSICAL AND ELECTRICAL PROPERTIES OF C₆₀ THIOL-ENE NETWORKS

Henry Ewing, Hanaa Ahmed, Paige Buchanan, Steven Bunkley, Randy Buchanan
University of Southern Mississippi, USA

Fullerene-containing materials have the ability to store and release electrical energy. As a consequence, fullerenes may ultimately find use in high-voltage equipment devices or as super capacitors for high electric energy storage due to this ease of manipulating their excellent dielectric properties and their high volume resistivity. A series of fullerene (C₆₀) polymer nanocomposite samples were synthesized via a rapid step-growth free-radical chain polymerization process between alkyl thiols and allyl functionalized C₆₀ derivatives. The resulting high-density networks possessed excellent mechanical properties. The novel networks were characterized using standard techniques, including infrared spectroscopy (FT-IR), thermal gravimetric analysis (TGA), and dynamic mechanical analysis (DMA). Bulk resistivity of the prepared films were measured by applying a DC voltage across the sample, ranging from -210 to +210 volts, and measuring the resulting current. The dielectric spectra for the prepared samples were determined over the frequency range 1 KHz – 10 MHz at room temperature. The changes in physical and electrical properties of these novel thiol-ene films were measured as a function of the C₆₀ content.

11:40 – 12:50 PM

LUNCH BREAK

1:00 – 2:30 PM

Poster Session II, Chemistry and Chemical Engineering

P3.31 ENVIRONMENTAL IMPACT OF CARBON NANOMATERIALS ON COMMON CONTAMINANTS IN AQUEOUS MEDIA EXPOSED TO OXIDATION WITH CHLORINE

Corneliu Bogatu¹, A.B.M Zakaria², Danuta Leszczynska¹

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Carbon nanotubes present a great interest due to their specific properties, such as nano size,



high surface area, tendency to aggregate, suitable to be functionalized, and potentially, to act as catalysts or inhibitors. Their possible catalytic/inhibiting properties are not fully understood, and currently available literature is very limited. We are presenting results of the study on interactions between single-walled nanocarbons and phenol during chlorination in distilled water at varied pH, in ambient temperature, constant mixing and with different mass ratios. Identification and quantification of by-products was studying by using transmission electron microscopy (TEM), UV and FT-IR spectrophotometry. Preliminary results have shown new absorption bands at 455, 932.8, 1002.7 and 1093 cm^{-1} on the FT IR spectra of chlorinated single walled nanocarbons. Also, the intensity of absorptions was higher than recorded for the nanocarbons spectra without chlorination.

P3.32 TOWARDS DELINEATING THE BIOCHEMICAL PATHWAY TO THE ANTI-CANCER MEDICINAL PODOPHYLLOTOXIN IN *PODOPHYLLUM HEXANDRUM* USING NEXT GENERATION SEQUENCING

Kerry Robey¹, Joaquim Marques², Kyle Kim², Lawrence Davin², Norman Lewis²

¹Mississippi Valley State University, Dept. of Natural Science & Environmental Health, Itta Bena, MS, USA, ²Washington State University, Institute of Biological Chemistry, USA

The main goal of this research project is to interrogate massive amounts of transcriptome data obtained from pharmaceutically important plants, in order to assist in delineating the poorly understood biochemical pathways to commonly used, but structurally complex, medicinals. One such species, *Podophyllum hexandrum* (Himalayan mayapple), is one of many medicinal plants being investigated; podophyllotoxin and related lignans accumulate in its rhizomes, with its lignans being used as precursors of the semi-synthetic antitumor drugs, etoposide and teniposide. Using Illumina sequencing, the corresponding transcriptome data and gene assemblies were generated from the different *P. hexandrum* tissues being examined. Particular attention was placed on the cytochrome P450 gene families, with several candidates selected as potentially encoding enzymes involved in podophyllotoxin biosynthesis. Following this analysis, some of these genes were cloned and transformed into yeast in order to study substrate preferences of the various recombinant proteins against putative substrates, via either *in vivo* or using microsome preparation assays. This poster describes

the overall approach used, together with results obtained in evaluating physiological/biochemical function: as examples, these include, for control purposes, several candidate enzymes from the phenylpropanoid pathway (e.g. potentially encoding the known enzymes, cinnamic acid 4-hydroxylase, C4H and ferulic acid 5-hydroxylase, F5H), as well as other candidates for unknown putative enzymatic steps (e.g. hydroxylation and methylenedioxy bridge formation).

P3.33 TWO-DIMENSIONAL CALCULATION OF THE VIBRATIONAL MODES OF AMMONIA

David Clark, Micah Davis, Ver Geisha Johnson, Joe Bentley
Delta State University, USA

A two-dimensional potential energy surface (PES) for the Ammonia (NH_3) molecule is modeled by fitting a data set generated by GAUSSIAN. Our first step in developing a two-dimensional PES for the Ammonia molecule involved setting up the Z-matrix and performing an *ab initio* Restricted Hartree-Fock calculation with a 6-31G(d) basis set for various geometries. In these calculations one of the N—H bonds was allowed to vary, along with the dihedral angle (γ) between the N—H bond and the plane containing the Nitrogen and the other two Hydrogens. The set of geometries consisted of 41 radial (N—H) points ($R = [0.5\text{\AA}, 1.75\text{\AA}]$) and 34 dihedral angles ranging from 10° to 175° . This gave a dataset of 1394 points. The graph of the energies from the 2D GAUSSIAN calculations reveals a PES that is slowly increasing in energy as the dihedral angle is varied for small values of R_{NH} . This approaches a maximum at $\gamma = 0^\circ$ (or 180°). Subsequently, the 2D vibrational wavenumbers were calculated with a set of DVR points as a basis set for the radial coordinate and a set of cosines for the angular (γ) coordinate. Future work will include extending our model for NH_3 to higher dimensions and fitting the resulting data to give a surface which will then be used in a vibrational calculation. Furthermore, the work presented here could be extended by using a higher level basis set in GAUSSIAN to calculate a more accurate potential energy surface.

**P3.34 SEPARATION OF ZINC IONS FROM
DEGRADATION OF ZINC OXIDE
NANOPARTICLES – PROBING
NANOPARTICLE TOXICITY**

Martha Johnson, Mehmet Ates, Zikri Arslan
Jackson State University, USA

Metal oxide nanoparticles are widely used in both industrial and medical innovations. The need for understanding the properties and mechanism toxic effects has grown to prevent the detrimental effects on environmental and human health. In many instances, toxic effects are mediated by the metal ions released from nanoparticles. Therefore, the detection of particular metal ion concentration is critical to understand the sources of toxicity exhibited by accidental or environmental exposure. In this study, we have investigated experimental conditions to separate metal ions and nanoparticles using commercially available zinc oxide nanoparticles (ZnO NPs). The objective is to develop a less expensive yet efficient separation method for separating the zinc ions that allows understanding pathways of ZnO NP-nanoparticle-induced toxicity. Attempts for separating Zn ions from ZnO NPs were conducted using liquid-liquid extraction with different chelating agents, including dithiozone (DTPC), 1,5-diphenylcarbazone (DPC), 4-(2-thiazolylazo) resorcinol (TAR), 4-(2-pyridylazo) resorcinol (PAR) and sodium diethyldithiocarbamate (Na-DDC). Extractions were performed with cyclohexane and methyl isobutyl ketone (MIBK). The effect of pH for the extraction efficiency was investigated from pH 2 to 10 in solutions containing Zn ions. Initial results have shown that both DTPC and Na-DDC offer the potential for separation of Zn ions from ZnO NPs. The extraction of Zn ions was highest with DTPC and Na-DDC using both cyclohexane and MIBK. The protocol was evaluated with aqueous suspensions of ZnO to elucidate if ZnO NPs release Zn ions to solutions to affect their toxic properties.

**P3.35 CONVENTIONAL STRAIN ENERGIES
OF AZETIDINE, PHOSPHETANE, THE
DIHYDROAZETES, AND THE
DIHYDROPHOSPHETES**

Shelley Smith¹, David Magers², Glake Hill¹
¹*Jackson State University, USA*, ²*Mississippi College,
USA*

The conventional strain energies for azetidine, phosphetane, 1,2-dihydroazete, 2,3-dihydroazete, 1,2-dihydrophosphete, and 2,3-dihydrophosphete are determined within the isodesmic, homodesmotic, and hyperhomodesmotic models. Optimum equilibrium geometries, harmonic

vibrational frequencies, and corresponding electronic energies are computed for all pertinent molecular systems using SCF theory, second-order perturbation theory, and density functional theory. Eight different functionals are investigated: BLYP, B3LYP, B3PW91,B97D, wB97XD, M062X, TPSS, and TPSSh. Three correlation-consistent basis sets are employed: cc-pVDZ, cc-pVTZ, and cc-pVQZ. Single-point CCSD(T) calculations are performed for all systems at the corresponding MP2/cc-pVTZ optimized geometry. Unsurprisingly, the double bond increases the conventional strain in the dihydroazete systems, but the double-bond has little effect in the dihydrophosphetes. We gratefully acknowledge support from the NSF (EPS-0903787) and the W.M. Keck Foundation.

**P3.36 THE CONVENTIONAL STRAIN
ENERGIES OF
BICYCLO[1.1.1]PENTANE,
BICYCLO[2.1.1]HEXANE,
BICYCLO[2.2.1]HEPTANE,
BICYCLO[3.1.1]HEPTANE, AND
BICYCLO[2.2.2]OCTANE**

Elizabeth Mobley, David Magers
Mississippi College, USA

The conventional strain energies for bicyclo[1.1.1]pentane, bicyclo[2.1.1]hexane, bicyclo[2.2.1]heptane, bicyclo[3.1.1]heptane, and bicyclo[2.2.2]octane are determined within the isodesmic, homodesmotic, and hyperhomodesmotic models. Optimum equilibrium geometries, harmonic vibrational frequencies, and corresponding electronic energies are computed for all pertinent molecular systems using SCF theory, second-order perturbation theory, and density functional theory. The DFT functional employed is Becke's three-parameter hybrid functional using the LYP correlation functional. Two correlation-consistent basis sets are employed: cc-pVDZ and cc-pVTZ. In addition, single-point CCSD(T) results are computed at the MP2/cc-pVTZ optimum geometries using both the cc-pVTZ and the cc-pVQZ basis set. Results are compared to the conventional strain energies of other cyclic hydrocarbons. We gratefully acknowledge support from the NSF (EPS-0903787) and the W.M. Keck Foundation.



P3.37 EFFECT OF CAPPING AND ACIDITY ON SOLUBILITY OF SILVER NANOPARTICLES IN WATER/OCTANOL SYSTEM

Gabrielle Goree, Oliva Primera-Pedrozo, Zikri Arslan
Jackson State University, USA

Silver nanoparticles (Ag NPs) exhibit attractive for health care products, disinfectant agents, food packaging, drug delivery systems, therapeutics, and biosensors. Under certain conditions the NPs release Ag ions that are toxic. This objective of this study was to investigate the conditions influencing stability and solubility of Ag NPs. Octanol/water system was used as a model to elucidate solubility and distribution of Ag NPs between organic and aqueous media. The effects of pH and capping were examined with three different types of commercial NPs; uncoated - (99.95 % 20-30 nm), PVP- (99.95 % 20-30 nm), and oleic acid-coated (99.9 % 30-50 nm) Ag NPs. A portion of each NP (25 mg) was first suspended in 100 mL methanol (stock NPs suspension). To test distribution, 100 μ L of the stock solutions were added to 10 mL water at pH 2, 4, 6, 8 and 10 followed by 10 mL of octanol. Contents were shaken and samples were taken from each phase at for 0, 12, 24, and 48 h. ICP-MS analysis showed that Ag NPs were present primarily in the aqueous phase and did not show any significant distribution in octanol. The solubility in aqueous phase increased with increasing pH while NPs were found to be stable in relatively acidic solutions (pH 2 and 4). The increased Ag concentration in alkaline solutions was thought to occur due to the formation Ag complexes with ammonia. Similar pattern occurred for PVP coated NPs suggesting that PVP coating undergo dissolution in alkaline solutions.

P3.38 EXPOSURE OF ALUMINUM OXIDE NANOPARTICLES TO BRINE SHRIMP LARVAE –SIZE, SHAPE AND DOSE DEPENDENT EFFECTS

Mehmet Ates, Zikri Arslan, James Daniels, Ibrahim Farah
Jackson State University, USA

Brine shrimp (*Artemia salina*) larvae were used to test the toxicity and uptake profiles of α -Al₂O₃ (50 nm and 3.5 μ m) and g-Al₂O₃ (5 nm and 0.4 μ m) NPs. Acute exposure was conducted in seawater for 24 h. Larvae were exposed to four different concentrations (5, 10, 50 and 100 mg/L) of α -Al₂O₃ and g-Al₂O₃ NPs. When suspended in water, Al₂O₃ NPs aggregated substantially with sizes ranging from 6.3 nm to 100 nm for spherical NPs, and 250 nm to

756 nm for rod-shaped NPs. Although α -Al₂O₃ and g-Al₂O₃ NPs were not acutely toxic, differences in toxicity were detected with NP size and morphology. g-Al₂O₃ NPs were more toxic than α -Al₂O₃ at all conditions. Highest mortality was 34% within 24 h measured from g-Al₂O₃ NPs (5 nm) at 100 mg/L (LC₅₀ > 100 mg/L). The phase contrast microscope images revealed that NPs deposited inside the guts as aggregates. ICP-MS analysis showed that accumulation was dependent on NP size. Larger particles, α -Al₂O₃ (3.5 μ m), were not taken up by artemia, while fine NPs (0.4 μ m g-Al₂O₃) and ultra-fine NPs (5 nm g-Al₂O₃ and 50 nm α -Al₂O₃) accumulated substantially. Oxidative stress was measured through malondialdehyde assay (MDA) in artemia. MDA levels indicated that g-Al₂O₃ (5 nm) NPs (MDA = 16.03 nmol/g) were more toxic compared with α -Al₂O₃ (50 nm) NPs (MDA = 10.16 nmol/g). No toxicity was detected from exposure to α -Al₂O₃ (3.5 μ m) NPs indicating that toxic effects of Al₂O₃ NPs were mediated by oxidative stress.

P3.39 SYNTHESIS AND CHARACTERIZATION OF RIGID MACROMOLECULES WITH EXTENDED CONJUGATION

Cody Robertson, Trent Selby
Mississippi College, USA

The synthesis and characterization of polyacetylenic arrays with potential luminescent properties is proposed and the execution of initial steps is described. Palladium-catalyzed coupling of 1,3,5-triiodobenzene with trimethylsilylbuta-1,3-diyne, trimethylsilylocta-1,3,5,7-tetrayne, and trimethylsilylhexadeca-1,3,5,7,9,11,13,15-octayne to yield the new 1,3,5-tris(trimethylsilylbuta-1,3-diyne)benzene, 1,3,5-tris(8-(trimethylsilyl)octa-1,3,5,7-tetrayne)benzene and 1,3,5-tris(trimethylsilyl)hexadeca-1,3,5,7,9,11,13,15-octayne)benzene respectively.

P3.40 PHOTOCURABLE THIOL-ENE NETWORKS: INFLUENCE OF NETWORK COMPOSITION ON PHYSICAL PROPERTIES AND STRATEGIES TO ENHANCE THEIR FIRE BEHAVIORS

Charles Manzi-Nshuti, Luke Kwisnek, Omeshia Moffet, Sergei Nazarenko
University of Southern Mississippi, USA

Photocurable thiol and ene monomers with varying functionality and rigidity were used to prepare a series of basic thiol-ene networks. These materials were chosen to answer the basic questions of how crosslink density and monomer rigidity

influence the thermal/thermo-mechanical properties [differential scanning calorimetry (DSC), thermogravimetric analysis (TGA)] and fire properties (cone calorimeter with different irradiation) in networks. The glass transition temperatures of the photopolymerized networks investigated in this work spanned between $-33\text{ }^{\circ}\text{C}$ and $57\text{ }^{\circ}\text{C}$ and was correlated with the functionality and rigidity of the monomers used in the fabrication of these materials. The fire behavior of these networks was investigated in cone calorimeter experiments. The cone calorimeter allows evaluation, in a dynamic way, of the rate of heat release produced by a sample during its combustion. This parameter is considered as the most representative one in order to quantify the magnitude of a fire. The peak heat release rate values spanned between $700 - 1800\text{ kW/m}^2$ at an external irradiation of 50 kW/m^2 for the various networks. The general trend was that the most rigid networks showed the lowest peak heat release rate (PHRR) values. The morphology of the cone residues was determined using scanning electron microscopy (SEM) and the ease of decomposition/ morphology of residues was correlated with the observed fire performance for the networks. In this study, the ability to tune parameters like $t_{g,s}$, storage moduli, and PHRR values was also demonstrated by simply mixing and matching various thiol and ene monomers during network fabrication.

P3.41 NOVEL CHEMOTHERAPEUTIC AGENTS OF COPPER(II) WITH THIOSEMICARBAZONES AS LIGANDS: STRUCTURAL AND *in vitro* STUDIES

Rosella Taylor, Rodney Ballard, Antonio Sarrias, Tiffany Edwards, Navindra Seeram, Floyd Beckford, Alvin Holder
University of Southern Mississippi, USA

The synthesis and chemical investigations of thiosemicarbazones (TSCs) and their metal complexes are of considerable importance because of their potentially beneficial medicinal application and a wide variation in their modes of bonding and stereochemistry. Recently, Beckford et al. reported the use of novel ruthenium(II) complexes with new sulfur and nitrogen chelating thiosemicarbazones on cancer cell growth inhibition of MCF-7 and MDA-MB-231 (breast adenocarcinoma) and HCT 116 and HT-29 (colorectal carcinoma) cell lines. The use of thiosemicarbaones as anti-cancer agents is now extended to copper(II)-containing complexes. Copper(II) thiosemicarbazone complexes have been the focus of investigation as metallodrugs for various medical applications for a long period of time. These applications include use as anti-cancer agents. In this

study, a series of novel copper(II) complexes containing thiosemicarbazones and trans-2-(2'-quinolyl)methylene-3-quinuclidinone (quin) as ligands were synthesized and characterized. novel complexes were characterized by elemental analysis, FT IR, UV-visible, and EPR spectroscopy, and electrochemistry. *In vitro* studies were carried on three colon cancer cell lines, viz., HTC-116, Caco-2, and HT-29, with a comparative anti-proliferative activity on non-cancerous colonic myofibroblasts, CCD18-Co. In general, those compounds which exhibited anti-proliferative activity on cancer cells may have a potential in chemoprevention.

P3.42 A PH-RESPONSIVE NANO-SILICA- ATTACHED PORPHYRIN FOR PHOTODYNAMIC THERAPY IN CANCER TREATMENT

Aisha Reed, Brandon Newton, Ruomei Gao
Jackson State University, USA

The synthesis and characterization of bare silica (4 nm in diameter) nanoparticle-attached *meso*-tetra(N-methyl-4-pyridyl)porphine (SiO₂-TMPyP, 6 nm in diameter) are described for pH-controllable photosensitization. SiO₂ nanoparticles were functionalized as a potential quencher of triplet TMPyP and/or singlet oxygen (¹O₂) at alkaline pH, thereby turning off sensitizer photoactivities. In weak acidic solutions, TMPyP was released from SiO₂ surface for efficient production of ¹O₂. By monitoring ¹O₂ luminescence at 1270 nm, quantum yields of ¹O₂ production were found to be pH-dependent, dropping from ~ 0.35 in a pH range of 3-6 to 0.05 at pH 8-9, which is consistent with pH-dependent adsorption behavior of TMPyP on SiO₂ surface. These features make bare SiO₂-attached cationic porphyrin a promising candidate for use in PDT for cancer treatment in which efficient ¹O₂ production at acidic pH and sensitizer deactivation at physiological pH are desirable. The enhanced therapeutic selectivity was confirmed by 3-(4,5-dimethylthiazol-2-yl)-2,5-diphenyltetrazolium bromide (MTT) tests in breast cancer cell lines. Bimolecular quenching rate constants of ¹O₂ by free TMPyP, SiO₂ and SiO₂-TMPyP nanoparticles were also determined.

P3.43 ACUTE EFFECTS FROM NANOPARTICLES OF ZINC OXIDE (ZnO) AND ZINC (Zn) ON BRINE SHRIMP LARVAE

Mehmet Ates, James Daniels, Zikri Arslan, Ibrahim Farah
Jackson State University, USA

Release of products containing nanomaterials have been reported in aquatic ecosystems. Nevertheless, their effects to aquatic



organisms are not understood yet. In this study, impact of ZnO and Zn nanoparticles (NPs) was investigated on *Artemia salina* larvae, a marine model organism of aquatic toxicity. Acute exposure was conducted on in seawater with a concentration of 10, 50 and 100 mg/L ZnO and Zn NPs for 24 h and 96 h. Accumulation limits were measured along with toxicity as total lipid peroxidation. ZnO and Zn NPs content was determined by ICP-MS analysis from artemia. Phase contrast microscope images confirmed that ZnO and Zn NPs deposited inside the guts, as large aggregates. Artemia were unable to eliminate the aggregates. No acute toxicity was observed in 24 h from ZnO and Zn NPs. However, mortality rates increased in 96 h with increasing concentration. Highest mortality was 41% for nauplii within 96 h at 100 mg/L Zn NPs (40-60 nm) ($LC_{50} > 100$ mg/L). Lipid peroxidation levels, characterized by total malondialdehyde (MDA) concentration, were not different from those of controls in 24 h, but elevated in 96 h ($p < 0.05$). The MDA levels showed high correlation with the 96-h mortality rates, indicating that toxic effects were due to oxidative stress. Zn NPs were more toxic than ZnO NPs. Toxic effect elevated with smaller NPs. The results suggest that ZnO and Zn NPs are not totally benign to artemia. Prolonged exposure induces marginal toxicity mediated by oxidative stress.

P3.44 SEPARATION OF TRACE METALS FROM OTOLITHS BY COPRECIPITATION AND DETERMINATION BY ICP-MS

Domingos Afonso, Mehmet Ates, Zikri Arslan
Jackson State University, USA

Otoliths of fish contain trace elements reflecting the chemistry of water, and thus act as chemical markers of fish's life-history. Otolith calcium confounds accuracy and deteriorates the performance of ICP-MS in analysis of otoliths. We developed a coprecipitation method to eliminate calcium from otolith solutions using NaOH and NH_4OH . Several variables, including calcium concentration, volume of bases, and precipitation conditions were investigated for precipitation of trace elements. NaOH performed better in precipitation of the elements than NH_4OH . A series of elements, including Ag, As, Bi, Cd, Co, Cr, Cu, Fe, Mn, Ni, Pb, and Zn were quantitatively coprecipitated with trace amounts of calcium hydroxide. Optimum volume of 1.0 mol/L NaOH was around 100-110 μ L. The solutions were filtered through 0.45 μ m PTFE filters to recover precipitates that were redissolved in 5% HNO_3 . For successful coprecipitation, calcium concentration in solution should be above 5 mg/mL.

The volume of sample solution did not significantly affect the coprecipitation efficiency, but was found to be advantageous to reduce the concentration of calcium in solution. The calcium concentration in analysis solutions was around 500, 350, 180 and 120 μ g/mL when precipitation was performed in 1, 2, 3, and 4 mL. Under same conditions, the recoveries ranged from 92-99%. Although most elements coprecipitated instantaneously with calcium hydroxide, Ag, Co, Ni, Pb and Zn exhibited low recoveries. These elements were recovered when precipitation was performed overnight. The method was validated by analysis of otoliths reference material and applied to analysis of otoliths of pacific halibut.

P3.45 MULTIELEMENT HYDRIDE/VAPOR GENERATION FOR ARSENIC, CADMIUM, LEAD, MERCURY, SELENIUM DETECTION BY ICP-MS

LaKeysha Rose, Gabrielle Goree, Maria Little,
Mehmet Ates, Zikri Arslan
Jackson State University, USA

Hydride/vapor (HG) generation is an attractive sample introduction technique in atomic spectroscopy. Most prominent advantage is its improved sensitivity compared with nebulization due to the gaseous sample transported to the spectrometer. In addition, HG generation offers the ability for separation of analyte from sample matrix. Thus, it is advantageous in determination of heavy metals that form hydrides. Hydride forming elements exhibit unique chemical conditions for generation of their hydrides. In this study, experimental conditions were examined to develop a hydride/vapor generation for a multielement determination of arsenic, cadmium, lead, mercury and selenium by ICP-MS. Stand-alone spray chamber was used a gas-liquid separator. The concentration of acid (HCl), sodium borohydride, and reducing/oxidizing agents were investigated. Initial results indicated that HCl concentration between 0.5 and 2% v/v was optimum for hydride generation. Mercury showed robust signals up to 5% v/v HCl. Lead worked best between 0.5-1% HCl while As and Se required a minimum of 2% HCl. Potassium ferricyanide was essential for formation of PbH_4 , while L-cysteine improved signals of As, Se. Sodium borohydride was sufficient at 1% m/v levels sufficient for Hg and Pb, but As, Cd and Se worked better with 2% m/v $NaBH_4$. Effects of on-line and off-line reactions are under currently investigations to improve the HG performance.

P3.46 SOLID PHASE EXTRACTION OF TRACE ELEMENTS USING A NOVEL CHELATING POLYMERIC RESIN

Vedat Yilmaz, Zikri Arslan
Jackson State University, USA

Heavy metal pollution in natural waters has become a significant concern for water quality. Thus, accurate determination of heavy metals has become increasingly necessary to avoid environmental and public health problems. Inductively coupled plasma-mass spectrometry (ICP-MS) is a highly sensitive technique for accurate determination of trace heavy metals. However, direct determination of trace metals in real matrices is difficult because of their low concentrations and strong interference from the sample matrix. The use of preconcentration/separation protocols is therefore an important necessity to achieve accurate determination. Various methods have been used for trace metal preconcentration and separation, including ion-exchange separation, liquid-liquid extraction, co-precipitation and solid-phase extraction. Solid phase extraction (SPE) has been the most attractive and effective for ultra-trace elemental determination. In this work, we evaluated the performance of a new chelating polymer of poly(NTM-AT-EGDMA) synthesized with N-(thiazol-2-yl)methacrylamide (NTM) and allylthiourea (AT) as co-monomers, ethyleneglycol dimethacrylate (EGDMA) as cross-linker. The resin was packed into a mini-column (1.0 cm long 1.5 mm id) and examined for retention of trace metals through a pH of 2 to 10. Initial results indicated that the column has significant capacity for extraction of Cu(II), Cr(III), Fe(III), Pb(II) and Zn(II) between pH 8 and 9. Elution was carried out with 10% v/v HNO₃. Recoveries ranged from 92-98% for the elements of interest. Preliminary studies with Ca(II) matrix suggested that the column was highly robust under calcium matrix up to 1000 µg/mL Ca(II).

P3.47 COMPARING PHENOLIC CONCENTRATION USING FOLINCIOCALTEU AND FAST BLUE BB DIAZONIUM SALT

Tyree Ratcliff¹, Donna Marshall², Gretchen Sassenrath³, Marcus Steele¹
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Polyphenolics contribute to antioxidant properties of food, juices, and beverages, and are essential to the human diet. These phytochemicals have various preventive and disease fighting

properties. The Folin-Ciocalteu method is commonly used to measure total phenolic content of fruit samples. Folin-Ciocalteu uses 2N Folin to reduce chemical compounds. The problem with this method is that it will also react with non-phenolic antioxidants as well as reducing substances (ascorbic acid, glucose, fructose, sulphites) that are common food additives, or that are naturally present in juices, fruits and vegetables. In addition, amino acids (tyrosine, tryptophan) and proteins containing these amino acids will react as phenol compounds because of their phenolic ring. Fast Blue BB method uses a diazonium salt, which reacts with the phenol group only, making Fast Blue BB more reliable to measure total phenolics. However, the Fast Blue BB method requires the production of a standard solution (background) that is measured after each test. Both reagents work by oxidation/reduction of phenol compounds within plant samples. The main goal was to determine which method would produce readings that are more precise and reproducible. Of the two methods, Folin-Ciocalteu and Fast Blue BB, Fast Blue BB read the highest total phenolics and reproducibility. Of the different variations of Fast Blue BB tested, the process that produced the highest concentration was the NaOH base samples in acetone extraction solvent at 120 min in the dark. These findings will provide for more accurate measurements of total phenolic concentration.

P3.48 ANALYSIS OF THE PHOTOCHEMISTRY OF NITROGENONIUM SALTS

Priya Patel, Katie Odom, Brooke Lassiter, GeNita Finley, Wolfgang Kramer
Millsaps College, 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 quinoline, isoquinoline and phenanthridine N-methoxy compounds. Each transient species was produced with a yield of about 0.6 (±0.05). Several methoxy quinolines in the irradiation solution led to the conclusion that the energy wasting step appears to be a radical recombination reaction. Identification by NMR analysis proved to be complicated because of several acid-base equilibria. The energy wasting step includes the production of a proton which moves the chemical shifts of the products in the NMR experiments. GC-MS analysis of the extracted irradiation solution led to the identification of several methoxy quinoline isomers. To have a quantitative tool for the analysis of the energy wasting side



reaction in the photochemistry of nitrogen onium salts, the measurement of the produced proton is the focus of this study. Several attempts have been undertaken, such as pH monitoring in water, buffer, and titration with p-nitrophenolate.

P3.49 POLYHEDRAL OLIGOMERIC SILSESQUOXANE (POSS) NANOCOMPOSITES: SOLUBILITY PARAMETER CALCULATIONS VIA MOLECULAR DYNAMICS SIMULATIONS AND GROUP CONTRIBUTION METHODS

Matthew Williams, Robert Cook, Sarah Morgan
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Hybrid polymer nanocomposites (HPNC's) are a unique class of materials that consist of an organic polymer matrix and an inorganic nano-scale filler material. When processed, these systems result in new materials with unique property sets and characteristics defined by their individual components. One of the challenges in the creation of HPNC's is controlled dispersion of the nano-fillers throughout the polymer matrix, which can ultimately be related to the solubility of the filler into the matrix material. Polyhedral Oligomeric Silsesquioxane (POSS) is a hybrid organic-inorganic nanochemical that consists of an inorganic siloxane core with an attached organic corona. The organic groups that comprise the corona can be interchanged to a variety of different functionalities, giving rise to tailored solubility of the POSS nanoparticles into different polymer matrices. To determine if theoretical solubility parameters can be used to predict and control POSS dispersion in a highly-crystalline HDPE matrix, both group contribution calculations and molecular dynamics simulations were conducted to obtain theoretical solubility parameters. Rheological, surface and bulk mechanical analyses were then conducted on the HDPE-POSS nanocomposites to determine the utility of the theoretical solubility parameters in the creation of HDPE-POSS HPNCs.

P3.50 FINGERPRINTING OF FARM-RAISED CATFISH USING ELEMENTAL PROFILES DETERMINED BY INDUCTIVELY COUPLED PLASMA MASS SPECTROMETRY AND CHEMOMETRICS

Lorlyn Reidy, James Cizdziel
University of Mississippi, USA

The purpose of the study was to evaluate the feasibility of using elemental profiles determined by Inductively Coupled Plasma-Mass

Spectrometry (ICP-MS) and categorized by chemometrics to: (1) trace the geographical origin of catfish, and (2) determine the relative influence of diet and water on elemental profiles of fish. Farm-raised catfish were collected from ponds in Alabama and Mississippi. Fish muscle tissue was acid-digested using a closed-vessel microwave system. The digests were analyzed using ICP-MS to determine elemental profiles for the individual fish. Elemental profiles were evaluated using Principal Components Analysis (PCA) and Discriminant Analysis (DA). PCA results showed visual clustering between the groups and DA results showed that the groups are statistically different from one another. This reveals that elemental profiles could be used to differentiate the geographical source of catfish. Results from the water and diet study will be presented at the meeting.

P3.51 DIRECT ANALYSIS OF HERBAL SUPPLEMENTS FOR TRACE ELEMENTS BY LASER ABLATION-ICPMS

Kaixuan Bu, James Cizdziel, Lorlyn Reidy
University of Mississippi, USA

Concentrations of eleven trace elements (Mg, Al, Ca, V, Cr, Mn, Fe, Co, Ni, Cu, Zn) were determined in herbal supplements (Korean Root Ginseng, Golden Seal, Ginger Root, St. John's Wort, Green Tea and Valerian Root) by both laser ablation-inductively coupled plasma mass spectrometry (LA-ICPMS) and conventional closed-vessel digestion solution nebulization-inductively coupled plasma mass spectrometry (SN-ICPMS). For LA-ICPMS, powder from supplement capsules and leaf reference materials were pressed into pellets, the later being used for calibration and quality assurance. Laser ablation was performed using line scans with a scan rate of 30 $\mu\text{m min}^{-1}$, a frequency of 20 Hz and a spot size of 100 μm ; ^{13}C served as the internal standard. For both LA and SN, elements were determined in medium resolution mode ($m/\Delta m \approx 4000$) using a sector field ICPMS to eliminate polyatomic interferences. Overall, LA-ICPMS of pelletized supplements yielded results comparable to SN-ICPMS ($\pm 20\%$ in most cases) while eliminating the use of acids and increasing throughput.

P3.52 CE-MS ENHANCED ENZYMATIC ASSAY OF D-AMINO ACIDS

Cassandra McCullum, Yi Zheng, Yiming Liu
JACKSON STATE UNIVERSITY, USA

An enzymatic assay of D-Proline enhanced by CE-MS is presented. Samples were incubated with D-amino acid oxidase (DAAO) at room temperature

for 30 minutes. The incubation solution was separated by using capillary electrophoresis (CE) coupled with mass spectroscopy (MS/MS). The CE conditions were: capillary, 40 cm x 75 μ m ID; separation voltage, +22 kV; sample injection, 35 mbar for 5seconds; running buffer, 0.1 M formic acid in water. The separation was completed within 5 min. The sheath liquid used for MS/MS detection was 5.0 mM ammonium acetate prepared in 50% methanol. Results showed that D-Pro could be quantified accurately and selectively, even in the presence of large amounts of L-Proline using the proposed method.

2:45 PM ANNOUNCEMENT OF STUDENTS' AWARDS

3:00 PM CONCLUDING REMARKS

ECOLOGY AND EVOLUTIONARY BIOLOGY

Chair: Brent Hendrixson,
Millsaps College

Friday, February 24

Room TBA

O4.01

10:00 CHARACTERIZING THE DEMISE AND RECOVERY OF THE MACROBENTHIC COMMUNITY AT A KEY SITE LOCATED IN THE CENTER OF THE 2008 COASTAL MISSISSIPPI HYPOXIC ZONE

Daneen Menke, Chet Rakocinski

University of Southern Mississippi, Hattiesburg, MS, USA

Macrobenthic communities provide effective indicators of biotic integrity. However, because many coastal taxa are eurytolerant, they can be problematic for discerning anthropogenic stress. Effective coastal management calls for indicators that relate to specific stressors, apply across different habitats and regions, and convey ecosystem function. Organic enrichment followed by hypoxia engenders depauperate macrobenthic communities largely composed of small short-lived opportunistic organisms. Thus, macrobenthic process indicators based on body-size descriptors should respond to eutrophication. The overarching objective of this study was to examine how macrobenthic condition may have been impaired by hypoxia within a study

area of Coastal Mississippi which experienced widespread and sustained hypoxia throughout the summer of 2008. Two sites located on the 10-m and 20-m isobaths within the 2008 hypoxic zone served as the focal area for a case study of the effects of hypoxia on the benthic macrofauna. Benthic samples were taken prior to the onset of hypoxia, during hypoxia, and for two years following the 2008 hypoxic event. The macrobenthos shifted from a mature diverse assemblage containing large and long lived organisms to a depauperate assemblage. Macrobenthic process indicators comprised production potential, faunal turnover rate, mean body size, total biomass, total abundance, and the normalized biomass size-spectrum. Overall, the process indicators reflect community maturity and secondary production as independent responses. Consideration of the roles of macrobenthic constituents revealed a balance between equilibrium, opportunistic, and tolerant taxa relative to hypoxic effects.

O4.02

10:15 GOOGLE IMAGES AS A MEANS OF DETERMINING GEOGRAPHIC DISTRIBUTION OF *LEPOMIS MEGALOTIS* AND SUBSPECIES

Michael Stegall, Aaron Francois

Mississippi Museum of Natural Science, Jackson, MS, USA

Many fisherman and fishing enthusiasts have shared photographs and localities of their catch on forums and photo sharing websites. Using Google Images, these photos can be found, along with detailed information on where these fish were collected. By utilizing this technology, we are able to form an idea on the geographic distribution of *Lepomis megalotis* and its subspecies, as described as Jennings (1992). This study is not meant to be a definitive way of describing a distribution, but as means to indicate where field collection and research can begin. Each website and subsequently used photographs will be checked for authenticity via correspondence with the original photographer. Our goal will be to map these data to clarify how *L. megalotis* is distributed nationwide and concentrate field collecting efforts.

**O4.03**

10:30 POST-PLEISTOCENE EXPANSION OF TWO NORTH AMERICAN TARANTULA SPECIES IS SUPPORTED BY ECOLOGICAL NICHE MODELS AND MITOCHONDRIAL DNA

J. Nate Davis, Brent Hendrixson

Millsaps College, Jackson, MS, USA

The Pleistocene epoch was characterized by repeated episodes of glaciation throughout the Northern Hemisphere. Desert areas in the southwestern United States and northern Mexico, though never actually covered by ice, responded to these fluctuations in climate by expanding, contracting, and otherwise shifting their ranges. Consequently, animals that are adapted to these arid regions are expected to have tracked these changes in their environment over time. We investigated the post-Pleistocene population dynamics and historical biogeography of two tarantula species (*Aphonopelma gabeli* and *A. punzoi*) in the Sonoran and Chihuahuan Deserts using ecological niche models (ENMs) and phylogenetic analyses of molecular data. Predictably, comparison between ENMs constructed from Pleistocene and present-day climate data demonstrates that the optimal habitat for these spiders has shifted in response to climate change following the most recent glacial maximum (LGM). In addition, phylogenetic analyses of mitochondrial DNA show that spiders collected from “newly available” habitat (i.e., habitat that is not suitable under LGM ecological niche models) have experienced a recent genetic bottleneck. Taken together, these independent analyses strongly support the hypothesis that *A. gabeli* and *A. punzoi* have recently expanded their ranges alongside the expansion of arid habitats throughout the southwestern United States. These findings help us better understand how the endemic desert fauna has responded to recent climate change. Furthermore, these results have important implications for future conservation measures regarding predicted future climate change.

10:45 BUSINESS MEETING**POSTER SESSION – Thursday Afternoon****(1:30-2:45 PM)****P4.01**

HEAVY METALS IN VEGETABLE CROPS GROWN IN CONTAMINATED SOILS

Md S. Zaman, Cynthia Addae

Alcorn State University, Alcorn State, MS, USA

Studies indicated that some vegetable crops accumulate significant amounts of heavy metals from contaminated soils. In this study, bioaccumulation of cadmium (Cd) and lead (Pb) in cabbage plants (*Brassica oleracea*) has been investigated. Plants were grown in the laboratory, under color corrected lights, in Memphis silt loam soil. *B. oleracea* plants were grown in soils containing 0, 100, 250 and 500 ppm Cd, and 100, 250, 500, and 1000 ppm Pb. Plants were harvested on day 30 of the experiment. Plant materials were dried in an incubator and then acid digested for tissue metal content analysis. Tissue metal content analysis was performed using AA spectrophotometry. Results indicated that *B. oleracea* accumulated considerable amounts of Cd and Pb in plant tissues, and the metal uptake was dose related. These findings suggest that consumption of this widely used vegetable crop may pose health threats if grown in metal contaminated soils.

P4.02

ISOLATION OF DIVERSE MICROBES FROM ORGANICALLY GROWN FRUITS AND VEGETABLES

Shanzeil Hinton, Bianca Garner, Baraka Williams, Kimtrele Williams, Linden Haynes

Tougaloo College, Tougaloo, MS, USA

Bacillus species are ubiquitous Gram-positive organisms found throughout the world. Members of this genus are diverse organisms that can be isolated from animals, insects and soil. These bacteria produce toxins that are specific to the environment from which they are isolated. Members of the *Bacillus cereus* group include the insect pathogens *Bacillus thuringiensis* and *Bacillus larvae* and the human pathogens *Bacillus anthracis* and *Bacillus cereus* and the etiological agent of the zoonotic disease anthrax. These organisms are genetically similar and were initially predicted to be one species. The link between these organisms has heightened the concern for more vigilance in food safety and agroterrorism. We have identified viable *Bacillus* species on organically grown local and international food in Mississippi markets. Samples tested positive for toxin production and spore

formation. Samples taken from the same market also displayed differences in *Bacillus* infectivity, suggesting that random sampling of agriculture might not prove effective in identification of *Bacillus* contamination on food. While routine washing can decrease exposure to *Bacillus* species, consumers do not normally wash these samples with soap or bleach prior to consumption. The ability of *Bacillus* spores to attach to food makes it a particularly important mechanism for introduction of a biological weapon. Indeed, most of the samples that tested positive for *Bacillus* are handled by large numbers of individuals, are placed in well ventilated areas and are prepared without cooking.

P4.03

MORPHOLOGICAL COLOR FORMS OF *LEOPOMIS MEGALOTIS* FOUND IN MISSISSIPPI

Michael Stegall¹, Aaron Francois¹, Philip Schwartz^{1,2}

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

The longear sunfish, *Leopomis megalotis*, is found in all major water drainage systems in Mississippi. Within these water drainages, three distinct morphological color varieties of *L. megalotis* occur. These varieties have predictable geographical distributions throughout the state and are found in three dissimilar habitats. The Delta form of *L. megalotis* is found primarily in lentic ecosystems of the Mississippi Delta. Conversely, The Loess form of *L. megalotis* predominates in lotic ecosystems within the Loess Hills of Mississippi and the Tennessee River. Thirdly, the Gulf form *L. megalotis* is found in all streams that empty into the Gulf of Mexico including those that initially enter Lake Pontchartrain. *L. megalotis* collection took place at each of the three ecosystems at five different locations. From these locations, ten specimens were caught using seines, dip-nets, or electro-shocking and were subsequently photographed. The photographic data indicates that the morphological color form of *L. megalotis* is consistently similar in all five locations of a defined ecosystem and is consistently dissimilar when comparing members of different ecosystems.

P4.04

THE USE OF RADIOMETRIC ASSAYS TO INVESTIGATE THE STINGENCY OF tRNA CHARGING

Douglas Iverson, Teresa Vernig, Anthony Bell

University of Southern Mississippi, Hattiesburg, MS, USA

The development of sensitive assays designed to examine the intricacies of protein translation is critical

to gaining a clear understanding of the enzymes and nucleic acids involved. Aminoacyl-tRNA synthetases (AARSs) are the first and most stringent of the bacterial translation machinery, followed by Elongation Factor-Tu and the ribosome. We are currently using an [α P³²]ATP-based assay to monitor the two initial stages of translation: amino acid activation and tRNA charging. At present, we are optimizing a radiometric tRNA charging assay in order to measure the level and rate of charging of tRNAs with cognate (i.e. L-amino acids) and non-cognate (i.e. misacylated or analog) substrates. This assay offers a very sensitive, rapid method to measure tRNA charging. Classical charging assays do not offer a straightforward and sensitive method to measure the level and rate of aminoacylation. The kinetic data produced in this study will be used to help screen analog (i.e. unnatural) amino acid substrates. In addition, these assays may also provide

GEOLOGY AND GEOGRAPHY

Chair: Frank Heitmuller

University of Southern Mississippi

FRIDAY MORNING

9:00 Welcome

O5.01

9:15 RECOVERY AND NEW NORMALCY OF THE MISSISSIPPI COASTAL COUNTIES: KATRINA +6 YEARS –

David Holt

University of Southern Mississippi, Hattiesburg, MS

A study looking at the change in population of the southern 6 counties from 1990-2010 has been completed. This study shows that housing stock and population are not growing at the same rates, areas in the BFE and inundation zones are not recovering, and unincorporated areas are growing disproportionately.

This project compiled data from the US Censuses from 1990, 2000, and 2010 at the block group level for the southern 6 counties of southern Mississippi. Incorporated areas were defined by using the current (2010) boundaries and selecting block groups that had centroids inside the current boundaries. Inundation zones were defined by any block groups that intersected the inundation zones. Counties were divided by county, unincorporated area, north of Interstate 10, south of Interstate 10 but north of the CSX tracks, south of the CSX tracks, inundation in block group from Katrina, and Base Flood Elevation.



Incorporations were divided similarly to counties with exception to unincorporated.

Recovery is a difficult thing to quantify. Much of the coast is at or near predicted population and tax levels based on average state trends. Housing stock saturation should become an issue in Harrison and Jackson. The unincorporated areas of all 6 counties but Jackson have shown large increases. This could be the result of an inability to build on the coast and previous growth north of I-10. This should impact the coastal tax-base significantly by moving taxes from municipalities to the counties.

O5.02

9:30 LAND USE AND LAND COVER CHANGE ALONG THE MISSISSIPPI GULF COAST: 1985–2009 –

George Roedl

West Virginia University

Change detection provides decision makers, policy makers, and researchers with information necessary for making informed decisions essential to managing and using resources. In rapidly growing coastal areas, such as the Mississippi Gulf Coast, change detection becomes vital to sustainable development and growth. In this research project, land use and land cover change (LULCC) is determined on a bi-annual basis utilizing satellite imagery to quantify where changes are occurring, the types of LULCC, the types of transformations occurring, and the rates and amounts of LULCC. Landsat TM data captured between 1985 and 2009 along the three coastal counties is used to devise a baseline dataset of long-term LULCC using a Coastal National Land Cover Dataset LULC Classification. Quantification of LULCC between counties reveals both distinctive and similar trends critical to understanding the proximate causes and underlying driving forces of coastal LULCC that occur at various spatial, temporal, and organizational scales. Results highlight the necessity, importance, and challenges of identifying human-environmental interactions to understanding LULCC. This information is being used to facilitate ongoing researcher into the unique coastal complexities of coupled human and natural systems (CHANS).

O5.03

9:45 DECREASING VULNERABILITY OF COASTAL POPULATION WITH INCREASING INLAND DISTANCE –

Bandana Kar

University of Southern Mississippi, Hattiesburg, MS

Coastal communities today face economic and social volatility due to a wide range of factors,

one of which appears to be an increase in coastal hazards, notable tropical storm impacts. A growing body of research has shown that both the frequency and intensity of tropical cyclones have increased in recent decades, and have adversely impacted the Gulf Coast more than any other region of the U.S.

Despite their exposure to a wide range of hazards, coastal communities across the U.S. have experienced a dramatic increase in population and property values over time. According to the U.S. Census Bureau (2011), in 2009, about 52% of the total U.S. population was residing in 675 coastal counties. As per the AIR World Corporation, an insurance agency, in 2007, the estimated insured values of coastal counties from Texas to Maine amounted to almost \$9 trillion dollars. Taken together, these factors partly explain rising costs and severity of impacts from disasters in recent decades.

Coastal hazards, such as tropical storms, cannot be prevented. Given this trend of increase in coastal population, it is pertinent to determine the vulnerable coastal communities so that their resilience and adaptive capacity to mitigate impacts of such future hazard events can be enhanced. The purposes of this study are to explore the relationship between coastal population distribution and inland distance from the coast, and to use the relationship in predicting future population growth and their distribution in the Gulf Coast region.

O5.04

10:00 LEVEEMAPS: A WEB-BASED GIS APPROACH FOR EFFICIENT ASSESSMENT OF FLOOD-CONTROL LEVEES –

Franklin Heitmuller, George Raber, David Patrick, Joseph Dunbar, and David Biedenbarn

University of Southern Mississippi, Hattiesburg, MS

The LeveeMaps geodatabase is a GIS data structure designed to facilitate efficient assessment of flood-control levees, including structural, geotechnical, and hydraulic characteristics and conditions. The motive to develop LeveeMaps is fourfold: (i) to enhance the existing LevCAT data model of the U.S. Army Corps of Engineers, (ii) to serve as a national, standardized clearinghouse for spatial and tabular data associated with flood-control levees, (iii) to facilitate web-based access to the geodatabase for qualified management authorities, and (iv) to facilitate the federal levee certification program. The data structure builds upon the LevCAT model, a ranking system based on selected structural and geotechnical data that collectively determine if levee segments are prone to damage or possible failure during a flood. The LeveeMaps data structure

segments levees based on type (e.g., earthen, floodwall) and underlying soil. Each individual segment is parameterized for various attributes including, but not limited to, age, relative height, side slope, waterbody distance, encroachments, observed erosion, vegetation growth, and animal trampling or burrowing, among others. The most effective implementation of the LeveeMaps application should include local or municipal levees in addition to federally-certified levees, which will require local authorities to digitize (in GIS) and upload levee segments under their jurisdiction. Examples of the LeveeMaps application are provided for the Red River of the North and the Yakima River. Future work for LeveeMaps will focus on automating various levee segmentation criteria and parameterization of data fields based on readily available, national GIS datasets.

O5.05

10:15 CLAY FABRIC AND MASS PHYSICAL PROPERTIES OF SURFICIAL MARINE SEDIMENT NEAR THE DEEPWATER HORIZON OIL SPILL –

Andrew Head, Richard H. Bennett, Jessica R. Douglas, Kenneth J. Curry

University of Southern Mississippi, Hattiesburg, MS

Surficial sediment was obtained on the RV Cape Hatteras Cruise (2010) from the seafloor at a water depth of 1570 meters located at latitude 28°44'20.16"N and longitude 88°20'24.96"W in close proximity to the Deepwater Horizon well, Gulf of Mexico. Preliminary clay nano- and microfabric observation using a transmission electron microscope (TEM) depicted a sediment rich in clays and organic matter (OM) especially in the upper 2 cm subbottom. Initial analysis of TEM micrographs depicted a high porosity clay sediment. Initial study of the mass physical properties revealed water content $\omega_t = 67.32-67.28\%$ (percent total mass), porosity $n = 84.1-83.6\%$ (corrected for salinity of 35ppt), and wet bulk density $Y_t = 1.29 \text{ Mg/m}^3$ at subbottom depths of 0-2 cm. At a depth of 17 cm subbottom, $\omega_t = 66.19-64.57\%$, $n = 85.3-83.4\%$ and $Y_t = 1.32 \text{ Mg/m}^3$. The slightly higher wet bulk density at 17 cm burial depth reflects a considerably lower percentage of OM in contrast to the sediment water interface (0-2 cm) as preliminary testing demonstrated. Minor lateral and vertical variability in the mass physical properties is revealed within the sediment core at subbottom depths of 2-19 cm. Detailed study of total OM and organic carbon will enhance the resolution of the sediment physical properties horizontally and vertically. This study will provide preliminary understanding of the role of clay fabric and depositional processes on the sequestering of crude

oil in the surficial marine sediment near the Deepwater Horizon Oil Spill.

10:30 BREAK

O5.06

10:45 QUANTITATIVE ANALYSIS OF THREE-DIMENSIONAL CLAY NANO- AND MICROFABRIC

Jessica Douglas, Kenneth J. Curry, Richard H. Bennett, Matthew H. Hulbert

University of Southern Mississippi, Hattiesburg, MS

Clay fabric (spatial distribution, orientation, and particle-to-particle relations) has been of scientific and engineering interest for over a century. A significant refinement of clay particles and two-dimensional fabric models emerged with the advancement of transmission electron microscopy (TEM). Important properties such as particle orientation, tortuosity, and the distinction between effective and inaccessible porosity remained elusive until recently. Three-dimensional nano-scale TEM micrographs that we present provide new volumetric details of clay fabric that reveal physical properties such as porosity, particle size distribution, and particle shape. We used a model marine sediment saturated with salt water comprising a 9:1 ratio of illite/smectite with 1% and 10% organic matter in two samples respectively. We developed a technique to obtain ultra-thin serial sections which were photographically mapped, assembled as mosaics, serially stacked, and reconstructed using image analysis software to render three-dimensional representations of clay fabric at nano- and microscales. Three-dimensional representations of clay fabric at the nanometer level reveal extraordinary interconnectedness of that portion of sample volume containing the organic matter and fluid; this cannot be appreciated in two-dimensional images. Measurements of particle volumes ranged over five orders of magnitude. Separate histograms for clay particle and non-clay volumes were created showing their x-y-z orientation. These histograms demonstrate that the largest clay particles have a preferred x-y orientation that grades into a non-preferred orientation as particle size decreases. These data suggest that important differences in clay nano- and microfabric morphology are nested at different scales of organization.

O5.07

11:00 THE BRANDYWINE STONE WALL –

David T. Dockery III

Mississippi Office of Geology, Jackson, MS

The Brandywine Stone Wall was once touted in no less than the November 7, 1900, edition of *The New York Times* (citing an article from *The New Orleans Picayune*) as an archaeological ruin much like the



Great Wall of China. The *Times* account was entitled "Mississippi's Great Wall. A Mysterious Structure Whose Builder No One Now Knows." This account was prompted in part by a letter Mr. Watson of Hazlehurst sent to Governor Longino (Mississippi's thirty-fifth governor, 1900-1904) with a pencil drawing of an immense pile of stone in southeastern Claiborne County, suggesting that the stone might be utilized in construction of the new Capitol building. Watson's theory of these stones and the Brandywine Stone Wall was a revival of similar beliefs held in the mid-1800s. Eugene Hilgard in his 1860 book on the geology of Mississippi noted that sandstones of the Grand Gulf Group had right-angle joints of great regularity, which led some to believe that they were the "result of human agency." Today these sandstones are mapped in the outcrop belt of the Catahoula Formation and account for the waterfalls and rapids on many streams in southern Mississippi. Field work by the Mississippi Office of Geology has yet to find Mr. Watson's "immense pile" of stone in Claiborne County or other evidence of the Brandywine Stone Wall.

05.08

11:15 FREDERIC F. MELLEN AND THE MISSISSIPPI GEOLOGICAL SURVEY

Michael B. E. Bograd
Mississippi Office of Geology, Jackson, MS

Frederic Francis Mellen (1911-1989) had a long history of service to the Mississippi Geological Survey, making a very significant find as a young field geologist, serving as State Geologist, and mentoring staff as editorial consultant. He worked for the Survey, then located at Ole Miss, from 1937 to 1940. In 1939 while mapping the geology of Yazoo County, Mellen proved the value of surface geologic mapping, and made his name, by finding an exposure of Moodys Branch Formation structurally high. The find was announced in a press release and was followed by the discovery of Tinsley Field, a giant field, with the first oil production in Mississippi. He authored or had papers in 12 titles in the Survey's Bulletin series, in the 1930s, 40s, 50s, and 60s. Mellen served as State Geologist of Mississippi from 1962 to 1965. He started his tenure when the Survey completed its move to North West Street, where the core and sample library had been relocated to serve the petroleum industry centered in Jackson. Under his direction, the Survey published 11 Bulletins on economic minerals, county surveys, collections of research papers, and the Survey's centennial. During the 1970s Mellen mentored Survey geologists by leading field trips and editing publications. Mellen had a distinguished career

working for other government agencies, private industry, and as a consulting geologist in industrial minerals and oil and gas, but a significant part of his career of service to his state and his profession was with the Mississippi Geological Survey.

11:30 LUNCH

FRIDAY AFTERNOON

05.09

1:00 A GRAIN SIZE ANALYSIS OF THE PASCAGOULA RIVER SYSTEM –

Allison Tarbox, Zachary A. Musselman
Millsaps College, Jackson, MS

Downstream fining of alluvium in a river system is a well-known and broadly assumed phenomenon. This assumption is supported by Sternberg's Law, also known as the abrasion law. Most grain size studies that have investigated the abrasion law have been performed in gravel-bed river systems. Our study examines grain size at 59 sites within the Pascagoula River system. Channel and bank samples were collected on the Leaf, Chunky, Chickasawhay and Pascagoula Rivers. Alluvium samples were air dried and sifted using a sonic sifter. Grain size distribution (i.e. cumulative frequency) curves were created for each sample and $\Phi 5$, $\Phi 16$, $\Phi 50$, $\Phi 84$ and $\Phi 95$ sizes were determined from the curves. Each Φ value was plotted against the sampling location's distance from the river's mouth at Pascagoula Bay. The graphs show no clear pattern of downstream fining. Inclusive graphic standard deviation (ISD) values were calculated for each sub-system, as well as the entire Pascagoula River basin. ISD values reveal moderate sorting throughout the entire Pascagoula River system. Abrasion and selective transport are the most cited factors that may influence sorting and fining within a fluvial system. We postulate that the effects of selective transport and abrasion on downstream fining is minimal within the Pascagoula River system; rather sediment additions through tributary and colluvial sources are keeping the alluvial system moderately sorted with no clear downstream fining pattern.

05.10

1:15 EXTREME NONPOINT SOURCE SEDIMENT RUNOFF, DESOTO COUNTY, MISSISSIPPI –

Sloan Click and Stan Galicki
Millsaps College, Jackson, MS

Loosely consolidated loess and Tertiary age sediment from northern Mississippi are easily eroded. Best management practices were not implemented to minimize soil loss during construction activity in the

headwater of a small watershed. Using the pre-impoundment surface as a datum the capacity of a small pond was reduced by 28% due to sediment runoff from an adjoining property. The physical analysis of sediment samples taken from seven sediment cores, and the sediment thickness and water depth measurement from 181 sites across a 0.47 ha pond in Desoto Co., Mississippi were used to document an extreme instance of nonpoint source sediment pollution. Sediment accumulation on the Eocene Kosciusko Fm. pre-impoundment pond base ranged up to 1.65 m and averaged 0.46 m. The sediment accumulation rate for a two year period coinciding with up-gradient property development is estimated at 19 cm y^{-1} ; if averaged over the 10 year life of the pond the accumulation rate is 4.6 cm y^{-1} ; the two year rate is extreme but even the 10 year average is excessive. Based on dry bulk density calculations which are independent of time, the sediment loading exceeds $500,000 \text{ kg ha}^{-1} \text{ y}^{-1}$ which is over 25 times the rate of the closest analog in north Mississippi.

O5.11**1:30 URBAN HEAT ISLAND EFFECT IN JACKSON, MISSISSIPPI –**

Anna Crousillac and Stan Galicki
Millsaps College, Jackson, MS

Twenty one digital temperature and relative humidity loggers were deployed throughout the Jackson, MS metropolitan area in a four tier radial pattern extending to 40 km from the base station at Millsaps College to document the magnitude and distribution of the urban heat island effect. The loggers, which take readings hourly, were activated in late spring 2011 and will remain in place for a full year. The first data download was completed in October 2011; results of the summer data collected from June 1 through August 31 are presented here. After eliminating measurements that reflect frontal activity, 101 intervals with a total temperature differential greater than 4° C were selected for further analysis. Sixty one percent of the 101 selected intervals were between 6:00 and 10:00 AM (7:00 AM maximum - 27%), and 20% were between 8:00 and 11:00 PM. Based on tier averages for all measured intervals the highest temperature gradient is between the base and Tier 2 stations with a gradient of 0.43° C/km . The gradient between Tier 2 and Tier 3, and Tier 3 and 4 is 0.04° C/km and 0.01° C/km respectively. Results indicate that Jackson, MS does generate a heat island effect in the summer months which is strongest in the morning and late evening hours. The gradient is highest in the area of greatest development.

O5.12**1:45 GROUNDWATER AVAILABILITY ASSESSMENT OF UPPER CRETACEOUS AQUIFERS OF NORTHEAST MISSISSIPPI**

John Banks, RPG

Concerns over availability of groundwater suitable for consumption have increased steadily as water-related topics have taken center-stage in the scientific and political world. Northeastern Mississippi has had significant problems in the past with declining water levels in heavily populated areas, specifically the Tupelo and West Point areas. In the late 1980's to mid 1990's, a comprehensive study was conducted on the aquifers in the region. From 2008 to 2011, a subsequent study was conducted by the Office of Land and Water Resources, Groundwater Investigations and Planning Division using water-level data and electric logs to gain a better understanding of the groundwater quantity available in the region. Results show there are ample amounts of water available for human consumption and industrial use for most of Northeast Mississippi.

2:00 BREAK –**O5.13****2:15 ZIRCON PLACER DEPOSITS OF THE MISSISSIPPI EMBAYMENT –**

David Thompson

Mississippi Office of Geology, Jackson, MS

Zircon (ZrSiO_4) is the major commercial source of zirconium. Industrial uses of zircon include ceramics, opacifiers, foundry applications, refractories, chemicals, and metal alloys. Currently, most zircon is mined from deposits in Australia and South Africa. Annual worldwide zirconium production is approximately 1.2 million metric tons, and worldwide reserves are estimated to exceed 55 million metric tons. Demand and prices for zircon have risen sharply in recent years, and supply shortages are endemic. Currently, China and the Asian region at large constitute about 70% of worldwide consumption. Zircon prices are anticipated to move higher still, as the likelihood of additional supply into world markets over the next five years is unlikely. The Mississippi Embayment holds heavy mineral (HM) placer deposits, which contain zircon. Assessment of surface geochemical anomalies indicates that certain sandy facies of Cretaceous and Tertiary deposits are relatively higher for zircon, compared to the Embayment at large. Preliminary elemental/mineralogic analyses of selected formations indicate a zircon grade range of 9.6 to 36.2%. Pirkle et al. (2007) documented



Atlantic and Gulf Coastal Plains zircon grades from selected economic deposits at 4.9 to 20.6%. Exploitation of Embayment placers would likely require a deposit with overall HM percentage in excess of 2%, with accompanying valuable heavy minerals such as ilmenite, rutile, and leucoxene. As larger, substantial deposits are depleted worldwide, economic models, in turn, are being reassessed whereby smaller, lower grade deposits are becoming commercially exploitable. The relatively smaller deposits of the Mississippi Embayment might be developed via nimble, portable mining operations.

05.14

2:30 SIOUX QUARTZITE OF THE PRE-LOESS GRAVELS IN MISSISSIPPI –

James E. Starnes

Mississippi Office of Geology, Jackson, MS

The Sioux Quartzite, a Precambrian age metaquartzite, can be found in ancestral Mississippi River terraces (Pre-Loess Terrace Deposits), which underlie western Mississippi's loess belt. The source region for this quartzite is likely in the bedrock of the Missouri River drainage in South Dakota and southwestern Minnesota. The Sioux Quartzite is the dominant material in Kansan end moraines, and was transported to the Lower Mississippi Valley during the Pleistocene as glacial outwash. It is characterized as a hard, pink to dark purple, fine- to coarse-grained, commonly banded quartzite. It may contain quartz pea gravel inclusions and may be brecciated. The quartzite may be seen in gravels as cobble- to boulder-sized clasts insitu, or where it has been reworked into stream alluvium that dissects Pre-Loess Terrace strata. The quartzite has proved to be a unique constituent and helpful in differentiating the origins of gravel deposits and stream alluvium. Identification of the Sioux Quartzite, and its utilization as an important prehistoric archaeological tool in the Lower Mississippi Valley was only recently discerned. Due to its metamorphic origins, the Sioux Quartzite has an irregular to subconchoidal fracture. This characteristic makes it poorly suited for knappable material, although it can be ground and polished into exquisite tools and ornaments. It is ideal material for hammerstones because of its superior durability, and commonly large clast size. The Sioux Quartzite was preferred for use in quarrying Hattiesburg Quartzite (Franklin County, MS), which was inferred by identification of numerous broken fragments of hammerstones at heavily worked outcrops.

05.15

2:45 HEXACORALLIAN AND OCTOCORALLIAN ANTHOZOANS (CORALS) FROM THE UPPER CRETACEOUS OF MISSISSIPPI –

George Phillips

Mississippi Museum of Natural Science, Jackson, MS

Several macroinvertebrate groups remain poorly studied in the Upper Cretaceous of the Southeast--the Anthozoa among them. Members of three anthozoan orders have been identified to date--stony corals (Hexacorallia: Scleractinia), sea pens (Octocorallia: Pennatulacea), and sea fans/gorgonians (Octocorallia: Alcyonacea). Stony corals, both solitary and colonial, are preserved either as calcareous skeletal corallites and coralla or as internal/external molds thereof. Octocorals are represented by fragments of the simpler skeletal axes that support fleshy polypterous colonies. Solitary scleractinians, namely the Caryophylliidae and Micrabaciidae, are considerably more abundant in Upper Cretaceous deposits than colonial forms, only two instances of the latter having been recovered in Mississippi. *Astrangia*-like (Rhizangiidae) impressions were collected from the basal Tombigbee Sand (Late Santonian), and a well-preserved skeletal fragment of an intriguing yet unidentified form was recently collected in the Coon Creek beds (Early Maastrichtian). In Mississippi, octocorals are known primarily from Maastrichtian deposits, particularly the "Troy beds" (Ripley Formation), Coon Creek Tongue (Ripley Formation), and "Nixon sand" (Prairie Bluff Formation). Sea pen axes may be locally abundant in all these units and are occasionally encountered in vivo. Gorgonian fossils, including holdfasts, are generally rare in all these units but axial fragments are numerous in the uppermost Owl Creek Formation, at least at one location. The sea pen axes are typically smooth and very straight with a circular or subrectangular cross section, whereas the gorgonian axial fragments are branching and longitudinally twisted. The dominant pennatulacean axial morphology in the Mississippi samples is consistent with the Virgulariidae, like *Graphularia*.

3:00 Geology and Geography Divisional Business Meeting

HEALTH SCIENCES**Co-Chair: Zelma Cason,**

University of Mississippi Medical Center

Co-Chair: Felicia Tardy,

University of Mississippi Medical Center

Thursday**February 23****8:50 Welcome and opening remarks****Drug Delivery Symposium****O6.01****9:00 REPRODUCTIVE SYSTEM
BEHAVIOR FOLLOWING EXPOSURE
OF SUSTAINED DELIVERY OF NPY
ANTAGONIST IN OVARECTOMIZED
(OVX) RATS**

Zelma Cason*, Gerri Wilson, Olga Golanov, Michelle Tucci, Robert McGuire, and Hamed Benghuzzi

Department of Diagnostic and Clinical Health Sciences, University of Mississippi Medical Center, Jackson, MS 39216

Several investigations have documented that sustained delivery of estrogen was able to modulate or sustain normal female reproductive functions. However, the literature is lacking scientific evidence regarding the mechanism of estrogen and neuropeptide Y antagonist (NPY) effect on the hypothalamic-pituitary-gonadal axis. The objective of this study was to explore the role of sustained delivery of estrogen and its effects on reproductive organ function compared to an antagonist agent such as NPY. A total of twenty adult female rats (OVX, n=15; intact control, n=5) were divided into five groups (intact control, OVX, sham, OVX + estrogen, and OVX + NPY). Animals in two groups were surgically implanted with a TCP delivery device loaded with estrogen or NPY. Vaginal smears and body weights (BW) were evaluated at baseline and at two weeks post implantation. At the end of the two week phase, all animals were euthanized and vital and reproductive organs were retrieved for histopathological evaluation. The results revealed differences in BW between intact control and OVX animals. Furthermore, there was significant statistical difference ($P < 0.05$) in BW between OVX and OVX + NPY animals. Vaginal smear evaluation revealed that estrogen exposure induced estrus cyclic activities as compared to OVX and sham animals. The animals exposed to sustained delivery of NPY triggered moderate cyclic activities compared to intact control animals. There were no significant differences ($P < 0.5$) in vital organ wet weights among and between animals in all groups. Overall conclusions of this investigation proved the capability of TCP to

release estrogen and NPY at sustained levels, which resulted in pathophysiological changes in female reproductive organs.

O6.02**9:15 HYDROXYAPATITE DRUG
DELIVERY DEVICE CAPABLE OF
RELEASING HYDROGEN PEROXIDE IN
VITRO**

Merilyn Long, Michelle Tucci, and Ham Benghuzzi
CHS, University of Mississippi Medical Center.

The specific aim of this present experiment was to determine if hydrogen peroxide (H_2O_2) can be released by a hydroxyapatite (HA) drug delivery system within 24 hours. The GOX/CAT system was used to independently provide and control the amount of H_2O_2 and oxygen in cell culture after reaching steady state dose at 150 minutes. The GOX/CAT system is composed of glucose oxidase (GOX) and catalase (CAT). Four groups were treated as follows: Group I: Control (Cells only), Group II: $10\mu MH_2O_2$, Group III: HA capsules (Sham), and Group IV: HA capsules + $10\mu MH_2O_2$. A 24-well plate was plated with HGF CRL-2014 followed by treatment. After treatment, the 24-well plate was incubated at $37^\circ C$ for a period of 30 min, 60 min, 120 min, 240 min, 480 min and 24 hours. After each incubation period, hydrogen peroxide release from HA capsule *in vitro* was measured spectrophotometrically (249nm). Spectrophotometric analysis was performed by Spectronic® Genesys™ 5. Our results show that cells + $10\mu MH_2O_2$ /HA capsule began releasing very small amounts of H_2O_2 after 60 minutes ($1.26\mu MH_2O_2$). Hydrogen peroxide concentrations began to increase to $5.07\mu M$ after 120 minutes and peaked after 240 minutes at $29.18\mu M$. After 480 minutes H_2O_2 concentrations were at $13.95\mu M$, while $16.49\mu M$ was evident after 24 hours. Based on the overall findings of this study, we propose that low dose steady state hydrogen peroxide delivered by HA drug delivery device may have potential as an antibiotic alternative in the treatment of early dental infections.

O6.03**9:30 ANDROGENIC HORMONES
INFLUENCE ANGIOGENESIS IN THE
TISSUE IMPLANT RESPONSE**

Kenneth R. Butler, Jr., PhD, Hamed Benghuzzi, PhD, Michelle Tucci, PhD, Aaron Puckett, PhD
University of Mississippi Medical Center, Jackson, Mississippi—USA

The objective of this investigation was to demonstrate the effect of androgens on angiogenesis within the fibrous tissue surrounding tricalcium phosphate (TCP) implants. Sixteen animals in four experimental groups ($n = 4$ /group) were implanted



with one TCP implant each. Group I animals were implanted with the sham TCP ceramic (Control). Group II animals received a testosterone-loaded ceramic. Group III animals were implanted with a dihydrotestosterone containing bioceramic. Group IV animals received the androstenedione filled bioceramic. At 90 days post-implantation, the fibrous tissue surrounding the implants were evaluated microscopically following staining with routine hematoxylin and eosin (H&E), Masson's trichrome, and Papanicolaou stains. Using Image Pro (Media Cybernetics, Silver Spring, MD) digital analysis software, data were collected to compare the hormonal effects on the number (per high power field) and size of blood vessels (micrometers, μm) within the fibrous tissue surrounding all four groups. The presence of androgens greatly affected the angiogenic response within the fibrous tissue. All three hormones exhibited less neovascularization compared to the control. Though not as dramatic as androstenedione (3 ± 0), both testosterone (12 ± 1) and dihydrotestosterone (10 ± 1) suppressed the number of blood vessels present in the fibrous tissue capsule compared to control (13 ± 1). However, the circumference of the vessels was much larger for the testosterone ($236\mu\text{m} \pm 8\mu\text{m}$) and dihydrotestosterone ($256\mu\text{m} \pm 4\mu\text{m}$) treated groups compared to the androstenedione ($146\mu\text{m} \pm 7\mu\text{m}$) or control ($163\mu\text{m} \pm 3\mu\text{m}$) groups. The results of this study demonstrate androgens strongly vary in their effect on neovascularization by limiting the number of new vessels developed while contributing to the presence of larger vessels within the fibrous tissue surrounding TCP implants loaded with testosterone and dihydrotestosterone.

O6.04

9:45 EVALUATION OF CHONDROCYTE GROWTH AND FUNCTION SUBJECTED TO 21% AND 6% OXYGEN LEVELS

Lawyer TJ, Tucci MA, Benghuzzi HA
University of Mississippi Medical Center, Jackson, MS. 39216

In osteoarthritis, the metabolic activity of the chondrocytes is shifted toward a state where new matrix synthesis is outweighed by breakdown of matrix constituents. The result is degeneration and gradual loss of articular cartilage. Although osteoarthritis is frequently regarded as a non-inflammatory form of arthritis, considerable data implicates a role for pro-inflammatory cytokines in the cartilage destruction associated with osteoarthritis. The best studied pro-inflammatory cytokines in osteoarthritis are interleukin-1 β (IL-1 β), tumor necrosis factor- α (TNF- α), and interleukin-6

(IL-6). Since articular cartilage is not vascularized, it must rely on diffusion from the articular surface for nutrient and metabolic exchange. Consequently, the entire metabolism of the cell is geared towards operating at a low oxygen tension.

In this study, chondrocytes were challenged with pro-inflammatory cytokines at 21% O₂ and 6% O₂. Chondrocyte proliferation, membrane integrity, oxidative stress, matrix metalloproteinase – 9 (MMP-9) and hypoxia inducible factor-1 α (HIF-1 α) production were measured. Our results showed that there was less of a decrease in cell number at 6% O₂ compared to 21% O₂ after they were challenged with pro-inflammatory cytokines. In addition, there was less of an increase in oxidative stress, membrane damage and MMP-9 production at 6% O₂ compared to 21% O₂. The significance of this study represents the first attempt to replicate a diseased inflammatory environment characterized by an osteoarthritic joint *in vitro* and to examine these effects on the growth and stability of chondrocytes.

O6.05

10:00 OPTIMIZATION OF 3D LIVER CELL SPHEROID FORMATION ON ELASTIN-LIKE POLYPEPTIDE-POLY VINYL DIMETHYL AZLACTONE-POLYELECTROLYTE (ELP-PVDMA-PE) COPOLYMER SURFACES

Charles A. Weeks, Paul Turner, Amol Janorkar

In order to study and treat liver diseases, an improved *in vitro* hepatic cellular model is needed. Elastin-Like Polypeptides (ELPs) are a class of genetically-engineered polypeptides that have demonstrated promise as a liver cell culture substrate, encouraging adherence, proliferation, and biological function from primary rat hepatocytes as well as immortalized liver cell line. Furthermore, hydrophobic ELP molecules conjugated with various hydrophilic polyelectrolytes induced an aggregation of primary rat hepatocytes into 3D spheroids. Such spheroids demonstrated increased biological function that was more closely aligned to *in vivo* conditions compared to cells in traditional monolayer morphology. Unfortunately, difficulty obtaining high yields of ELP-PE conjugates has hindered advancement of 3D spheroid models. Our research focuses on preparation and characterization of a new copolymer class comprising of ELPs conjugated to poly(vinyl dimethyl azlactone), a straight chain polymer with periodic amine-reactive azlactone functional groups. We hope to conjugate ELP with an azlactone group of PVDMA and subsequent conjugation of remaining azlactone groups with amino acid like cationic molecules to use as a culture

substrate. Based on this model, we seek to optimize hepatic culture spheroid formation. We will also compare the results of this new method to formation of ELP conjugates with PEs such as polyarginine, polylysine, and polyethylenediimine (PEI) using traditional carbodiimide chemistry. This research has direct implications in uncovering important factors underlying cell-biomaterial interaction such as the copolymer substrate morphology, hydrophilicity, and primary amine content and their effect on 3D spheroid generation and cell function.

10:15 Break

O6.06

10:45 RATIONALE, DESIGN, AND SAMPLE CHARACTERISTICS OF A STATEWIDE COMPREHENSIVE SURVEY TO ASSESS ACCESS TO CARE, HRQOL AND SERVICE NEEDS OF PLWHA

Denise D. Krause¹, Kenneth R. Butler, Jr.¹, Warren L. May²

University of Mississippi Medical Center, Department of Medicine¹ and Department of Preventive Medicine², Jackson, MS

Mississippi ranks 25th among fifty states in cumulative reported HIV cases. Care of these individuals is important to assess since there has been great improvement in treatment of HIV. A survey to assess access to care, health-related quality of life (HRQOL), and service needs of people living with HIV/AIDS (PLWHA) was developed and administered by trained interviewers at community-based organizations and locations convenient to study participants over a twelve month period. A random probability sample of 1,500 PLWHA was drawn from a pool of 7,800 individuals living in Mississippi as of November 1, 2004. Of these, 220 participants completed interviews. The baseline demographic characteristics of the sample were 52% female and 88% African American. Age ranged from 18-74 years, while those aged 35-54 years represented the largest group (64%). Educational status of participants was more evenly distributed, while a majority reported being heterosexual (80%), income of <\$10,000/year (44%), having some type of health insurance (71%), having been prescribed anti-retroviral medications (75%), not having problems accessing health care or services (86%), and social support (83%). Nearly half of the sample reported being satisfied with the care they were receiving. Results of this study will be helpful in determining how to prioritize funding distributions to improve care and services available to those with HIV/AIDS. Findings may also be used to assist in understanding how access to care issues and needed services impact

the health-related quality of life of PLWHA in Mississippi.

O6.07

11:00 PROFESSIONAL PORTAL PROGRAM: REDESIGN OF A RURAL HEALTH CARE TRAINEE PIPELINE

Rob Rockhold, Steve Watson, Mitzi Norris

In 2011, the University of Mississippi Medical Center (UMMC) School of Graduate Studies modified the two year postbaccalaureate Professional Portal Track (PPT) program into a three-semester Professional Portal (PPP) to enhance access of students from rural and disadvantaged backgrounds to medical or dental training programs. Completion of PPT/school-specific requirements leads to direct admission into the desired program. Of 50 PPT graduates, 54% of medical-track graduates earned admission to the UMMC School of Medicine and 60% of dental-track graduates earned admission to the School of Dentistry. However, 80% of all graduates have been admitted into a professional biomedical training program at any institution. Graduates included more women (64%) than men (32%) and equal percentages (44%) of Caucasians and Blacks with fewer Asians (10%) and Hispanics (2%). The PPP offers direct admission opportunities with half the cost and time investment of the PPT program. Like the PPT, the PPP stresses orientation to rural health service, but requires a 30 hour minimum for graduation and adopts a core curriculum common to a Masters degree program. Students in the PPP program participate in the Mississippi Rural Health Association. The PPP is situated to better serve students underrepresented in medicine and dentistry at UMMC. This presentation was funded by DHHS' OMH (Prime Award Number 1 CPIMP091054-01-00). This paper was written, in part, by RR at UMMC by a grant with UMMC's Delta Regional Institute. The findings, opinions and recommendations expressed therein are those of the author and not necessarily those of UMMC or DHHS.

O6.08

11:15 SUMMER FOOD SERVICE PROGRAM DEMONSTRATION TO DECREASE FOOD INSECURITY, INCREASE HEALTHY BEHAVIOR IN CHILDREN

Sylvia Byrd, Brent Fountain, Andrew Frugé
Mississippi State University, USA

Since 1946, USDA has recognized and addressed the need for adequate nutrition among all children through the National School Lunch Program (NSLP). In 1975, this service was extended into summer months with the Summer Food Service



Program (SFSP) to reduce food insecurity in lower income areas. In 2010 and 2011, USDA provided funds for small demonstration grants to SFSP sites in Mississippi and Arkansas. Henderson Ward Stewart Elementary School (HWS), an SFSP site for the previous 14 years, held a day camp during the month of July between breakfast and lunch feedings. The goals were to increase SFSP participation and promote physical activity and healthful eating through gardening, food demonstrations, and play. The HWS school nurse and physical education teacher were co-directors and led physical activities. Students learned about horticulture in the school garden and participated in nutrition lessons. "Fun on the Hill" was advertised to all students at HWS (grades 3-5) and marketed to children with BMI > 85th percentile of their age/sex cohort on CDC growth charts. Seventy-one percent of participants were above their respective 95th percentile and identified as overweight. Preliminary surveys given to participants (n=30) and their parents (n=23) indicated that on average, parents overestimated their child's physical activity and underestimated fruit and green leafy vegetable consumption. Height and weight measurements taken 3 months after participation indicated a slight decrease in BMI for all participants. This improvement in weight status may be due to participation in SFSP and "Fun on the Hill" summer day camp.

O6.09

11:30 SERVICE NEEDS REPORTED BY PLWHA: RESULTS OF A STATEWIDE SURVEY

Kenneth R. Butler, Jr.¹, Warren L. May², Denise D. Krause¹

University of Mississippi Medical Center, Department of Medicine¹ and Department of Preventive Medicine², Jackson, MS

The purpose of this cross-sectional study was to determine the unmet needs of PLWHA in Mississippi. A series of questions were asked about twenty-three health care services and thirty public or private assistance services. Each participant was asked if they needed each service in the last twelve months followed-up by the question of if they received that service. Additional questions included: if they received the service, from what type of facility they received the service, perceived quality of the service, and if the service was still needed. If they did not receive the service, they were asked why they did not receive the service and if they still needed the service. Health care services that demonstrated the most unmet needs among study participants were dental care and exams, eye care and exams, mental

health therapy or counseling, emotional support groups, job placement or employment, help paying for housing, subsidized housing assistance, and transportation to get care. Services that respondents identified as more than adequate were medical care at a physician's office or clinic, specialty care in HIV treatment, visits to emergency rooms, tests for CD-4 and T-cell counts and availability of free condoms. The findings from this study demonstrated areas that participants viewed as significant unmet needs for PLWHA as well as areas that were perceived to be adequately or overly met. Data from this study may be used to help better allocate health care resources to improve areas where needs are greatest.

12:00- 1:00 Plenary Speaker

1:30-3:30

Poster session I

P6.01

QUANTITATIVE EVALUATION OF BRAIN TISSUE DAMAGE IN MULTIPLE SCLEROSIS WITH GRADIENT ECHO PLURAL CONTRAST IMAGING TECHNIQUE

Britney Johnson, Jie Luo, Anne Cross, Dmitriy Yablonskiy

Washington University, USA

Gradient Echo Plural Contrast Imaging (GEPCI) is introduced as a MRI technique demonstrating improved image quality, acquisition time, and method for estimating the severity of brain tissue damage in Multiple Sclerosis lesions. At 1.5 T, GEPCI is applied to obtain images of the brains of healthy subjects and subjects with MS. Quantitative T2*, T1-weighted images, and FLAIR-like maps are acquired simultaneously. As tissue destruction becomes more severe, accompanied by demyelination and axonal loss, the $R2^*(=1/T2^*)$ value decreases. Histogram of $R2^*$ within the whole white matter volume is generated. We then define for each voxel a tissue damage score - TDS = $(R2^* - R2^*_c)/R2^*_c$, which scales from 0 (corresponding to normal tissue at peak center) to 1 (corresponding to total demyelination and axonal loss). The lesion score map provided by GEPCI technique not only depicts lesions similar to clinical FLAIR image, but indicates severity of the tissue damage on a pixel basis. The TDL (Tissue Damage Load), which is summation of TDS from all the abnormal pixels, was shown to have very good correlation with the clinical disability score (EDSS). While center and width of $R2^*$ distribution reflect global changes of the brain tissue, the distribution tail reflects local changes in the MS lesions. This method not only depicts lesions similar

to conventional T1w and FLAIR images, but also allows quantitative evaluation of disease progression based on R2* histograms. An efficient method based on GEPCI technique might be used for monitoring disease progression and response to therapy in patients.

P6.02

ADVANCED CT IMAGE ANALYSIS OF DIFFUSE LIVER DISEASE

Katherine Thaggard¹, Haowei Zhang², Andrew Smith²

¹Mississippi College, USA, ²University of Mississippi Medical Center, USA

Objective: Liver fibrosis is difficult to manage and often leads to end-stage cirrhosis which is complicated by liver failure, liver cancer, varices, ascites, etc. We hypothesize that the stage of liver fibrosis is associated with measurable changes on computed tomography (CT) images. The primary objective is to establish a database containing patients with various stages of liver fibrosis and corresponding liver CT images.

Methods: A retrospective search of the pathology database and radiology information system at UMMC between 2004 and 2011 for patients with various stages of liver fibrosis (normal liver through fulminant cirrhosis) was performed. Included patients were age >18 years with liver fibrosis on surgical pathology or autopsy specimens and liver CT imaging within 1 year of biopsy or autopsy. Patients were excluded if they were age <18 years, or if they had no liver CT imaging within 1 year of biopsy, metastatic disease of any type, portal venous thrombosis, splenectomy, prior liver surgery, acute hepatitis, or inadequate biopsy specimens.

Results: After applying our detailed inclusion/exclusion criteria to the 3,343 patients that had liver pathology specimens, 368 subjects with adequate liver pathology and liver CT imaging within 1 year of biopsy or autopsy were included in our final database. The etiology of liver fibrosis included Hepatitis C Virus (N=222), Hepatitis B Virus (N=79) and other cause (N=67).

Conclusion: A database containing patients with pathology-proven liver fibrosis and liver CT images may be used to identify CT imaging features associated with the stage of liver fibrosis.

P6.03

OXALATE MEDIATES ACID RESISTANCE IN *E. COLI*

Elise Fontenot, Cory Toyota
Millsaps College, USA

We report that the addition of 1 mM sodium oxalate in minimal acid challenge medium results in a significant increase in survival of *E. coli* cells

compared to cells challenged in the absence of sodium oxalate at pH 3.0. However, unlike the well-known glutamate-dependent AR2 system, oxalate confers no apparent acid resistance at pH 2.5. Cells did not survive when challenged with the addition of 50 mM oxalate. Further, the oxalate-dependent acid resistance required overnight induction with oxalate in a dose dependent manner (1 to 50 mM sodium oxalate). Greatest survival was seen in cells grown to stationary phase in 50 mM sodium oxalate. Single deletion mutants of each gene in the *yfdXWUVE* operon were grown to stationary phase and challenged at pH 3.5 in minimal medium supplemented with 1 mM oxalate. Survival was similar to that of cells grown in control medium (not oxalate). Thus, it seems that acid resistance conferred by oxalate in the medium is lost when genes in the *yfdXWUVE* operon or *yhjX* were deleted, suggesting they are indeed involved in this low pH survival mechanism.

P6.04

STEM CELL DERIVED FACTORS REGULATES THE DIFFERENTIATION OF HUMAN FIBROBLASTS

Nishant K. Rout and Ujjwal K. Rout

Department of Surgery, University of Mississippi Medical Center, Jackson, MS USA

Stem cells may not only differentiate into other cell types but may also regulate the shape and functions of other cells. This may be incurred by specific molecules that are released by stem cells. Human Adipose Derived Stem Cells (ADSCs) were tested for this potential. ADSCs were cultured and supernatants were collected at 48 and 72h of incubations. Medium from parallel cultures, with no ADSCs, were also collected at the same time. Effects of the culture supernatant or the medium were examined on the proliferation of human skin fibroblasts in culture using a fluorescent based method. Results show that ADSCs supernatants from 48h culture inhibit the proliferation of fibroblasts. This effect was not observed with the supernatant collected at 72h of incubation or media collected at 48h and 72h of incubation. Our data indicate that human ADSCs release some molecules in the medium that may inhibit the proliferation of other cells. The absence of any effects of supernatants from 72h culture suggest that there may be a temporal control for the release of molecules from the ADSCs and/or at later time (72h) additional molecules are released that may inhibit the functions of those released earlier (at 48h).

**P6.05****ANALYSIS OF TOBRAMYCIN RELEASE FROM HYDROGELS, TRICALCIUM PHOSPHATE CAPSULES AND TCP PASTE**

Simeyon Butler, Michelle A. Tucci, and Hamed Benghuzzi

Alcorn State University and The University of Mississippi Medical Center, School of Health Related Professions, Jackson, Mississippi

The purpose of this pilot study was to determine the *in-vitro* release properties of tobramycin by tricalcium phosphate (TCP) paste. In addition, two different forms of TCP capsules, matrix and reservoir, were characterized. Two types of TCP paste were constructed: three sham TCP paste (Group A) and three tobramycin loaded TCP paste (Group B). The TCP paste samples were placed in a 24 well plate and allowed to solidify and dry overnight. The material was then submerged in 1 mL of PBS and 1 mL elutant were collected and replaced every 10 min for the first hour and then hourly for the next 8 hours. Sampling continued every 24 hours for the next 3 days. The elutant (10 uL) from selected capsules was placed onto bacterial discs and placed on confluent *Staphylococcus aureus* agar plates to evaluate zones of inhibition. There was a statistically significant difference in the concentration of tobramycin released between Group A versus Group B over a 3 day period. Bacterial discs containing Group A elutant did not have a visible zone of inhibition, while Groups B elutant discs had an appreciable zone of inhibition for the duration of the study. Group A sham paste eluted no antibiotics implying that TCP by itself lacks antibacterial properties. Group B paste eluted sustained tobramycin concentrations that were bactericidal for the duration of the study. The data from this study demonstrates that the sustained release property of tobramycin loaded TCP matrix allows for a suitable mode for local antibiotic delivery.

P6.06**DICHLOROACETATE INDUCES APOPTOSIS IN MELANOMA CELLS**

Jacob Morgan and Elizabeth Brandon, Ph.D.
Mississippi College, Jackson, MS

P6.07**THE ROLES OF LEPTIN AND IGF-1 IN MELANOMA CELL MIGRATION**

Eden Johnston, Chasity Moss, Krystal Stewart, and Elizabeth Brandon, Ph.D.

P6.08**THE ROLES OF LEPTIN AND IGF-1 IN MELANOMA PROLIFERATION BY**

Sam Yelverton, Matt Bosarge, and Elizabeth Brandon, Ph.D.

P6.09**LEPTIN AND IGF-1 SIGNALING IN MELANOMA CELLS**

Ashton Brown, Corey Hicks, Nate Gorham, M.S., and Elizabeth Brandon, Ph.D.
Mississippi College, Jackson, MS

P6.10**THE ROLE OF LEPTIN IN MELANOMA CELL SURVIVAL**

Daniel Roberson, Josh Ferguson, and Elizabeth Brandon, Ph.D.
Mississippi College, Jackson, MS

P6.11**CHARACTERIZATION AND ANALYSIS OF A RANAVIRUS THAT AFFECTS ECOLOGICALLY IMPORTANT NORTH AMERICAN SALAMANDERS: AMBYSTOMA TIGRINUM VIRUS**

Mississippi College, Jackson, MS

P6.12**CHARACTERIZATION AND ANALYSIS OF A RANAVIRUS THAT AFFECTS ECOLOGICALLY IMPORTANT SILURIFORMES: EUROPEAN CATFISH VIRUS**

Mississippi College, Jackson, MS

P6.13**CHARACTERIZATION AND ANALYSIS OF A RANAVIRUS THAT AFFECTS ECOLOGICALLY IMPORTANT SILURIFORMES: EUROPEAN SHEATFISH VIRUS**

Mississippi College, Jackson, MS

P6.14**CHARACTERIZATION AND ANALYSIS OF A RANAVIRUS THAT AFFECTS ECOLOGICALLY AND ECONOMICALLY IMPORTANT PERCIFORMES: LARGEMOUTH BASS VIRUS**

Mississippi College, Jackson, MS

P6.15**CHARACTERIZATION AND ANALYSIS OF A RANAVIRUS THAT AFFECTS ECONOMICALLY IMPORTANT AQUACULTURED ANURANS: RANA CATESBEIANA VIRUS - Z**

Mississippi College, Jackson, MS

P6.16**CHARACTERIZATION AND ANALYSIS OF A RANAVIRUS THAT AFFECTS ECOLOGICALLY IMPORTANT SALMONNIFORMES: EPIZOOTIC**

HEMATOPOIETIC NECROSIS VIRUS

Mississippi College, Jackson, MS

P6.17**CHARACTERIZATION AND ANALYSIS OF THE REPLICATION TRAITS OF A TEMPERATURE SENSITIVE MUTANT STRAIN OF THE TYPE SPECIES RANAVIRUS: CLASS I**

Mississippi College, Jackson, MS

P6.18**CHARACTERIZATION AND ANALYSIS OF THE REPLICATION TRAITS OF A TEMPERATURE SENSITIVE MUTANT STRAIN OF THE TYPE SPECIES RANAVIRUS: CLASS II**

Mississippi College, Jackson, MS

P6.19**CHARACTERIZATION AND ANALYSIS OF THE REPLICATION TRAITS OF A TEMPERATURE SENSITIVE MUTANT STRAIN OF THE TYPE SPECIES RANAVIRUS: CLASS III**

Mississippi College, Jackson, MS

2:00- 4:00 Symposium**INNOVATIVE HEALTH PROFESSIONAL EDUCATION: THE CHALLENGES OF INTEGRATION**¹Francis I. Achike, ¹John Jones, and ²Robin Rockhold¹William Carey University, College of Osteopathic Medicine, Hattiesburg, MS 39401²University of Mississippi Medical Center, Jackson, MS 39216

The Flexner report of 1910 represents a watershed moment in the history of modern medical / health professional education. It set the foundation for what is today referred to as the traditional medical curriculum. The report not only emphasized on the need for integration of the clinical and basic medical sciences, it also laid the foundation for the recognition, growth and development of the various disciplines that make up scientific medicine. By the middle of the 20th century, the various disciplines had grown enormously, many beyond their traditional boundaries into novel disciplines (or sub-disciplines). This geometric growth in knowledge, aided by silicon chip technology, created an unprecedented ease of information dissemination and concomitantly, changes in medical concepts. Despite these factors, the American medical school curriculum remains fixed at 4 years of training, leading to a need for innovative curricular approaches. The doctor/ health professional of tomorrow will need to cope with

rapid changes in medical knowledge and attitudes. He must be equipped with knowledge, attitudes and skills for integrating the rapid advances in medical sciences into clinical practice. He should be well-adjusted to an increasingly medically aware and litigious public. Modern innovative medical/ health professional curricula are geared toward producing graduates with these characteristics, including communication and information and communication technology (ICT) skills.

Dodge Poster (poster session 2)

6:30-8:00 (10 posters)

P6.20**THE EFFECT OF THREE COMMONLY USED RESTORATIVE DENTAL ADHESIVES ON THE CELLULAR STRUCTURE AND FUNCTION OF HUMAN GINGIVAL FIBROBLASTS**

Garner AD, Tucci MA, Benghuzzi HA

University of Mississippi Medical Center, Clinical Health Sciences Graduate Program and Department of Dental Hygiene

The purpose of this study was to test the effectiveness of three potential bonding materials on the proliferation, viability, and functional capacity of the human gingival fibroblasts in an in vitro environment. The cultured gingival fibroblasts used were obtained from the American Type Culture Collection (ATCC). The three bonding materials used were Polymethyl methacrylate, OptiBond®, and Prime & Bond®. Fibroblasts were treated with each bonding agent for durations of 24, 48, and 72 hours. Biochemical analysis determined that there was a significant difference among the groups metabolic behavior ($P = <0.001$). Prime & Bond demonstrated the expression of protein in all phases compared to the other two agents. Glutathione and Malondialdehyde Determination assays indicated that there was a significant difference in the metabolic activities, along with membrane and cellular alterations seen in the cells treated with Polymethyl methacrylate ($P = <0.001$). It is concluded that Polymethyl methacrylate caused greater damage to cellular structure and function of human gingival fibroblasts in in vitro cultures compared to OptiBond®, and Prime & Bond®. Overall conclusion, this investigation suggests that the physiochemical characteristics of restorative

P6.21**ACCESS TO CARE AND HEALTH-RELATED QUALITY OF LIFE IN PLWHA**Denise D. Krause¹, Kenneth R. Butler, Jr.¹, Warren L. May²*University of Mississippi Medical Center, Department of Medicine¹ and Department of*



Preventive Medicine, Jackson, MS

The objective of this study was to describe the relationship between access to care and health-related quality of life (HRQOL) for persons living with HIV/AIDS (PLWHA) by administering a statewide survey to a random sample. This cross-sectional observational study queried 220 PLWHA in Mississippi based on a random probability sample derived from the Mississippi State Department of Health's communicable disease tracking system. Data were obtained on access to care, demographic and social characteristics, and HRQOL. MANOVA models demonstrated income level, having experienced problems accessing care, and having been prescribed antiretroviral medications to be significantly associated with HRQOL. Eliminating barriers is an important goal in improving quality of life for PLWHA. This research provides a model for examining associations between access to care-related variables and HRQOL. Based on the findings of this study, improving access to care of specific services is a major factor in improving quality of life. Overall, most participants reported sufficient access to care and good HRQOL. Additional support services are needed to help PLWHA deal with mental health, anxiety, depression, and disability.

P6.22

REVIEW OF THE EFFECTS OF LOW-LEVEL LASER THERAPY ON WOUND HEALING: CHRONIC ULCERATIONS

Newman, R., Tomlinson, F., Brown, E., Sutton, T., Shearry, C., Lott, M., Slaughter, J., Greenwald, N., Huang, M., Department of Physical Therapy, School of Health Related Professions, University of Mississippi Medical Center, Jackson, MS 39216

Purpose: Wound reduction secondary to laser treatment has been demonstrated in various animal studies. The purpose of this systematic review was to determine the effectiveness of low level lasers therapy (LLLT) on healing of chronic ulcerations. Further incorporation of LLLT into wound care practice is dependent upon additional research on humans.

Methods: The database used for the systematic review was PubMed. General search terms were low level laser therapy and ulcers. Electronic limits included humans, English and randomized control trial. Exclusion criteria included ligament/tendon, bone, scars, post-surgical wounds and animal studies. Internal validity was determined using the PEDro 10 point scale. The articles analyzed averaged 6. Oxford Centre of Evidence Based Medicine (CEBM) levels of evidence were assigned for each study based on individual PEDro scores. The average CEBM score

for all studies included in the review was a III.

Results: All studies included met the criteria determined valid for this review. There were seven studies selected. One study scored a Level II on the CEBM and the other six scored a III. The PEDro score varied from receiving a 5 to 7 out of 10. The average score was a 6.14.

Conclusion: In conclusion, majority of studies described that the addition of LLLT resulted in reduction of wound size and promoted wound healing. However, only one study demonstrated a significant statistical difference above the other methods of treatment. Our systematic review of LLLT on chronic ulceration received an overall grade of "B" due to varying degrees of internal validity in the articles selected. According to the evidence examined, the addition of LLLT to the standard of care for chronic ulcerations has the potential to shorten the wound size reduction time frame. Further research is encouraged to determine the clinical effectiveness of laser therapy and its incorporation into wound care practice.

P6.23

THE EFFECTS OF BONE MORPHOGENETIC PROTEINS ON MESENCHYMAL STEM CELL VIABILITY AND DIFFERENTIATION

Lisa Dorman, Michelle Tucci, and Hamed Benghuzzi
University of Mississippi Medical Center, Jackson, MS 39216

The need for bone graft substitutes is increasing. The understanding of how these potential treatments exert their effect is lacking. The goal of this project was to add information to the discovery of the signaling networks of osteogenic growth factors. Specifically, to evaluate mesenchymal stem cells (MSC) after exposure to various osteogenic growth factors (BMP-2, BMP-7, and BMP-13) for dose and time dependant changes in cell number, growth, viability. Also, to evaluate MSC cells for dose and time dependant cytological changes as well as bone specific markers (alkaline phosphatase, osteocalcin, and osteopontin) after administration of growth factors. The final specific goal of this project was to evaluate MSC cells after exposure to various osteogenic growth factors for SMAD, MAPK, and JAK STAT intracellular signal pathways, and compare those with the known signaling pathways proposed for osteoblast cells. The data demonstrated the effectiveness of all experimental factors to safely stimulate osteoblast-like cells to grow, differentiate, and produce markers of bone cell maturity.

P6.24**EFFECT OF PLATELET DENSE GRANULE CONTENTS UPON OSTEOBLAST VIABILITY**

Siddhant K. Mehta, Michelle Tucci, and Hamed Benghuzzi

University of Mississippi Medical Center, North State Street, Jackson, MS 39206

The incorporation of platelet-rich plasma (PRP) into scaffolds for application in musculoskeletal injuries has been a topic of recent interest in orthopaedic surgery. Platelets have dense granules containing ADP, ATP, serotonin, and calcium; and alpha granules containing PDGF, VEGF, IGF, TGF- β , and EGF. Particular focus of previous studies has been on mitogenic effects of alpha granules, but the role of dense granules in PRP therapy currently remains undefined.

The objective of the present study was to evaluate the effect of ATP, ADP, and serotonin upon osteoblast viability *in vitro*. Human osteoblast-like cells (MG-63 cells) were exposed to phosphate buffered saline (control group), ATP (20 μ M), ADP (10 μ M), and serotonin (11.75nM) for 24, 48, and 72 hours. Osteoblast viability, cellular damage, and cellular morphology were evaluated at each timepoint. When compared to controls, osteoblasts treated with ATP and ADP resulted in a significant reduction in cell number, while serotonin caused an increase at 24 hours. Similar trends were noted at later timepoints. At 48 hours, a trend towards increase in glutathione was observed with ADP and ATP, but was not sustained at 72 hours. No significant differences in membrane damage were detected between groups. Results of this study demonstrate that ATP, ADP, and serotonin induced significant structural adaptive responses to osteoblastic activities. The data revealed minimal functional alteration as evident by biomarker measurements. *Overall conclusion:* the results provided further insight regarding PRP therapy for traumatized bone.

P6.25**THE EFFECT OF REFERRING PROVIDER PROXIMITY ON CARDIOVASCULAR DISEASE STATE FOR UNIVERSITY HEART INVASIVE PROCEDURES AT THE UNIVERSITY OF MISSISSIPPI MEDICAL CENTER**

Dorthy K. Young, K. Mechelle Keeton, and Fazlay Faruque, PhD

University of Mississippi Medical Center, Jackson, MS

Geographic Information Systems analysis offers a multiple layer visual tool that bolsters the

understanding of the dynamics of health care, disease prevalence and patient population. This study is intended to provide a retrospective review of 1437 University of Mississippi Medical Center (UMMC) patients undergoing invasive cardiovascular and electrophysiology procedures, to examine the relationships between referring provider location, disease state, and proximity to UMMC. After receiving IRB approval the dataset involved was analyzed using ArcGIS and SPSS software. The referring provider location was geocoded, referral volume for each provider calculated and mean cardiovascular disease state was calculated using a MSDRG-based ranked scale (on a scale of 1-9, with 1 indicating least severe disease progression and 9 indicating most severe). Maps were generated indicating disease state by county, referral volume by county, and a three dimensional view of the relationship between the two factors.

This study was intended to determine whether a statistically significant difference between mean cardiovascular disease state level, referring provider location and proximity to referring provider exists. 339 referring providers were identified, with regards to referral volume, the data was not normally distributed according to the Shapiro-Wilke test ($p < 0.0001$), the mean was 4.236 ± 0.622 and the median was 1.0. The mean cardiovascular disease state, as determined by the ranked scale, was 3.415 ± 0.079 , the median was 3.00, and the data was not normally distributed according to the Shapiro-Wilke test ($p < 0.0001$). The individual provider referral volume, county and proximity to UMMC frequencies were calculated. No statistically significant correlation between mean referral volume, provider distance, county and disease state scale, was found ($p = 0.613, 0.900, 0.419$). A statistically significant correlation between referring provider volume and distance and between mean referring volume and mean disease state was found ($p = 0.0001$). With regard to referral volume, 26.3% ($n = 89$) originated from UMMC providers, followed by providers at a distance of 100,000-150,000m with 18.6% ($n = 63$), and 1,000-10,000m with 15.9% ($n = 54$). 45.1% of referring providers were located in Hinds County ($n = 153$), 4.1% in Rankin County ($n = 14$), 3.8% in Madison County ($n = 13$), 3.2% in Washington County ($n = 11$), and 2.9% in Forrest County ($n = 10$).

The results of this study could be used to identify UMMC patient populations throughout the state that receive cardiovascular interventions at a more advanced disease state. As the state's only academic medical center, UMMC could use this study to better target underserved populations and educate referring providers on best practices for management of



cardiovascular disease. The information gained from this analysis will also help identify areas of the state in which preventative health education programs might be helpful in reducing the number of patients that do not receive proper cardiovascular care until advanced stages of disease progression.

P6.26

LOW LEVEL LASER THERAPY VS EXERCISE FOR TREATMENT OF CHRONIC LOW BACK PAIN: A SYTEMATIC REVIEW

Felix Adah, Natalie Danforth, Jena Tetzlaff, Mary Tackett, Jack Aubic, Nathan Sexton, Robert Ellis
University of Mississippi Medical Center, Jackson, MS

Friday

February 24, 2012

8-10 Health Fair

O6.10

9:00 EVALUATION OF POLYMERASE CHAIN REACTION ASSAY FOR DETECTION OF METHICILLIN Resistant *Staphylococcus aureus* IN A HOSPITAL SETTING.

Gay Henson¹, Donna Sullivan², Shelia King², Andrea Swiatlo¹

¹G. V. "Sonny" Montgomery VA Medical Center, USA, ²University of Mississippi Medical Center, USA

Purpose: Recent changes to Medicare and Medicaid have established a policy of non-reimbursement for hospital acquired (HA) infections. Methicillin resistant *Staphylococcus aureus* (MRSA) infections are a major problem in hospitalized patients. Several studies have shown that identification of MRSA carriers and appropriate cohorting reduce the number of extended hospital stays. **Materials and Methods:** Validation studies are required for implementation of any new techniques prior to use in a CLIA/CAP certified laboratory. Duplicate swabs were collected from nasal passages of patients. One swab was used to inoculate MRSA (Chromagar and/or BioMerieux) agar plates for overnight culture. A visual identification of MRSA colonies was made. The second swab was employed in the Cepheid Gene Xpert MRSA assay, a polymerase chain reaction (PCR) assay. **Results:** Results of the two protocols were compared to determine correlation of MRSA identification in patient samples. The VA laboratory employed a standard set of 15 known MRSA positive samples and 15 known negative samples as well as quality control strains of *S. aureus*. The University of Mississippi Medical Center conducted validation

assays employing samples obtained from staff and laboratory personnel. For both laboratories, there was a perfect correlation between culture and PCR results. **Conclusions:** The VA and UMMC laboratories have adopted the PCR technology as equivalent to traditional culture techniques. Although initially more expensive, PCR provides a major advantage in that the turn-around time for the assay, allowing the identification of MRSA carriers for cohorting and special care precautions.

O6.11

9:30 QUANTITATION OF IMMUNOGLOBULIN E USING FLUORESCENCE ASSAY

Adam Shirley, Sabrina Bryant, Margot Hall
University of Southern Mississippi, USA

The following paper describes an experiment to fluorescently tag immunoglobulin E (IgE) with Alexa Fluor® 488 Dye carboxylic acid, tetrafluorophenyl (TFP) ester and measure known concentrations of the dye-protein complex using a Biotek Synergy 2 Micro-plate reader to determine its fluorescence intensity. IgE is a human antibody that mediates immediate hypersensitivity reactions and aids the immune system in defending the body against parasitic infection. The characteristics and functions of IgE and fluorescence are discussed followed by a detailed protocol on the tagging of Alexa Fluor® 488 Dye to IgE. The fluorescence is successfully measured using the micro-plate reader on samples with known concentrations ranging between 20 ug/mL to 100 ug/mL using a Gen5 computer software program. Lastly, the author explores how the experiment could be implemented into the clinical setting along with how the procedure could be expanded using fluorescence polarization.

O6.12

9:45 EXPRESSION PROFILE OF INFLAMMATORY MARKERS AFTER KIDNEY TRANSPLANTATION IN ASSOCIATION WITH GFR.

Benita Williams¹, Debbie Rigney², Jordan Windham², Kori McDaniel², Fanzia Butt², Alan Hawxby², Olga McDaniel²
¹Mississippi INBRE Program, USA, ²University of Mississippi Medical Center, USA

Aim: Allograft dysfunction after renal transplantation occurs as a result of the interplay between mechanisms that maintain graft tolerance and promote rejection. Several biological markers have been identified to play a critical role in allograft rejection, including cytokines and Toll-like receptors (TLRs). We hypothesized that in response to signals

released from injured kidney cells due to ischemia/reperfusion the TLRs expressed on renal epithelium become activated, causing release of pro-inflammatory cytokines and allograft dysfunction. **Methods:** We used 45 transplant patients, 3 samples from each at different time intervals (pre-transplantation, day 3, and day 6 post-transplantation) were tested using a quantitative RT-PCR. AIF-1, TLR-2 and TLR-4, IFN-g, IL-10, IL-17, IL-17R and IL-18 mRNA were tested. The group differences for mRNA transcript levels between the clinical outcomes were determined by 1 way analysis of variance. **Results:** TLR-2 and TLR-4 expression levels were increased 1.2-1.4-fold in PBMCs from samples obtained at post-transplantation in association with poor glomerular filtration rates (GFR), high creatinine and BUN levels. The mean SEM level of IL-10 was increased with high GFR (GFR >60), whereas, IL-18 and IFN-g were 1.4-1.6-fold increased allograft rejection and low GFR. TLR-2 was increased 2-fold with high GFR (0.005) in neutrophils, also it was reduced 2.8-fold with low GFR ($p < 0.002$). IL-17R, AIF-1 and TLR-4 all were reduced on day 6 ($p < 0.03$). **Conclusions:** IL-18, IFN-g, IL-10, TLR-2 and TLR-4 played a major role in regulating the recipient's immune responses during the early phase after transplantation and may influence the outcome of allograft survival.

O6.13

10:00 PERIVASCULAR ADIPOSE TISSUE RELAXATION OF RAT THORACIC AORTA IS PARTIALLY EDNO-MODULATED.

Francis Achike

William Carey University, Hattiesburg, MS

The perivascular adipose tissue (PVAT) is traditionally considered a structural tissue with no physiologic function, but it is now known to exert both vasorelaxant and contractile effects.¹ We explored the mechanism by which PVAT exerted relaxant effect in endothelium-denuded but not endothelium-intact thoracic rat aorta. Endothelium-intact or denuded rings with or without PVAT were dissected from male Sprague-Dawley rats and were mounted in Krebs solution for isometric tension recording. The tissues were contracted with phenylephrine (PE, 0.1nM - 0.1mM) in the presence or absence L-NAME (NOS- blocker) or the c-GMP inhibitor, methylene blue (MB). PVAT had no observable effect on endothelium-intact tissues but exerted anti-contractile (relaxant) effects in LNAME- / MB- treated or untreated endothelium-denuded tissues. PVAT exerted relaxant effect in L-NAME- but not the MB-treated endothelium-intact tissues. The results reaffirm our earlier finding that

PVAT causes relaxation of thoracic aorta through a mechanism that is inhibited by the endothelium. The endothelium inhibitory effect is EDNO- but not cGMP modulated.

O6.14

10:15 POLYCATIONS AS NOVEL ANTICOAGULANTS BLOCK TISSUE FACTOR-DEPENDENT FVII ACTIVATION: A POSSIBLE MECHANISM

Arthur J. Chu¹, Wujian Miao²

¹Biological & Physical Sciences, Delta State University, Cleveland, MS, ²Department of Chemistry & Biochemistry, University of Southern Mississippi, Hattiesburg, MS

Background: Tissue factor (TF), an initiator of the extrinsic blood coagulation, is often susceptible to upregulation by tissue injury, advanced glycation end-product, or diverse inflammation/infection. TF hypercoagulability is accompanied by elevated generation of clotting factors and fibrin production in many pathological conditions. Apart from thrombotic consequence, coagulant mediators (e.g., FVIIa, FXa, and thrombin) and fibrin are proinflammatory; protease-activated receptors or Toll-like receptors mediate such pro-inflammation. In this laboratory, we have previously shown the modulation of extrinsic hypercoagulation by intervening TF-dependent FVII activation at post-translational level. **Results:** Assessing rabbit brain TF (rbTF) procoagulant activity (PCA) in vitro by a single-stage clotting assay, polycations including compound 48/80, polybrene, and cationic polyamino acids substantially prolong clotting time. These polycations preferentially suppress FVIIa formation, which is also shown as non-competitive inhibition on FVIIa amidolytic activity by a chromogenic assay. Quartz Crystal Microbalance (QCM) demonstrates high affinities of polycations for rbTF. Moreover, such affinities are significantly correlated with (1) rbTF-PCA and (2) inhibition constants (K_i) in the presence of polycations in the respective assays. Our data suggest that polycation binding to rbTF could serve as a mechanism by which polycations block TF-dependent FVII activation. **Conclusion:** Such unique upstream downregulation of blood coagulation could present polycations as a new class of anticoagulants. In view of coagulation-dependent inflammation and the new paradigm of blood coagulation-inflammation-thrombosis circuit, polycationic anticoagulants could contribute to antiinflammation, antithrombosis, and cardioprotection. Further development of effective anticoagulants is of biopharmaceutical significance in broadly easing diverse disease conditions.



10:45-12:00

Poster II (poster 3)**P6.27****EXPRESSION OF INFLUENZA PROTEINS IN *Saccharomyces cerevisiae***Graeme Campbell², Stephen Stray¹¹Department of Microbiology, University of Mississippi Medical Center, USA, ²Base Pair Program, University of Mississippi Medical Center, USA

We have cloned genes from influenza virus into expression plasmids for transformation into *Saccharomyces cerevisiae* (budding yeast). Transformants will be tested for the ability to synthesize viral proteins and produce influenza virus-like particles (I-VLP). I-VLP could be a quicker, more efficient means of constructing future vaccines. Yeast-based vaccines are in use for hepatitis B and human papillomaviruses, and would have advantages over the current vaccine because yeast cultures allow large scale production without live fertilized chicken eggs. (Supported by the Howard Hughes Medical Institute)

P6.28**THE INVOLVEMENT OF MATRIX METALLOPROTEINASES DURING THE PROGRESSION RENAL INJURY IN TYPE-II DIABETIC NEPHROPATHY RATS**Carlos Rucker¹, Denisha Spire², Tiffani Slaughter³, Adrienne Wells³, Patrick Kyle³, Richard Roman³, Jan Williams³¹Murrah High School, USA, ²Tougaloo College, USA, ³University of Mississippi Medical Center, USA

The Type 2 Diabetic Nephropathy (T2DN) rat is a rodent model of type-2 diabetes that develops progressive proteinuria and glomerular abnormalities that resemble patients with diabetic nephropathy (DN). We recently demonstrated that chronic blockade of matrix metalloproteinases (MMPs) with XL784 (50 mg/kg/day) markedly prevented the progression of renal injury in T2DN rats. However, which isoform(s) of MMPs that plays a significant role in the development of renal injury remains to be determined. The current study determined whether MMP levels are increased during the development of renal disease and examined whether lower doses of XL784 would be effective in reducing the progression of renal injury in T2DN rats. We observed that MMP-2 protein levels and MMP-9 activity were increased during the development of renal disease in T2DN rats. The next set experiments were performed on uninephrectomized T2DN rats at 24 weeks of age and separated into four groups: (1)

vehicle, (2) XL784 (5 mg/kg/day), (3) 20 mg/kg/day, or (4) 50 mg/kg/day. At 36 weeks of age, proteinuria (indicator of renal injury) increased to 208±34 mg/day in vehicle treated rats while chronic treatment of XL784 at all three doses inhibited the development of proteinuria. These data indicate that MMP-2 and -9 are involved in the progression of renal injury in T2DN rats and provide preliminary evidence that MMP inhibitors hold the potential to prevent the progression of renal disease in patients suffering from DN. This study was supported by the Howard Hughes Medical Institute and NIH grants HL36279 and HL29587.

P6.29**CONTROLLING PLASMA GLUCOSE LEVELS REDUCES RENAL INJURY IN DIABETIC DAHL SALT-SENSITIVE RATS**Denisha Spire¹, Tiffani Slaughter², Carlos Rucker³, Adrienne Wells², Patrick B. Kyle², Richard J. Roman², Jan M. Williams²
¹Tougaloo College, USA, ²University of Mississippi Medical Center, USA, ³Murrah High School, USA

Recently, we observed that the induction of diabetes in Dahl salt-sensitive (SS) rats promoted the development of renal histological abnormalities including mesangial expansion, glomerulosclerosis, and interstitial fibrosis with progressive proteinuria similar to patients with diabetic nephropathy. The current study examined whether treatment with a therapeutic dose of insulin would reduce the progression of renal injury in diabetic SS rats. Nine week-old SS rats were treated with (1) vehicle, (2) streptozotocin (STZ, 50 mg/kg, i.p.) to induce diabetes and given one insulin implant (2 U/day, s.c) to maintain plasma glucose between 300-400 mg/dL, or (3) STZ and two insulin implants to normalize plasma glucose levels (90-110 mg/dL). Rats were fed a low sodium diet containing 0.3% NaCl to minimize the development of hypertension. At 18 weeks of age, proteinuria (an indicator of renal injury) increased to 302±36 mg/day in STZ-treated SS rats versus 103±13 mg/day in vehicle treated rats. Treatment with a therapeutic dose of insulin prevented severe development of proteinuria in STZ-treated SS rats (101±14 mg/day). Kidneys from STZ-treated SS rats displayed signs of inflammation, glomerulosclerosis, tubular necrosis, and interstitial and renal fibrosis. In contrast, administration of the therapeutic dose of insulin reduced inflammation and markedly improved the renal histopathology. These results suggest that controlling plasma glucose levels could be an effective treatment in patients with diabetes-induced renal disease.

P6.30
HYPOXIA STIMULATED ENDOTHELIN-1 SECRETION FROM UTERINE LEIOMYOMAS; LINKING HYPERTENSION WITH FIBROID DEVELOPMENT.

Justin Porter, Kedra Wallace, Evan Turnage, Krystal Frazier, Venessa Johnson, Bryan Cowan, Babbette LaMarca

University of Mississippi Medical Center, Jackson, MS

Uterine leiomyoma (fibroids) are benign tumors of the female reproductive tract and a major cause of infertility in women of reproductive age. Fifty percent of UMC patients undergoing hysterectomy for uterine fibroids have underlying hypertension. Hypoxia, decreased oxygen, is implicated in transformation and aberrant cell growth of normal myometrium into leiomyomas. We and others have shown a potent vasoconstrictor peptide Endothelin-1 (ET-1) to be associated with fibroid growth. We hypothesize that hypoxia stimulated ET-1 is a link between the development of uterine leiomyoma and hypertension. Therefore, we tested the hypothesis that hypoxia stimulated ET-1 in the human myometrium similar to that seen in fibroids. Immediately following hysterectomy, fibroids and myometrium are excised and cultured in a modular incubator chamber programmed for hypoxia cycles (final 1% pO₂). Intermittent hypoxia (IMH) for 6 hours was followed by 18 hours normoxia (6% pO₂). ET-1 was measured from culture supernatants by ET-1 ELISA and mRNA was measured via real-time PCR. ET-1 increased in fibroid media compared to myometrium (9.69±2.72 vs 6.81±1.41 pg/mg/mL). ET-1 mRNA was significantly increased in fibroid tissue (14.37 + 0.11ΔCT) compared to myometrium (10.28±.56 ΔCT; p<0.002). Hypoxia stimulated myometrial ET-1 secretion (8.10±2.38 pg/mg/mL) and mRNA to levels comparable to ET-1 secretion and mRNA from normoxic fibroid cultures (13.27 vs 8.42 ΔCT). These data indicate that ET-1 is increased in the fibroid and further stimulated by hypoxia. Moreover, hypoxia stimulated myometrium ET-1 secretion, similarly to that of uterine leiomyomas, thereby supporting a link between hypoxic-stimulated ET-1, hypertension and uterine fibroids.

- (Supported by the Howard Hughes Medical Institute)

P6.31
CD4+T CELL BLOCKADE PRIOR TO PLACENTAL INSULT ATTENUATES HYPERTENSION AND SFLT-1 IN RESPONSE TO PLACENTAL ISCHEMIA

James Gill, Sarah Novotny, Kedra Wallace,

Pushpinder Dhillon, Janae Moseley, Judith Heath, James Martin, Babbette LaMarca
University of Mississippi Medical Center, Jackson, MS

Preeclampsia is associated with hypertension, activation of CD4+ T cells, and anti-angiogenic factor sFlt-1. We have shown hypertension in the RUPP rat model of preeclampsia proceeds with CD4+T cell activation and sFlt-1 production. Therefore, we hypothesize that blockade of CD4+ T cells with abatacept (Orencia) would attenuate hypertension and sFlt-1 in RUPP pregnant rats. Four groups of pregnant rats were examined: NP (n=20), RUPP (n=20), NP+orencia (NP+O; n=12) and RUPP+orencia (RUPP+O; n=19). Orencia (250mg/kg) was infused via jugular catheter on day 13 into NP (n=31) rats. On day 18 carotid catheters were inserted into all groups, day 19 blood pressure (MAP) analyzed, plasma collected for FACS analysis of CD4+ T cells, placental explants isolated, cultured and media analyzed for sFlt-1 secretion. MAP increased from 94±/2 mmHg in NP rats to 123±/3 mmHg in RUPP rats. Circulating CD4+ T cells increased in RUPP compared to NP, 66%±/3% and 55.5%±/2.7% respectively (p<0.04) but was attenuated in RUPP+O (54.8±/2.5%) and was 59±/4% in NP+O. The hypertensive response in RUPP rats was attenuated with CD4+ T cell blockade, MAP was 104±/2 mmHg in RUPP+O, and was 96±/2 mmHg in the NP+O. Placental sFlt-1 secretion was 488±/61 pg/ml in RUPP placentas but was significantly decreased to 151±/28 pg/ml in RUPP+O placentas (P<0.001). These data demonstrate the importance of activation of CD4+ T cells in mediating hypertension and placental sFlt-1 in RUPP rats thus suggesting the importance of immune activation in the pathophysiology of preeclampsia. (Supported by the Howard Hughes Medical Institute)

P6.32
A GEOGRAPHIC INFORMATION SYSTEMS (GIS) ANALYSIS TO DETERMINE WHETHER LOW ACCESS TO MEDICAL CARE RESULTS IN HIGHER CANCER STAGING DUE TO INADEQUATE CANCER SCREENING IN MISSISSIPPI

Denae Bradley, Elizabeth Nichols, Fazlay Faruque, Roy Duhe

University of Mississippi Medical Center, USA

Mississippi's overall cancer mortality rank is fifth highest in the United States. Cancer is Mississippi's second leading killer with 15,000 new cases and 6,000 deaths per year. While Caucasians have a higher incidence of cancer, African Americans have higher cancer mortality rates. Cancer screening



detects various cancers at early stages before symptoms appear, when treatment is more likely to succeed. Our research will examine the effects of access to care on cancer staging in Mississippi by using Geospatial Information Systems (GIS) to map the five most lethal cancers in Mississippi: breast, lung & bronchus, colon & rectum, prostate, and pancreas. The major challenge of our experimental design is to determine how large of a geographic area is needed to provide sufficient epidemiological data to test our hypothesis in a statistically meaningful manner, without losing the geospatial resolution needed to identify locations where geographic disparities exist. The three components of our experimental process are to: 1) map all health care facilities; 2) develop a survey to assess the availability and accessibility of cancer screening services and technologies (as defined by current U.S. Preventive Services Task Force recommendations); 3) complete the GIS map with population data, cancer staging and cancer screening capacity data. Within each geographic sector of the map, data sets will be analyzed to determine how the availability and accessibility of cancer screens correlates with cancer staging; we will then determine if this trend is statistically significant throughout Mississippi.

P6.33

A STINGING HEALING TO PROSTATE CANCER

Alice Johnson, Tamesha Barnes and Dr. Stacy Hull Vance

Diagnostic and Clinical Health Sciences, School of Health Related Professions,
Clinical Laboratory Science, University of Mississippi
Medical Center, Jackson, Mississippi, USA

Annually, 29, 093 men die in the United States each year from prostate cancer. African American men are more susceptible to prostate cancer and usually have more aggressive forms of prostate cancer. Stinging nettle (*Urtica dioica*) has a long medicinal history and has been used as a diuretic, treatment for joint pain and prostate cancer.

Objective: The objective of this project was to determine if *U. dioica* can be utilized in the treatment of prostate cancer utilizing LNCAP prostate cell line.

Hypothesis: *U. dioica* will decrease the rate of proliferation and viability of LNCAP cells.

Methods: A total of 24 wells were plated with androgen positive prostate cancer cell and subdivided into four equal groups. Group 2-4 was treated with 1ng, 2 ng or 20 ng of *U. dioica*, respectively. **Results:** After 24 hours of treatment the groups treated with 1 ng or 2 ng of *U. dioica*

significantly decreased cell numbers in comparison to the control. The administration of 1-2 ng of *U. dioica* significantly increased PSA secretion at 24 and 48 hours in comparison to the control. Cell count was insignificantly different from the control in the group treated with 20 ng of *U. dioica* 24 hours. **Conclusion:** Our data suggest that within 24 hours of treatment 1ng or 2 ng of *U. dioica* is effective in lowering the number of prostate cancers in vitro. The lower concentrations (1 ng or 2 ng) were more effective at the shorter durations, but the effects were not long lasting.

P6.34

PHENOTYPIC CHARACTERIZATION OF *cydDC* MUTANTS OF *MYCOBACTERIUM SMEGMATIS*.

Kimyattia L. Smith and Michael D. Lundrigan.
Department of Microbiology, University of
Mississippi Medical Center, Jackson, MS 39216.

Interference with microbial aerobic respiration would undermine energy-requiring processes of bacteria resulting in death. The respiratory cytochrome *bd*-type terminal oxidases are unique to bacteria and thus are attractive targets for antimicrobial intervention. We previously reported the construction and preliminary characterization of knockout strains of the *M. smegmatis* *CydDC* ABC transporter. The *cydDC* genes are immediately downstream of the genes for the mycobacterial cytochrome *bd*-type terminal oxidase, *cydAB*, and are probably encoded as an operon along with *cydAB*. In *Escherichia coli* the orthologous *CydDC* transporter is required for assembly of the *b*- and *c*-type cytochromes and has been shown to transport the redox molecule glutathione into the periplasm. Mycobacteria do not produce glutathione but instead synthesize a functionally equivalent molecule known as mycothiol. Our hypothesis was that the *CydDC* transporter of Mycobacteria transports mycothiol. The phenotypes of constructed *cydDC* allelic exchange mutants of *M. smegmatis* were examined and compared to phenotypes described for *E. coli* *cydDC*. Growth curve experiments demonstrated that *M. smegmatis* *cydDC* mutants are not slow to exit stationary phase. Results from disc diffusion assays showed that the mutants were more sensitive to dithiothreitol and cysteine than the wild-type strain. When complemented with wild-type genes on plasmids, these mutants behaved as wild-type. *M. smegmatis* *cydDC* phenotypes are similar, for the most part, to those of *E. coli*; however, the phenotypes do differ with respect to exit from lag phase. Additionally, complementation and RT-PCR results indicate that sensitivity to various chemical

agents is not the result of altered expression or functionality of the *bd*-type oxidase.

P6.35

EFFECTS OF ASTRAGALUS ROOT ON RHESUS MONKEY KIDNEY CELLS

*Ashley Tucker, *Carol Irizarry Capetillo and Dr. Stacy Hull Vance

Diagnostic and Clinical Health Sciences, School of Health Related Professions, Clinical Laboratory Science, University of Mississippi Medical Center, Jackson, Mississippi, USA

In the US, kidney disease is the ninth leading cause of death; diabetes and hypertension are the most common causes of chronic kidney failure. If you have diabetes or hypertension, you have a greater risk of developing kidney disease. Kidney disease often proceeds silently over many years, with no signs or symptoms. *Astragalus root* an ancient root from Northern China and Mongolia is giving positive results in lower the kidney diseases related problems. Chen Li (2009) study showed that AR had a greater reducing effect on protein levels in urine. Liu D (2003) study showed also the AR is effective in reduce the levels of creatinine and reduce cellular damaged. **Objective:** The objective of this research was to determine if *Astragalus root* will reduce the levels of: creatinine, uric acid, protein, cellular damaged, nitric oxide and cell count. The research team is going to use normal cell line of Madin-Darby canine kidney cells and incubated with a solution of AR. **Hypothesis:** The research team expects that AR will reduce the Rhesus Monkey kidney cells by the following process: apoptosis, inhibits cell proliferation, pro-inflammatory response or phagocyte function. **Methods:** Kidney damage will be assessed using creatinine, uric acid, MDA and protein as biochemical markers. **Conclusion:** Our data suggests Astragalus may require at least 48 hours in order to observe its protective effect and additional time frames should be evaluated to determine the long term effects of Astragalus on normal renal tissue.

P6.36

THE EFFECTS OF EGCG ON BLOOD COAGULATION

*Deberal McKinney, *Ashley Williams, and Dr. Stacy Hull Vance

Diagnostic and Clinical Health Sciences, School of Health Related Professions, Clinical Laboratory Science, University of Mississippi Medical Center, Jackson, Mississippi, USA

Epigallocatechin gallate (EGCG) has many

beneficial properties in relation to health. For example, it reduces inflammation in Inflammatory Bowel Disease, raises HDLs while lowering LDLs, and helps control blood sugar in cases of Type I diabetes. EGCG selectively induces apoptosis in human carcinoma cell lines. EGCG blocks the activation of EGF receptors and HER-2 receptors which are over-expressed or constitutively active in many human malignancies. **Objective:** To evaluate the effects of EGCG on activated partial prothrombin time after 1 day and 7 days. **Hypothesis:** The addition of EGCG will result in prolonged activated partial prothrombin. **Methods:** 20 men and 20 women (age 20s-70s) whole blood patient samples were collected in sodium citrate (blue top) tubes. 10 μ L or 20 μ L of 720 mg concentration of EGCG was added to 400 μ L of each patient's plasma. The partial thromboplastin (APTT) times of each patient were measured on a STart@4 analyzer. The APTT times were measured on Day 1 and Day 7 using the protocol provided. The samples were stored in a refrigerator between testing periods. **Conclusion:** After 1 day the male and female test results showed a significant increase in the APTT times above the initial times obtained for each patient measured to >100 seconds. After 7 days the APTT times were significantly elevated and were all >120 which is the cut off reference range for APTT. Our data suggests that EGCG is effective in preventing platelet aggregation and its consumption should be evaluated further to determine its full potential.

P6.37

INHIBITION OF STAPHYLOCOCCUS AUREUS AND METHICILLIN-RESISTANT STAPHYLOCOCCUS AUREUS USING EPIGALLOCATECHIN GALLATE

*LaShandra Harris, *Taylor Lee, and Dr. Stacy Hull Vance

Diagnostic and Clinical Health Sciences, School of Health Related Professions, Clinical Laboratory Science, University of Mississippi Medical Center, Jackson, Mississippi, USA

Studies have shown that Epigallocatechin gallate (EGCG) is helpful for cardiovascular health, cancer prevention, weight loss, and has antimicrobial properties. Several studies have shown that combining EGCG with various antibiotics, β -lactam drugs particularly increases the drugs' potency. EGCG has also been found to be an effective antimicrobial against various gram positive and gram negative bacterial species such as Staphylococcus infections. EGCG effectively inhibits bacterial attachment by directly binding to the peptidoglycan layer which affects the integrity of the bacterial cell



wall. **Objective:** The objective of this project was to determine the minimum inhibitory concentration of various concentrations of EGCG and its effectiveness against *S. aureus*, *S. epidermidis*, and MRSA. **Hypothesis:** The lower concentration of EGCG will be more effective against the *S. aureus*, *S. epidermidis*, and will not be effective against MRSA. **Methods:** 320 mg capsules of EGCG were dissolved in cell culture media starting with a stock concentration of 720mg. Each filter paper disk was inoculated with 20 μ L of EGCG and various dilutions were made. **Conclusion:** Data obtained suggests: (1) EGCG pills at a concentration of 720mg concentration demonstrated antibacterial properties against *S. aureus* and *S. Epidermis*. (2) The 30 mmol EGCG extract was effective in inhibiting the growth of *S. aureus*, *S. epidermis* and MRSA. (3) *S. epidermis* was the only organism susceptible to EGCG pills in a dosage of 680mg. From this study we established the dosage required to inhibit the growth of the bacteria and potentially prevent host invasion

P6.38

THE ANTIMICROBIAL EFFECTS OF NIGELLA SATIVA

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Thymoquinone (TQ) is the bioactive component of the plant herb *Nigella sativa* that has been used for over 2,000 years. Not only has it been used as a form of treatment for several issues, TQ has also been used as an antineoplastic, antioxidant, and antimicrobial drug. **Objective:** The objective of this project was to determine the optimal concentration of thymoquinone required to treat infections with *Enterococcus faecalis*, *Staphylococcus aureus* or *Streptococcus Pyogenes*. **Hypothesis:** Thymoquinone will be an effective antimicrobial agent against *E. faecalis*, *S. aureus*, and *S. Pyogenes*. The zone of inhibition will be concentration dependent. **Methods:** Ten Mueller-Hinton plates each were used to determine the MIC for *E. faecalis* and *S. aureus*. A 1:10 dilution was performed with ten test tubes starting with a 30mM concentration of TQ. Only five plates were used for *S. aureus* starting with a 50mM concentration of TQ that was diluted. **Conclusion:** *E. faecalis* treated with a 30mM- 0.0000003mM did not result in zones of inhibition. TQ was not effective in inhibiting the growth of *E. faecalis*

utilizing the concentrations used in this study. Treating *S. aureus* with 30mM- 0.0000003mM were not effective in inhibiting the growth of the bacteria. The 50mM of TQ produced zones of inhibition but were only specific to *S. pyogenes*. Additional tests may need to be completed in order to establish the optimal concentration TQ for each type of bacteria. Additional studies should include use of TQ in combination with conventional antibiotics.

P6.39

THE EFFECTS OF BONE REGULATORS ON OSTEOCLAST CELLS

Vincent Morton, Kendra Whittington, Michelle Tucci, and Hamed Benghuzzi

University of Mississippi Medical Center

The cellular mechanisms responsible for the adaptation of bone are modeling and remodeling. Bone modeling produces a change in the size and shape of the bone when new bone is deposited without previous bone resorption. During remodeling, resorption by osteoclasts precedes bone formation by osteoblast cells. Recently, neuropeptide Y (NPY) an extremely potent protein in the nervous system has been proven to be a stimulator of many bodily functions. In particular, the neuropeptide Y receptor site 2 (NPY2) has been linked specifically to osteoclast proliferation. Estrogen and Demineralized Bone Matrix (DBM) play an important role in overall bone remodeling to include maintaining a balance of osteoblast and osteoclast cell activity. We have found that converting RAW 264.7 murine macrophages with receptor activator of nuclear factor κ B ligand (RANKL-cRAW) and introducing these cells to a 20ng concentration of NPY antagonist altered the morphology and decreased total cell counts by nearly 18% over a 24, 48, and 72 hour period. The same concentration of estrogen and DBM was added to the cultured cells and was thought to reduce the overall proliferation of osteoclast cells and was found unsuccessful. After incubation of cRAW macrophages, cells were stained with Hematoxylin and Eosin stain to evaluate the morphological features. Results showed a total reduction of multinucleated cells in all wells of the culture plate that included the control, NPY antagonist, Estrogen and DBM over the 24, 48, and 72 hour period. Additionally, an upward trend was identified in the glutathione assay performed during all phases indicating oxidative stress to the cells as seen with the principle of cell survival. The data shows Y antagonist may be a useful and safe compound that could be used in the treatment of osteoporotic fractures.

P6.40**THE EFFECTS OF BONE REGULATORS ON OSTEOBLAST CELLS**

Kendra Whittington, Vincent Morton, Michelle Tucci, and Hamed Benghuzzi

University of Mississippi Medical Center

Currently, osteoporosis affects over half of our population beyond the age of 50, and hip fractures related to osteoporosis accounted for direct costs of \$18 billion in 2002 ("About Osteoporosis: Fast Facts", 2006). The average length of a hospital stay for a primary fracture diagnosis is nearly one week, and approximately 25% of previously independent older patients who sustain hip fractures remain in long-term care for over a year. In response to the necessity for improved fracture care and shortened healing time, the field of orthopaedic surgery has begun to turn toward cellular and molecular biology research for the next answer. The goal of the proposed research is to determine if current treatment and potentially new therapeutic compounds are capable of regulating bone cell function. Osteoblast cells were treated for periods of 24, 48 and 72 hours in the presence of estrogen, demineralized bone matrix proteins, or an antagonist to neuropeptide Y. Following the incubation, cell viability, cell function, and morphology were determined. The results indicated a significant increase in osteoblast proliferation and alkaline phosphate production in cells treated with estrogen and DBM without evidence of cellular damage. The data shows Y antagonist may be a useful and safe compound that could be used in the treatment of osteoporotic fractures.

P6.41**THE EFFECTS OF SUGAR PHOSPHATES IN REDUCING HIF-1 α UNDER HYPOXIC CONDITIONS**

Wesley Perrett, Victoria Scott, Gerri Wilson, David Black, Michelle Tucci, and Ham Benghuzzi

University of Mississippi Medical Center, Jackson, MS

Preliminary research has shown evidence of the presence of connective tissue growth factor CTGF in the tenosynovium of patients with carpal tunnel syndrome, a finding which supports the fibrotic pathophysiological progression of the disease. Connective tissue growth factor (CTGF) expression is regulated through the actions of two distinct molecular signals; transforming growth factor-beta (TGF- β) and hypoxia inducible factor-1 alpha (HIF-1 α). Mannose-6 phosphate is a natural inhibitor of TGF- β and can also be converted to fructose 6 phosphate which we have shown is

capable of reducing HIF-1 α . The goal of this experiment was to determine if mannose 6 phosphate is capable of reducing HIF-1 α reducing both components of the CTGF pathway. Fibroblast cells were subjected to 5 μ M or 50 μ M concentration of either fructose 1,6 diphosphate (F6P) or mannose 6 phosphate (M6P) for a period of 24 hours in either ambient or hypoxic conditions. After the incubation period, cell viability, cell damage, morphology, and concentration of HIF-1 α were determined. Cell numbers were reduced by approximately 50% in hypoxic conditions compared with ambient control. Intracellular glutathione concentration was increased significantly under hypoxic conditions compared with control. The concentration of reduced glutathione in both F6P and M6P were similar to ambient air values indicating a protection against oxidative stress. Hypoxia inducible factor-1 alpha was increased in cells under hypoxic conditions compared to base line levels in normoxic treated cells. Interestingly, only 5 μ M F6P was able to reduce HIF-1 α back toward control normoxic values. The data suggest that the HIF-1 α pathway leading to fibrosis is not the primary pathway for reductions in CTGF following MP6 treatments. This information is important in terms of developing compounds which decrease adhesion while not decreasing cell viability or impairing cellular function.

P6.42**THE EFFECTS OF SUSTAINED DELIVERY OF ALENDRONATE ON THE KIDNEY IN OVARIECTOMIZED FEMALE RATS**

Aaron Burchfield, Lacey Taylor, Christina Woods, Michelle Tucci, and Ham Benghuzzi

University of Mississippi Medical Center, Jackson, MS

Bisphosphonates are indicated for the treatment and prevention of osteoporosis in adults; the treatment and prevention of glucocorticoid-induced osteoporosis; the treatment of Paget's disease; and the treatment of multiple myeloma in patients with documented bone metastases. Two long-term trials in cancer patients demonstrated an increase in serum creatinine (SCr) when 8 mg of bisphosphonate was administered, prompting a recommendation to reduce the dose to 4 mg. The risk for renal toxicity remains a possibility following chronic administration of bisphosphonate treatment for osteoporosis. The goal of the study was to evaluate the kidney of osteoporotic female rats following chronic administration of alendronate using a drug delivery device for 4 weeks and compare the finding with control non-ovariectomized animals, ovariectomized control animals (OVX), and ovariectomized animals with an empty drug delivery



system. The results of the study showed significant increases in body weights in the ovariectomized animals compared with non-ovariectomized animals. The organ wet-weights were not statistically different between the control and treatment groups or the ovariectomized and non-ovariectomized animals. Histological and histomorphometric analysis of the kidney revealed significant changes in the glomerular area on alendronate treated animals at 4 weeks when compared with ovx, ovx-sham and control non-ovariectomized animals. The results indicate chronic use of alendronate for osteoporosis may impair renal function or increase renal related problems in patients with existing kidney disease.

P6.43

THE EFFECTS OF GENISTEIN ON PROSTATE CARCINOMA CELLS

Aisha January and Dr. Stacy Hull Vance
University of Mississippi Medical Center, Jackson, Mississippi, USA

Prostate cancer is the third most common cause of death from cancer in men of all ages and is the most common cause of death from cancer in men over age 75. Genistein is one of the most abundant isoflavones found in soy. The main source of genistein is soybeans. Genistein has been known for possessing anti-cancerous properties. The anti-cancer action of genistein has been linked to the inhibition of tyrosine kinases and angiogenesis, antioxidant property, and anti-estrogen action, which helps to reduce the risk of hormone related cancers, such as breast and prostate cancers. The objective of this project was to evaluate the inhibitory effects of Genistein on the proliferation and viability of prostate carcinoma cells *in vitro*. The administration of genistein will result in a decrease in cell growth and survival of prostate carcinoma cells *in vitro*. Genistein was administered at 3 levels, 10, 50, and 100 mMol, over a 24 hour and 48 hour time frame using CRL-2505 Human Prostate Carcinoma cell line. The cells were counted and several assays were performed, such as Malondialdehyde (MDA) Assay, Glutathione Assay, and the AxSYM Free PSA Assay. After 24 hours of treatment the groups treated with 50 and 100 mMol of genistein resulted in a decrease in cell proliferation and an increase in MDA, NO, and PSA levels after 24 and 48 hours of incubation. Our study indicated treating prostate cancer cells with 50 or 100 mMol of genistein may be beneficial in treating prostate **cancer in vitro**.

Plenary Speaker 12:00-1:00

1:15 Student Awards and Business Meeting

HISTORY AND PHILOSOPHY OF SCIENCE

Chair: Dr. Paula Smithka,

University of Southern Mississippi

Vice-chair: J.J. Sylvia IV,

Itawamba Community College

February 23

Thursday MORNING

O7.01

9:00 ON THE GENERAL LINEAGE CONCEPT OF SPECIES

Kenneth J. Curry, Paula J. Smithka

University of Southern Mississippi, Hattiesburg, MS, United States

Over twenty different definitions or descriptions of species have appeared in the last twenty or so years which have enlivened, if not exacerbated, the already difficult species problem. Criteria attributed to species have included reproductive isolation, mate recognition, ancestral-descendant sequence of populations, unique ecological adaptive zones, genetic and ecological group cohesion, various incarnations of monophyly, phenetic similarity, and genotype clusters among others. Kevin de Queiroz suggested in 1998 that all the various concepts of species had one thing in common: they all included the concept of a lineage of populations. He suggested, in a series of papers published between 1998 and 2011, that the confusion over species came from conflating a concept of species with criteria for discovering, identifying, or delimiting species. He has urged biologists to embrace a General Lineage Concept of Species while accepting the tenets of the various proposed "concepts" as criteria for identifying important aspects of given particular species. His approach calls for recognizing a species conceptually as a segment of a lineage between speciation and extinction events. We agree with his approach in general, but argue that the species as a level of biological organization is fundamental to the species concept and should play a more central role in the General Lineage Concept than de Queiroz has allowed. Understanding this level of organization is complicated by the elusive nature of lineage which current usage situates at the levels of alleles, organisms, populations, and species.

O7.02**9:30 THE FECUNDITY OF HOMEOSTATIC PROPERTY CLUSTERS FOR DEMARCATING BIOLOGICAL SPECIES**

Paula Smithka, Kenneth Curry

University of Southern Mississippi, Hattiesburg, MS, United States

Kevin de Queiroz (1998; 1999; 2005a, b, c; 2011) has argued that the species lineage is the common link among modern species concepts. Other criteria demarcate, delineate, and identify particular species. This distinction is fecund because it provides explanatory unification for what constitutes a biological species. We argue that the homeostatic property cluster kind (HPCK) conception of demarcating species (e.g., Kornblith 1993, Boyd 1998) is more fecund than other species demarcation criteria because (1) it is compatible with those criteria and (2) it provides a way to unify those criteria. The various species concepts focus on different demarcation aspects: phenotype (phenetic concept), genotype (genotypic cluster), mate recognition (recognition concept), etc. HPCK contains elements of virtually all of the proposed species concepts. The covariance of characteristics in organisms is the result of functional interaction of genes and environmental factors-various mechanisms and processes-that form a stable property cluster, the homeostatic property cluster (HPC). The HPC is reliable for identifying members and delimiting species, precisely because of homeostasis; the property cluster is resilient against genetic and environmental perturbations. A new species could begin to emerge under the conditions that perturbations are significant enough to create a "crisis" in homeostasis. A new species will be acknowledged when the new property cluster has achieved homeostasis; it will be a new HPCK. Thus, the HPCK conception of species employs what all field biologists use for identification and demarcation, namely, characteristics, yet undergirds those properties with causal mechanisms and processes that maintain homeostasis.

10:00 BREAK**O7.03****10:15 THE QUANTUM MECHANICAL BASIS FOR HUMAN FREE WILL**

Kinsey-Ann Zarske

University of Southern Mississippi, Hattiesburg, MS, United States

The question of whether or not humans have free will has been frequently debated. Philosophers have periodically drawn upon contemporary

scientific theories to try and answer the question of free will, often linking free will to the concept of causation. Based on the modern theories of quantum mechanics, I argue that humans do have free will. In order to establish my case, I will trace the impact of Classical mechanics and quantum mechanics on the philosophical concept of free will.

Classical mechanics impacted free will primarily through the concept of determinism. Within such a deterministic framework, humans had no choice but to act as they do. I will analyze that position as posited by Bertrand Russell and Pierre-Simon Laplace.

Quantum mechanics contends that the universe is innately indeterministic as illustrated by Schrödinger's infamous cat. Richard Feynman's use of probability in quantum mechanics reshaped the previous conceptions about causation on the sub-atomic level. Tim Maudlin's views of the impact of quantum mechanics on philosophy will be examined.

O7.04**10:45 AN EXPLORATION OF THE RANGE OF VALUES IN THE MORAL LANDSCAPE**

J.J. Sylvia IV

Itawamba Community College, Tupelo, Mississippi, United States

In his 2010 book "The Moral Landscape," Sam Harris argues that by defining morality in terms of well-being, science can, in principle, determine our values and tell us how we ought to behave. He argues that neuroscience can, in theory, measure "well-being," which we could then use to determine what is morally correct by working to maximize this well-being. I will consider several criticisms of this claim before arguing that there is a simpler objection to be made.

Harris says, "It seems uncontroversial to say that a change that leaves everyone worse off, by any rational standard, can be reasonably called bad, if this word is to have any meaning at all." I argue that well-being is only one of the values that must be taken into account in moral judgments, but there are other, possibly competing values which are relevant for morality that may not actually lead to increased well-being. For example, it may be that promoting personal autonomy leads to a society which is, all things considered worse off in terms of well-being. Yet, we may value autonomy in such a way that we would choose a life of autonomy and diminished well-being over a life without autonomy but with a higher overall well-being. I will consider several possibilities for ideas that may be of moral value whether or not they actually increase overall well-



being. In other words, there are some things we morally "ought" to do but that do not increase our scientifically measurable well-being.

07.05

11:15 KANT ON BIOLOGICAL TELEOLOGY

Georgia Rae Rainer, Kenneth J. Curry

University of Southern Mississippi, Hattiesburg, MS, United States

Immanuel Kant was born (1724) into a society that largely embraced a mechanical universe in which matter theory rested on material properties of size, shape, solidity, and motion. But the development of organisms from undifferentiated matter could not be explained by the properties of matter alone. The ontogeny of organisms appeared to have a goal toward which matter was organized, and the parts of organisms seemed in so many instances to play both cause and effect of each other. Kant argued that human artefacts were explained in part by the intention of the designer and in part by the mechanics of construction and subsequent operation. By contrast, organisms were not the product of a designer, but did indeed seem to be ends in themselves, i.e., designed. Hence he referred to organisms as purposes of nature or natural purposes. We could understand much about organisms in mechanical terms, but not their goal-directed organization. Ultimately Kant argued that we can understand organisms through mechanism subordinated to a natural teleology, where that natural teleology was a heuristic device. Darwin proposed in 1859 that new species came from pre-existing species through natural selection. Biological natural selection provides a theoretical basis for understanding apparent design ranging from biomolecules through organisms and their ontogeny, to populations and species. Natural selection is understood to operate without any internal or external design. We suggest that natural selection at least partially answers Kant's teleological dilemma with a mechanical explanation with apparent, but not actual, design.

Thursday AFTERNOON

1:45 BUSINESS MEETING

07.06

2:00 ANTI-REALISM, OBSERVATION, AND ANALOGY

Jonathan L. Cain

University of Southern Mississippi, Hattiesburg, MS, United States

Many philosophers think that, on the most

basic level, scientific explanations are made by analogy; this simply means that we use some mechanism or process we are already familiar with to explain an unknown mechanism or process. Rom Harré thinks we first apply a somewhat "weak" or imprecise analogy, and fine tune as we make more relevant observations. Eventually an iconic model is developed with the aim of knowing the causal process itself. There is ample room here for a Humean kind of skepticism. I wonder how we come to know the original process. Is it even necessary to know such a process, or it be simply imagined? The claim that the original process is imagined is comparable with Harré's account of explanation, though this fact leaves his account open to a kind of "anti-realism". The question is, at what point can it be said that we have come to know some real causal process? The answer can easily be 'never'.

07.07

2:15 SCIENCE: WORLD UNDER CONSTRUCTION

Georgia Rae Rainer

University of Southern Mississippi, Hattiesburg, MS, United States

Society naively accepts the position of scientific realism, which grants that science has an epistemic advantage in providing true theories about a mind-independent natural world. For realists, there is no distinction made between observable and unobservable entities in that both have the same ontological status that aid in the discovery of facts about the natural world. The opposing position, scientific anti-realism, traditionally denies the existence of a mind independent world and claims that the explanatory value of scientific theories is based not on truth or correlation to the perceived world, but rather how well the theory works within the paradigm where it is situated. Anti-realists frequently grant an ontological status to the observable entities but not unobservables yielding an empirical distinction between competing theories, which is warranted based on the restricted abilities of the unaided human senses. Superempirical values, such as parsimony and coherence, are merely a heuristic device for the reasoning apparatus of the human mind, and are not relevant deciding factors between paradigms or theories. I defend a variety of anti-realism in that there are no grounds to assert claims about a mind independent world, because we cannot apprehend objectivity beyond our perceptions. Science is only a pragmatic enterprise of constructing particular worlds, including facts and laws, based on sociological aspects such as, economics, politics,

competition, and the relevant scientific community, that renders predictive value but has no ontological commitment to the observable or unobservable truth of scientific theories.

2:30 BREAK

07.08

2:45 HOW DO YOU DEFINE THE NUMBER ONE? PART III

Andrew Harrell

Independent Researcher, Vicksburg, MS, United States

I have given two previous talks in our division about this problem. The first dealt with abstract epistemology, or how this question affects the philosophy of the way we know things. The second gave a short summary of the history of Truth as far as the 17 Aristotelian syllogisms go. It then discussed how logic machines, and the algebra of Boolean logic functions were developed. They arose out of the problem of how to represent this Aristotelian form of truth more symbolically (mathematically). This talk will focus on a short history arising from a century of thinking about how these ideas can be implemented in hardware (computers). We will look how electrical telegraph wiring diagrams implement Boolean logic. Shift registers are a physical implementation (representation) of zero, the number one, and the positive integers. We will look at how they are constructed from these simple basic logic functions. First electrical wires were used, then vacuum tubes, then transistors, then using solid state circuit boards, and finally in our present day solid state chips. What is next, probably, nano-technology? How we can do it inside ourselves, using parts of ourselves (our DNA)?

3:15 A CONCEPTUALIST INTERPRETATION OF GÖDEL'S FIRST INCOMPLETENESS THEOREM

William F. Suttle III

Independent Scholar, Hattiesburg, MS, United States

In 1931, Kurt Gödel, *On Formally Undecidable Propositions of Principia Mathematica and Related Systems*, presented proofs, the results of which are referred to as his 'incompleteness theorems', that any consistent formally axiomatized system strong enough for arithmetic is essentially such that there are true statements (called 'Gödel Sentences') able to be formalized within the system that cannot be derived, i.e. proved, within that system. His proofs are usually understood to

demonstrate fundamental limitations of the axiomatic method for mathematics. Gödel was a mathematical Platonist. He believed that the objects of mathematical inquiry are abstract, mind-independent entities: mathematical objects are literally discovered, not invented. I argue that from a constructivist standpoint, i.e. the view that mathematical objects are invented, Gödel's proofs have quite different consequences. For the constructivist, Gödel's proofs do not demonstrate a fundamental limitation in the axiomatic method, but that there are well-formed mathematical expressions that in principle are neither true nor false. One implication of this interpretation is that some central problems of contemporary mathematics, e.g. the continuum hypothesis, Goldbach's conjecture, etc. may be well-formed mathematical expressions that are neither true nor false. Unfortunately, as I will explain, we cannot know which mathematical expressions belong to this category, only the ones that do not belong to this category. However, contrary to the standard interpretation of Gödel's proofs, this implies no limitation on the axiomatic method, as axiomatic systems are designed for the purpose of deriving what can in principle be derived within those systems.

MARINE AND ATMOSPHERIC

Chair: Dr. Charlotte Brunner,
The University of Southern Mississippi
Vice-Chair: Dr. Kevin Dillon,
The University of Southern Mississippi

February 23, 2012

FRIDAY MORNING

08.01

9:00 OIL SPILL AND SEA SURFACE EFFECTS OVER GULF OF MEXICO USING WRF AND SATELLITE DATA

Francis Tuluri, R. Suseela Reddy Remata, Duanjun Lu, Jessica Everett, Bhaskar Rao Dodla, Ajnaneyulu Yerrammilli

Jackson State University, Jackson, MS, United States

In the present study, we investigate the Gulf of Mexico oil spill effects on environmental changes in atmospheric circulation, using Weather Research Forecast (WRF) model simulations, and effects on the sea surface temperature (SST), and tropical cyclone heat potential (TCHP), using satellite data. Compared to the month of June climatology of SST (27⁰ C), the current satellite data showed very high SSTs (a peak of about 31⁰C) corresponding to



an increase of about 3⁰ C, much higher than expected due to seasonal heating. The corresponding heat potentials over the Gulf have shown elevated values of about 80 J/cm³, which has potential to develop tropical disturbances into severe storms. The model simulations of WRF captured the observed increase in SST and showed westerly wind patterns—like the wind reversal circulation of a high pressure system due to El Nino conditions—and indicate the possibility that the large-scale oil slick has affected the weather patterns associated with the Loop Current and eddies over the Gulf, leading to increases in SST and TCHP. In the absence of any other major factors responsible for affecting the Gulf, the onset of the high pressure system in the region may be attributed to the changes in wind patterns and may be responsible for blocking the passage and hindering the growth of hurricanes that tend to pass towards the U.S. Gulf coast region as observed in the case of Hurricane Alex.

Research Laboratory.

08.02

9:15 MEASUREMENT OF RADON CONCENTRATION IN THE PEARL RIVER, MISSISSIPPI

Yinghao Chen, Joy Buck, Alan M. Shiller

The University of Southern Mississippi, Hattiesburg, MS, United States

Radon-222 is a natural radioactive noble gas which is part of the ²³⁸U decay-series. Rocks containing radioactive elements continually diffuse radon to the surrounding areas including ground water. The natural radon in rivers could be used to help understand the ground water discharge as well as some other processes, such as gas exchange across the air-water interface. Water samples have been collected from the East Pearl River at the Stennis Space Center (SSC) weekly beginning in October, 2010. Surface water was collected by pump and stored in 2-L glass bottles. The bottles were connected to a RAD 7 RADON DETECTOR in a closed air-loop mode with a desiccant tube. The radon concentrations of most samples in the Pearl River are low with values typically in the range of 0.05-0.2 Bq/L. The result shows a seasonal variation with higher values in winter (~0.2 Bq/L) and lower values in summer (~0.1 Bq/L). The seasonal variation may be due to the temperature effect on diffusion across the air-river surface. On the other hand, the Pearl River discharge at SSC is affected by the Pearl River at Bogalusa, La. and the Hobolochitto Creek. The radon concentration shows positive correlation with the river discharge. There was also a very high

value of radon (~0.65Bq/L) during the spring flooding period in March. This may have resulted from flushing of local marshes or flushing of fertilized soils. We are also measuring the radium-226 concentrations in some samples. The relationship between radium and radon concentrations may help us better understand the sources of the radon.

08.03

9:30 THE DELIVERY, SPECIATION AND FATE OF TOXIC METALS IN ST. LOUIS BAY, MS

Gopal Bera, Alan Shiller, Kevin Yeager

The University of Southern Mississippi, Hattiesburg, MS, United States

Estuaries play an important role in the transport of sediment-bound materials through the coastal zone, both in terms of storage and chemical processing. St. Louis Bay in southern Mississippi is a useful estuary to study sediment-bound pollutant transport because it is shallow and hence prone to wind-driven resuspension as well as being disturbed by occasional tropical weather systems. To determine the influence of natural resuspension of sediment on trace metal distributions and transport, I am looking at seasonality of metal distributions in the water column, suspended particulate matter, and pore waters. To date, I have found that some stations with high silt-clay percentages in bottom sediments show addition of dissolved nickel (Ni), cobalt (Co), manganese (Mn), iron (Fe), chromium (Cr) and copper (Cu) to the water column. When I compare the metal distribution of September, 2010 (wind speed = 6-7 knots) with metal distribution of September, 2011 (samples collected one day after Storm Lee; wind speed = 35-40 knots), I have found that concentrations of Mn, Ni, Co and Cr are 2-5 fold higher in the September, 2011 samples. Thus addition of dissolved trace metals might have been caused by natural resuspension of bottom sediment along with high river discharge. Another important goal of this project is to evaluate the impact of Hurricane Katrina on sediment and associated pollutant deposition history in marshes fringing St. Louis Bay. We have found disturbed sediment layers (indicated by total Pb-210, POC profile) in wedge cores which might have been caused by Hurricane Katrina.

08.04**9:45 SEASONAL VARIATIONS OF DISSOLVED AND PARTICULATE CARBOHYDRATE IN THE MISSISSIPPI SOUND/BIGHT**Kusumica Mitra, Laodong Guo*The University of Southern Mississippi, Hattiesburg, MS, United States*

Dissolved carbohydrates (CHO), including monosaccharides (MCHO) and polysaccharides (PCHO), and particulate carbohydrates (p-CHO) are major components of natural organic matter and play an important role in biogeochemical cycles of carbon and may serve as an indicator of the bioreactivity and diagenetic state of both dissolved and particulate organic matter. This study is aimed to provide new insights into the abundance and partitioning of CHO between dissolved and particulate phases and their seasonal variations in the Mississippi Sound/Bight. MCHO was the dominant species in the dissolved CHO, with high concentrations in the month of March and May 2011, resulting from the influence of the Pearl River and flooding event from the Mississippi River through Bonnet Carr spillway. The discharge peak of Pearl River and Mississippi River matches for these specific months which is controlling the MCHO concentration resulting in the seasonal variation of dissolved and particulate CHO. The percentage of MCHO/DCHO was up to 90% during the Mississippi River influence while average percentage of MCHO/DCHO was 65%. There is a strong seasonality in the distribution and partitioning of CHO. The fraction of particulate CHO in the total CHO pool increased from January to June but decreased again from June to September in 2011, consistent with the variations in water temperature and primary production and opposite for dissolved-CHO in the total CHO pool. There is a positive correlation between p-CHO and chlorophyll-a (Chl-a) but a negative correlation between DCHO and Chl-a for the same months, indicating phytoplankton as a source of p-CHO.

08.05**10:00 GENE EXPRESSION AND GROWTH AS INDICATORS OF EFFECTS OF THE BP DEEPWATER HORIZON OIL SPILL ON *CYNOSCION NEBULOSUS***Rachel Brewton, Richard Fulford, Joe Griffitt*The University of Southern Mississippi, Hattiesburg, MS, United States*

To assess potential impacts of the *Deepwater Horizon* oil spill, we are examining the effects of hydrocarbon exposure on individual fish in

laboratory assays. *Cynoscion nebulosus* (spotted seatrout) are considered a good indicator of estuarine health because they occupy a mid-trophic level, are estuarine residents and show plasticity in their growth due to environmental conditions. Laboratory assays of survival and growth of spotted seatrout as a function of dispersed oil concentration were conducted at Gulf Coast Research Laboratory (GRCL) Toxicology Research Center using spotted seatrout. Weathered oil was produced for experiments by mixing crude oil with seawater for 24 hours creating a water accommodated fraction (WAF); chemically enhanced weathered oil (CEWAF) was produced with the same methods using both crude oil and dispersant (Corexit 9500). Juvenile fish were exposed to a sublethal concentration (10 mg/L loading rate) of either CEWAF, WAF or dispersant alone for 72 hours in a spiked exposure. At the conclusion of the exposure, individuals were removed and measured. 2 individuals from each treatment were sacrificed. The surviving fish were retained for 6 weeks to evaluate if the effect of exposure on the growth of the fish. To confirm exposure of the fish to hydrocarbons, biomarker stress responses to hydrocarbons were evaluated within these fish; using Cytochrome P450-1A levels. Evidence of endocrine disruption was evaluated using vitellogenin as a biomarker.

08.06**10:15 BACKGROUND LEVELS OF METHANE IN THE VICINITY OF THE DEEPWATER HORIZON SITE**Hannah Roberts, Alan Shiller*The University of Southern Mississippi, Hattiesburg, MS, United States*

A significant fraction of the material released by the leaking Macondo well was methane. A deep (~1000 m) methane plume with high micromolar concentrations was observed by others during this event. This is in contrast to low nanomolar concentrations normally expected for these waters. In our work, samples were taken in October of 2011 in the vicinity of the wellhead to collect background level profiles and also check for continuing leakage. The dissolved CH₄ of the samples was measured using a cavity ringdown spectrometer following headspace equilibration. The resulting profiles showed dissolved methane concentrations of 2 - 10nM in the surface waters with a maximum coinciding with the chlorophyll maximum around 50 m. A sharp decline in concentration to the low nanomolar range was observed in the rest of the water column, with some locations showing an increase of 1 - 12 nM in bottom



samples. These profiles are in accord with other background methane profiles from the northern Gulf of Mexico, suggest a lack of significant continuing methane leakage from the wellhead, and also suggest that the plentiful natural seeps in the area do not substantially affect background methane.

10:30 Break and Division Business Meeting

08.07

10:45 ASSEMBLAGES OF LIVE BENTHIC FORAMINIFERA NEAR THE DEEPWATER HORIZON OIL SPILL IN THE NORTHERN GULF OF MEXICO

Valerie Cruz, Charlotte Brunner

The University of Southern Mississippi, Hattiesburg, MS, United States

The study's main objective is to compare live benthic foraminiferal assemblages at contaminated and uncontaminated bathyal sites around the Deepwater Horizon oil spill. The sample analyzed here came from an uncontaminated site (PAH: 73 ng/g) and is part of a larger project to determine the effects of the spill on benthic ecology. The top 10 cm of sediment from a multicorer tube was sliced into 1-cm intervals, and each was soaked for 24 hours in a buffered solution of rose Bengal and seawater. Samples were washed through a sieve with 45 μm openings and split into equal portions using a settling-type splitter. Splits of >300 specimens were picked wet from a gridded Petri dish and identified at successive depth intervals until 95% of the living assemblage was accumulated. To date, over 60 species of foraminifera have been identified with 32.7 to 13.7% of specimens yet to be identified. The top first centimeter is dominated by *Textularia earlandi*, *Bulimina* sp., *Uvigerina* sp., and *Rutherfordoides mexicana* with relative frequencies of 31.2, 7.7, 3.1, and 3.6%, respectively. The relative frequency changes with depth and by mid core *Fursenkoina tessellata*, *Bolivina* sp., *Cassidulina curvata*, *Epistominella* sp., and *T. earlandi* dominate with percentages of 10.0, 8.8, 6.7, 6.6, and 4.3%, respectively. The density decreased from 484 to 129 tests/10 cm^3 from 0 to 6 cm, but increased sharply to 312 tests/10 cm^3 below. The density minimum lies at the base of an intensely bioturbated interval below the oxidized layer and could be related to predation.

08.08

11:00 BENTHIC FORAMINIFERA IN BARATARIA, LA MARSHES RESPOND TO THE 2010 DEEPWATER HORIZON OIL SPILL

Joseph Keim, Charlotte Brunner, Carlo Fortner

The University of Southern Mississippi, Hattiesburg, MS, United States

Oil from the Deepwater Horizon accident in 2010 heavily fouled the marsh edge of Bay Jimmy and moderately covered the marshy fringe of Bayou Battiste in Barataria Bay, La. This study examines the impact of oil on an abundant member of the meiofauna, benthic foraminifera, with implications for the macrofauna that utilize them for nutrition. Two replicate cores were taken from each site. The top 10 centimeters was sliced into centimeter sections and soaked in rose Bengal and sea water for 24 hours to stain live foraminifera. The samples were washed on a screen with 45 μm openings and spilt into equal aliquots convenient for counting in a gridded Petri dish. A census of species was tabulated in aliquots until 300 or more live specimens were counted. We also tabulated deformed specimens. The assemblage at both locales was dominated by species of *Ammomarginulininae*, with *Arenoparrella mexicana*, other agglutinated taxa, and several carbonate species, all consistent with a low marsh fauna. At both sites, ninety-five percent of the live assemblage was enumerated within the top three centimeters of the core. The top two centimeters has densities >500 specimens/10 mL, which then sharply decreases to <70 specimens/10 mL in the underlying sections. In contrast, un-oiled sites in Mississippi Sound contained near 500 specimens/10 mL throughout the upper 10 cm. Up to 18% of empty tests at Bay Jimmy were deformed, an effect associated with pollution. These results suggest a foraminiferal population under stress.

08.09

11:15 LITHOSTRATIGRAPHY OF JUMBO PISTON CORES FROM THE WOOLSEY MOUND, THE NORTHERN GULF OF MEXICO

Jennifer L. Brizzolara, Charlotte Brunner

The University of Southern Mississippi, Hattiesburg, MS, United States

This study determined major lithostratigraphic units and associated climate changes captured in jumbo piston cores collected from four sites at MC118 within the Seafloor Observatory of the Gulf of Mexico Hydrates

Research Consortium. Four cores, which averaged 14 m in length, were photographed and described. Descriptions and photographs of the cores were integrated to determine major stratigraphic units. Carbon-14 dates, from a previously studied 5-m-long core from MC118, were obtained for age approximation of the upper units contained in both studies. Seven correlative units were established and will be described from the top down. Unit 1 contains highly bioturbated, homogeneous sandy mud, suggesting a slow rate of deposition and a significant pelagic source. Unit 2 consists of bioturbated mottled mud, consistent with a faster deposition rate. Units below Unit 2 contain distinct strata layers with minimal bioturbation. Unit 3 alternates between homogenous mud and indistinct color strata. Unit 4 contains distinct light-colored layers with a clear boundary at the top and bottom of each light layer. Unit 5 is also stratified, but the colors within strata gradually change from light to dark, with distinct boundaries between. Unit 6 contains indistinct color strata without clear boundaries. Units 4 and 5 also contain frequent, thin, silt laminae. Stratal layers in Units 3-6 indicate fast deposition by dilute turbidity currents. This succession of lithofacies is consistent with climate history in the Gulf of Mexico from the Wisconsinan lowstands to the rapid deglaciation and the present-day high-stand of sea level.

08.10

11:30 LITHOSTRATIGRAPHY OF A HOLOCENE TRANSGRESSIVE BARRIER ISLAND NEAR SPRING BAYOU, EAST MATAGORDA BAY, TX

Franklin M. Williams¹, Charlotte Brunner¹, Kevin Yeager²

¹*The University of Southern Mississippi, Hattiesburg, MS, United States*, ²*University of Kentucky, Lexington, KY, United States*

The lithostratigraphy of a barrier island in East Matagorda Bay depicts a late Holocene history of transgression. A total of 27 vibracores were collected along three transects. The 100-to-200 meter-long transects run northwest to southeast perpendicular to the long axis of the island and intersect an active fault currently being examined as part of a larger study to determine the effects of faulting on the area. Each core was opened, photographed, described, sampled, and archived. The photographs and core descriptions of the lithology were utilized to correlate discernible facies across the barrier island. At the top of the section, Unit A comprises an orange, muddy sand containing plant fibers and overlies Unit B, which comprises an

orange-stained fine sand; these units are consistent with a sub-aerial barrier environment with high oxidation. These units are underlain by Unit C, a grey muddy sand unit that contains layers of shells, one typically with plant fibers identified as seagrass. Unit C also contains a layer of grey mud below the shells. This sequence of grey muddy sand and grey mud is repeated in some cores and is characteristic of a low-energy shallow lagoonal environment. A sharp contact separates Unit C from Unit D, a red-brown mud layer deposited by the Colorado and Brazos rivers 4,000 to 5,000 years ago. The coarsening-upward sequence of marine lagoonal sediments overlain by sub-aerial dune deposits is typical of a transgressive barrier island moving over its lagoon.

08.11

11:45 USING AUTONOMOUS VEHICLES IN EXTREME ENVIRONMENTS: NATURAL HYDROCARBON SEEPS IN THE GULF OF MEXICO AND THE ROSS SEA, ANTARCTICA

Vernon Asper¹, Ray Highsmith², Arne Diercks¹, Max Woolsey², Roy Jarnagin¹, Walker Smith³, Karen Heywood⁴, Craig Lee⁵, Mike Dinniman⁶, Bastien Queste⁴

¹*The University of Southern Mississippi, Hattiesburg, MS, United States*, ²*The University of Mississippi, University, MS, United States*, ³*Virginia Institute of Marine Science, Gloucester Point, VA, United States*, ⁴*University of East Anglia, Norwich, UK*, ⁵*University of Washington, Seattle, WA, United States*, ⁶*Old Dominion University, Norfolk, VA, United States*

Unmanned, robotic vehicles hold enormous potential for exploring and documenting extreme environments throughout the world's oceans. Powered AUVs (Autonomous Undersea Vehicles) are used for short time periods to study smaller areas at close range while gliders (propelled by gravity through buoyancy manipulation) are used to study phenomena which span large temporal and spatial scales. In collaboration with scientists from several institutions, we have used AUVs to study natural oil seeps in the Gulf of Mexico and gliders to study the intense spring phytoplankton bloom in Antarctica. In the Gulf our primary emphasis was to apply the high accuracy multibeam echosounder to map the features associated with the seeps, including collapse pits and carbonate pavements. We also installed a mass spectrometer on the AUV for a mission to map the distribution of dissolved methane near the seafloor. In the Ross Sea, the gliders were deployed early in the season and monitored the growth of plankton biomass as well as the warming and stratification of the water column as the season progressed. These



expeditions are never straightforward and included surprises such as the unplanned excursion under the ice shelf, encounters with supercooled water in Antarctica, and the discovery of previously unknown seeps in the Gulf.

POSTER SESSION

P8.01 QUANTIFYING THE IMPACT OF THE GULF OF MEXICO OIL SPILL ON THE HEALTH AND PRODUCTIVITY OF LOUISIANA AND MISSISSIPPI SALT MARSHES

Chris Downs, Shuvankar Ghosh, Deepak Mishra
Mississippi State University, Mississippi State, MS, United States

The biggest current threat to the sensitive salt marsh habitat in the northern Gulf of Mexico has been the Deepwater Horizon oil spill, now considered as the largest offshore spill in U.S. history. The spill has been particularly damaging to emergent marine and wetland habitats of Louisiana and Mississippi. We aim to use a combination of non-invasive proximal remote sensing data along with ground truth, as a reference for a large scale remote sensing methodological approach to analyze and interpret the impact of the oil spill on emergent wetlands and their biophysical parameters, such as distribution of canopy chlorophyll content (CHL), leaf area index (LAI) (a ratio of green foliage area vs. ground area), green vegetation fraction (VF) (percent green canopy cover) and above ground green biomass (GBM). Initial proximal data analysis indicates progressive decreasing prominence of the characteristic red-edge (685nm), with increasing levels of oil contamination. We intend to use NASA and USGS satellite data to develop models in order to quantify the significant short-term impact of the oil spill on the productivity and physiological status of these coastal salt marshes. The models and products developed through this project will directly support the Gulf States as they plan, implement, and monitor coastal restoration efforts.

P8.02 HOW DISSOLVED OXYGEN AND SALINITY LEVELS AFFECT PHYTOPLANKTON POPULATION AND DENSITY IN THE GULF OF MEXICO

Luciano Mendoza¹, Kristina Broussard²
¹*Mississippi Gulf Coast Community College, Gautier, MS, United States,* ²*Mississippi Department of Marine Resources, Biloxi, MS, United States*

Phytoplankton, an important part of the food chain, are affected by the level of salinity, dissolved oxygen, and population density. The purpose of this project was to analyze data collected from oyster reef monitoring to ascertain any notable phytoplanktonal change. The hypothesis was that an increase in dissolved oxygen would lead to an increase in phytoplankton population and a decrease in dissolved oxygen would reduce the phytoplankton population density. An increase in salinity in a phytoplankton environment would decrease their population and a decrease in salinity would allow a larger population of phytoplankton. Research conducted on dissolved oxygen demonstrated that phytoplankton require oxygen to survive. Also, deoxygenation of water increased the population of anaerobic organisms, resulting in the death of phytoplankton and other aerobic organisms. Research conducted on salinity levels documented that if salinity levels are too high, they create a hypertonic state in the phytoplankton population, causing the phytoplankton to die. Additionally, a reduction in salinity levels would cause the phytoplankton to enter a hypotonic state, causing them to burst. Three years of sampling from monitoring oyster reefs was used to research these effects.

P8.03 PROJECT ii SAMPLE ORGANIZATION, TABULATING, AND RECORDING OF SHARKS IN ORDER TO DETERMINE EFFECTS OF THE BRITISH PETROLEUM (BP) OIL SPILL UPON MARINE LIFE

Rebecca Lesser¹, Andre Deboise², LaGena Fantroy²
¹*Mississippi Gulf Coast Community College, Gautier, MS, United States,* ²*National Oceanic and Atmospheric Administration, Pascagoula, MS, United States*

The purpose of this project was to explore the after effect(s) of the BP Oil Spill of 2010, as it related to marine life in the Gulf of Mexico. This project was performed at the field laboratory under the United States Department of Commerce at its NOAA Fisheries Laboratory in Pascagoula, Ms. The methods used to perform this general research on the subject included interaction with the different research teams who employed a special emphasis on the shark unit. The NOAA Library collection to support this research was also explored. Shark dissection and Marine Biologist shadowing were also foci of this internship to further analyze the reports, research, and digital imagery taken as the ongoing BP Oil Spill research is continued through this effort.

P8.04 SIMULATION AND PREDICTION OF HURRICANE LILI DURING LANDFALL OVER THE GULF OF MEXICO USING MESOSCALE MODELING (MM5) SYSTEM

Remata Reddy, Harine Natarajan, Duanjun Lu, Wilbur Walters

Jackson State University, Jackson, MS, United States

Renewable Energy and Technology Project to adopt the numerical weather prediction model for possible use in regions where solar equipment will be used. Accurate and reliable forecasting is crucial in regions that have limited resources where renewable solar energy can be utilized. Devices such as solar cookers and solar sterling engines can be effectively operated under adequate sunlight in converting solar energy to cook food. A case study of Hurricane Lili 2002 (category 4) has been modeled to show changes in weather conditions that could affect solar-energy utilization. The Mesoscale Model (MM5) is used to simulate the storm's formation and development, and predict its track and intensity change. The simulation was for a period of two days during October 3 and 4 when Hurricane Lili made landfall over the coastal areas of Louisiana and Mississippi. Model configuration includes two nested domains, the outer domain of grid size 27 km and the nested domain of grid size 9 km closer to the coast of LA-MS. Model predicted parameters included sea level pressure, rainfall, temperature, and radiation. The results are compared with aircraft observations taken by the National Hurricane Center and are in reasonably good agreement. The present study will aid in determining weather conditions in advance so that early warnings can be issued and damage to life and property can be averted.

P8.05 CAN EMPIRICAL EVALUATION OF HETEROLOGOUS MICROSATELLITE MARKERS FOR PEDIGREE RECONSTRUCTION AND STUDIES OF REPRODUCTIVE SUCCESS

John Cirino¹, Corey R. Anderson², Eric Saillant²

¹Mississippi Gulf Coast Community College, Gautier, MS, United States, ²The University of Southern Mississippi, Hattiesburg, MS, United States

The Atlantic croaker, *Micropogonias undulates*, is a small sciaenid common along the coasts of the northern Gulf of Mexico and the Western Atlantic Ocean. The species is of interest for the marine baitfish aquaculture industry and is also a popular model for studies of organism response to

anthropogenic effects on marine habitats. In this work, heterologous microsatellite markers were evaluated for parentage studies in the Atlantic croaker. Fin tissue samples were obtained from adult specimens held as brooders at the University of Southern Mississippi Gulf Coast Research Laboratory. The DNA was extracted from tissue samples and used in test amplifications by Polymerase Chain Reaction (PCR) of 25 microsatellite loci developed from red drum and spotted seatrout genomic libraries. One primer of each primer pair was labeled with a fluorescent dye for visualization of PCR products on an automated DNA sequencer. Amplification tests and optimization of PCR conditions were performed on a subsample of five individuals to evaluate amplification success, interpretability of PCR product electrophoregrams, and polymorphism of the tested loci in Atlantic croaker. Microsatellites showing successful amplification of a variable PCR product were tested in additional individuals to evaluate occurrence of scoring artefacts. The power of selected combinations of the microsatellites for parentage analysis was then determined using simulations and a likelihood ratio framework. The method was empirically validated during pedigree construction of a mixture of offspring from multiple parents generated during captive spawning experiments at the Gulf Coast Research Laboratory.

P8.06 A SURVEY OF FISH PARASITES COLLECTED FROM LOCATIONS IN THE MISSISSIPPI SOUND

Isaiah Tolo, David Spencer, Andrew Sinclair

Belhaven College, Jackson, MS

Several factors have led to the need for parasitological studies in the Gulf of Mexico. Economic factors such as the increasing demand for seafood globally, and the increasing percentage of seafood provided through marine aquaculture are most important.

Ecological factors within aquaculture systems have also contributed to the need for these studies. Disease has become the largest single cause of economic losses in aquaculture. Spread of parasites in overcrowded holding tanks can be devastating to stock populations as well as to wild communities if infected stocks manage to escape.

Samples of fish were collected from the Pascagoula River Audubon Center (salinity <1ppt), Davis Bayou (15ppt), Biloxi Bay (27-33ppt). These samples were examined and dissected for an analysis of the parasites that infect these fish.

The first group of 17 fish was infected with 98 parasites including leaches, acanthocephalans,



nematodes and copapods. The second group of 30 fish was infected with 863 parasites including copapods, monogeneans, leaches, nematodes, and acanthocephalans. The third groups of 30 fish infected with 99 parasites including monogeneans, copapods, nematodes, acanthocephalans, isopods, leaches and trematodes.

**MATHEMATICS, COMPUTER
SCIENCE AND STATISTICS**

Chair: Elegenaid Hamadain,
University of Mississippi Medical Center
Vice-Chair: Dr. Krishna Additya,
Alcorn State University

February 23, 2012
Thursday MORNING

09.01

**8:40 VORONOI REDUCTION OF
QUADRATIC FORMS**

Andrew W. Harrell

Independent Researcher, Alcorn, MS

In 1907 and 1908 G.F. Voronoi introduced two methods of reducing positive definite quadratic forms, in a series of three articles in Crelle's Journal. The first method used the inner product on the corresponding space of n -dimensional symmetric matrices. The second method involved what he called primitive parallelehedrons (in which each vertex and face of the form's lattice belongs to exactly one edge and one face respectively of all its translates). In 1974 I wrote a PhD Thesis at U.C. Berkeley clarifying the relation of the two methods of reduction in the case $n=2$ and 3. I also added a short discussion of the application to the desingularization of the compactified domains of Siegel Modular functions of degree 2 and 3. In this talk I will briefly discuss some more recent applications of Voronoi's ideas to mapping of surface elements in finite-element computer programming, to sphere packing, and also the algebraic geometry of Calabi-Yau Manifolds.

09.02

**9:00 CROSS-LAYER PROTOCOLS FOR
MULTIMEDIA COMMUNICATIONS
OVER WIRELESS NETWORKS**

Pritham Reddy Kancharla

Alcorn State University, Lorman, Mississippi USA

In the last few years, the Internet throughput, usage and reliability have increased almost exponentially. The introduction of broadband wireless mobile ad hoc networks (MANETs) and cellular networks together with increased computational power have opened the door for a new breed of applications to be created, namely real-time multimedia applications. Delivering real-time multimedia traffic over a complex network like the Internet is a particularly challenging task since these applications have strict quality-of-service requirements on bandwidth, delay, and delay jitter. The time-varying nature of wireless channels and resource constrained wireless devices make the problem even more difficult. To improve perceived media quality by end users over wireless Internet, QoS supports can be addressed in different layers, including application layer, transport layer and link layer. Cross layer design is a well-known approach to achieve this adaptation. In cross-layer design, the challenges from the physical wireless medium and the QoS-demands from the applications are taken into account so that the rate, power, and coding at the physical layer can adapted to meet the requirements of the applications given the current channel and network conditions. A number of propositions for cross-layer designs exist in the literature. In this chapter, an extensive review has been made on these cross-layer architectures that combine the application-layer, transport layer and the link layer controls. Particularly, the issues like channel estimation techniques, adaptive controls at the application and link layers for energy efficiency, priority, transmission rate control at the transport layer, and adaptive automatic repeat request are discussed in detail.

09.03

**9:20 DISPELLING THE MYTHS: USING AN
INNOVATIVE STRATEGY TO
INCREASE INTEREST IN
COMPUTING**

Jacqueline Jackson, Loretta Moore

Jackson State University, Jackson, Mississippi USA

The Bureau of Labor Statistics reports that in 2018, the projected employment opportunities for computing professionals will increase 45.3 percent from the 2008 levels. Giving the anticipated job opportunities within Computer Science, why aren't more students choosing to major in this discipline? Common perceptions of Computer Science that discourage enrollment include: 1) Computer Science is hard; 2) Computer Science is boring; and 3) Computer Science only involves programming.

One effort to dispel the myths and combat the problem of declining enrollment is engaging students in research. Traditional curriculums often provide a narrow view of what Computer Science is. Research experiences are an essential part of learning because they expose students to the relevance of Computer Science as well as facilitates exploratory/discovery learning thus changing the perception of Computer Science.

Through research experiences, students were instrumental in the: (1) development of BANGA (an Android open source mobile application that supports word-finding practice, a therapy solution for individuals who suffer from Aphasia); (2) design of a mobile visual analytics application that could be used by emergency personnel to determine the meaning of hazmat placards; (3) design of an infrastructure that demonstrates how Radio Frequency Identification (RFID) technology and Personal Digital Assistants (PDAs) could be used to facilitate communication and data access in surgical environments with the goal of reducing surgical errors. These experiences have broadened the participating students perceptions of Computing and better positioned them to enter the workforce and doctoral programs.

09.04

9:40 EXCEL AS A VISUALLY LEARNING TOOL FOR CALCULUS CONCEPTS

Tapan Tiwari, Chunmun Trivedy

Alcorn State University, Lorman, Mississippi, USA

Although the spreadsheet program of Excel is widely used for financial planning and record-keeping purposes, it also provides a suitable platform for presenting many of the differential and integral calculus concepts that are dynamical in nature, visually comprehensible. In this work, we have developed easy to implement algorithms to help introduce some of the abstract concepts, including the limit of a function, the tangent line problem, and the area problem numerically and graphically, which our first year calculus students find most difficult. Unlike other popular and powerful mathematical software that evaluate limit, integral, and derivative with a click of a mouse, Excel lacks special features that automate these tasks. However, in this process students learn to compute the desired results without compromising conceptual understanding.

BREAK 10:00-10:15

10:15 SYMPOSIUM: STATA FOR DATA MANAGEMENT, STATISTICAL ANALYSIS, AND GRAPHICS

Elgenaid Hamadain, Michael Griswold, Alan Penman, Imran Sunesara

University of Mississippi Medical Center, Jackson, Mississippi USA

STATA is a complete and integrated statistical package that provides excellent data analysis, comprehensive data management, and fine graphics. It is very easy and intuitive to use. The program includes comprehensive graphics procedures designed to summarize results of the analyses and to assist in fit diagnostics for models. Results, including graphics, can be readily copied across to Word or other programs. STATA offers a wide capability of powerful data-management functions that allows users to manipulate their data with very good flexibility and ease. Data can be readily imported from or exported to ASCII and spreadsheet formats. The STATA/Transfer facilitates transfer between any data formats: STATA, EXCEL, ACCESS, SPSS, SAS, ASCII, etc. STATA includes its own programming language so that users can add their own procedures. New commands are regularly distributed through the STATA Journal or made available through the web. STATA makes it easy to generate publication-quality and styled graphs, including regression fit graphs, distributional plots, time-series graphs, survival plots, and contour plots. Stata do all of the statistical procedures found in other comprehensive statistical software, but is particularly strong on survival analysis, panel data analysis, time series, analysis of survey data, and meta-analysis. This mini-symposium will demonstrate STATA features and capabilities and illustrate all STATA aspects mentioned above with real examples.

Thursday AFTERNOON

1:00-2:00 TIPS AND TRICKS FOR iPad

Chris Dunbar, Apple HiEd Senior System Engineer

Description: Tips and Tricks on iPad 2 compares the initial iPad to the iPad 2 and focuses on the educational relevant features. The workshop is designed to show ways to more efficiently use the device. The seminar is designed to be sharing and interactive so bring a tip/workflow/app to share. The target audience is new (or planning on being new) iPad users.

**09.05****2:15 INFORMATION HIDING THROUGH COVER GENERATION: USING CONTEXT-FREE GRAMMAR**

Natarajan Meghanathan

Jackson State University, Jackson, Mississippi USA

In this presentation, we use Context Free Grammar (CFG) to demonstrate information hiding as well as cover generation (English texts) for secure communication. Given a set of production rules (used as shared stego-key), we assign a probability to each possible production for the variables of the CFG. The sender and receiver, each, could construct a Huffman tree for the set of all productions associated with every variable. For a given secret message to be sent, a sequence of English sentences is generated using the CFG and the Huffman tree. The bits of the secret message are scanned from left to right and an English sentence is derived by traversing the Huffman tree according to the next bits of the secret message until a node of the tree is reached. The start symbol is then substituted by the production which can be found at this node of the tree. This process is repeated until all the message bits are used and the string consists only of terminal symbols. The receiver would be able to decode the secret message by iteratively parsing through the Huffman trees of the production rules (beginning from that of the Start symbol), according to the sequence of sentences received. The size of the secret message is assumed to be known to the receiver so that it can terminate the excess bits that get encoded due to the structure of the Huffman tree. The work leading to the above presentation is funded through the NSF-TUES grant DUE-0941959.

09.06**2:30 A SECURE ONLINE STUDENT-ADVISOR APPOINTMENT MANAGEMENT AND REGISTRATION SYSTEM**

Brock Chess, Pervis Fly, Alex Moncrief, Jermaine White, Hyunju Kim, Natarajan Meghanathan

In this undergraduate senior capstone project, we developed a secure online Student-Advisor Appointment Management and Registration System (SAAMRS) that will facilitate students to login, pre-select a list of courses to register and schedule an appointment to meet with an academic advisor to complete the registration. The SAAMRS system reduces the time and management overhead typically incurred during the registration process in an academic environment. Once implemented, there will not be long queues at the doorsteps of academic

advisors and there is no need to manually keep track of the appointment schedule of the academic advisors. The following security aspects were analyzed and incorporated to this project: (i) All user inputs to the login module are sanitized to prevent code injection attacks - a white-list of acceptable characters was used to validate the input values entered for both the username and password fields; (ii) The username and password information entered by the students at the client side is encrypted using the RSA algorithm and sent to the SAAMRS server - thus preventing unauthorized information disclosure; (iii) The number of appointments that a student can make with the academic advisors within a particular time period is limited (2 appointments during a week and 6 appointments per month) to prevent any potential denial of service attacks and be fair to all students. The efforts to incorporate systems and software security into the undergraduate senior capstone projects conducted by the Computer Science majors are currently funded by the NSF-TUES grant DUE-0941959.

09.07**2:45 SIMULATION OF A SECURE TOUCH-SCREEN KIOSK SYSTEM FOR AMUSEMENT PARK PLANNING**

Jeremy Bouldin, John Etheredge, Jesse Harris, Hyunju Kim, Natarajan Meghanathan

Jackson State University, Jackson, Mississippi, USA

In this undergraduate senior capstone project, we simulated a touch-screen kiosk system called PARKS (Plan A Route Kiosk System) that facilitates customers visiting an amusement park to see everything that they want to see (as much as possible, given the time constraints) and plan their day. PARKS has been implemented as a client-server system with the client being a Linux-OS based Kiosk Development Environment (KDE) distribution; the browser used is Firefox with add-ons such as Real Kiosk (R-Kiosk) and GreaseMonkey for augmented browsing. The following security features are incorporated into this project: (i) Customers should not be able to access the desktop of the Linux OS at the client-side. To ensure this, all files in the /etc, /usr, /bin, and other folders should only be given RWX access to the root, and read-only access to the users; (ii) To prevent a customer from over-purchasing tickets for any attraction and selling them at higher price, each customer can buy at most 7 tickets for any attraction; (iii) User inputs are sanitized for any special characters and scripts to make sure that a customer is not able to add their own (fake) shows into the database server and make other

genuine customers to buy tickets for such fake shows; (iv) The credit-card information sent from the Kiosk to the server needs to be encrypted to avoid anyone from being able to extract that information in plaintext using packet sniffers. The efforts to incorporate security are funded through the NSF-TUES grant DUE-0941959.

3:10 Divisional Business Meeting

POSTER SESSION (6:30-8:00)

P9.01

A COMPARISON OF PATIENT OUTCOMES (MORBIDITY, MORTALITY, AND AVERAGE LENGTH OF STAY) AMONG ACADEMIC MEDICAL CENTERS WITH AND WITHOUT VALUE ANALYSIS PROGRAMS USING THREE SERVICE LINES

Adrienne Murray, Elgenaid Hamadain, Edward Smith

University of Mississippi Medical Center, Jackson, Mississippi USA

Value analysis (VAP) is the methodical review of value of goods and services. It converges on quality and patient outcomes such as morbidity, mortality, and average length of stay (ALOS). This study compares ALOS, morbidity, and mortality in academic medical centers (AMCs) with value analysis programs (VAPs) and those without VAPs using three service lines (Orthopedics, Cardiovascular, and Neurosciences). The UHC Clinical Data Base/Resource Manager (CDB/RM) was utilized as secondary data for this study, which represents 90 % of AMCs in the country. The CDB/RM data was imported to SPSS, for analysis. Shapiro-Wilks normality test indicated that the data on all three outcomes were not normal; therefore, Mann-Whitney non-parametric statistical methods were used for analysis. The differences between AMCs, with and without VAPs, were not found to be significant regarding patient outcomes ALOS, morbidity, and mortality. All Mann-Whitney pairwise comparisons demonstrated significant differences among the service lines with respect to ALOS, morbidity, and mortality. Trends in patient outcomes were found to be somewhat similar between the two VAP groups. However, the NS service line consistently demonstrated higher ALOS, morbidity, and mortality, with the CV service line trailing. The Ortho service line steadily revealed the lowest rates for ALOS, morbidity, and mortality. Even though the difference between the two VAP groups was not significant with respect to ALOS, morbidity, and

mortality, a negative impact on patient outcomes was not noted. It has been demonstrated that VAP have saved healthcare organization valuable dollars to be reinvested in clinical programs and equipment.

P9.02

COMPARATIVE STUDY OF DIRECT AND ITERATIVE METHODS OF SOLVING LINEAR SYSTEMS

La'Trese Davis, Candice Rankin, Krishna Aditya

Alcorn State University, Lorman, Mississippi USA

We implemented in Matlab, several direct and iterative methods for solving linear systems. Gauss and Gauss-Jordan elimination methods, solving by Cramer's Rule were the direct methods tested. Gauss-Seidel, Jacobi and Conjugate Gradient method are the iterative algorithms implemented and tested. We generated several random linear systems, with some systems having symmetric positive definite coefficient matrices, and some not. Also some of the matrices were diagonally dominant and some were not. The matrices had different amounts of sparseness. Solutions of these systems are known a priori. We tested the algorithms for the accuracy of solutions, number of iterations, and effect of tolerance on the number of iterations (in case of iterative algorithms). For large sparse coefficient matrices iterative algorithms perform better. Conjugate Gradient algorithm performed better than other two iterative algorithms. Gauss-Seidel algorithm takes less number of iterations as compared to Jacobi's algorithm but Jacobi's algorithm is more amenable for parallelization. All these iterative algorithms converge when the coefficient matrix is symmetric positive definite or diagonally dominant. It is possible to solve linear systems with non symmetric coefficient matrices by pre multiplying the system equation by transpose of the coefficient matrix and then solving.

P9.03

NUMERICAL EXPERIMENTS WITH FEW UNIVARIATE POLYNOMIAL ROOT FINDING ALGORITHMS

Madhu Aditya, Krishna Aditya

Alcorn State University, Lorman, Mississippi USA

There are several polynomial root finding algorithms. In this comparative study we conducted numerical experiments with our Matlab implementation of popular root finding algorithms like Jenkin-Traub, Weirestrass-Durand-Kerner, Aberth and also the method which involves finding eigen values of companion matrix of the polynomial by QR decomposition. The last method is actually the algorithm used by Matlab's polynomial root finding



function, roots(). Implementing and testing these algorithms is easier in Matlab environment as compared to implementations in c/c++. The poly() function of Matlab allows us to construct test polynomials with known roots, with known multiplicities of these roots and also to construct Wilkinson's polynomials. These polynomials become input to the algorithm implementations. We studied the algorithms for maximum degree polynomials they can solve (considering that the algorithms are not implemented in arbitrary precision arithmetic), accuracy of the roots generated, local and global convergence rates, effect of initial root approximations if there are any etc.,

Superior performance in several measures is by the method of solving for roots by solving for eigen values of companion matrix, even though it involves dealing with a high condition number matrix, and it has higher space complexity.

PHYSICS AND ENGINEERING

Chair: Dr. James Stephens,
University of Southern Mississippi
Vice-Chair: Partha Biswas,
University of Southern Mississippi

THURSDAY MORNING

O10.01

8:45 CONSEQUENCES OF NOT FINDING HIGGS

O10.02

9:00 THE TOP FORWARD BACKWARD ASYMETRY WITH GENERAL Z' COUPLING

O10.03

9:15 MYSTERIOUS ANTIMATTER

Amin Haque

Alcorn State University

According to the very successful Standard Model of particle physics, matter and antimatter were equally produced in the earliest stages of the Universe. There is no intrinsic difference between particles and antiparticles. The laws of physics for antiparticles are almost identical to those for particles. Any pair of matching particle and antiparticle can be produced anytime there is sufficient energy available to provide the necessary mass-energy. Similarly, anytime a particle meets its matching antiparticle, the two annihilate each other, and both disappear, leaving their energy transformed into electromagnetic form. Any antimatter produced in the laboratory soon disappears because it meets up

with matching matter particles and annihilates. The observed imbalance between matter and antimatter is a mystery yet to be solved. Attempts to explain it are an active area of research today. Early data from experiments at the Tevatron particle accelerator at Fermi National Accelerator Laboratory, found an odd behavior in a particle called the B_s which flips back and forth between its matter and antimatter forms three trillions times per second. A combined data of European researchers with Fermi Lab. make it 99.7 percent likely that the discrepancy is real, and not a statistical fluke. Researchers believe that CP violation is required to explain why matter is so abundant. In order to answer this question, we need to better understand that tiny part of the laws of physics that differ for matter and antimatter. The Large Hadron Collider may solve the mystery.

O10.04

9:30 MODELING THE HORIZONTAL PROPAGATION OF SOUND FROM AIRGUN SOURCES

Bharath Kandula, Michael Vera

University of Southern Mississippi, Hattiesburg, MS

There have been concerns about the impact of airgun sound sources on marine mammals. Airguns have been widely used by the oil industry for exploration. The amount of energy released in an airgun fire is enormous with typical levels of about 240dB re 1 micro Pascal. Studies have shown that this energy does not physically harm marine mammals. There is some evidence of changes in behavior and disturbance of the communication between mammals. Existing models could be substantially improved with a more sophisticated treatment of the source and environment. The intensity of seismic energy at a point in the horizontal direction (after bouncing from the sea floor) is the area of interest. Simulations need to be done considering the geometry of the airgun array. Suitable grid sizes have been found to simulate airgun seismic energy propagation for low and high frequencies.

O10.05

9:45 INVESTIGATING THE ACCURACY OF AN EQUIVALENT-FLUID APPROXIMATION FOR ACOUSTIC REFLECTION FROM THE SEAFLOOR

Michael Vera, Bharath Kumar Kandula

University of Southern Mississippi, Hattiesburg, MS

Equivalent-fluid approximations are used in order to simplify simulations of acoustic propagation in the ocean. Modeling the transverse shear waves

that result when sound is incident on the elastic solid seafloor from the water can be computationally difficult and unstable. Calculations which use an equivalent fluid, a material chosen to mimic the acoustic reflection coefficient of an elastic solid, are faster and more robust. Prior equivalent-fluid techniques utilized a fictitious complex density along with the actual solid's sound speed to generate a medium with an appropriate reflection coefficient. An expanded method treats all of the equivalent-fluid quantities as free parameters in an attempt to yield a more accurate reflection coefficient. This method has been used to model long-range experiments and led to successful identification of arrivals. A more detailed examination of the performance of the method has been completed. The expanded method is more accurate than prior results for materials with a relatively high shear speed. However, its most important advantage appears to be in simulating cases where a wide range of grazing angles for the incident sound are relevant.

O10.06**10:00 PHOTOIONIZATION CROSS SECTION MEASUREMENT OF RB $5P_{3/2}$**

Charles Young, Brad Crochet, Alina Gearba

University of Southern Mississippi, Hattiesburg, MS

We have measured the photoionization cross section of Rubidium in the $5P_{3/2}$ state at several wavelengths near the ionization limit. In our experiment, the Rb atoms are cooled and trapped in a magneto-optical trap (MOT) and excited from the $5S_{1/2}$ ground state to the $5P_{3/2}$ state through absorption of a 780 nm photon. As atoms decay from the excited state, they emit photons. By detecting these photons, we can measure the loss rate of atoms from the trap, which is strictly due to collisions with background gases. By applying a photoionizing laser, we can measure an increased loss rate, since the newly formed rubidium ions are not confined by the MOT forces. This new loss rate is caused by collisions with background gases and photoionization. By subtracting the two loss rates, we can determine the loss rate due to only photoionization. The photoionization rate depends on the intensity of the photoionizing beam, the photon energy, the excited state fraction of atoms in the MOT, and the photoionization cross section. By plotting the photoionization rate versus the ionizing intensity for a given photon energy and calculating the excited state fraction, we have determined the photoionization cross section of Rubidium in the $5P_{3/2}$ state at that particular photon energy.

Measurements were repeated for other photon energies.

10:15 BREAK**O10.07****10:30 VOIDS AND MOLECULAR HYDROGEN IN HYDROGENATED AMORPHOUS SILICON**

Rajendra Timilsina, Parthapratim Biswas

University of Southern Mississippi, Hattiesburg, MS

Infrared spectroscopy (IR) and nuclear magnetic resonance (NMR) experiments show that hydrogen microstructure of amorphous silicon (a-Si:H) samples at high concentration (> 15%) consist of voids [1] and molecular hydrogen [2] in addition to the presence of clusters of hydrogen atoms. While several theoretical studies have attempted to address this observation by introducing hydrogen inside artificially created cavities, there exists no theoretical study that conclusively demonstrate the direct presence of voids and molecular hydrogen in realistic models of a-Si:H. By using an information-based inverse approach, we have addressed this problem by constructing large models of hydrogenated amorphous silicon at high concentration. The distribution of hydrogen in the models, is generated by inverting nuclear magnetic resonance (NMR) and structure factor (of H-H) data in association with an approximate first-principles method. Models obtained this way show the presence of voids and molecular hydrogen as an in-built characteristic of the method.

[1] A. H. M. Smets, W. M. M. Kessels and M. C. M. van de Saden, Appl. Phys. Lett. 82, 1547 (2003)

[2] T. Su, S. Chen, P. C. Taylor, R. S. Crandall and A. H. Mahan, Phys. Rev. B 62, 12849(2000)

O10.08**10:45 CAVITY ENHANCED ABSORPTION SPECTROSCOPY: NEAR INFRARED ABSORPTION BY WATER USING A LED (LIGHT EMITTING DIODE)**

Maheshwar Ghimire, Christopher R. Winstead

University of Southern Mississippi, Hattiesburg, MS

Water vapor in the atmosphere is a primary absorber of the heat energy radiated by the sun, thereby playing a critical role in atmospheric radiative transfer as well as atmospheric chemistry. In this presentation, experimental characterization of the absorption of electromagnetic radiation by water vapor in the near infrared spectral region will be described. This work is based on a novel approach that employs an infrared light emitting diode (LED) for cavity enhanced absorption spectroscopy (CEAS).



CEAS includes techniques such as Cavity Ring Down Spectroscopy (CRDS) and Integrated Cavity Output Spectroscopy (ICOS) and is now well known in the field of trace gas spectroscopy. The physics of CEAS methods will be briefly reviewed, experimental systems described, and initial results reported. The experimental system comprises two highly reflective spherical mirrors used to form a stable optical cavity together with the necessary gas handling and water vapor introduction system. An infrared LED (950 nm) serves as the light source to excite the optical cavity for measurement of the absorption coefficient of the water vapor at room temperature with different concentrations. Because the LED is a relatively broadband light source and the water absorption spectrum is highly structured, corrections for the structure of the water absorption lines will be included. Results will be compared to literature values for the water absorption cross-section.

O10.09

11:00 EQUILIBRIUM CONFIGURATIONS OF C₆H₆, C₆H₅Cl, C₆H₅N₀₂ MOLECULES AND C₆H₆-C₆H₅Cl COMPLEX

O10.10

11:15 CREEP TESTING OF VINYL ESTER POLYMER USING DIGITAL IMAGE CORRELATION TECHNIQUE

Daniel Drake, Rani Sullivan

Mississippi State University

Short term creep-recovery experiments are conducted on neat vinyl ester resin at a range of temperatures and stress levels. The Digital Image Correlation (DIC) technique is used to measure the viscoelastic response. Typically, strain measurements are obtained from surface-bonded strain gages and extensometers, which provide local measurements at specific locations and gage lengths. This study will compare results obtained from strain gages, extensometer and the Digital Image Correlation (DIC) technique. The DIC photogrammetry system is a non-contact measurement system from which creep strains in both longitudinal and transverse directions are obtained. An overview of the DIC technique and its applications will be presented.

O10.11

11:30 INVESTIGATION OF VIBRATION CHARACTERISTICS OF COMPOSITE BEAMS AT ELEVATED TEMPERATURES

Arjun Shanker, Rani W. Sullivan

Mississippi State University

Structural components made of composite materials are usually subjected to changing environmental conditions during their service life. Among various environmental conditions, changes in temperature significantly influence the static and vibration characteristics of composite structures. In this study, modal characteristics such as fundamental frequencies and associated mode shapes and damping coefficients are obtained as functions of temperature for metal and composite beams. Vibration testing is performed at elevated temperatures below the glass transition temperature for each beam. The test beams are instrumented with accelerometers to obtain the vibration characteristics. An open loop data acquisition system with single input excitation is used to excite a shaker system. A shaker table fixture is used to test all beams in a vertical cantilever configuration.

O10.12

11:45 STRUCTURAL RESPONSE OF A CARBON-COMPOSITE WING USING FIBER BRAGG GRATING

Matthew Nicolas, Rani Sullivan

Mississippi State University

The objective of this study is to determine strength and stiffness characteristics of a full-scale carbon composite wing structure using fiber Bragg grating technology. Measurements from conventional foil strain gages and fiber Bragg grating will be compared. To establish test procedures and verify with finite element models, strain measurements are obtained from cantilevered prismatic beams subjected to bending and torsion, followed by a combination of both. The composite wing consists of foam-core sandwich skins and three spars with varying laminate ply patterns and wall thickness dimensions. From the fuselage centerline to the tip, the wing measures 5.5 m. with a root chord dimension of 74 cm. and a maximum airfoil thickness of 10 centimeters. A three-tier whiffletree system is used to load the wing in a manner consistent with a pull-up maneuver condition. Multiple strain and deflection gages are used in conjunction with the fiber Bragg grating sensors to measure the static response of the wing and also to obtain the wing shape at various load levels below the limit load value.

12:00 LUNCH

O10.13**1:20 OVERVIEW OF NASA-STENNIS
ACTIVITIES****O10:14****2:00 ERROR PERFORMANCE OF
DECODE-AND-FORWARD
COOPERATIVE SYSTEMS WITH CO-
CHANNEL INTERFERENCE IN
NAKAGAMI-M FADING CHANNELS**

Mohammed Akhoirshida, Mustafa Matalgah
The University of Mississippi

In this paper, the average bit error rate (ABER) performance of dual-hop decode-and-forward (DF) cooperative systems with co-channel interference at both the relay and destination nodes is analyzed in Nakagami-m fading channels with arbitrary (integer as well as non-integer) values of m . This channel condition is assumed for both the desired signal as well as co-channel interfering signals. In addition, the practical case of unequal average fading powers between the two hops is assumed in the analysis. Accurate closed-form approximate expressions for the BER performance of different modulation schemes, specifically differential binary phase shift keying (DBPSK) and noncoherent binary frequency shift keying (NCBFSK), are derived. The analysis assumes an arbitrary number of independent and non-identically distributed (i.n.i.d.) interfering signals at both relay (R) and destination (D) nodes. The derived closed-form expressions are simple and easy to evaluate as compared to the simulation.

O10.15**2:15 SIMULATION OF SPIRAL BASED
ANTENNA FOR GROUND
PENETRATING RADAR**

Mohammad Kishk

Ground Penetrating Radar (GPR) is known to detect objects under the ground without destroying the surface. GPR has many applications; a primary application is the detection of landmines. Landmines are typically buried at a shallow depth of no more than six inches under the surface. Most GPR frequency ranges are between 30 MHz and 3 GHz. This is difficult to achieve with a single antenna, because of the general size difference between the lower and higher frequencies of operation. Spiral based antennas are known to achieve a very wide band of frequencies and also left and right hand polarization, which is needed for transmission (TX) and reception (RX) of the signal. The design process of the antenna is important, so a step by step process will be described to show how the development of a spiral antenna was made for this application.

O10.16**2:30 FLIGHT MECHANICS AND
PUTATIVE AUDIO RECORDINGS OF
THE IVORY-BILLED WOODPECKER
(*Campephilus principalis*)****2:45 BREAK****O10.17****3:00 RADIOLOGICAL EMERGENCY
PREPAREDNESS**

Pao-Chiang Yuan

Jackson State University, Jackson, MS 39217

On March 11, 2011, a Richter scale 9 earth quake and tsunami caused a series of equipment failures, nuclear meltdowns, and releases of radioactive materials at the Fukushima I Nuclear Power Plant in Japan. The plant comprises six separate boiling water reactors maintained by the Tokyo Electric Power Company. This incident is the largest Japanese nuclear accident arising from an earthquake and tsunami, and experts consider it to be the second largest nuclear incident after the Chernobyl disaster, but more complex because multiple reactors are involved. This incident shocked a lot of people in the world, especially the people that live next to the commercial/licensed nuclear power plant. On December 7, 1979, following the Three Mile Island nuclear power plant incident in Pennsylvania, Federal Emergency Management Agency (FEMA) established the Radiological Emergency Preparedness Program (REP). The REP develops plans, training, and exercises to assist jurisdictions surrounding commercial nuclear power plants respond to potential scenarios that might occur. There are four classes of Emergency action levels (Emergency Classifications) established by the Nuclear Regulatory Commission (NRC). These classifications range from minor plant events involving no public danger to more serious conditions which might require protective actions, a) Unusual Event b) Alert c) Site Emergency d) General Emergency. The United States is the world's largest supplier of commercial nuclear power. This paper discusses the problems of the Fukushima Daiichi nuclear disaster and what the public should get involved in the offsite emergency preparedness.

**O10.18****3:15 AUTONOMOUS UNDERWATER VEHICLES IN HOMELAND SECURITY AND OTHER APPLICATIONS**

Henry Hargrove, Brandee Haney, Cayce Lee, J Gadewadikar, O Kuljaca
Alcorn State University

Autonomous Underwater Vehicles (AUVs) represent one of the most challenging frontiers for robotics research. AUVs work in an unstructured environment and face unique perception, decision, control and communications difficulties. An Autonomous Underwater Vehicle (AUV) is a robotic device that is driven through the water by a propulsion system, controlled and piloted by an onboard computer, and maneuverable in three dimensions. This level of control, under most environmental conditions, permits the vehicle to follow precise preprogrammed trajectories wherever and whenever required. Sensors on board the AUV sample the ocean as the AUV moves through it, providing the ability to make both spatial and time series measurements. The work presents the basic fundamentals of the dynamics of AUVs. In this work Key characteristics of AUVs and their applications will be explained. The successful use of unmanned AUVs in recent years has led to recognition of their broader utility and to additional calls for more unmanned vehicles. There are huge benefits in terms of lower unit costs and risks for unmanned vehicles than for manned vehicles. Roles of these vehicles including coastal surveillance, mine countermeasure, anti-submarine warfare, communication, navigation, sea bottom investigation, searching of bottom of foreign ships on ports, and searching with underwater cameras and many more will be discussed. The topics will also include Vehicle Designs, Sensors for Unmanned Water Vehicles, and Navigation.

O10.19**3:30 INTERPOLATION-BASED TECHNIQUE WITH REDUCED COMPLEXITY OF MIMO-OFDM SYSTEMS**

Mohammed Akhoirshida, Mustafa Matalgah
The University of Mississippi

The process of combined multiple-input multiple-output and orthogonal frequency division multiplexing (MIMO-OFDM) systems requires the computation of the parallel sorted QR Decomposition (P-SQRD) for each of the data-carrying OFDM tones. Since MIMO-OFDM systems involve large number of data-carriers, the corresponding computational complexity becomes significantly large. In this paper, we present a computationally efficient technique for MIMO-OFDM symbols at the

transmitter/receiver, respectively, which depends on applying the conventional PSQRD process for only limited number of subcarriers. Making the advantage of the fact that the inverse FFT (IFFT) and FFT processes are inherently implemented in the MIMO-OFDM transmitter and receiver, respectively, we propose to use the FFT based interpolation method at the receiver to estimate the PSQRD decompositions for the remaining of the MIMO-OFDM subcarriers. We show that the new proposed technique results in reduced computational complexity in MIMO-OFDM symbols as compared to other schemes known in literature.

3:45 BUSINESS MEETING**Room Exhibit Hall C****6:30-8:00 Thursday****P10.01****DEVELOPMENT OF A DUST DROPPER FOR DUSTY PLASMA EXPERIMENTATION**

Chioma Udemgba, DK Mansfield, S. Wissel, A. Zwicker, A. Merali

Dusty plasma research has applications in many scientific disciplines, from space physics to fusion engineering. Experimentally creating these complex systems requires the addition of fine dust particles to low temperature plasmas in a controlled way. This project focuses on engineering a dust particle dropper to insert 10^4 - 10^6 spherical SiO_2 beads (40 μm diameter) into argon plasma at 10^{-3} - 10^{-4} Torr at a steady rate. Dust particles are deposited at an averaged .008 - .530 mg/s into the plasma with the use of an adapted particle dropper (Mansfield, 2010) consisting of a piezoelectric disk that confines particles to a central 2.54 cm circle when it is driven with a 2.35 kHz signal. The device regulates the motion of the dust particles using both acoustical and mechanical constraints in order to provide linearity and strict control of particle deposition through a central 0.08 cm aperture. The use of this device will allow for a reproducible addition of dust particles into plasma and enable the production of stable dusty plasma which aids in investigating the charge accumulation of dust clouds, as well as the study of the formation and characterization of dusty plasmas.



Friday, February 24

FRIDAY MORNING

Room: Lamar II

O10.20

9:00 TEMPERATURE AND HUMIDITY MEASUREMENT IN A PHOTOCATALYTIC CHAMBER

Jared Rester, Randy Buchanan

University of Southern Mississippi, Hattiesburg, MS

Photocatalytic chambers require that temperature and humidity be monitored and measured accurately to ensure precise characterization of photocatalytic material processes. The measurement of temperature and humidity must be performed in such a manner that the sensors are not degraded by incident radiation. Sensors must be located close to the process sample to provide accurate measurements without significant lag time. A temperature and humidity measurement system was designed, implemented, and calibrated to meet these requirements and accurate measurements were obtained. Current photocatalytic materials characterization can now be accomplished with correlated sample environment temperature and humidity values.

O10.21

9:15 NUCLEAR MAGNETIC RESONANCE SPECTRA OF HYDROGENATED AMORPHOUS SILICON: A MOMENT-BASED APPROACHParthapratim Biswas

University of Southern Mississippi, Hattiesburg, MS

The direct calculation of the nuclear magnetic resonance (NMR) spectra of amorphous solids from the first-principles density functional theory is highly nontrivial, and is difficult due to the presence of the short- and the medium-range order. In this work, I discuss how the NMR spectra of amorphous solids can be constructed from a knowledge of the moments of a resonance spectrum. The moments of the NMR spectrum can be obtained from the real-space distribution of the spins in the model amorphous networks, which are then used for the construction of an NMR spectrum. We have applied this approach to calculate the NMR spectra of model hydrogenated amorphous silicon networks at different concentration, and compared our results to the experimental NMR data.

O10.22

9:30 MAINTAINING ACCURATE MEASUREMENTS WITH PHOTOIONIZATION DETECTOR IN A VOC FLOW STREAMAnton Netchaev, Randy Buchanan

University of Southern Mississippi, Hattiesburg, MS

Recent developments in sensor technology enable accurate nondestructive measurements of bulk volatile organic compounds (VOC) down to five parts per billion (ppb). These sensors use photoionization detectors (PID) to accurately measure VOC concentration of measured gases. Operating PID sensors in VOC-rich environment presents a problem due to sensor contamination. PID sensors use a lamp to strip electrons from passing VOC molecules. The free electrons are then detected by an amplifier which creates a signal that represents concentration. If this lamp becomes contaminated, the accuracy of the sensor suffers. A procedure was developed to maintain sensor functionality and accuracy during prolonged testing. Results of implementing the procedure produced accurate measurements of reference samples and extended operation.

O10.23

9:45 DESIGN OF HIGH PRESSURE INSTRUMENTED TEST FIXTUREBiju Bajracharya, Roger Harrison, Randy Buchanan

University of Southern Mississippi, Hattiesburg, MS

Experimental research required an instrumented test fixture capable of measuring pressure, temperature, and gas flow rates. A high pressure test fixture was designed using ASTM certified stainless steel materials capable of withstanding 3000 psi of pressure and operating under cryogenic temperatures. The test fixture was constructed using two schedule-80 pipes, coaxially aligned to form two sealed chambers. The inner chamber consisted of two access ports for gas flow and pressure relief. The outer chamber was constructed with multiple access ports and fittings that were used for gas input, measurement and instrumentation devices. A full computer aided design layout and simulation was completed to verify the design and pressure ratings of the test fixture prior to construction. The test fixture provided a safe and reliable platform for high pressure, low temperature process measurements.

**O10.24**

**10:00 ELECTRODE DESIGN
CONSIDERATIONS FOR SURFACE
AND VOLUMETRIC RESISTIVITY
MEASUREMENTS OF SMALL
SAMPLES OF THIN FILM POLYMERS**

Steven Bunkley, Randy Buchanan

University of Southern Mississippi, Hattiesburg, MS

To fully understand the resistive properties of a thin film polymer, both surface and volumetric measurements must be taken. Surface resistivity must be considered along with volumetric due to the skin affect that is introduced into a system at high frequencies. The ASTM standard includes the theory behind the physical design of the electrodes that contact the polymer. This presentation will provide an explanation of the theory along with the problems encountered when physically implementing a test stand. Results were tested against known values to establish accuracy and repeatability.

O10:25

**10:15 10:15 CONCERNING THE EFFECT
OF WATER VAPOR ON THE
OSCILLATION OF AN AIR BUBBLE**

James Stephens

University of Southern Mississippi, Hattiesburg, MS

The oscillation of an air bubble is in a fluid is of importance to exploration geophysicists and oceanographers. The oscillation of the bubble is typically treated as a polytropic or even an adiabatic process. In this paper we review a simple derivation of the Rayleigh-Plessett equation from the energy of the bubble and surrounding water, which allows for the evaporation of vapor into the bubble. The effect of evaporation is explored by comparison with free oscillation of a "dry" bubble with no included water vapor.

PSYCHOLOGY AND SOCIAL SCIENCES

Chair: Shaila Khan,
Tougaloo Collge
Co- Chair: Kurt Thaw,
Millsaps College,

February 23

THURSDAY MORNING

O11.01

**9:00 PTSD SYMPTOM SEVERITY AND ITS
RELATIONSHIP WITH LOCUS OF
CONTROL AND GENDER**

April Fitzpatrick, Shaila Khan

Tougaloo College, Tougaloo, Mississippi, United States

O11.02

**9:15 THE INFLUENCE OF SINGLE,
DIVORCE, AND DUAL FAMILY
STRUCTURE ON INTIMATE
RELATIONSHIPS**

Jaleesa Seals, Nhan Truong

Tougaloo College, Tougaloo, Mississippi, United States

O11.03

**9:30 THE LISTENING PREFERENCES
OF HIGH SCHOOL AND COLLEGE
STUDENTS BASED ON
PERSONALITY, MUSICAL TASTE
AND MUSICAL TRAINING**

Beverly Bretteney, Shaila Khan

Tougaloo College, Tougaloo, Mississippi, United States

O11.04

**9:45 EXAMINING THE RELATIONSHIP
BETWEEN SOCIAL ENVIRONMENT
AND DELINQUENCY**

Kasey Autman, Meherun Laiju

Tougaloo College, Tougaloo, Mississippi, United States

10:00 BREAK

O11.05**10:15 SEXUAL BIAS: PHYSICAL ATTRACTIVENESS PREFERENCES**

Christopher Thomas, Shaila Khan

Tougaloo College, Tougaloo, Mississippi, United States

O11.06**10:30 A COMPARATIVE STUDY: RACIAL IDENTITY AWARENESS AMONG AFRICAN AMERICAN BABY BOOMERS AND GENERATION Y**

Kristen Harris, Meherun Laiju

Tougaloo College, Tougaloo, Mississippi, United States

O11.07**10:30 ATTITUDES AND BELIEFS OF ABORTION AMONG AFRICAN AMERICAN MOTHERS AND YOUNG ADULT WOMEN**

Marnise Webb, Shaila Khan

Tougaloo College, Tougaloo, Mississippi, United States

O11.08**11:00 TIPS FOR GETTING ADMISSION IN GRADUATE SCHOOL**

Sheree Watson

University of Southern Mississippi, Hattiesburg, Mississippi, USA

O11.09**11:15 DE-MYSTIFYING MYTHS: CREATION AND FIRST MAN-WOMAN MYTHS**

Madhu Singh

Tougaloo College, Tougaloo, Mississippi, United States

This paper cuts across traditional academic boundaries and critically uses a multitude of data, currently available sources of knowledge: philosophy, religion, psychology, sociology, geography, archaeology, and genetics, to understand the origin development and transmission of myths. Myths are rooted in pre-history and it is incumbent to trace mans' journey from the cradle in the Rift Valley, driven by natural disasters and taking with him his stories, cultures and beliefs, in both directions, East and West. There probably was considerable travel between the Occident (the fall of the sun, i.e. Europe and Africa), and the Orient (the rise of the sun, i.e. Asia and Indonesia). All this was the "Old World," and one could move from one part

of it to another in a boat without getting too far from land. An attempt is being made to unravel the story by using archaeological and genetic information from the Bronze Age (and earlier), tracing the remnants of bones, tools, cave paintings, and writings. The greatest philosophical questions that have obsessed man since the beginning of time: Why does anything exist at all? What is the point of it? Who created the universe? *The answer religion gives is God, or in ancient times, Gods. At the same time an ancient Greek philosopher named Euhemerus, argued that man created the gods. Focusing on the creation myths and the first-man myths in different cultures, the paper seeks to develop an understanding of the evolution of mans' consciousness and creation of organized society*

O11.10**11:30 A STUDY OF FACTORS THAT AFFECT AFRICAN-AMERICAN COLLEGE STUDENTS' ATTITUDES TOWARDS COLLEGE PHYSICS**

Carl Drake

Jackson State University, Jackson, Mississippi, United States

My research focuses on the belief that a person's attitude affects the way they view a subject, pursue knowledge, and achieve within that subject area. The Fennema-Sherman Mathematics Attitude Scales were modified for physics and used to analyze the attitudes of the 135 African-American participants enrolled in an introductory college physics class to determine the students' attitudes toward physics. Demographic information was also collected to provide a better picture and understanding of the typical African-American college student that is enrolled in an introductory college physics course. The students with good attitudes toward physics will have a higher level of achievement. The multiple linear regression revealed that the relationship was significant, $F(9, 115) = 2.97, p = .003, R^2 = .189$.

O11.11**11:45 A STUDY OF THE ROLE OF THE GENDER OF AFRICAN-AMERICAN COLLEGE-STUDENTS AND THEIR ATTITUDES TOWARDS MATHEMATICS**

David Bramlett

Jackson State University, Jackson, Mississippi, United States

My research focuses on the belief that a person's attitude affects the way they view a subject, pursue, and achieve within that subject area. The Fennema-Sherman Mathematics Attitude Scales were



administered to 239 African-American students that were enrolled in 12 separate College Algebra classes to determine the students' attitudes towards mathematics. Demographic information was also collected to provide a better picture and understanding of the typical African-American college student that is enrolled in a college algebra classroom. The male domain, father domain, and confidence domain scores of the Fennema-Sherman Mathematics Attitude Scales indicated a significant difference from each other when considering gender. The confidence domain scale was found to have the strongest overall effect on student achievement.

12:00 LUNCH

ORAL PRESENTATION

O11.12

1:30 WICKED WEATHER: HURRICANE IRENE TO TROPICAL STORM

Tia Caston, Myles James, Jenny Li, Madhu Singh

Tougaloo College, Tougaloo, Mississippi, United States

A disaster implies sudden misfortune resulting in the loss of life or property or other forms of great harm or damage (Halpern & Tramontin, 2007). Natural disasters are inevitable, but are impacted by man-made conditions. Of the many forms of natural disasters, the second most frequent is a hurricane. This is a tropical storm with winds of 74 or more miles per hour (Louisiana Homeland Security and Emergency Preparedness, 2009). This presentation reviews the seven stages of disaster in reference to Hurricane Irene. It begins with the origin of Tropical Storm Irene. Early tracking, warning signals, and alerts are discussed as it developed into Hurricane Irene and then reduced to a tropical storm as it swept through the many islands and states. Special emphasis is laid on its impact on the megacity of New York and the neighbouring states. The 13 billion dollars in damages are reviewed, together with the efforts of the first responders that volunteered in terms of the relief they provided both physically and psychologically to those affected. The presentation briefly covers recovery and clean up procedures, as they are ongoing. This paper disseminates the current knowledge regarding the seven stages of disaster in terms of current practices and what individuals, communities, local, regional and national agencies can do to mitigate the effects of natural disasters. Recommendation and policy changes are also suggested to streamline

preparedness, evacuation and recovery procedures.

O11.13

1:45 GOVERNMENT ROLE: PREPAREDNESS AND RESPONSE TO NATURAL DISASTER

LaDouglas Ford, Meherun Laiju,

Tougaloo College, Tougaloo, Mississippi, United States

O11.14

2:00 THE EFFECTS OF MUSIC FOR HEALING OF GULF COAST RESIDENTS FOLLOWING HURRICANE KATRINA

Brenda Wilder

Tougaloo College, Tougaloo, Mississippi, United States

“The Effects of Music for Healing of Gulf Coast Residents Following Hurricane Katrina” is a research project that studied ways music was used to benefit coastal residents following the devastating events surrounding Hurricane Katrina. The researcher used books, publications, interviews, and surveys to collect data. The population surveyed included the Mississippi and Louisiana Gulf Coast residents, Mayors of Mississippi coastal towns, and both professional and amateur musicians. The research showed that music was a healing tool for coastal residents following Hurricane Katrina, and positive effects were noted mentally, emotionally, and physically.

O11.15

2:15 BEST PRACTICES TO INCREASE PREPAREDNESS AND RESILIENCE OF AT _ RISK POPULATIONS

Madhu Singh

Tougaloo College, Tougaloo, Mississippi, United States

Coastal communities worldwide are endangered as sea-levels rise and there are changes in storm and rainfall patterns due to global warming and overall climate change. Hurricane Katrina (2005) highlighted existing inequities and failure of state and national systems in preparedness to protect and evacuate the most vulnerable populations. A need was felt to reassess current approaches to develop best practices to enhance the level of preparedness and build on the resilience of people. This project used coastal disasters such as the Indian Ocean Tsunami (2004), Australia's floods (2011), and Japan's tsunami (2011) as case studies to learn from. The study focused on the vulnerable/at-risk defined as “The characteristics

and circumstances of a community, system or asset that make it susceptible to the damaging effects of hazards.” Literature search utilized web sources, books, and conference presentations and published papers. The analysis of global disaster management measures focused on both cities and rural areas. Both individuals and communities are resilient, able to resist, absorb, accommodate and recover from the effects of a hazard. Recovery is on two levels, at least, the physical rebuilding of city, or neighborhood, and the mental, again at the individual and community level. Suggestions are given for pre-during and post disaster stages that incorporate the cooperation of the individual, community, local, national and international levels that can applied to the potential future disasters. It is emphasized that to minimize the effect of a disaster-in- the- making greater focus be placed on local organizations and community and individual self-help organizations.

O11.16**2:30 AN EVALUATION OF THE CURRENT ASSESSMENTS OF RESILIENCE TO DISASTERS FOR THE COASTAL COMMUNITIES OF MISSISSIPPI**

Shaila Khan, Jasmine Moore

Tougaloo College, Tougaloo, Mississippi, United States

A community’s ability to adapt to the impact of disaster events on the course of social, economic, and environment changes is referred to as community resilience. The level of resiliency conceptually describes the ability of a community to absorb shocks and still maintain function. This study focuses on the studies of resiliency on the coastal communities of Mississippi, particularly on the Gulfport-Biloxi Metropolitan Statistical Area (MSA) as well as evaluates the current assessments of resilience. Evaluations of these studies reveal that most of them offer partial views of resiliency, focusing heavily on previous experiences in discussing a problem or improvement of some community characteristics that apparently improves resilience. None of these studies use any quantitative indicators for measuring resilience except a recent one. Even, there have been disagreements among studies on the definition of disaster, and resilience. The interview with an official at Katrina Research Center demonstrates further how different the concept of resiliency may appear to different individuals. This present study reviewed studies on theories of resiliency as used in various fields, and those on resiliency done at Community Regional Research Institute (CARRI) for the purpose of comparing them with those for Gulfport area. Using the results of the study that

employed quantitative indicators for measurement of resiliency, it was found that the overall resiliency of the Gulfport-Biloxi Metropolitan Statistical Area is average, with variations in the subcomponent values. This observation suggests that more changes are required for the area to achieve greater resiliency to disaster events.

O11.17**2:45 PANEL DISCUSSION ON NATURAL DISASTER TOPICS**

3:00 P.M. to 4:00 P.M.

POSTER SESSION**P11.01****ATTITUDES OF AFRICAN AMERICANS TOWARDS INCARCERATED PERSONS**

Gabrielle Sanders, Madhu Singh

Tougaloo College, Tougaloo, Mississippi, United States

P11.02**COMPARATIVE ANALYSIS OF PARENTAL ATTACHMENT AND EMOTIONAL EXPRESSIVITY OF THOSE IN A RELATIONSHIP AND THE UNCOMMITTED.**

Tia Caston, Madhu Singh

Tougaloo College, Tougaloo, Mississippi, United States

P11.03 D**DIFFERENCE IN SELF ESTEEM OF TEEN MOTHERS FROM SINGLE AND DUAL PARENT HOMES: A COMPARATIVE STUDY**

Charity Thomas, Madhu Singh

Tougaloo College, Tougaloo, Mississippi, United States

P11.04**THE RELATIONSHIP OF EXERCISE, DIET, AND HEALTH LOCUS OF CONTROL TO OBESITY**

Antoinette McKay, Gary Chong

Tougaloo College, Tougaloo, Mississippi, United States

**P11.05****THE ECHO READING STRATEGY AND ITS EFFECT ON THE ORAL READING FLUENCY OF FIRST GRADE STUDENTS**Kiara Burton, Gary Chong

Tougaloo College, Tougaloo, Mississippi, United States

P11.06**THE RELATION OF PARENTAL STYLE TO AGGRESSION AMONG AFRICAN AMERICAN COLLEGE STUDENTS**Angela Hodges, Gary Chong

Tougaloo College, Tougaloo, Mississippi, United States

P11.07**THE RELATIONSHIP OF SELF-EFFICACY AND SELF-ESTEEM TO SCHOLASTIC ACHIEVEMENT AMONG AFRICAN-AMERICAN STUDENTS**Indeya Womack, Gary Chong

Tougaloo College, Tougaloo, Mississippi, United States

P11.08**CYBER BULLYING: THE KNOWLEDGE AND PREVALENCE OF DIFFERENT TYPES OF CYBERBULLYING AMONG AFRICAN AMERICAN COLLEGE STUDENTS.**Keyaira Johnson, Shaila Khan

Tougaloo College, Tougaloo, Mississippi, United States

P11.09**THE EFFECT OF WORRY AND SEXUAL BEHAVIOR**Kaitlin Short, Brittany Kinman*Millsaps College, Jackson, Mississippi, United States***P11.10****DO YOU KNOW WHAT I KNOW?**Stover, T., Harper, C., Trigg, K., Wesley, A. Watson, S.

University of Southern Mississippi, Hattiesburg, Mississippi, United States

Today's information explosion represents a "double-edged sword". Copious information, easily accessed, is at the students' fingertips, but students may be unable to determine which of it is scientifically sound. We examined information cited in "science" magazines (Psychology Today,

American Scientist) and attempted to trace it to scientific reports in peer-reviewed journals. Information in the magazines could rarely be verified in peer-reviewed journals. Indeed, 35% could not be traced back to a peer-reviewed source at all. Of the 65% that were located, half could only be found with great difficulty and appeared to be composite information from several secondary sources. We will discuss strategies for developing student awareness of the importance of the problem and providing students with skills to determine how to recognize reliable information.

4:00 A.M. to 4:30 P.M. DIVISIONAL BUSINESS MEETING**FEBRUARY 24, 2012.****FRIDAY MORNING:****ORAL PRESENTATION****O11.18****9:00 DOMINANCE BEHAVIORS IN GARNETT'S BUSHBABIES (OTOLEMUR GARNETTII)**Edens, K.D., Christopher, J., Greer, T., Baker, T., Stover, T., Watson, SL

University of Southern Mississippi, Hattiesburg, Mississippi, United States

The behavioral repertoire of Garnett's bush baby has not been well characterized due primarily to their nocturnal and semi-solitary nature. In particular, little is known about their dominance behaviors in the natural environment. To better understand the dominance hierarchy of this species, we studied four conventional indicators of dominance in a sample of five female bush babies resident at the University of Southern Mississippi Laboratory for Prosimian Studies. Following habituation, the bush babies were paired and placed in an open field environment for 20 min. In the second condition, they were placed in the same open field with access to fruit juice. For both conditions, each bush baby was paired with every other bush baby to form a total of 10 distinct dyads. We recorded the frequency and/or duration of displacement, feeding priority, grooming, and agonistic interactions. Results indicated that larger animals were more likely to displace conspecifics than smaller animals ($r = .936$, $p < 0.05$), displacement was positively related to interaction with the juice dispenser ($r = 0.918$, $p < 0.05$), and grooming was positively related to preferential access to juice ($r = .971$, $p < 0.01$). There were fewer agonistic interactions when juice was present, $t(4) =$

5.504, $p < 0.01$. These results suggest that bush babies may have more clearly defined dominance hierarchies than have been previously reported. The findings will be discussed in the context of socio-ecological models of social systems.

O11.19

9:15 MECHANISMS UNDERLYING RISKY BEHAVIOR IN POSTTRAUMATIC STRESS DISORDER

Nicole H. Weiss

Jackson State University, Jackson, Mississippi, United States

Individuals with posttraumatic stress disorder (PTSD) are at heightened risk to exhibit a wide range of maladaptive behaviors (e.g., substance abuse, binge eating and purging, and risky sexual behavior; Booth-Kewley et al., 2010; Gleaves et al., 1998; Weiss, Borne, Tull, & Gratz, in preparation). Recently, greater attention has been given to examining individual difference variables that may increase risk for engagement in dysregulated behaviors among individuals with PTSD. Two potential individual difference variables worth investigating are emotion dysregulation and impulsivity, as both have been found to be associated with PTSD (e.g., Weiss, Tull, Davis, Dehon, Fulton, & Gratz, in press) and dysregulated behavior (e.g., Tull, Weiss, Adams, & Gratz, under review). The following presentation will provide an overview of the role of emotion dysregulation and impulsivity in psychopathology and related maladaptive behaviors, with a particular focus on PTSD and risky behaviors. Specifically, it will outline my early research examining the robustness of the relationship between emotion dysregulation and PTSD (across racial/ethnic groups and relevant to other risk factors; Weiss et al., in press; Weiss, Tull, Anestis, & Gratz, under review), as well as explore whether maladaptive ways of responding to emotions (particularly in the form of negative emotions) heighten the risk for impulsive behaviors (Weiss, Tull, Viana, Anestis, & Gratz, under review). Lastly, clinical implications of the aforementioned studies will be provided, including the utility of techniques that target emotion dysregulation in the treatment of PTSD.

O11.20

9:30 GRIT AS A PREDICTOR OF POSTTRAUMATIC STRESS DISORDER

Mary W. Pollard, Karen K. Lambdin, Brandy J. Baczowski, and Stefan E. Schulenberg,

University of Mississippi, Mississippi, United States

The purpose of this study was to determine whether grit, which measures trait-level perseverance and passion for long-term goals, is an accurate predictor for posttraumatic stress disorder (PTSD) while controlling for perceived meaning and purpose in life. A perceived lack of meaning, often termed meaninglessness, is associated with symptoms of PTSD. It was predicted that lower levels of grit would be predictive of higher levels of PTSD, controlling for perceived meaning and purpose in life. At a mid-sized southern university, undergraduate students ($N = 273$) completed the Short Grit Scale (Grit-S; Duckworth & Quinn, 2009), the Purpose in Life test -Short Form (PIL-SF; Schulenberg, Schnetzer, & Buchanan, 2011), and the PTSD Checklist-Civilian Version (PCL-C; Weathers, Litz, Huska, & Keane, 1994). A linear regression analysis was conducted and showed that a low level of grit was not a significant predictor of PTSD in this sample ($F(1, 204) = .046, p = .830$). These results did not support our original hypothesis, yet we did find that meaninglessness is predictive of PTSD through a separate linear regression analysis ($F(1, 205) = 11.402, p < .01$). These results are consistent with the idea that approaches designed to enhance perceived meaning and purpose in life may be valuable components to a comprehensive treatment program for individuals with PTSD. While we did not find grit to be a statistically significant predictor for PTSD, there should be additional research into the construct of grit to better understand its relationship to other variables.

O11.21

9:45 VARIATIONS IN INTERACTION WITH ENRICHMENT DEVICES IN GARNETT'S BUSHBABY (*OTOLEMUR GARNETTII*)

Christopher, J. Edens, KD, Fontenot, MB, Harper, C, Trigg, K, Wesley, A., Watson, SL

University of Southern Mississippi, Hattiesburg, Mississippi, United States

Enhancing the psychological well-being of captive primates is a priority for both zoo and laboratory environments. However, there is great variation in the extent to which enrichment efforts succeed, both between species and among individuals of a given species. We examined the frequency and duration of interaction with several commonly used enrichment devices in a captive colony of Garnett's bush babies resident at the USM Laboratory for Prosimian Studies. The enrichment devices were plastic jugs used for nesting, branches suitable for climbing, and hanging plastic toys that could be



handled and manipulated. We categorized these items as being related to either security (jugs), motor activity (branches) or interactive activity (hanging toys). Five female bush babies were exposed to the enrichment items in an open field environment. Each bush baby was allowed 20 min to interact with the objects both individually and as a member of four distinct dyads. Levels of interaction with the objects decreased overall when either a food item or a conspecific was present ($p < .05$), although there was substantial variation among individuals. Nevertheless, there was a clear preference for interaction with the branches compared the hanging toys. These results indicate that maximum benefit of enrichment devices requires attention to individual preferences as well as species typical activities.

10:00 BREAK

O11.22

10:15 PERCEIVED MEANING IN LIFE AS A MODERATOR BETWEEN POSTTRAUMATIC STRESS AND SUICIDALITY

Bethany J. Aiena, B.S. and Stefan Schulenberg,
University of Mississippi

The purpose of this study was to determine if a person's perceived meaning and purpose in life was a significant moderator variable between Posttraumatic Stress Disorder (PTSD) and suicidality. People who meet criteria PTSD are at increased risk for suicidality. People who perceive their lives as being meaningless are also at increased risk for suicidality. To what extent would the degree to which a person believes that his or her life has meaning and purpose affect the relationship between PTSD and suicidal behavior? It was hypothesized that people with symptoms of PTSD would report significantly decreased risk for suicidality as their reports of meaning and purpose in life increased. The Purpose in Life test-Short Form (Schulenberg, Schnetzer, & Buchanan, 2011), the PTSD Checklist – Civilian Version (Weathers, Litz, Huska, & Keane, 1994), and the Suicidal Behaviors Questionnaire – Revised (Osman, Bagge, Gutierrez, Konick, Kopper, & Barrios, 2001) were completed by undergraduates ($N = 273$) at a southern university. A statistical moderation analysis was conducted, and it was found that perceived meaning and purpose in life does indeed moderate the relationship between PTSD and suicidality, $F(3, 205)=24.146$, $p < .01$. While PTSD is predictive of suicidality, meaninglessness serves as a significant moderator between the two such that

perceived meaning reduces the risk for suicidality among those with PTSD. This has treatment implications for people with both PTSD and suicidal ideations. Treatments designed to enhance perceived meaning and purpose in life could improve therapeutic outcomes in these instances.

O11.23

10:30 RELATIONSHIP BETWEEN GROOMING AND SELF INJURIOUS BEHAVIOR IN GARNETT'S BUSHBABY (*OTOLEMUR GARNETTII*)

Baker, T., Edens, KD, Christopher, Wesley, A, Watson, SL

University of Southern Mississippi, Hattiesburg, Mississippi, United States

Self-injurious behavior (SIB) is a common problem in captive primate populations. Although the cause is unknown, many have speculated that SIB is related to such issues as boredom, anxiety, and stress. We examined five female bush babies from the USM Laboratory for Prosimian Studies in an effort to determine whether other behaviors or behavioral characteristics were related to SIB. The bush babies were paired with another female and placed in an open field environment. Their behavior was examined for ten 20 min intervals. We found a significant positive relationship between SIB and grooming of conspecifics ($p < .05$). We also found that injuries related to SIB tended to result from excessive self-licking rather than self-biting, as has been found in other primate species. These findings suggest that SIB may be related to the individual's temperament and are discussed in the context of the relationship between SIB and various measures of temperament in primate species.

O11.24

10:45 MENTAL HEALTH AND PERCEIVED MEANING AS PREDICTORS OF LIFE SATISFACTION

Brandy Baczwaski, Stefan Schulenberg

University of Mississippi, Mississippi, United States

The purpose of this study was to determine which construct general mental health or perceived meaning, is a greater predictor of life satisfaction among students. It was predicted that perceived meaning would be a better predictor of life satisfaction than general mental health. Undergraduate students ($N=273$) from a southern university completed the Satisfaction with Life Scale (Diener, Emmons, Larsen & Griffin, 1985), the General Health Questionnaire (Goldberg, 1992), and the Purpose in Life test-Short Form (Schulenberg,

Schnetzer, & Buchanan, 2011). These measures were selected based on their psychometric support. Separate linear regression analyses were conducted which showed that perceived meaning explained 18.6% ($p < .001$) of the variance in satisfaction with life and general mental health explained 22.5% ($p < .001$) of the variance. When considered separately, general mental health is a greater predictor of satisfaction with life in this sample (i.e., it explains a greater portion of the variance). A hierarchical regression analysis was conducted to determine the amount of unique variance explained by perceived meaning. Results showed that when controlling for general mental health, perceived meaning explained 7.5% ($p < .001$) of unique variance when predicting life satisfaction. Both general mental health and perceived meaning are important factors to consider with regard to life satisfaction among students, and are therefore variables of significance to mental health professionals working with this population.

O11.25

11:00 EXAMINING STANDARDS AND THEIR IMPACT ON EXPECTATIONS OF STUDENTS, DEMONSTRATIONS OF UNDERSTANDING, AND EQUITABLE PROGRAMS

Lecretia Buckley

Jackson State University, Jackson, Mississippi, United States

The expectations for student performance in mathematics and the criteria for mathematics education programs to be deemed high quality are dynamic. For the past two decades the National Council of Teachers of Mathematics (NCTM) has been the leading national voice in setting both expectations of students and the criteria for high quality programs. With the newly adopted Common Core State Standards (CCSS) by more than 95% of the states in the U. S., there is a great deal of uncertainty about expectations for student learning. In this presentation, I examine expectations set forth by the CCSS for student learning and demonstration of understanding. Through a comparison of the Principles and Standards for School Mathematics, published by NCTM in 2000, and the CCSS in Mathematics which were adopted in 2010, I also explicate changes in content emphasis, vertical alignment, and cognitive rigor. Finally, I explore how the CCSS are likely to impact efforts to create more equitable mathematics learning environments.

O11.26

11: 15 EXAMINING PREDATORY LENDING: MAKING CONNECTIONS IN SECONDARY MATHEMATICS EDUCATION BETWEEN CONTENT AND EQUITY ISSUES

Rashaad Riley and Lecretia Buckley,

Jackson State University, Jackson, Mississippi, United States

Two key concerns in secondary mathematics teacher education are a lack of conceptual understanding and preparedness to teach a diverse student body. Pre-service secondary mathematics teachers (PSMTs) often struggle to demonstrate a deep understanding of fundamental concepts in the K-12 curriculum despite their extensive mathematics course taking which may be the equivalent of a Bachelor of Science degree in mathematics or the mathematics requirement for such a degree with the exception of two or three courses. PSMTs also report that they feel underprepared to teach students from varying backgrounds. Their feelings of inadequacy may be connected to isolated instruction and experiences in their teacher education programs that deal with issues of equity, diversity, or multiculturalism separate from mathematics content. This presentation provides an exemplary mathematics project that allows PSMTs to examine fundamental mathematics content while juxtaposing their thinking with issues of equity, specifically, socio-economic status (SES). The mathematical task, on predatory or payday lending, allows PSMTs to examine algebraic concepts while they explore SES-related issues and how SES correlates with achievement. The mathematical task is coupled with mathematics education research and, together, they serve as a site to develop content understanding, become aware of equity issues, and examine the impact of equity issues on mathematics instruction. Findings from research conducted in a secondary mathematics methods course in which the task was implemented are also presented.



SCIENCE EDUCATION

Chair: Bud Donahou,
Northwest Community College
Vice-chair: Sherry Herron,
University of Southern Mississippi

Thursday, February 23

Room

O12.01

8:00 RESTORATION OF THE NOAA LIBRARY AT THE NATIONAL MARINE FISHERIES SERVICE LABORATORY

Cristena Culpepper¹, LaGena Fantroy²

¹Cooperative Intern Program Mississippi Gulf Coast Community College-Jackson County Campus Biological Science Students, USA, ²the National Oceanic and Atmospheric Administration-National Marine Fisheries Service, USA, ³the National Aeronautic and Space Administration, USA, ⁴the Institute for Marine Mammal Studies-Center for Marine Education and Research, USA

The objective of this project focused on restoring the Special Collections Library at the National Oceanic and Atmospheric Administration (NOAA)-National Marine Fisheries Service Laboratory which supports Mississippi research laboratories. Hurricane Katrina destroyed the Library in 2005; since then, materials have been donated from libraries world-wide to re-establish the NOAA Library in Pascagoula. Donated materials must be unboxed, sorted, and shelved. The current stage of re-establishment has been focused on properly shelving all materials in a manner conducive with national library standards. The NOAA Library supports many Mississippi researchers; therefore, restoring the NOAA Library to full working order was/is vital.

O12.02

8:15 STEM CELL RESEARCH: THE HOLY GRAIL OF MEDICINE FOR END-STAGE RENAL FAILURE PATIENTS

Rachel L. Payne¹, Mario Magnone²

¹Cooperative Intern Program – Mississippi Gulf Coast Community College – Jackson County Campus Biological Science Students, USA, ²The University of South Alabama Transplant Clinic, USA, ³the National Aeronautic and Space Administration, USA, ⁴the Institute for Marine Mammal Studies, USA

The growing expense of the rising need for

dialysis and the life-long cost of post-renal transplant care, combined with limited Medicare coverage, insurability of patients, and the lack of available organs for transplant, lead to an unacceptable mortality rate. The purpose of this research was to explore the statistics and predictions for the increased needs, costs, and mortality rates for dialysis and kidney transplants compared to the projected cost and promise of regenerative medicine through stem cell research. Based on the proven ability of stem cells to induce various damaged tissues to regenerate, and compared to the growing expense, diminished quality of life, and mortality rates of patients suffering from end-stage renal failure, Regenerative Medicine is a financially viable research alternative that promises a virtual panacea of therapeutic treatment options with the potential to make organ failure and the transplant waiting list a thing of the past.

O12.03

8:30 EXPANDING THE CHEMISTRY LAB BOOK EXPERIENCE

Fatma Mohy El-Din¹, Steve Manis²

¹Cooperative Intern Program between the Mississippi Gulf Coast Community College-Jackson County Campus Biological Science Students, USA, ²The Mississippi Department of Marine Resources, USA, ³the National Aeronautic and Space Administration, USA, ⁴the Institute for Marine Mammal Studies-Center for Marine Education and Research, USA

The purpose of this project was to revise The Chemistry Lab Manual. The process included a careful study of the chosen units. Area topics developed were: "Identification of an Unknown Liquid and Solid Substance," "Determining a Rate Law," and "Determination of an Ionization Constant of a Weak Acid." Background information was gathered from many references books and through search of various websites. Experiments were designed and appropriate background information was added. Students were encouraged to include and design data tables to support their findings.

O12.04

8:45 CREATING INFORMATIVE BROCHURES FOR THE PUBLIC VISITING THE INSTITUTE FOR MARINE MAMMAL STUDIES

Kristian Harvey¹, Sharon H. Walker²

¹Cooperative Intern Program between the Mississippi Gulf Coast Community College- Jackson County Campus Honors Biology Students, USA, ²the Institute for Marine Mammal Studies-Center for Marine

Education and Research, USA, ³the National Aeronautic and Space Administration, USA

The objective of this project was to produce a collection of educational brochures focusing on the leading recreational and commercial species of vertebrates and invertebrates inhabiting the Mississippi Sound and the Gulf of Mexico. These informative brochures will help increase the awareness and understanding by the public visiting the IMMS-CMER concerning Gulf of Mexico and recreational fisheries, focusing on sports fish, i.e., Spotted Sea Trout and Red Drum and commercial species, i.e., Gulf Menhaden, Eastern Oyster, Brown Shrimp, and White Shrimp. The recreational fishing brochures will offer information relating to the classification, distribution, reproductive cycle, diet, anatomy, typical sizes, number and weight limits, and the largest of the species caught on record. For the commercial vertebrates and invertebrates, the brochures will also provide information on classification, distribution, reproductive cycle, diet, anatomy, and average size. In addition to this information, data will include economic yields (financial and weight). By utilizing these brochures, the public should become more aware of economically and recreationally important species, as well as their relevance to our everyday lives. Attendees will also be offered an overview of the procedure involved in the production of brochures developed for the public.

O12.05

9:00 STUDENTS OF THE ROBOTICS PROGRAM

Elton Barrett¹, Anja Comerford²

¹*Cooperative Intern Program between Mississippi Gulf Coast Community College Jackson County Campus Honors Chemistry Student, USA, ²Magnolia Park Elementary School, USA, ³the National Aeronautics and Space Administration, USA, ⁴the Institute for Marine Mammal Studies-Center for Marine Education and Research, USA*

Magnolia Park Elementary School has a robotics program that aids students in science, mathematics, problem-solving, and reasoning. Young students need exposure to a multi-faceted education that promotes an integration of several areas of learning. Students who possess a high academic ability participated in this program. This project taught the gifted students how to design and program a working robot, use software media to acquire information, and use feedback to adjust a programming system output. Robotics provided a unique cross-curricular learning experience necessary to develop skills in science, technology, and

engineering. The primary objective of this project was to mentor and observe students to observe the manner in which robotics program improves their academic abilities, problem-solving, and reasoning skills.

O12.06

9:15 DEVELOPMENTAL ETHICS: A MODULE FOR PROSPECTIVE NURSING PROFESSIONALS

Kysa Robinson¹, Bertha Oatis², L. Hollis Melton¹

¹*Cooperative Intern Program between the Mississippi Gulf Coast Community College (MGCCC)-Jackson County Campus (JCC) Honors Biology Students, USA, ²the MGCCC-JCC Nursing Program, USA, ³the National Aeronautic and Space Administration, USA, ⁴the Institute for Marine Mammal Studies-Center for Marine Education and Research, USA*

Life in the 21st century becomes more advanced every day. However, as medicine and technology develop, the medical profession must also grow. This project attempted to resolve this problem by developing a core group, or module of ethics principles desired in Level One Nursing Students at MGCCC-JC. The intern perused previous ethics documents from across the nation to form the module. The result of this project yielded the core principles of this ethics module. The module included citations from the Student Handbook. The resulting module was satisfactory to the Campus Board and the Nursing Program.

O12.07

9:30 MARINE MAMMAL AND REPTILE ARTIFACT DISPLAYS

Joseph R. Quiros¹, Chris Breazeale²

¹*Cooperative Intern Program between the Mississippi Gulf Coast Community College-Jackson County Campus Biological Science Students, USA, ²the Institute for Marine Mammal Studies-Center for Marine Education and Research, USA, ³the National Aeronautic and Space Administration, USA*

The education staff members at the Institute for Marine Mammal Studies-Center for Marine Education and Research (IMMS-CMER) want to enhance current marine mammal and sea turtle exhibits with the addition of various artifacts that have been confiscated by the National Oceanic and Atmospheric Administration. These artifacts are "on loan" to IMMS-CMER for education purposes. The goal of the project was to re-design and construct two display cases that feature marine mammal and reptile artifacts that were confiscated by NOAA due to the Marine Mammal Protection Act (1972) and the Endangered Species Act (1973)-with the education



goal being to help the public understand the need for protection and conservation of these species. Each item has been labeled according to species and habitat range. This project also included designing a 16-foot otter trawl exhibit that will help demonstrate the importance of turtle excluder devices (TEDs) to IMMS-CMER guests. The results will be three well-designed exhibits that help explain the importance behind each artifact to the public.

O12.08

9:45 CAN STUDENT OUTCOMES FOR A COMMUNITY COLLEGE MICROBIOLOGY COURSE BE AFFECTED BY SCHEDULING?

Sabrina Bryant¹, Amanda Parker², Mary Lux¹

¹University of Southern Mississippi, USA, ²Forrest County Campus of Pearl River Community College, USA

The four credit hour microbiology course taught at night at the community college historically was offered with class meeting one night/week. In fall and spring semester, the course met once a week for a 5 hour session (5:00 p.m. until 10:00 p.m.) with 150 minutes of lecture and 120 minutes of laboratory for 16 weeks for a total of 72 contact hours. Until 2008, the lab and lecture course in the summer met for the same 5 hour session but only for 12 weeks, resulting in only 54 contact hours contact hours which did not meet the accreditation standards for a four hour course. The issue with summer contact hours was corrected in 2008 when the summer microbiology course was scheduled to meet twice weekly for 3 hours for 12 weeks to provide 72 contact hours. Students enrolled in the summer classes since 2008 have been more successful than students in either previous course schedule. Student outcomes (course final grades) were used for statistical analyses: Pearson correlation coefficient was computed between student outcomes and frequency of class meeting per week. The results [$r^2 = (.905) = .819$, $p < .05$] revealed that students who met class more frequently per week were significantly more likely to have better outcomes than those who meet only once per week, regardless of contact hours. The data suggested that the twice per week class meeting schedule is more beneficial to the students, regardless of contact hours or length of semester.

10:00

BREAK

O12.09

10:15 BIOLOGICAL CONTROL OF THE CHYTRID FUNGUS

Taija Dismuke

Jim Hill High School, USA

Batrachochytrium dendrobatidis (Bd or Batrachochytrium) is a chytrid fungus that causes the disease chytridiomycosis. It is fungal pathogen of amphibians. Chytridiomycosis is responsible for exceptional population declines and extinctions globally. Host defenses against chytridiomycosis include cutaneous symbiotic bacteria and antimicrobial peptides, and proposed treatment measures include use of fungicides and bioaugmentation. Efforts to eliminate the fungus from restricted areas of disease outbreak have not been successful. The infective stage of the fungus, Bd, is an aquatic zoospore, 3-5 μ m in diameter. Zooplankton, *Daphnia magna*, consumes the zoospores of Batrachochytrium. *Daphnia magna* live in amphibian breeding sites where Batrachochytrium transmission occurs. By *Daphnia magna* consuming Batrachochytrium and testing the *Daphnia magna*, an effective biological control of Batrachochytrium may be found. Bd can be grown within a wide temperature range (4-25°C), with optimal temperature being between 17-25°C. The fungus becomes more pathogenic at lower temperatures. I plan to experimentally test the hypothesis that *Daphnia magna* consume Batrachochytrium zoospores.

O12.10

10:30 DESIGN AND TESTING OF THE LEONARDO ONLINE DISCUSSION BOARD STRATEGY FOR COLLEGE SCIENCE TEACHING

James Wandersee¹, Renee Clary²

¹Louisiana State University, USA, ²Mississippi State University, USA

An online discussion board is a server-based application hosted on the World Wide Web that allows class members to read and participate in asynchronous, illustrated, threaded discussions. The objective of this study was to design and test our LEONARDO online discussion board-based college science teaching strategy--which was built using Gelb's summary of Leonardo da Vinci's methods of scientific inquiry; Wiggins and McTighe's backward design model; Mintzes, Wandersee, and Novak's human constructivist learning theory; and Duschl's categories of discussion and scientific argumentation. After 12 semester-long iterations of implementation and associated testing within university science

courses, we arrived at our current LEONARDO discussion board strategy. We have amassed evidence that its structure, rules, and design—when used throughout the semester—insure total class participation; build a class-based discourse community; allow students to “talk science;” enhance course-centered student-student and student-instructor interaction; encourage student collaboration; reveal student thinking; allow the instructor to teach more science than before; and are linkable to assessment.

O12.11

10:45 PETRIFIED WOOD IN MISSISSIPPI'S K-12 SCIENCE CLASSROOMS: AN EFFECTIVE PORTAL FOR MISCONCEPTION IDENTIFICATION AND INTERDISCIPLINARY SCIENCE STUDY

Renee Clary¹, James Wandersee²

¹Mississippi State University, USA, ²Louisiana State University, USA

We first researched petrified wood in informal settings, including Mississippi's petrified forest in Flora. In our investigations, we identified petrified wood as an interdisciplinary topic. College classroom investigations ($n = 151$, $n = 24$) revealed that petrified wood was an effective portal to introduce and investigate geologic time, fossilization processes, and evolution: Students exhibited significant content knowledge increases with petrified wood incorporation ($\alpha = 0.05$). Because the majority of students noted they had previous petrified wood instruction, we turned our investigation to Mississippi's science teachers. We administered the Petrified Wood Survey (PWS) to MS teachers in professional development programs ($N = 97$), and investigated the teaching/learning potential of petrified wood classroom activities among in-service teachers ($N = 39$). Teachers performed significantly better ($\alpha = 0.05$) on the PWS than the college students. Teachers who participated in geosciences professional development programs also fared better than their colleagues. However, our analysis revealed that most Mississippi science teachers exhibited similar misconceptions to college students with regards to fossilization processes, petrified woods' colors, and its composition. Reflections on a fossil/modern wood comparison activity ($n = 39$) revealed 23% of teachers thought fossil wood was hundreds/thousands of years old, but teachers affirmed this activity's use in science classrooms. Likewise, a fossilization replication activity was identified as an effective classroom technique that would generate student interest. We propose our

latest research affirms the use of petrified wood in Mississippi's science classrooms to address interdisciplinary science concepts, and uncover misconceptions.

O12.12

11:00 "GREEN" WATER BOTTLES: CREATIVE SOLUTIONS FOR OUR PLANET

Renee Clary¹, James Wandersee², Jessica Kelly¹, Burnette Hamil¹

¹Mississippi State University, USA, ²Louisiana State University, USA

Earth Day 2011 provided the venue and inspiration for integrating creativity, ecology instruction, and environmental awareness among Mississippi school students. Because billions of water bottles end up in landfills each year, the Dunn-Seiler Museum in the Department of Geosciences at Mississippi State University sponsored a contest that invited students to invent a creative solution for water bottles that might otherwise end up as rubbish. Our "Green Water Bottle project" not only focused attention upon the ecological hazards of bottled water, but also encouraged students to drink tap water, and use only recyclable containers for their water.

The Dunn-Seiler received over 100 entries from among Mississippi's school students. Student solutions ranged from fashion accessories, organizers, and planters-to picture frames, noise makers, and camera stands. The Green Water Bottle project helped us to educate the future stewards of our state by instructing them in environmental issues, and promoting sustainable practices. The project also allowed students to express their creativity in designs and practices that may potentially impact our planet. Although Earth Day is only celebrated once a year, we propose that annual competitions that promote sustainable practices can influence our Mississippi school students, and actually encourage them to think about how they affect the environment on a regular basis. We are currently assessing the impact of these "green" competitions on student behavior.

**O12.13**

**11:15 INTEGRATING PLANTS IN THE
SCIENCE CLASSROOM THROUGH
OUR HUMAN-FLOWER
CONNECTION**

Renee Clary¹, James Wandersee², Mauriesia Johnson¹,
Burnette Hamil¹

¹Mississippi State University, USA, ²Louisiana State
University, USA

Plants form the base of most food chains, clothe and shelter us, and inspire us in countless ways. However, plants typically are only incorporated into science classrooms through a brief botany unit. Originally designed to explore the human relationship with flowering plants, The Human Flower Project (HFP) website archives plant vignettes that can be directly incorporated into science classrooms to extend plant learning. In 2008, Kate March and James Wandersee produced the first Human Flower Project spreadsheet for teachers that categorized articles by topic, providing direct links to the source materials. In 2011, the Teachers for a Competitive Tomorrow program at Mississippi State University partially funded the efforts to extend the HFP Guide for Teachers (Johnson & Clary, 2011). This free, downloadable spreadsheet for science teachers

(http://www.humanflowerproject.com/downloads/HFP_Guide_for_Science_Teachers.xls) includes sub-categories for biological discussions, classification, conservation, ecology, endangered plants, experiments, food, invasive plants, genetics, green science, and plant use in medicine. The newest version, extended through June 2011 HFP articles, also includes "teacher warnings" to indicate potentially sensitive topics. The HFP Guide for Teachers promotes plant integration in science classrooms by providing an organizing framework for teachers to locate useable plant resources.

11:30 DIVISIONAL BUSINESS MEETING

O12.14

**1:00 CREATING COMMON CONNECTIONS
AND STEWARDSHIP OF MARY
WALKER BAYOU PRESERVE**

John Christopher Marshall¹, Cynthia Ramsuer²

¹Cooperative Intern Program Mississippi Gulf Coast Community College- Jackson County Campus Honors Biology Students, USA, ²the National Wildlife Federation Habitat Stewards, USA, ³the Institute for Marine Mammal Studies-Center for Marine Education and Research, USA, ⁴the National Aeronautic and Space Administration, USA

Mary Walker Bayou Preserve in Gautier, MS. is a scenic natural area near the Gautier Business District. An 800-acre nature preserve owned and managed by the State of Mississippi is home to an abundance of wildlife and includes a 5.5 mile-long water trail and several walking trails that can connect residents and visitors with local businesses and the college. Creating Common Connections and Stewardship of Mary Walker Bayou Preserve has three main objectives: Objective One: the intern will receive training and education about natural resource management and public use through the Habitat Stewards Program, National Wildlife Federation; Objective Two: the intern will continue to plan and host the annual Spring Fling, a volunteer-workday for MGCCC students that consists of debris cleanup, trail work, and creation of a butterfly garden at the trailhead. This effort will make Mary Walker Preserve more beautiful and welcoming; and Objective Three: the intern and mentor will design a brochure that local businesses can use to inform visitors: an attractions map Gautier - Nature's Playground, about the Preserve and important natural areas nearby.

O12.14

1:15 MARINE LITTER DECAY TIMELINE

Raven Supak, Bianca Lewis

Mississippi Gulf Coast Community College, Jefferson Davis Campus, Gulfport, MS, USA

The objective of this project was to construct a marine litter decay timeline. A survey of local marine habitats was conducted to determine the typical marine litter by searching the beaches and local waters for harmful litter. The 3-D display provides the time the collected litter can persist within the environment. The display was constructed using a support beam approximately 4' (wide) x 8' (tall) x 4' (depth). This project was constructed and placed on display within the IMMS-CMER educational classroom area.

012.15**1:30 DEEPWATER HORIZON OIL SPILL:
THE BEGINNING OF THE STORY**Christian Martin¹, Randi Watt¹*Mississippi Gulf Coast Community College, Jefferson Davis Campus, Gulfport, MS, USA; Institute for Marine Mammal Studies, Center for Marine Education and Research, Gulfport, MS, USA*

The objective of this project was to construct a timeline of the observations and effects of the British Petroleum (BP) oil spill in the Gulf of Mexico in 2010. This is part one of a three part series that was intended to produce a digital file for making a large photo display. The photo display was arranged as a timeline of events that occurred in the first few months of the oil spill. The time line includes both digital images and important information pertaining to the consequences the oil spill has had on the Gulf of Mexico. This educational mural was then presented to IMMIS-CMER to be used as an educational display in its main display hall in the existing Museum.

012.16**1:45 DEEPWATER HORIZON OILS SPILL
TIMELINE: THE STORY
CONTINUES...**Brittney Cruz, Tiffani Freeman*Mississippi Gulf Coast Community College, Jefferson Davis Campus, Gulfport, MS, USA*

The objective of this project was to construct a timeline of the observations and effects of the British Petroleum (BP) oils spill in the Gulf of Mexico in 2010. This is part two of a three part series that was intended to produce a digital file for making a large photo display. The photo display was arranged as a timeline of events that occurred in the last several months of the oil spill. The timeline includes both digital images and important information pertaining to the consequences the oil spill has had on the habitats and inhabitants of the Gulf of Mexico. The educational mural was then presented to IMMS-CMER for use as an educational display in its main display hall in the existing museum.

012.17**2:00 MISSISSIPPI HIGHWAY LITTER DECAY
TIMELINE**Joseph Koehler¹, Katlyn Meadows¹*Institute for Marine Mammal Studies-Center for Marine Education and Research, Gulfport, MS USA; Cooperative Intern/Mentor Program between the Mississippi Gulf Coast Community College, Jefferson**Davis Campus, Gulfport, MS USA*

The objective of this project was to create a timeline showing the length of time for various types of litter to decay. This litter is found along our barrier islands, mainland beaches, and highways. A 3-D display was created for permanent display on the Jefferson Davis Campus that informs the visiting public of the litter issues within our environment. Items such as plastic bottles, cans, Styrofoam, metal, and natural products were collected over several weeks and digital images were taken of items too large for display. Research was conducted to determine the length of time for natural decay of each item.

012.18**2:15 MISSISSIPPI GULF COAST COASTAL
WATERS AND BARRIER ISLANDS
MURAL**Sana Solangi, Justin Wagner*Mississippi Gulf Coast Community College, Jefferson Davis Campus, Gulfport, MS, USA*

The objective of this project was to paint a mural of the coastal mainland, the Mississippi Sound, the barrier islands, the island passes and the Gulf of Mexico. Research was conducted to determine the names of the major waterways and islands that compromise these areas. This mural also serves as a learning tool for students and the public who visit the IMMS-CMER to enhance their awareness and understanding of the coastal marine environment. The mural was painted on a wall in the IMMS-CMER educational classroom area.

012.19**2:30 MISSISSIPPI RIVER WATERSHED
EDUCATIONAL MURAL**Dylan Graham¹, Julia Perrett¹, and Stephen West¹*Cooperative Intern/Mentor Program between the Mississippi Gulf Coast Community College, Jefferson Davis Campus, Gulfport, MS USA; Institute for Marine Mammal Studies-Center for Marine Education and Research, Gulfport, MS 39503*

The objective of this project was to paint an educational Mississippi River Watershed basin mural for the IMMS-CMER's educational area. The interns researched to determine the 31 U.S. States and two Canadian provinces that drain into the Mississippi River basin. The display provides educational information on the U.S. states' and Canadian provinces' waterways that drain into the Mississippi River and ultimately the Gulf of Mexico. Additionally, this display indicates the possible dead zones that result seasonally from the drainage effect of the waters into the Gulf of Mexico.



2:45 BREAK

012.20

3:00 TRAIL PLANT BROCHURES FOR THE INSTITUTE OF MARINE MAMMAL STUDIES NATURE TRAIL

Christopher Guice, Jr.¹

¹*Mississippi Gulf Coast Community College, Jefferson Davis Campus, Gulfport, MS, USA; Institute for Marine Mammal Studies, Center for Marine Education and Research, Gulfport, MS, USA*

The objective of this project was to construct and produce brochures of a selected grouping of coastal plants found on the nature trail at the IMMS-CMER. Information gathered included the lifecycles, general appearances, typical habitats and other interesting facts on each individual plants. The brochures were provided to the IMMS-CMER for use as an educational resource for the visiting public.

012.21

3:15 DEEPWATER HORIZON OIL SPILL TRIFOLD BROCHURES

Kishana Mcknight¹, Summer Pedley¹

Mississippi Gulf Coast Community College, Jefferson Davis Campus, Gulfport, MS, USA; Institute for Marine Mammal Studies, Center for Marine Education and Research, Gulfport, MS, USA

The objective of this project was to develop brochures documenting the effects of the oil spill on the coastlines of Alabama, Florida, Mississippi, and Louisiana. Research was conducted on reported effects to the wildlife, habitats, and ecosystems of each state. These educational brochures provide a summary of related effects and issues. The brochures were provided to IMMS-CMER for use as an educational resource for the visiting public.

012.22

3:30 TEACHING SECOND GRADERS TAXONOMIC CLASSIFICATIONS

Anja Ewing¹, Caroline Knight²

¹*Cooperative Intern Program Mississippi Gulf Coast Community College—Jackson County Campus Biological Science Students, USA,* ²*the Ocean Springs School District—Oak Park Elementary School, USA,* ³*the National Aeronautic and Space Administration, USA,* ⁴*the Institute for Marine Mammal Studies, USA*

The purpose of this project was to educate second grade, gifted students at Oak Park Elementary School about the organization of animals in

taxonomic categories. Various of methods were utilized in accomplishing this task, such as teaching the students a song, using a tree analogy and diagram to illustrate the categories, and playing a classification game. The intern also spent "one-on-one time" with each student, helping research the animal he or she had chosen. Before teaching the students, the intern organized a group discussion to gauge any prior knowledge. The students had no prior knowledge of taxonomy. At the conclusion of this project, another group discussion was conducted. The students demonstrated a tremendous amount of knowledge for their specific age group. To demonstrate their knowledge, the students performed a play for their peers.

012.23

3:45 LEARNING STRATEGIES FOR THE INTELLECTUALLY GIFTED

Ryan Lake¹, Linda Foster²

¹*Cooperative Intern Program between the Mississippi Gulf Coast Community College-Jackson County Campus, USA,* ²*the Ocean Springs School District-Taconi Elementary School, USA,* ³*the National Aeronautic and Space Administration, USA,* ⁴*the Institute for Marine Mammal Studies-Center for Marine Education and Research, USA*

The opportunity to work with a group of intellectually gifted students at Taconi Elementary, a fifth grade school in the Ocean Springs School District, resulted in an opportunity to compare and contrast learning methods used by and with the students as they studied World War II. Additionally, the students focused on scientific advancements accomplished as the country defended itself and the free world. Werner Von Braun's passion for rocketry stimulated a great deal of interest. Activities were developed focusing on the use of touch (tactile), sound (auditory), and sight (visual). Pre- and post-tests were administered to evaluate learning styles.

Division Poster Session**Following Dodgen Lecture**

6:30-8:00 pm

P12.01**TEACHER TRAINING, METHODS AND INTENT TO PERSIST**Mark Holcomb, MacAllister Marshall, Kelsey Sisney, Cynthia Burdette*University of Southern Mississippi, USA*

Teachers and administrators have used many different methods and training techniques in the public school setting; however, there has been little comparison between these techniques and teacher's intent to continue working as a teacher. In this study, over one hundred fifty teachers and administrators were given surveys which showed few significant relationships between teacher training, methods, anxiety and persistence. All teachers showed high anxiety towards high-stakes testing, teacher accountability, the tier process, and performance based pay regardless of their years of experience, but only a small percent showed lack of interest in continuing their career. The material provided from this research seeks to provide intuition for future teachers, counselors, and principals who plan on entering the field of education.

P12.02**IMPROVING THE FOOD SAFETY KNOWLEDGE, ACCORDING TO HACCP, AMONG INTERNATIONAL RESTAURANT FOOD HANDLERS IN THE MISSISSIPPI GULF COAST REGION**Hang Nguyen¹, Barakat S. M. Mahmoud²

¹Cooperative Intern Program between the Mississippi Gulf Coast Community College-Jackson County Campus Biological Science Students, USA, ²The Mississippi State University Extension Service, USA, ³the National Aeronautic and Space Administration, Stennis Space Center, USA, ⁴the Institute for Marine Mammal Studies-Center for Marine Education and Research, USA

In any restaurant, knowing the basic knowledge about food safety and how to properly handle food is a vital step in producing a safe, high-quality food to maintain their reputations with the consumers. The purpose of this project was to increase available guidelines for international restaurants in the Mississippi Gulf Coast Region. In this work, flyers about washing hands effectively, cleaning services, storing and cooking food at the right temperature were created. The food handlers were trained how to effectively wash their hands and

how to safely serve food to minimize the number of bacteria. The other part of this work was conducted to determine the most associated bacteria within these restaurant environments and to find the best method to reduce/control these bacteria. The Seven HACCP (Hazard Analysis Critical Control Points) principles were explained to the food handlers in these several chosen restaurants. By following these steps and recommendations, the quality of the food and also the service of the restaurants were significantly improved.

P12.03**EVALUATION OF CHEMOTHERAPY PATIENT EDUCATION**Katie Day¹, Courtney Parker¹, Maggie Clarkson²

¹Cooperative Intern Program between the Mississippi Gulf Coast Community College Jackson County Campus Biological Science Students, USA, ²Singing River Hospital System, USA, ³the National Aeronautics and Space Administration, USA, ⁴the Institute for Marine Mammal Studies-Center for Marine Education and Research, USA

Throughout the fall semester, a student intern worked with Maggie Clarkson in the Cancer Center of Singing River Hospital. The patients who receive chemotherapy at the Cancer Center of Singing River Hospital are initially required to take a class that "walks the patient through" the process of chemotherapy and its various side effects. The class also prepares the patient for the physical and emotional trials that he or she will endure throughout the chemotherapy. The student intern used the evaluation forms collected from the patients who completed the class and entered the results into an Excel document. The student intern then sent evaluation forms to the patients who completed the class and their chemotherapy to evaluate the usefulness of the class. The results were presented to the hospital staff.

P12.04**HOW TO STOP THE SPREAD OF GERMS WITHIN OCEAN SPRINGS ELEMENTARY SCHOOLS**Tave' Henry¹, Devin King¹, Barakat S. M. Mahmoud²

¹Cooperative Intern Program between the Mississippi Gulf Coast Community College-MGCCC Jackson County Campus Biological Science Students, USA, ²The Mississippi State University Extension Service, USA, ³the National Aeronautic and Space Administration, Stennis Space Center, USA, ⁴and the Institute for Marine Mammal Studies-Center for Marine Education and Research, USA



The spreading of germs and bacteria has become major health issues in school systems. Proper hand-washing techniques utilized after bathroom usage, before and after eating, and food preparation can reduce the spread of microbes. A variety of hands-on experiences were developed which increased student awareness of the prevalence of germs in everyday life. Multiple elementary schools in Ocean Springs, MS were exposed to experiments in appropriate hand-washing techniques. Additionally, cafeteria workers were interviewed concerning food preparation safety. Key points in food preparation safety were summarized and shared with each school. The focus of student cleanliness and food preparation safety resulted in increased awareness and a healthier environment by all students involved in this project.

P12.05

DR. WILLIAM E. HAWKINS AND HIS CONTRIBUTIONS TO MARINE SCIENCE

Kristina Zwerg¹, Joyce Shaw²

¹*Cooperative Intern Program between the Mississippi Gulf Coast Community College-Jackson County Campus Biological Science Students, USA,* ²*the University of Southern Mississippi-Gulf Coast Research Laboratory, USA,* ³*the National Aeronautic and Space Administration, USA,* ⁴*the Institute for Marine Mammal Studies-Center for Marine Education and Research, USA*

The Gunter Library at the Gulf Coast Research Laboratory (GCRL) collects and maintains archival materials related to its history, its faculty, staff, students, and programs. Significant among these materials are newspaper clippings, reports, photographs, and publications generated by researchers at GCRL. As part of a 16-year effort to document and preserve the history of the GCRL, this project focused on the work of Dr. William E. Hawkins, retired GCRL Director and former chair and professor in The University of Southern Mississippi, Department of Coastal Sciences. Articles, reprints, newspaper clippings, and other historical materials were sorted and organized for preservation and conservation purposes. A poster was created for the 2011-2012 Mississippi Academy of Sciences annual conference which highlighted Dr. Hawkins's many contributions to marine science.

P12.06

TEACHING STUDENTS ABOUT NEWTON'S LAWS OF MOTION.

Laura Woitalla¹, Roma Flowers²

¹*Cooperative Intern Program Mississippi Gulf Coast*

Community College-Jackson County Campus Biological Science Students, USA, ²*the Oak Park Elementary School, USA,* ³*the National Aeronautic and Space Administration, USA,* ⁴*the Institute for Marine Mammal Studies, USA*

The purpose of the project was to educate students about Newton's Laws of Motion. The students were first assessed in their prior knowledge by a class discussion and debate. Most of the students had little or no basic knowledge of the Laws of Motion. With hands-on activities such as creating a catapult, students acquired knowledge through the use of scientific observation, data collection and the usage of Newton's Laws of Motion. The activities required students to use logical thought processes such as identifying variables and careful observations in the construction or the catapult. The catapult lesson module concluded with a plethora of contributions by the students, supporting an increase in their knowledge of Newton's Law of Motion.

P12.07

ANALYZING DATA FOR POTENTIAL CHANGES IN HOSPITAL TECHNIQUES AT SINGING RIVER HEALTH SYSTEM (SRHS)

Arkadius Norvel¹, Deidre Peyton²

¹*Cooperative Intern Program between the Mississippi Gulf Coast Community College- Jackson County Campus Honors Biology Students, USA,* ²*the Singing River Health System, USA,* ³*the National Aeronautic and Space Administration, USA,* ⁴*the Institute for Marine Mammal Studies-Center for Marine Education and Research, USA*

The 21st Century has opened portals to advancements in many areas. The electronic age, and related technologies have provided the opportunity for consolidation of records and documents. The SRHS desired analyses of data for potential changes in the hospital techniques. Additionally, consideration must be given to a "safe of site" copy of pertinent data. A variety of scanning/filing/storage methods were explored. The purpose of this project was to develop digital copies of the paperwork available on demand in a way that was readily accessible. A power point presentation was created to improve ward competence. The presentation was presented to the Institutional Review Board (IRB). The project allowed the SRHS staff to easily access and track the documents, thereby eliminating the need to search through multiple folders.

P12.08

THE RISE OF THE APPS: IMPLICATIONS OF MOBILE APP ECOSYSTEMS FOR EARLY CHILDHOOD READING AND MATH LEARNING

Alex Scrimshire

University of Mississippi, USA

Smartphones and tablets are becoming commonplace in today's world. With so many people spending more and more time focused on these devices, is there any educational value? How many educational apps are available? If so, how many are worth the download (free vs. paid)? Also, which ones are best for different types of learning? How good are the reading or math apps for young children? How fast is this market growing in comparison with apps in general? Should we focus on the creation of a certain type of app specifically aimed at children's learning needs? In an attempt to get a better understanding of these questions, we surveyed the mobile app landscape to get a sense of how fast and in what directions that landscape is evolving, particularly with regard to reading and math apps for young children, and have made some observations about the implications on research to evaluate the effectiveness of mobile devices and apps as tools for improving childhood math and reading.

February 24, 2012**FRIDAY MORNING**

012.26

9:00 SCIENCE CURRICULUM THROUGH ART OF THE WALTER ANDERSON MUSEUMKatie Severs Smith¹, Melissa Johnson²

¹*Cooperative Intern Program between the Mississippi Gulf Coast Community College-Jackson County Campus Biological Science Students, USA,* ²*the Walter Anderson Museum of Art, USA,* ³*the Institute for Marine Mammal Studies-Center for Marine Education and Research, USA,* ⁴*the National Aeronautic and Space Administration, USA*

The Walter Anderson Museum of Art (WAMA) widened its influence of exploring the life and work of Walter Anderson by its placement of activities for children in its programs available during the summer and regular school year. This project's purpose was to assist children in exploring weather, tides, plants, and animals as they viewed Walter Anderson's Horn Island works. The project emphasized the "science" in Anderson's art of the island. Children from the three coastal counties,

(aged three to 10) attended a Workshop at WAMA during the Peter Anderson Festival in Ocean Springs. Participants received a 45-minute lecture centered on plant and animal life located within the art. A Horn Island picture and collage were reminders of the beauty of the island and the life within this special ecosystem.

012.27

9:15 CAN SCIENCE OLYMPIAD AND THE 5ES REDUCE ANXIETY AND IMPROVE ATTITUDES TOWARD TEACHING SCIENCE?Allison Downing, Sherry Herron, Shelia Hendry, Jodie Jawor*University of Southern Mississippi, USA*

We used a pretest/posttest quasi-experimental design to determine if the use of selected Science Olympiad (SO) events presented in the 5E instructional format (Bybee et al, 2008) and experienced in small groups would reduce anxiety and increase attitude toward teaching science. The mixed-methods study was conducted over two trimesters in an undergraduate science methods course with 34 female pre-service elementary teachers. The State-Trait Anxiety Inventory Form Y (Spielberger, 1983) and the Revised Science Attitude Scale (Shrigley and Thompson, 1986) were administered as pre and posttests. Because fidelity to the 5E instructional method and the SO events was essential, groups were video recorded through the 10-week course. Because students worked in groups of three to five during the SO events, the Cooperative Learning Rubric (2003 IRA/NCTE ReadWriteThink) was used to analyze group behaviors. A statistically significant decrease ($p < .001$) in anxiety and a statistically significant increase ($p < .001$) in attitudes toward teaching science upon course completion was found. Individual anxiety and attitude scores, combined with scores from the Cooperative Learning Rubric, revealed that 22 of the 34 students clearly supported the anticipated outcomes and four did not, with eight showing mixed results. Results provide clear evidence that these instructional tools are effective.

012.28

9:30 REPORT AND REFLECTIONS FROM YEAR ONE OF THE NSF GK-12 PROGRAM AT USMSherry Herron, Richard Mohn, Sarah Morgan, Sabine Heinhorst, Jeff Wiggins, Kim Wingo*University of Southern Mississippi, USA*

Graduate students in biology, chemistry, biochemistry and polymer science at the University



of Southern Mississippi are working with high school students in local schools. The graduate fellows spend 10 hours a week sharing their research through demonstrations, lab activities, and projects. The interdisciplinary research theme for "Connections in the Classroom: Molecules to Muscles" is used as a vehicle in science classes to connect research in areas important to teenagers, such as sports and soldier protection. Fellows benefit from enhanced communication, collaboration, team building and teaching skills. Teachers benefit from increased content knowledge and professional development opportunities. Students benefit by learning from a scientist. An array of formative and summative assessments is collected, including fellow and teacher logs, fellow and student surveys, interviews, and lesson plan assessments. Themes that emerged from the fellows' and teachers' logs submitted during the first year of the project will be presented. The website and lesson plans developed by the first seven fellows will be shared. Affirming our efforts, data from pre and post questionnaires on attitudes about science administered to students in which fellows were assigned revealed significant gains in these statements: There is a need to know about science in most jobs. It does not make me nervous to think about doing science. It would be difficult to get along perfectly well in everyday life without science.

O12.29

9:45 A REVIEW OF SCIENCE, TECHNOLOGY AND SOCIETY (STS) CURRICULAR IDEAS AND STRATEGIES SINCE 2000 IN THE MIDDLE GRADES

William Sumall, Paul Rogers

University of Mississippi, USA

The connections made between science, technology and society (STS) has been a theoretical and philosophical construct whose exact date of origin is debatable. Specifically, ideas related to how science evolves due to technological and societal influences can be traced as far back as 1935. Using the topic of STS as an actual way to teach science has undergone varying degrees of classroom implementation through the years. While the actual STS term and acronym did not appear until the 1980s there have consistently been elementary and secondary science education curriculum developments that have attempted to infuse STS relationships into the learning of science as early as the 1960s. The purpose of this presentation is to provide a comprehensive though current (i.e., 2000 to the present) middle grade review of STS curricula ideas the National Science Teachers Association

(NSTA) journal *Science Scope* has published in relation to 1996 national science education standards (National Research Council, 1996) and the proposed 2012 "A Framework for K-12 Science Education: Practices, Crosscutting Concepts, and Core Ideas" (National Research Council, 2011). Curricular ideas since 2000 focused on STS have used varying approaches to learning science in the middle grades. Studying science historically through timelines, test and measuring activities that involve students in quality control, understanding the invention process while considering both cost and safety related to problem solving are some of the STS ideas presented in the middle school *Science Scope* journal that will be discussed.

O12.30

10:00 INCORPORATION OF EXAMPLES OF CONTRIBUTIONS TO THE SCIENCES MADE BY MINORITY ETHNIC GROUPS INTO THE SCIENCE CLASSROOM

Johnny Mattox

Blue Mountain College, USA

The demography of science classes today is more varied than ever before. An important approach that should be included in science classes is the inclusion of scientific contributions made by different ethnic minority groups. Educators should research and become familiar with major contributions resulting from individuals belonging to various minority ethnic groups such as Hispanics, African Americans, Asians, American Indians, and others. Through inclusion of these examples in the format of science lessons, the lesson can become more meaningful and relevant to minority students. This can also help to facilitate a sense of pride and improve dispositions toward science in students from minority ethnic groups.

O12.31

10:15 BASE PAIR: 20 YEARS OF ENHANCING INQUIRY-BASED SCIENCE EDUCATION IN MISSISSIPPI

Rob Rockhold¹, Olga McDaniel¹, Susan Bender², Cindy Cook³, Karen Evans⁴, Kathy McKone⁵, Linda Noble², Jeff Stokes², Betsy Sullivan⁶, Denise Thibodeaux⁷, Cassandra Vanderford⁸, Donna Sullivan¹

¹*University of Mississippi Medical Center, USA*,
²*Jackson Public Schools, USA*, ³*Puckett High School, USA*, ⁴*Germantown High School, USA*, ⁵*Enterprise High School, USA*, ⁶*Madison Central High School, USA*, ⁷*Cathedral Catholic High School, USA*,

⁸Brandon High School, USA

Base Pair, a research mentoring program that pairs public high school students and teachers with UMMC faculty, begins the 20th year (1991-92 to 2011-2012) of higher education advancement and biomedical career choice in Mississippi. A total of 171 students have participated or are participating in individual mentoring activities with University of Mississippi Medical Center (UMMC) faculty. A total of 232 student -coauthored citations have resulted. Overall, 59 graduates are in or have completed post-baccalaureate training (22 MD, 6 PhD, 1 MD/PhD, 21 MS, 5 JD). The total number of teachers trained (1991-2012) in UMMC-based summer development is 119. Student Oriented Academic Research (SOAR) and Rural Biomedical Initiative (RBI) sites created by Base Pair-trained teachers enroll or have trained 1,726 urban and rural high school students. Several of these teachers have collaborated in science curriculum development activities with faculty from Princeton University and Woods Hole Marine Biological Laboratory to bring novel course offerings into Mississippi. Two SOAR high school sites are active within the Jackson School District, while expansion of the RBI program to six high schools across central Mississippi has occurred. A total of 83 citations by Base Pair-trained teachers have accrued and 120 teacher-initiated grants have resulted, with a 74% rate of funding and roughly \$438,190 new funds generated for individual high school classroom use as a result. Base Pair continues to positively impact science education in Mississippi. (Supported by Howard Hughes Medical Institute).

O12.32

10:30 USING FRACTALS AND SELF-SIMILARITY TO ENGAGE STUDENTS IN SCIENCE

Paul Rogers, Joseph Sumrall

University of Mississippi, USA

One of the most interesting developments of twentieth century science was the development of fractal theory. Benoit Mandelbrot, who is considered to be the father of fractal theory, was largely responsible for its development. Fractal theory has been shown to have both theoretical and practical value for scientists. Thus, for students to be scientifically literate, they should know some of the basic tenets of fractal theory. Yet, many students and teachers remain ignorant of fractal theory. The purpose of this study was to develop new activities and presentations for acquainting students with fractal theory. During the presentation, the authors will describe the basic ideas associated with fractal theory, such as the concepts of self-similarity and

fractals. The presentation will also include some of the important historical developments that led to Mandelbrot's work with fractals. The authors, who both have extensive science teaching experience, will also present some of the methods and activities they have used to acquaint students with fractal theory; such as slide shows, inquiry-based activities, and crystal-formation activities.

ZOOLOGY

Chair: Alex Alcholonu,
Alcorn State University
Vice-chair: Julius Ikenga,
Mississippi Valley State University

February 23

THURSDAY MORNING

O13.01

9:00 CHANGES IN CRANE VIGILANT BEHAVIOR DURING RELEASE ACCLIMATION

Edward Carr, Franky Williams¹, Scott Hereford²

¹*Mississippi Sandhill Crane National Wildlife Refuge
Gautier, MS, USA*

²*The Institute for Marine Mammal Studies, Gulfport,
MS, USA*

The Mississippi sandhill crane (*Grus canadensis pulla*) is a critically endangered subspecies found only in Jackson County, Mississippi. By the 1970s, there were less than 40 individuals. The 8000 hectare Mississippi Sandhill Crane National Wildlife Refuge was established in 1975 to provide protection and recovery for the crane and restoration and maintenance of its wet pine savanna habitat. Starting in the 1980s, captive-reared juveniles were released annually onto the refuge to bolster the population. An acclimated technique was developed where the juveniles are socialized at the captive site then transferred to a one hectare pen for a month acclimation period before release. During acclimation, the cranes adjust to their new home, develop site fidelity, and interact with local free-flying cranes, all aiding in increasing survival after release. However, any change in "wild" behavior during acclimation has not been quantified. Here, behavior of cranes using standard scanning methods during acclimation was recorded. As a measure of appropriate releasable behavior, a comparison was made of the percentage of vigilant behaviors between



the beginning and end of acclimation and between costume and parent-reared cranes.

O13.02

9:20 URINARY SCHISTOSOMIASIS AND BACTERIAL COINFECTION AMONG SCHOOL CHILDREN IN NDONI LOCAL GOVERNMENT AREA OF RIVERS STATE, NIGERIA

Ambrose Opara² and Alex Acholonu¹

¹Alcorn State University, Alcorn State, MS, USA

²Imo State University, Owerri, Imo, Nigeria

Urinary schistosomiasis usually interferes with the capacity for work and healthy development of children. Co-infection with bacteria causes complication in the management of the disease. A study of urinary schistosomiasis and bacteria co-infection among school children in Ndoni Local Government Area (LGA) of Rivers State, Nigeria was conducted between October and December of 2010. One hundred and twenty school children, made up of 70 males and 50 females and aged 5-16 years were tested. Urine samples were collected from subjects and tested for presence of eggs of *Schistosoma haematobium*. For bacterial infection, urine samples were inoculated onto cysteine-Lactose-electrolyte deficient medium and Blood agar Medium and incubated at 37°C for 24 hours. Forty one of 120 pupils tested (34.2%) had eggs of *S. haematobium* in their urine with males more infected (37.1%) than females (30.0%). There appears to be a direct correlation between the distribution of urinary schistosomiasis and bacterial infection among school children. Eleven of 15 (73.3%) females with ova of *S. haematobium* in urine, and 18 of 26 males (69.2%) had concomitant bacteria. The highest yield of bacterial isolates was among those aged 14-16 years. There was a significant difference in the distribution of schistosomiasis and bacteria among various age groups ($P < 0.05$). The bacteria isolates identified were *Escherichia coli*, *Staphylococcus aureus*, *S. saprophyticus* and *Pseudomonas* sp. with *E. coli* having the highest frequency (65.7%). Health education and reliable treatment are recommended for speedy control of infection and re-infection.

O13.03

9:40 SALMONELLA AVRA EFFECTOR INHIBITS THE ANTI-APOPTOTIC NF- κ B PATHWAY

Jasmine Burrell¹, Lin-Feng Chen², and Alex Acholonu²

¹University of Illinois, Urbana-Champaign, IL, USA

²Alcorn State University, Lorman, MS, USA

Salmonella typhimurium is a pathogenic bacterium found in the intestinal lumen of humans. It has an endogenous protein called AvrA. Previous studies have provided relatively little information about the role of AvrA. One hypothesis for the role of this protein is that it may be an effector that is accountable for the inhibition of NF- κ B signaling in activated immunologic B cells. NF- κ B is a complex of proteins that consists of the subfamilies RelA, RelB, and c-Rel, which regulate gene transcription. The p105 and p100 precursors are synthesized from NF- κ B1 and NF- κ B2 and are processed to make mature NF- κ B subunits known as p50 and p52, respectively. When NF- κ B signaling is activated, a cell that has been infected by the bacteria will recover and live. On the other hand, if NF- κ B signaling is inhibited, the cell goes through apoptosis. NF- κ B plays an important role in the regulation of an organism's immune response to infection. If NF- κ B is not regulated properly, it could lead to cancer, inflammatory diseases, autoimmune diseases, viral infections, and improper immune development. If an infected cell is not recovered properly or is inhibited from apoptotic behavior (cell death), other cells in the vicinity will be infected, which can lead to the infected organism's death. To determine the role of AvrA and how it affects the NF- κ B pathway, AvrA must be cloned and transfected into the pathway. The hypothesized conclusion of this research is that AvrA will affect the NF- κ B signaling pathway. No actual conclusions have been reached.

O13.04

10:00 WATER QUALITY STUDIES OF MUD ISLAND GREEK IN JEFFERSON COUNTY, MS

Alex Acholonu, Tanisha Hinton, Ebony Campbell, Yolanda Smith

Alcorn State University, Alcorn State, MS USA

A creek is a fresh water body, a small stream that is narrow and shallow. It may have relatively still areas, rapid shallow water flowing over gravel or rocks and deeper water flowing areas. The Mud Island Creek study area is located off the Natchez Trace Parkway in the picnic area about 17 miles southwest of Alcorn State University main campus. The study was conducted to assess the water quality of this lotic surface water and to compare the results with previous studies conducted in the creek. During the months of September and October, 2011 water samples were collected in three replicates from three sites about 50 meters apart and at one week intervals. They were taken to the laboratory and tested

according to the manufactures of LaMotte pollution test kits used for the study. The chemical parameters tested and recorded in parts per million (ppm) were Ammonia-Nitrogen, Alkalinity, Carbon Dioxide, Dissolved Oxygen, Phosphate, Nitrate, Hardness, Chloride, Sulfide, Salinity, Silica, and pH. The physical parameters tested were the creek's surface water temperature and atmospheric temperature' turbidity odor and color. The chemical analysis showed that 6 of 12(50%) parameters tested, exceeded the Mississippi Water Quality standards/criteria (MSWQC). These are: Alkalinity (161.03/3.02), Carbon Dioxide(49.7/10), Hardness(206.5/50), pH(11.4/7.0-9.0), Phosphate(10.25/0.1), and Sulfide(5.06/2.0). A comparison between the results obtained from this study and that of Hopkins and Acholonu (2005) showed that the following parameters were higher: Carbon Dioxide(49.7/4.9), Chlorides(30.09/29.0), Copper(0.38/0.15), Hardness(206.54/126.3), Nitrate(3.37/0.22), pH(11.4/6.68), Phosphate(10.25/0.41), Sulfate(170.87/3.3) and Sulfide(5.06/0.01).

O13.05

10:20 MACROZOOBENTHIC ASSEMBLAGES IN THE MARINE MAASTRICHTIAN (UPPER CRETACEOUS) OF MISSISSIPPI

George Phillips

Mississippi Museum of Natural Science, Jackson, Mississippi, USA

The composition of benthic macroinvertebrate assemblages in the sedimentary record changes vertically and laterally, mirroring sedimentary changes temporally and geographically. Several such changes occur in the marine Maastrichtian (Upper Cretaceous) outcrop belt in northeastern Mississippi as result of environmental differences within the Ripley Formation and overlying Prairie Bluff-Owl Creek beds. However, benthic fossil assemblage composition is determined by several variables: (1) interspecific differences in substrate preference [life history], (2) the physicochemical composition of animals [anatomy], (3) deposit formation, especially the response of corpses to hydrodynamic entrainment, sorting, and subsequent entombment [pre- and syndepositional history], and (4) the physicochemical nature of the entombing sediment as it affects corpse preservation [postdepositional history]. Thus, a species' potential for preservation depends on its composition and how it behaves/reacts before, during, and after its entombment. In spite of suitable bottom habitat, a resident organism may be absent due to a low

preservational potential. Alternatively, the presence or absence of an organism may be the result of postmortem transport by current or seafloor erosion (viz. reworking of older sediments). The fossil record of benthic marine macrofauna is dominated by eight major groups-mollusks, anthozoans (Hexacorallia, Octocorallia), tubicolous polychaetes (Serpulidae, Sabellidae), decapod crustaceans, barnacles (Scalpellidae), echinoderms (excl. Holothuroidea), bryozoans, and brachiopods. Although the various Maastrichtian sediment types investigated in Mississippi share many of the same taxa from these groups, notable differences in faunal composition occur, even among assemblages experiencing the same "apparent" preservational bias. These differences occur over meter-scale vertical distances and kilometer-scale horizontal distances.

10:40 BREAK

O13.06

11:00 MONITORING CHLOROPHYLL BIOMASS AS BIOINDICATOR OF WATER QUALITY IN THE COLES CREEK WATERSHED.

Maifan Silitonga

Alcorn State University, Alcorn State, MS, USA

Impacts of anthropogenic activities such as agricultural runoff, soil erosion, etc. can increase the nutrient compositions in water leading to excessive algal blooms. Excessive growth of benthic or planktonic macroalgae can create toxic conditions that can lead to fish kills, displacement of indigenous species, habitat destruction and oxygen depletion. Chlorophyll, a key biochemical component that is essential to the existence of phytoplankton, is often used as a biological indicator due to association with phosphorus and nitrogen. The purpose of this study is to monitor and evaluate the population and distribution of phytoplankton as it relates to composition, ecological status, and the integrity of water quality in the Coles Creek Watershed. The Coles Creek Watershed, located in southwest Mississippi is listed under US EPA impaired water section 303(d). Degradation of the ponds/lakes and streams/creeks in this watershed is caused mostly by biological impairment, followed by nutrients, organic enrichment or Low Dissolved Oxygen, sediment/siltation, pesticides, and pathogens. Rivers/streams and ponds/lakes in 16 locations within this watershed were monitored for chlorophyll *a* contained within the phytoplankton. Observation was conducted over a one-year period through *in-situ* sampling using YSI



Sonde Environmental Monitoring instrument. Results from the study shows that chlorophyll *a* levels detected vary from about 1-88 µg/L RFU. Of the 16 locations, 12 were found to be in good condition (<20 µg/L), 3 in fair condition (20-50 µg/L), and only one in poor condition (>50 µg/L).

O13.07

11:20 SPIDERS FOUND IN RIPARIAN COMMUNITIES WITHIN THE COCKSCOMB BASIN WILDLIFE SANCTUARY, BELIZE

Megan Chevis, Aimée Thomas

University of Southern Mississippi Hattiesburg, MS USA

Currently there is little literature on what arachnids inhabit the tropics of Central America, especially within the country of Belize. This study aimed to find which spider species are found in riparian areas within the Cockscomb Basin Wildlife Sanctuary in central Belize and to distinguish trends among spiders and the microhabitats in which they live. Specimens were collected from three riparian sites located on trails within Cockscomb. Diurnal and nocturnal samples were obtained using hand collecting techniques. Abiotic information including temperature, humidity, and elevation were also recorded. Vegetation surveys were conducted at each sample site and plant samples were collected to observe patterns between spiders and the substrate on which they were found. Spider specimens were preserved and later identified to family and (when possible) genus and species. Preliminary results have shown trends in spider families among the sample sites as well as between diurnal and nocturnal samplings. At all sample sites nocturnal collections yielded higher numbers of specimens than diurnal samplings. Nocturnal samplings also corresponded with lower temperature and lower barometric pressure readings compared to diurnal measurements at each site. Differences in the size of the streams and the amount of vegetation surrounding the areas could have been influential in the number and diversity of spiders collected. Further analysis of specimens and data will further distinguish differences in diversity and any trends in microhabitat preferences.

O13.08

11:40 POLLUTION STUDIES ON THE BIG SUNFLOWER RIVER AND THE YAZOO RIVER IN MISSISSIPPI

Alex Acholonu, G. Culley, K Shumaker, Y. Grant, K Morris

Alcorn State University, Alcorn State, MS, USA

As essential as water is for life, it is difficult to get a natural body of water devoid of pollutants. What matters is the concentration of the pollutants. The Mississippi Department of Environmental Quality set standards for various pollutants called Water Quality Standards adopted by the State in 1995. This study was conducted to determine if the Big Sunflower River and the Yazoo River met the standard of fresh water bodies in Mississippi. Adverse water quality is usually indicated by such conditions as increased concentrations of metals and nutrients, decreased dissolved oxygen, and diverse changes in physical characteristics. During the period, September to December 1999, water samples were collected at different locations in three replicates from the Big Sunflower River in the area near the Delta National Forest in Sharkey County and the Yazoo River in Redwood area and the area near the Yazoo City Pumping Station. The samples collected were taken to the laboratory at Alcorn State University and tested according to the methods of LaMotte water pollution and detection kits, and analyzed. For the Big Sunflower River, the parameters tested with the average readings recorded were: hardness, alkalinity, pH, dissolved oxygen, chromate, chloride, and fluoride. For the Yazoo River, the parameters tested with the average readings recorded were as listed for the Sunflower River with the exception of hardness and sulfate. Both the Big Sunflower River and the Yazoo River met the Mississippi water quality standards with the exception of hardness (189 ppm) and alkalinity (61.3 ppm for the first and alkalinity (110.6 ppm) for the latter.

12:00 Lunch Break

1:15 Divisional Business Meeting

O13.09**1:35 POLLUTION STUDIES ON A POND IN ALCORN STATE UNIVERSITY, MS.**

Alex Acholonu, Tanisha Hinton, Jasmine Burrell, Shala Kelly, and Keyundrea Hopkins

Alcorn State University, Alcorn State, MS, USA

A pond is a lentic freshwater body. It is a shallow body of water without seasonal stratification. The water is said to mix regularly from top to bottom. The pond in the Alcorn State University (ASU) main campus is located near the front gate. It was surveyed to find out if it is polluted. During the months of September and October, 2011, water samples from the pond were collected in three replicates from three sites, about 50 meters apart and at one week intervals. They were taken to the laboratory and tested according to the manufactures of LaMotte Pollution Test Kits used for this study. The physical parameters tested were surface water temperature, atmospheric temperature, water odor, color and turbidity. The chemical parameters tested and recorded in parts per million(ppm) were alkalinity, ammonia-nitrogen, carbon dioxide, chloride, copper, dissolved oxygen (DO), hardness, nitrate, phosphate, salinity and silica. The results of the tests showed that all met the Mississippi water quality criteria (MSWQC) with the exception of Alkalinity (84.3/3.08), carbon dioxide (33.2/10) and hardness (168.4/50). There are other ponds in the ASU campus. It is recommended that this kind of water quality study be conducted in them to assess the level of contaminants they harbor.

O13.09**1:55 HEALTH-RELATED TESTS ON SORGHUM BICOLOR**

Keneisha Green, Sandra Barnes, Johnnie Gibbs, Alex Acholonu

Alcorn State University, Alcorn State, MS, USA

Potential health-related benefits of the herb *Sorghum bicolor* was compared to that of the commonly consumed herbs basil and thyme. Extracts of the herbs were tested for total flavonoid content using the Aluminum Chloride Method, free-radical scavenging ability using the DPPH Free-Radical Scavenging Assay, and specific flavonoids using High Performance Liquid Chromatography (HPLC). The data shows that *Sorghum bicolor* has the highest total flavonoid content, comparable free-radical scavenging ability, and contains the flavonoid compound quercetin. This study indicates that *Sorghum bicolor* is an excellent herb which provides health-related benefits comparable to or above those provided by basil and thyme.

INVITED PRESENTATION**O13.10****2:15 HEMATOLOGICAL, ANTI-INFLAMMATORY AND ANTIOXIDANT PROPERTIES OF A SORGHUM-BASED COMMERCIAL HERBAL PREPARATION, JOBELYN®**

Patrick O Erah¹ Moses O Okubena², Dr. David Abia-Okon³ and Dr. Ololade Otitolaju² Alex D. W. Acholonu⁴

¹Department of Clinical Pharmacy and Pharmacy Practice, University of Benin, Nigeria; ²Health Forever Product Limited, Lagos, Nigeria; ³Lindabel Medical Centre, Lagos, Nigeria.; ⁴ Alcorn State University, Mississippi, USA

Jobelyn® is a herbal preparation whose primary active ingredient is from the leaves of *Sorghum bicolor*. It contains 3-deoxyanthocyanidins (Apigeninidin and Luteolinidin) and other bioflavonoids including Luteolin, Naringenin, 7-methoxyflavone Apigeninidin and Flavone-apigeninidin adducts. Animal and in vitro studies, supplemented by epidemiological evidence and human studies, indicate numerous health benefits (including protection from various ailments) associated with the antioxidant effects. In animals with trypanosome-induced anemia, Jobelyn® rapidly increases haemoglobin and PCV levels. Jobelyn® has extremely high Oxygen Radical Absorbance Capacity (ORAC, 37,622 µmoleTE/g) and is effective against the most important five predominant reactive species found in the body (peroxyl radicals, hydroxyl radicals, peroxynitrite, super oxide anion, and singlet oxygen). In humans, Jobelyn has been shown to increase CD4 counts in HIV positive patients either alone or in combination with antiretroviral drugs making it a possible good alternative and/or supplement to antiretroviral drugs in the management of HIV/AIDS patients. Studies on the effects on lipopolysaccharide-induced cytokine and PGE2 release in human monocytes of healthy human blood donors indicate that it significantly inhibits lipopolysaccharide-induced release of cytokines (IL-1beta, TNFalpha, IL-6, IL-8) and PGE2. Its selective effect on COX-2 activity makes it a very promising anti-inflammatory medicine with minimal side effects. In laboratory animals, the oral and intraperitoneal routes LD50 values are 215.1mg/kg and 193.4mg/kg, respectively. It is concluded that Jobelyn® is safe and useful for the management of anemia and HIV/AIDS, and is a promising medicine for inflammatory diseases and protection against many other diseases.



POSTER PRESENTATIONS

3:00-4:00 pm

P13.01

ESTROGEN VERSUS PHYTOESTROGEN: THE EFFECTS OF GENISTEIN ON SPATIAL AND NON-SPATIAL COGNITION IN THE MALE ZEBRA FINCH

Megumi Mathis, Jacob Elrod, Lainy Day

University of Mississippi University, Mississippi, USA

In mammals, estradiol (E) improves spatial cognition but has unwanted effects on reproduction. We compared the effects of long-term administration of the phytoestrogen, genistein (high-dose 57.8 mg/kg, n=7, low-dose 28.9 mg/kg, n=8), β -estradiol (80 mg/kg, n=5), and vehicle (sesame oil, n=7) on spatial and non-spatial cognition and testes and brain size in zebra finch. Drugs were administered subcutaneously for 30 days prior to and during 9 days of testing. Spatial learning was measured using the Day Escape Maze. Birds were required to escape through a hole in a clear cylinder to avoid a warm floor (54°C). The cylinder was located inside an aviary with spatial-visual cues hung level with the cylinder. Birds had 120 sec to escape the maze and 60 sec to rest in the aviary. Birds were trained for 5 days with 4 trials/day. The last trial on day 5 was a probe trial during which a cylinder with no escape replaced the escape cylinder and cues were rotated 180°. On day 6 the probe trial was run with no heat. Non-spatial trials where escape was indicated by a single visual cue were run on days 7-9. Brains, gonads, and blood were extracted. Surprisingly, groups spatial cognition did not differ but all three estrogen groups were marginally better than the vehicle group on the non-spatial task ($p=0.06$). Testes and brain size have not been analyzed. Thus, E and phytoestrogen have similar effects on cognition in zebra finches but E may effect cognition more broadly in birds than mammals.

P13.02

DISTINCTIVE SEQUENCE FEATURES OF *SCHISTOSOMA JAPONICUM* UNIVERSAL STRESS PROTEINS

Joyce Chumo¹, Ousman Mahmud², Raphael Isokpehi², Julius Ikenga¹, Wellington Ayensu², Andreas Mbah², Kafui Edusei²

¹Mississippi Valley State University, Itta Bena, MS 38941

²Jackson State University, Jackson, MS

The protein sequences of genes encoding the Universal Stress Proteins (USP) domain in *Schistosoma japonicum* were retrieved from Uniprot database and examined using a variety of bioinformatics tools and methods to discern any distinctive features. Genes that code for proteins containing the USP domain are known to provide bacteria, archaea, and eukarya (such as fungi, protozoa, and plants) with the ability to respond to a great number of environmental stresses. *Schistosoma japonicum* is a platyhelminth that causes schistosomiasis, a parasitic disease infecting more than 200 million people worldwide. The draft genome of *S. japonicum* has been sequenced paving the way for the identification of drug and vaccines targets from the genomic data. USPs are predicted to be found in the draft genome of *S. japonicum*. Multiple sequence alignment (MSA), Multiple EM Motif Elicitation (MEME), and phylogenetic analysis were performed. A total of ten *S. japonicum* USP protein sequences were retrieved from Universal Protein Resource. Based on the findings the ATP binding consensus sequences [G2XG9XGS/T], *S. japonicum* USP sequences can be classed as putative ATP binding class containing eight sequences and putative non ATP binding class containing two sequences. The D5XH1XVE motif was found in all the ten sequences. Motif Scan was used to confirm the presence of the USP domain in the *S. japonicum* protein sequences analyzed. Future studies should seek to determine the biological significance of the motifs identified.

P13.03

URIC ACID AND SOLUBLE PROTEIN CONTENT OF FECES FOR THREE SPECIES OF SUBTERRANEAN TERMITES

Timothy Arquette¹, Jose Rodriguez²

¹Mississippi State University, Poplarville, MS, USA

²State Chemical Laboratory, Starkville, MS, USA

This study aimed to determine levels of uric acid and soluble proteins in the feces of three wood-eating termite species, and in turn consider how these biomolecules are involved in the termite digestive process and nutrition. Little or no uric acid was measured in the feces, while significant protein levels were recorded. As subterranean termites are uricotelic, lack of uric acid in feces indicates proteins undergoing catabolism are slowly converted to uric acid owing to the insect's nitrogen poor diet. This in turn allows for near complete digestion of uric acid by uricolytic bacteria that inhabit the insect's hindgut. Protein levels in the feces were very high compared to wood. As termites are coprophagous

their feces provide a source of dietary nitrogen to the insect.

P13.04

SEQUENCE FEATURES OF TOXOPLASMA GONDII UNIVERSAL STRESS PROTEINS

Grace Ikenga, Ousman Mahmud, Raphael Isokpehi, Julius Ikenga, Wellington Ayensu, Andeas Mbah, Kafui Edusei

¹Mississippi Valley State University, Itta Bena, MS 38941

²Jackson State University, Jackson, MS

The Genes coding for proteins that contain the USP protein domains in *Toxoplasma gondii* were retrieved from Uniprot database & analyzed using a variety of bioinformatics tools and methods to discern possible distinctive sequence features present. Genes that code for proteins containing the universal stress protein (USP) domain are known to provide bacteria, archaea, & eukarya (such as, fungi, protozoa, and plants) with the ability to respond to a variety of environmental stresses. *T. gondii* is an obligate intracellular protozoan that causes toxoplasmosis in about one-third of the world's population. Given the current worldwide economy, the potential for this disease to afflict much more people around the world is quite great. The DNA sequences *T. gondii* retrieved showed a set of four identifiable USP protein sequences. Based on finding the conserved ATP binding consensus sequence [G2XG9XGS/T] with the multiple sequence alignment, the *T. gondii* USPs can be classified as putative ATP binding. Highly conserved regions (motifs) were found on *T. gondii* USP protein sequences with one of them containing the putative ATP-binding signature sequence. Motif Scan was used to confirm the presence of the USP domain in the all the *T. gondii* protein sequences analyzed. Further research is needed to study the expression of the *T. gondii* USPs and the biological significance of the motifs identified.

P13.05

EFFECT OF NON-TRADITIONAL LANDSCAPE MULCHES ON FORMOSAN SUBTERRANEAN TERMITE (ISOPTERA: RHINOTERMITIDAE) CONSUMPTION AND MORTALITY

K. C. F., Eldon J. Mallette

Mississippi State University, Poplarville, MS, USA

Laboratory tests were conducted to review mortality and consumption of non-traditional mulches by the invasive Formosan subterranean termite, *Coptotermes formosanus*. No-choice feeding

tests on seven mulch and weed block materials were conducted over a 6 week period. Two inorganic mulches and one organic mulch reached 100% mortality in 4 weeks. Consumption of these non-traditional products varied depending on the composition of the material.

P13.06

DISTINCTIVE SEQUENCE FEATURES OF ALVINELLA POMPEJANA UNIVERSAL STRESS PROTEINS

Oscar Scott-Awhe, Ousman Mahmud, Raphael Isokpehi, Julius Ikenga, Wellington Ayensu, Kafui Edusei, Andreas Mbah

¹Mississippi Valley State University, Itta Bena, MS 38941

²Jackson State University, Jackson, MS

Genes encoding proteins that contain the universal stress protein (USP) domain are known to provide bacteria, Archaea, fungi, protozoa, and plants with the ability to respond to a plethora of environmental stresses. *Alvinella pompejana* is one of the most thermotolerant deep sea annelide. Its sources of thermostable proteins and macromolecular complexes are of biochemical, biophysical and biomedical relevance. Analysis of cDNA libraries of *A. pompejana* revealed a prevalence of transcripts involved in oxidative stress resistance, detoxification, anti-bacterial defense, and heat shock protection. Universal Stress proteins (USPs) are predicted to be found in the cDNA libraries of *Alvinella pompejana*. The protein sequences of genes encoding the Universal Stress protein USP domain in *Alvinella pompejana* were examined using bioinformatics tools and methods. Multiple sequence alignment (MSA), Multiple EM for Motif Elicitation (MEME), and phylogenetic analysis and motif scanning were performed. Sequence retrieval produced a set of 16 *Alvinella pompejana* universal stress protein sequences. The Multiple sequence alignment (MSA), revealed most of the sequences contained single Universal Stress protein (USP) domains and had the ATP binding consensus sequence [G2XG9XGS/T]. Highly conserved regions (motifs) were found on the *Alvinella pompejana* Universal Stress protein (USP) sequences with one of them containing the putative ATP-binding signature sequence. Motif scan was used to confirm the presence of the Universal Stress protein (USP) domain in the all the *Alvinella pompejana* protein sequences analyzed. The biological and evolutionary significance of the motifs identified in this research should be examined in future studies.

Thank you for your contribution to the 2012 Annual Meeting!!

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**Abstracts for the 2013 Meeting will need to
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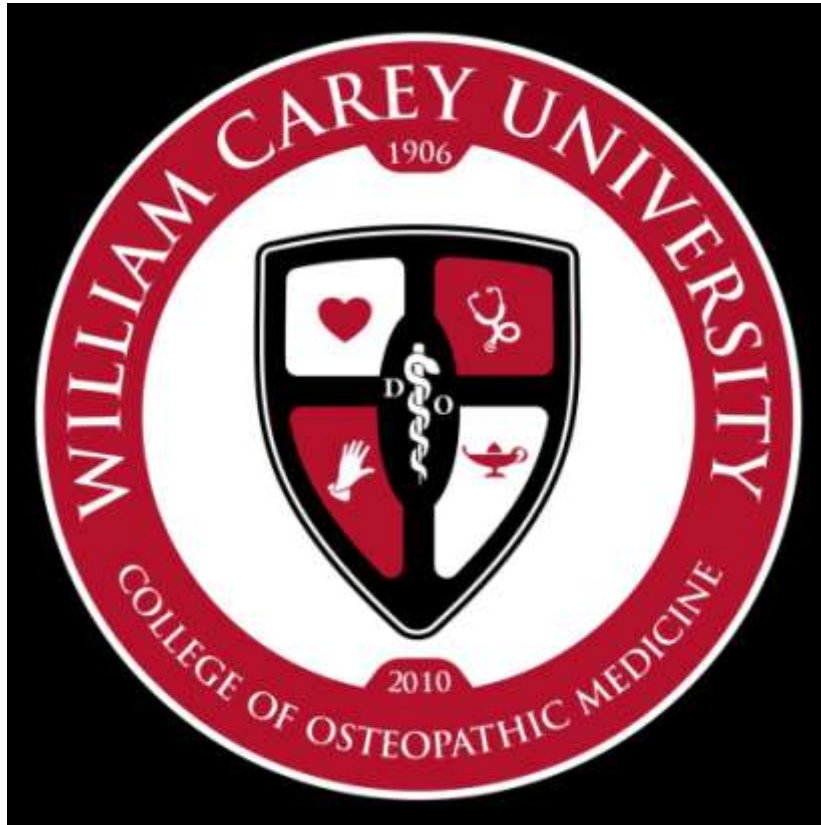
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- BS in Computer Engineering
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