

MISSISSIPPI ACADEMY OF SCIENCES



SEVENTIETH ANNUAL MEETING

February 22-24, 2006

Vicksburg, Mississippi

Vicksburg Convention Center

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**GENERAL SCHEDULE****WEDNESDAY, FEBRUARY 22, 2006**

<u>TIME</u>	<u>EVENT</u>	<u>LOCATION</u>
4:00 PM to 6:00 PM	Board of Directors Meeting	

THURSDAY, FEBRUARY 23, 2006

<u>TIME</u>	<u>EVENT</u>	<u>LOCATION</u>
7:30 AM to 5:00 PM	Registration	Lobby
9:00 AM to 7:00 PM	Exhibits	Walkways
8:00 AM to 4:00 PM	Divisional Programs	See Pages 10–115
Noon to 1:00 PM	Opening Session: Host Defense and Bacterial Virulence Active in Ocular Infections – Dr. O'Callaghan	Exhibit Hall A1
1:15PM to 2:30PM	The Psychology & Social Science Invited Symposium on Hurricane Katrina	Meeting Room 3
3:00 PM to 4:00 PM	MAS Community Forum: The Mississippi Academy of Sciences and the Post Katrina Recovery of the Gulf Coast Research Laboratory	Exhibit Hall A2
3:00 PM to 4:00 PM	Divisional Poster Session Health Sciences Mathematics, Computer Science and Statistics Physics and Engineering Zoology and Entomology	Exhibit Hall B
4:30 PM to 6:00 PM	2006 Dodgen Lecture & Presentation of Awards	Exhibit Hall B
6:00 PM to 7:00 PM	Reception and Divisional Poster Sessions Cellular, Molecular and Developmental Biology Chemistry and Chemical Engineering Health Sciences Psychology and Social Science	Exhibit Hall B

FRIDAY, FEBRUARY 24, 2006

<u>TIME</u>	<u>EVENT</u>	<u>LOCATION</u>
7:15 AM	Past-Presidents' Breakfast	To Be Announced
7:30 AM to 2:00 PM	Registration	Lobby
8:00 AM to 12:00 PM	Exhibits	Walkways
8:00 AM to 8:30 AM	MAS Business Meeting	Exhibit Hall B
8:30 AM to 3:30 PM	Divisional Programs	See Pages 10–115
9:40 AM to 10:30 AM	Mississippi Center for Supercomputing Research	Exhibit Hall A2
10:00 AM to 11:30 AM	Invited Speaker: Waste Wise: Computer Waste	Meeting Room 4
1:00 PM to 2:00 PM	Health Sciences: First Aid/Panel Discussion	Exhibit Hall A1

Directions from I-20 to the Vicksburg Convention Center

Exit 4B (Clay Street): Take exit 4B and head west on Clay Street. Continue down Clay Street for 2 1/2 miles. Turn left on Mulberry Street (one block before reaching the river) and continue for three blocks. The Vicksburg Convention Center is located at 1600 Mulberry Street.

Exit 1A (Washington Street): Take exit 1A and head north on Washington Street. Continue down Washington Street for 2 1/2 miles. Turn left at traffic light #25 on Veto Street. Go one block to Mulberry Street and turn left. The Vicksburg Convention Center is located at 1600 Mulberry Street at the intersection of Veto Street.



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Organizations that assist the Mississippi Academy of Sciences in its efforts to promote science in Mississippi

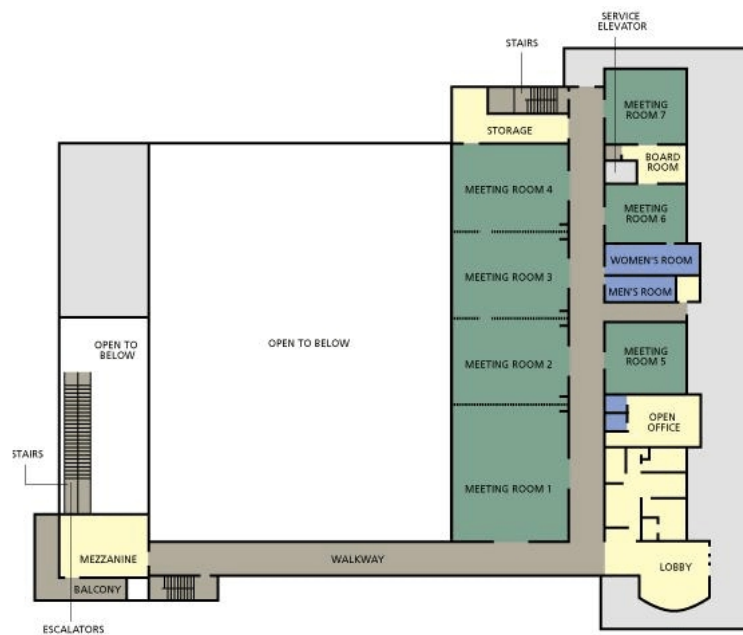
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Vicksburg Convention Center Floor Plan



Lower Floor of Convention Center
(Please note that Exhibit Hall A is divided into A1 and A2)



Upper Floor of Convention Center

Dodgen Lecturer for 2006 Annual Meeting of the Mississippi Academy of Sciences

Dr. Dr. John H. Marburger, III



John H. Marburger, III, Science Adviser to the President and Director of the Office of Science and Technology Policy, was born on Staten Island, N.Y., grew up in Maryland near Washington D.C. and attended Princeton University (B.A., Physics 1962) and Stanford University (Ph.D. Applied Physics 1967). Before his appointment in the Executive Office of the President, he served as Director of Brookhaven National Laboratory from 1998, and as the third President of the State University of New York at Stony Brook (1980-1994). He came to Long Island in 1980 from the University of Southern California where he had been a Professor of Physics and Electrical Engineering, serving as Physics Department Chairman and Dean of the College of Letters, Arts and Sciences in the 1970's. In the fall of 1994 he returned to the faculty at Stony Brook, teaching and doing research in optical science as a University Professor. Three years later he became President of Brookhaven Science Associates, a partnership between the university and Battelle Memorial Institute that competed for and won the contract to operate Brookhaven National Laboratory.

While at the University of Southern California, Marburger contributed to the rapidly growing field of non-linear optics, a subject created by the invention of the laser in 1960. He developed theory for various laser phenomena and was a co-founder of the University of Southern California's Center for Laser Studies. His teaching activities in-

cluded "Frontiers of Electronics," a series of educational programs on CBS television.

Marburger's presidency at Stony Brook coincided with the opening and growth of University Hospital and the development of the biological sciences as a major strength of the university. During the 1980's federally sponsored scientific research at Stony Brook grew to exceed that of any other public university in the northeastern United States.

During his presidency, Marburger served on numerous boards and committees, including chairmanship of the governor's commission on the Shoreham Nuclear Power facility, and chairmanship of the 80 campus "Universities Research Association" which operates Fermi National Accelerator Laboratory near Chicago. He served as a trustee of Princeton University and many other organizations. He also chaired the highly successful 1991/92 Long Island United Way campaign.

As a public spirited scientist-administrator, Marburger has served local, state and federal governments in a variety of capacities. He is credited with bringing an open, reasoned approach to contentious issues where science intersects with the needs and concerns of society. His strong leadership of Brookhaven National Laboratory following a series of environmental and management crises is widely acknowledged to have won back the confidence and support of the community while preserving the Laboratory's record of outstanding science.

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Overview of Divisional Programs

AGRICULTURE AND PLANT SCIENCE

Friday, February 24

Location: Exhibit Hall B

Oral Presentations

8:30 AM to 11:30 AM

(Abstracts pp 23-26)

- 8:30 Growth Conditions Affect the Expression of InlB in *Listeria Monocytogenes* and *Listeria Spp*
8:45 Expression of 80 Kilodalton *Listeria* Adhesion Protein in *Listeria Monocytogenes* and *Listeria Spp*.
9:00 Influence of Cooking Method on MIB Off-flavor Reduction in Farm Raised Channel Catfish
9:15 Effect of Storage Temperature Accumulation on Quality of Fresh Channel Catfish Fillets
9:30 Reduction of Geosmin and 2-methylisoborneol Compounds in Catfish Fillets by Pure Lime Extract Treatment Followed by Lemon Pepper Marination
9:45 The Study of Oxidative Stability of Biodiesel and Their Feedstocks
10:00 Influence of Sanitation Treatment after Harvest on Shelf Life of Blueberries in Mississippi
10:15 Chemical and Quality Changes of Sweet Potato Roots During Saccharification Pretreatment with and Without Added Enzymes to Produce a Sweet Potato Beverage

10:30 Break

- 10:45 Evaluation of Different Types of Mulches for Organic Production of Cucumber
11:00 Utilizing Rice Flour to Add Value to Low-fat Chicken Nuggets
11:15 Improved Rice Irrigation Technique Protects Ground Water Supplies and Reduces NPS Runoff

Divisional Poster Session

11:30 AM to 12:00 PM

(Abstracts pp 26-29)

- Diagnosis, Treatment and Prevention of Disease on First Year Blackberry, *Rubus Spp*
Influence of Chelates on the Solubility and Bioaccumulation of Lead by Coffeeweed (*Sesbania Exaltata Raf.*)
Chelate-induced Solubility of Metal Enhances Phyto-extraction of Cadmium-contaminated Soils by Wheat (*Triticum Aestivum L.*)
Phytoremediation of RDX and TNT Contaminated Soils Using Native Grasses
Seed Treatments Vs. In-furrow Treatments for Nematode, Insect, and Fungi Control
The Development of a Genomic Library of *Pinus Taeda*
Myrothecium Verrucaria's Effective Ability as a Bioherbical Agent Against Morningglory (*Ipomoea*) Species
The Effect of the Herbicide Glufosinate on Soil Biological Activity
Generation of Loblolly Pine DNA Library

Oral Presentations

1:15 PM to 3:30 PM

(Abstracts pp 29-31)

- 1:15 Pesticide Runoff from Warm-season Turfgrass Systems
1:30 Pharmaceutical Sorption by Coral Mucus as a Bio-indicator of Wastewater Contamination
1:45 Blueberry Biomass and Fruit Quality, and Ground Water Quality in a Heavy Soil as Affected by Animal and Forest Waste
2:00 Analysis at the Microscopic Level of Fungal Spore Inocula Applied to Strawberry Leaves for Fungicide Screening Experiments
2:15 Collecting Isolates of *Phytophthora Cinnamomi* for Screening Blueberry Cultivars Resistant to Phytophthora Root Rot Disease
2:30 Break
2:45 Influence of Zinc Coating Plug Trays on the Performance of Marigold *Tagetes Patula*, Zinnia *Zinnia Sp* and Vinca *Catharanthus Roseus*
3:00 Investigations into Italian Ryegrass (*Lolium Multiflorum*) Resistance to Glyphosate
3:15 Investigations on the Use of Sterol Inhibitor Fungicides as Seed Treatments to Control Seedling Diseases and Asian Soybean Rust
3:30 Sweetpotato Production and Utilization in Mississippi

Divisional Business Meeting

3:45 PM

CELLULAR, MOLECULAR AND DEVELOPMENTAL BIOLOGY

Thursday, February 23**Location: Exhibit Hall A2****Oral Presentations****8:30 AM to 12:00 PM****(Abstracts pp 31-35)**

- 8:30 Ethanol Toxicity in Japanese Medaka Development
- 8:45 Antibody Titers in Four Different Populations of Atlantic Bottlenose Dolphins' (*Tursiops Truncatus*) Serum Samples to *Erysipelothrix Rhusiopathiae*
- 9:00 The Importance of C-terminus Axin
- 9:15 Fluorescence Studies on the Interactions of TAT-PTD with Lipid Bilayer in Vitro
- 9:30 Determination of Intramolecular Distances in the *Bacillus Thuringiensis* Toxin Cyt1A by FRET and Molecular Dynamics Simulation
- 9:45 Construction of Genes That Express Histone-H1.s-peptide Fusion Proteins
- 10:00 Break**
- 10:15 Localization of Kin3 and Characterization of the Effects of Kin3 Deletion in *Saccharomyces Cerevisiae*
- 10:30 Genome-wide Interactions and Effects of the [URE3] Prion of *Saccharomyces Cerevisiae*
- 10:45 Expression Analysis of the Mold-specific M46 Gene in the Dimorphic Pathogenic Fungus *Histoplasma Capsulatum*
- 11:00 Size Identification of Aminoacyl-tRNA Synthetases from Plants
- 11:15 Characterization of the Genes Involved in the Pathogenesis of *Staphylococcus Aureus*
- 11:30 Regulation of *Staphylococcus* Accessory Regulator (*SarA*) in *Staphylococcus Aureus*
- 11:45 Regulation of Virulence by Quorum Sensing in *Staphylococcus Aureus*

Thursday, February 23**Location: Exhibit Hall B****Poster Session****6:00 PM to 7:00 PM****(Abstracts pp 35-40)**

- Inhibition of Breast Cancer Cell Growth by a New Class of Ring-substituted DIMs
- Optimization of Bacterial Growth Conditions and Isolation Techniques for Recombinant Carboxysomes Produced in *Escherichia Coli*
- Regulated Proteolysis of Mitotic Proteins in *Saccharomyces Cerevisiae*
- Hypertension in Male Growth Restricted Offspring Is Abolished by Castration Suggesting a Role for Testosterone in the Fetal Programming of Hypertension
- Ligand Binding Properties of the Breast Cancer Molecular Target Aromatase
- Growth Inhibition in Japanese Medaka (*Oryzias Latipes*) Fish Exposed to Tetrachloroethylene
- Isolation and Characterization of Aspartate Aminotransferase (AAT1) and Sulfite Oxidase (SOX1) Genes from the Pathogenic Fungus *Histoplasma Capsulatum*
- Expression Results from Five Endometrial Tumor/constitutive Tissue Panels
- Genetic Interactions of the *Saccharomyces Cerevisiae* Kin3 Gene
- Characterization of the *SNXB1* Mutation of *Aspergillus Nidulans*
- Molecular Mechanisms for the Expression, Secretion and Unipolar Localization of ICSA in *Shigella Flexneri*
- Activation of the Renin Angiotensin System Follows Development of Hypertension in a Model of Intrauterine Growth Restriction Induced by Placental Insufficiency in the Rat
- Construction of a GFP Reporter Vector for the Insertion into Xho1 Site of *Histoplasma Capsulatum* Telomere Vector pRPUT1
- Mechanical Strain Differentially Activates Rho Family GTPases in Fetal Lung Type II Epithelial Cells
- Measuring the Cellular Adenylate Energy Charge During the Derepression of the Pyrimidine Pathway
- Isolation and Expression of Recombinant Fusion Protein of Lectin like Transcript-1 (LLT1)
- Postnatal Development, Behavior, and Motor Function in Growth Restricted Offspring
- Effect of μ -Opioid Receptor Antagonist, β -Funaltrexamine on Methamphetamine-induced Stereotyped Behaviors in Mice
- Identification of SNPs On LDH-B Gene in Bovine



Friday, February 24
Location: Meeting Room 1

- Oral Presentations** **8:30 AM to 12:00 PM** **(Abstracts pp 40-43)**
- 8:30 Platelet Polymorphisms in Relation to von Willebrand Factor Signals
- 8:45 Neoplastic Transformation of the CD30^{HIGH} LYMPHOMAS Using MDV-Transformed Lymphomas in Chickens as a Model
- 9:00 Development of Elastin-like Polypeptide as a Macromolecular Carrier for a Cytotoxic Peptide
- 9:15 Generation of Cardiomyocytes Stably Overexpressing the Leptin Receptor
- 9:30 Implementation of a Chemically Inducible RNAi Construct for Post-transcriptional Silencing in Arabidopsis Thalian
- 9:45 Using the Variable Regions of the rDNA Cluster of Histoplasma Capsulatum for an Antisense Approach to Gene Silencing
- 10:00 Break**
- 10:15 The Structure and Function of Cso2 Protein in the Carboxysome
- 10:30 Effect of a Mutation in the Gene Encoding Carbonic Anhydrase on CO₂ Fixation in Halothiobacillus Neapolitanus Carboxysomes
- 10:45 Quantitative Evaluation of Carboxysome Gene Expression in *Halothiobacillus Neapolitanus* at Transcriptional Level
- 11:00 The Molecular Mechanisms for the Expression, Secretion, and Unipolar Localization of IcsA in *Shigella Flexneri*
- 11:15 The Effects of Several Selected Breast Cancer Drugs on Aromatase Activity
- 11:30 Investigation of Thermal Denaturation as a Tool for Studying H1_E- DNA Binding
- 11:45 Elucidating the Mechanistic Basis for Redox-regulation of Janus Kinase 2
- Divisional Meeting** **12:00 PM**

CHEMISTRY AND CHEMICAL ENGINEERING

Thursday, February 23
Location: Exhibit Hall A1

- Oral Presentations** **8:30 AM to 11:45 AM** **(Abstracts pp 44-46)**
- 8:30 Preparation of Homochirally Similar Serine Analogs from a Common Intermediate
- 8:45 Photo-induced Polymerization of Ionic Liquid Monomers
- 9:00 Comparison of the Corrosion Effect upon Wires and Pipes Utilized in Shipbuilding
- 9:15 Amide and Thioamide Based Receptors for Anions
- 9:30 A Novel Method to Synthesize Unnatural Cystein Analog
- 9:45 Design of a Photoactivated DNA-cleaving Agent
- 10:00 Break**
- 10:15 Aqueous Acyclic Diene Metathesis (ADMET) as a New Synthetic Approach for Water-soluble Materials with Anti-microbial Activity
- 10:30 Preparation of Homochirally Similar Lysine Analogs from a Common Intermediate
- 10:45 Analysis of Wombat Gases Injected into and Absorbed by Scrubbing Solutions
- 11:00 Asymmetric Chromium Mediated Epoxidation: a Detailed Investigation Using Manual Parallel Reaction Techniques
- 11:15 Electrogenenerated Chemiluminescence of Benzophenone Using Benzoperoxide as the Coreactant
- 11:30 Soil Analysis of Land Affected by a Chemical Spill
- Divisional Business Meeting** **11:45 AM**

Oral Presentations**1:30 PM to 3:15 PM****(Abstracts pp 46-48)**

- 1:30 Evolution of Transient Interfacial Phenomena in Miscible and Partially Miscible Systems
- 1:45 X-ray Diffraction Analysis of Soil for Clay-mineral Identification
- 2:00 Riboflavin-sensitized Phototransformation of Benzo[a]pyrene
- 2:15 Determining the Interfacial Tension Using a Spinning Drop Tensiometer
- 2:30 Grubbs-type Metathesis Catalysts with Functionalized Carbenes for Applications in Aqueous Media
- 2:45 Photochemical Synthesis of Pyrrolo-[1,4]-benzodiazepines
- 3:00 Monitoring Isothermal Frontal Polymerization in Thin-layered Cells via Laser Line Deflection

Thursday, February 23**Location: Exhibit Hall B****Divisional Poster Session****6:00 PM to 7:00 PM****(Abstracts pp 48-49)**

- Preparation and Structural Studies on the Diorganotin (IV) Complexes with Thiosemicarbazones of Cyclopentanone
- Photochemical Synthesis of Dna Groove-binding Pyrrolo-[1,4]-benzodiazepines
- Mechanistic Enzymology of 3-hydroxy-anthranilate-3,4-dioxygenase (Had)
- Evaluation of Techniques for Drying Amorphous Precipitated Silica
- Synthesis and Characterization of Diorgano Tin Complex of Acetone 4-ethyl -3-thiosemicarbazone
- The Scope and Principles of Green Chemistry
- Thiolated Polymers (Thiomers), New Potential Mucoadhesive Drug Delivery Vehicles
- Electrochemical Synthesis and Photoconductivity Studies of Poly(n-vinyl Carbazole)

Friday, February 24**Location: Meeting Room 2****Oral Presentations****8:30 AM to 12:30 PM****(Abstracts pp 50-53)**

- 8:30 Separation of Metallic Nitride Fullerene (MNF) Nanomaterial Mixtures via Selective Organic Functionalization
- 8:45 Towards the Synthesis of a Perylenediimide with Triple Tails Attached to Improve its Solubility
- 9:00 Spherically-propagating Thermal Polymerization Fronts in a Sequential Interpenetrating Polymer Network
- 9:15 Reliable Synthesis of a Versatile Grubbs-type Metathesis Precursor
- 9:30 The Synthesis of New Amino-2-pyridine Carboxylic Acids as Ligands for Designing Crystalline Host-guest Materials
- 9:45 Toward the Organic Synthesis of Water-soluble Precursors for Metallic Nitride Fullerene (MNF) Pharmaceuticals
- 10:00 Polymerization Systems Using Microencapsulated Reaction Components
- 10:15 Oxidation of Benzo[a]pyrene by Immobilized Laccase of *Trametes Versicolor* on Functionalized Kaolinite
- 10:30 Break**
- 10:45 Stability of Curcumin under Domestic Cooking Conditions and Synthesis of Water-soluble Curcumin
- 11:00 HPLC of Metallic Nitride Fullerene (MNF) Cycloaddition Reaction Mixtures
- 11:15 Hot Science: Cold Molecules
- 11:30 Water Dispersed Materials
- 11:45 N-chiral Nickel Complexes: High Diastereomeric Resolution upon Coordination of Dihydrosalen Ligands with a Chiral Backbone
- 12:00 Applying Snell's Law to Frontal Polymerization
- 12:15 Water-soluble N-heterocyclic Carbene (NHC) Ligands: Access to Water-soluble Late Transition Metal Complexes



ECOLOGY AND EVOLUTIONARY BIOLOGY

Thursday, February 23**Location: Meeting Room 7****Oral Presentations****8:30 AM to 11:45 AM****(Abstracts pp 53-55)**

- 8:30 Introduction to Session
- 8:45 The Influence of Testosterone and Migration on the Relapse of *Plasmodium Relictum* in Experimentally Infected Gray Catbirds (*Dumetella Carolinensis*)
- 9:00 Variation in White Blood Cell Count in Relation to Intensity of Malaria Infection in a Passerine Bird
- 9:15 Use of Dredge Material Islands by Passerine Migrants: Implications for Conservation and Restoration of Stopover Habitat
- 9:30 Use of Weather Radar in Studies of Bird Migration in the Southwest: Overcoming Radar Beam Obstruction
- 10:00 Break**
- 9:45 The Regulation of Gender Expression in *Ceratoperis Richardii* Gametophytes
- 10:30 Temporal and Spatial Variation of Methane (CH₄) Emission in a Spring-fed Forested Wetland
- 10:45 Effects of the Light Environment on Production of Bacterioplankton and Phytoplankton under Various Degrees of Nutrient-limitation
- 11:00 Controlling Factors of Submersed Aquatic Vegetation (SAV) in Grand Bay National Estuarine Research Reserve (Nerr), Mississippi
- 11:15 Effects of Malathion on Cholinesterase Activity in Blue Channel Catfish (*Ictalurus Furcatus*)
- 11:30 Environmental Variables Affecting Ant (Formicidae) Community Composition in Four Habitats in Mississippi

Divisional Business Meeting**11:45 AM**

GEOLOGY AND GEOGRAPHY

Thursday, February 23**Location: Meeting Room 6****Oral Presentations****10:00 AM to 11:20 AM****(Abstracts pp 56-57)**

- 10:00 Natural Disasters in Mississippi's Past and Future
- 10:20 Hurricane Katrina GIS Response
- 10:40 The Impact of Hurricane Katrina on the Pearl River Marsh
- 11:00 The Oak Hill Lignite in Southeastern Mississippi: a Possible Source for Coal-bed Methane

Oral Presentations**1:00 PM to 2:00 PM****(Abstracts pp 57-58)**

- 1:00 Drier in the Subtropics and Wetter in the Mid- to High Latitudes: Modeling the Albian Greenhouse Warming in North America
- 1:20 Greenhouse World Proxy Records in the Lower Tuscaloosa Formation, Mississippi
- 1:40 An Experimental Lab Exercise Used to Determine If Mississippi's Science Framework Is Adequately Preparing High School Graduates to Make Informed Decisions about Groundwater

Divisional Poster Session**2:00 PM to 2:30 PM****(Abstracts pp 58-59)**

- Comparison of Two Candidate Sites for Gas Hydrates Sea Floor Monitoring
- Mississippi Watershed Characterization and Ranking Tool

Divisional Meeting**2:30 PM**



HEALTH SCIENCES

Thursday, February 23**Location: Exhibit Hall B****Session I: Cardiovascular****8:00 AM to 9:15 AM****(Abstracts pp 59-61)**

- 8:00 Opening Remarks
- 8:02 Matrix Metalloprotease Activity Is Increased in Obese Dog Kidneys
- 8:15 Role of Aldosterone in Mediating Hypertension and Target Organ Injury During Obesity
- 8:30 Expression Levels of Allograft Inflammatory Factor-1 (AIF-1) and Interleukin-18 (IL-18) Might Predict Allograft Rejection after Cardiac Transplantation
- 8:45 The Impact of Obesity on Venous Thrombosis When Associated with Travel
- 9:00 Adenosine A1 Receptors in the Metabolic Syndrome and Coronary Artery Disease

9:15 Break**Poster Session I****9:30 AM to 11:00 AM****(Abstracts pp 61-67)**

- Sexual Dimorphism in Renal NADPH Oxidase Activity in Dahl SS
- Evaluation of Three Polyphenols as Potential Chemotherapeutic Agents
- Effects of Synthetic Fire Ant Venom Alkaloids on Human Cells
- Surveillance of Gram Negative Bacteria in non ICU Settings: Antimicrobial Susceptibilities and Prevalence
- Differential Effects of Cortisol on Normal MRC-5 Fibroblasts and Hypertrophic LI-29 Fibroblasts
- Aqueous *V. Amygdalina* Extracts Alter MCF-7 Cell Membrane Permeability and Efflux
- Activation of Na^+/H^+ Exchanger and Alkalization as a Mediator for Aldosterone-induced Vascular Fibrosis
- The Effects of Increasing H_2O_2 Concentrations on the Viability and Morphology of A549 Cells
- Nerve Growth Factor Regulation of Acid-sensing Ion Channel 3 in Vascular Smooth Muscle Cells
- Assessment of Survival Responses of A549 Cells to Modulation of Intracellular Energetics
- Thymoquinone Protects A549 Cells Exposed to Low Oxygen Concentration from Cellular Damage
- Heme Oxygenase-1 Decreases Angiotensin II Dependent Reactive Oxygen Species Production in Mouse Thick Ascending Loop of Henle Cells
- Surveillance of Gram Negative Bacteria in the ICU: Antimicrobial Susceptibilities and Prevalence
- Association of Serum Total Bile Acid Concentrations with Incidence of Fatty Liver Hemorrhagic Syndrome and F-strain *Mycoplasma Gallicepticum* Infection in Commercial Laying Hens
- Comparison of Hep-2 Cellular Function Following Either a Bolus Administration or Continuous Sustained Release of IP-6
- Development of a Fish Model to Study Alcoholic Liver Disease
- Mercury-induced Externalization of Phosphatidylserine in Human Liver Carcinoma Cells
- Research to Assist Singing River Hospital's Cancer Center Medical Staff in Development of a Clinical Research Trial Involving Radiation Therapy for Patients with Bone Metastases
- Development of the Pharmaceutical Policies, Procedures, and Tracking Forms for Study-related and Supplied Drugs or Devices for the Cancer Center Clinical Research Office Staff of Singing River Hospital
- Methods Used for Detecting Bacterial Contamination in Platelet Products by Blood Suppliers to South Mississippi and Louisiana

11:00 Break**Session II: Microbiology****11:15 AM to 12:00 PM****(Abstracts pp 67-68)**

- 11:15 Antibiotic Properties of Spice Extracts
- 11:30 Analysis of Human Complement Factor H Binding to *Streptococcus Pneumoniae* Clinical Isolates
- 11:45 Analysis of *Streptococcus Pneumoniae* from Middle Ear Effusions of Children in Mississippi Using PSPA Family Typing and Box PCR Based DNA Fingerprinting

Symposium I: Nursing**1:00 PM to 3:00 PM****(Abstracts pp 68-69)**

- 1:00 History of Nursing: Past, Present, and Future
- 1:15 Education Preparation in Nursing
- 1:30 Nursing: "So Many Options, Which One to Choose?"
- 1:45 Responsibilities of an Advanced Clinical Practice Nurse
- 2:00 Panel Discussion for Symposium I

Poster Session II
3:00 to 4:00 PM
(Abstracts pp 69-74)

- Inhibitory Effect of Cortisol in Human Lukemia Cells
- Effects of Cortisol on Rhesus Monkey Kidney Cell Viability in Culture
- Project F.I.R.M. (Family-based Insulin Resistance Management)
- Development of a DNA Identification Program for Elementary Students Based on Participation in the *Base Pair* Summer Research Institute
- The Effects of Fructose-1,6-bisphosphate on Lung Cells at Reduced Oxygen Levels
- Assessing the Varying Causes and Risk Factors Associated with Pediatric Hypertension
- The Effects of PMMA Particle Number on MG-63 Osteoblast Cell Function
- Epstein-barr Virus: Cloning, Expression, and Purification of Gp350
- Neuron Specific Enolase (NSE) and Ferritin Compared with Eleven Other Tumor Antigens for the Serodiagnosis of Pancreatic and Gastric Cancer
- Neuron Specific Enolase (NSE) and Ferritin Compared with Eleven Other Tumor Antigens for the Serodiagnosis of Leukemia and Lymphoma
- Synthesis and Characterization of Complexes of Cu(II), Zn(II), Ni(II) and Sn(IV) with Acetone N(4)-phenylthiosemicarbazone (Haptsc)
- The Effect of Green Tea Extract Administered Both Preventatively and upon Infection in Trypanosoma Lewisi Infected Rats
- Effects of Polystyrene Particle Number on Type II Pneumocytes
- The Effect of Curcumin & Bet A-glucan Individually & Incombination on Trypanosoma Lewisi Infected Rats
- Metabolic Effects of Fructose 1,6-bisphosphate in Normoxic and Hypoxic States of MG63 Osteosarcoma Cells
- Neuron Specific Enolase (NSE) and Ferritin Compared with Twelve Other Tumor Antigens for the Serodiagnosis of Breast Cancer

Poster Session III
6:00 PM to 7:00 PM
(Abstracts pp 74-80)

- The Newest Member of the Inhibitors of Apoptosis Family, IAP like Protein 2 Demonstrated Growth Factor Regulation in CD34+ and MO7e Cells
- Effects of Drugs on the Differentiation of PC12 Cells
- The Role of (-) Epigallocatechine Gallate (EGCG) and Thymoquinone on the Proliferation of PANC-1 Cell Line in Culture
- Differential Effects of Cyclosporine a on Rhesus Monkey Kidney Epithelial Cells in Culture
- Mechanical Strength Repercussions of Various Fixative Storage Methods on Bone
- Pathophysiological Responses of MRC-5 Cells Exposed to Various Doses of X-ray Radiation
- Role of Nitric Oxide in Domoic Acid Induced Hippocampal Degeneration
- Stem Cell Collection Methods and the Stem Cell Resources in Mississippi
- Chronic Blockage of VEGF Receptor 2 Causes Prolonged Increases in VEGF Expression in Skeletal Muscles of Treadmill-exercised Mice
- Time Course of Proangiogenic Growth Factor Expression During Exercise Conditioning in Mice
- The Effects of Estrogen on the Viability and Proliferation of Cervical Tumor Cell Lines, SW 756 and HeLa, and Normal Cervical Cells, Ect 1/E6E7 in Culture.
- The Effects of Growth Factors on the Production of Bone Matrix Proteins
- The Effects of Glucosamine, Chondroitin, and Thymoquinone on Htb-93 Synovial Cells
- Prevalence of Antibodies to Hepatitis C Virus in a University Setting
- The Physiological Effect of Conventional Treatment with Epigallocatechin-3-gallate, Thymoquinone, and Tannic Acid on the LNCaP Cell Line
- Immunostaining to Determine Osteocyte Apoptosis by Caspase-3
- Effects of Ambulation with Standard Walker And/or Rolling Walker with Platforms on Cardiopulmonary Functions and Biochemical Stress Markers in Non-weight Bearing Individuals
- Poxvirus Phosphatase Vh1 Alters Ifn-gamma Regulated Gene Expression in Macrophages
- The Effects of Growth Factors on Cellular Phospholipids

Friday, February 24
Location: Exhibit Hall A1

Session III: Biology **9:00 AM to 10:30 AM** **(Abstracts pp 80-81)**
 9:00 Opening Remarks
 9:02 Markers of Inflammation and Oxidative Stress in Alzheimer's Disease
 9:15 Effects of Butorphanol on Neuronal Activities of the Rat Locus Coeruleus
 9:30 Role of Cytochrome P-450 3A4 (CYP 3A4) Genes in the Development of Breast Cancer
 9:45 Developing New Classes of Antidepressant Medication
 10:00 Effects of Human Umbilical Cord Blood Regulatory T Cells on Effector CD8+ T Cell Differentiation
10:30 Break

Symposium II: Drug Delivery **11:00 AM to 12:00 PM** **(Abstracts pp 82-83)**
 11:00 Conventional and Sustained Delivery L-dopa and Thymoquinone on SH-SY5Y Human Neuroblastoma Cells
 11:15 The Effects of Cortisol and Endotoxin Exposure on RC/4B Pituitary Adenoma Cells
 11:30 Effect of Exogenous Steroid Hormones on Cytokine Expression in Fibrous Tissue Surrounding TCP Bioceramic Implants
 11:45 Effects of Sustained Release of Statin by Means of Tricalcium Phosphate Lysine Delivery System in a Defect and Segmental Femoral Injuries on Certain Biochemical Markers in Vivo

First Aid/ Panel Discussion **1:00 PM to 2:00 PM**
Divisional Business Meeting/Awards **2:15 PM**

HISTORY AND PHILOSOPHY OF SCIENCE

Friday, February 24
Location: Meeting Room 3

Oral Presentations **8:30 AM to 12:00 PM** **(Abstracts pp 83-85)**
 8:30 The Advantages of Developmental Systems in Biology
 9:00 On the Concept of 'A Life': a Biophilosophical Analysis
 9:30 Continuity Vs. Contextuality: the Contribution of Anneliese Maier (1905-1971) to the History and Philosophy of Science.
 10:00 Paradigms of Life: Historical Conceptions and Evolutions
10:30 Break
 11:00 The Utility of Extensional Complexity Modeling for the Biological Species as a Natural Kind
 11:30 String Theory and Aum

Oral Presentations **1:00 PM to 3:00 PM** **(Abstracts pp 85-86)**
 1:00 The Utility of Intensional Complexity Modeling for the Biological Species as a Natural Kind
 1:30 Intuition, Scale, and Nominal and Particulate Things: the Confusing Terminology of Plant Pathology
 2:00 Cladistics, a Systematics Methodology Realizing Darwin's "Great Tree of Life"
 2:30 Does Natural Selection Explain *Function*?

Divisional Business Meeting **3:00 PM**

Oral Presentations **3:30 PM to 4:00 PM** **(Abstract p 86)**
 3:30 "Scientific" Creationism and the End of Modern Science



MARINE AND ATMOSPHERIC SCIENCES

Thursday, February 23

Location: Meeting Room 2

Oral Presentations **9:00 AM to 10:45 AM** **(Abstracts pp 86-88)**

- 9:00 Characterization of Mid-shelf Current Variability
9:15 Analysis of Heme Oxygenase in Sheepshead Minnows, *Cyprinodon Variegatus*
9:30 Measuring Bubble Volume Using an Electromagnetic Detector
9:45 Matrix Elimination Using Hydrofluoric Acid for Analysis of Biogenic Carbonates by ICP-MS
10:00 Developing a Regional Model of the Indonesian Seas Circulation Based on the POM
10:15 Climate Variability, Fecal Coliform Dynamics and Shellfish Management in Mississippi Sound

10:30 Break

Divisional Poster Session **10:45 AM to 11:30 AM** **(Abstracts pp 88-89)**

- The Effects of Triclosan on Marine Algae Species
Cocprecipitation of Trace Elements by Sodium Hydroxide for Elemental Determination in Fish Otoliths
A Numerical Study of the Mesoscale Variability in the Norwegian Coastal Current
A Study of Ocean-atmospheric Interactions and Hurricane Predictive Index (HPI) Associated with Land Falling Hurricane Charley

Divisional Business Meeting **1:30 PM**

MATHEMATICS, COMPUTER SCIENCE AND STATISTICS

Thursday, February 23

Location: Meeting Room 1

Oral Presentations **9:00 AM to 12:00 PM** **(Abstracts pp 89-91)**

- 9:00 Modified Alphabet Overlap Graphs
9:30 Algebraic Properties of Sum One Matrices
10:00 Estimate and Handle Data Errors in Geographic Information System: a Literature Study
10:30 Interpolation Schemes for Sensor Data from Surfaces with Fractal Texture
11:00 Weigh in Motion (WIM) Interfacing with TC-AIMS II and AALPS
11:30 Regularly Structured Sum One Matrices

Divisional Meeting **2:00 PM**

Thursday, February 23

Location: Exhibit Hall B

Divisional Poster Session **3:00 PM to 4:00 PM** **(Abstracts p 91)**

- Robotic Formation: Correcting Boe-bot's Error by Trial Installation
A Method to Properly Color an Alphabet Overlap Graph
Automated Software Testing Using Rational Robot

Friday, February 24

Location: Exhibit Hall A2

Oral Presentations **8:30 AM to 11:45 AM** **(Abstracts pp 91-93)**

Special Subsession on Supercomputing (with concurrent poster session)

- 8:30 Carr-parinello Molecular Dynamics Benchmark Performance
8:55 Implementing a Tabu Search Algorithm for the Contact Map Alignment Problem Using OpenMP and MPI
9:20 An Algorithm to Determine the Sequence of Stable Multicast Trees in Mobile Ad Hoc Networks
9:40 Mississippi Center for Supercomputing Research (MCSR) User Advisory Group Meeting, Poster Session, and Special Subsession on Supercomputing

10:30 Break



- 10:45 Comparison Analysis of Human Protein Databases and Approach to Database Interoperability
 12:30 **Voting on Awards for Best Presentation and Poster and Presentation of Awards**
 1:00 **Mathematics, Computer, and Information Sciences Alumni Survey Online Form, (Abstract p 93)**

PHYSICS AND ENGINEERING

Thursday, February 23

Location: Meeting Room 4

Oral Presentations **8:00 AM to 11:40 AM** **(Abstracts pp 93-96)**

Advances in Numerical Modeling Techniques

- 8:00 Electromagnetic Scattering from Chiral Media Using the Finite Difference Frequency Domain Technique
 8:20 Hybrid FDFD and MoM Techniques in Conjunction with the Iterative Multi – Region Algorithm for the Solution of Large Electromagnetic Problems
 8:40 Solution of Maxwell's Equations on Boundary-fitted Grids Using a Convolutional Perfectly Matched Layer Technique as an Energy Absorbing Boundary Condition
 9:00 FDTD Analysis of a Probe-fed Dielectric Resonator Antenna Array with Hard Horn for Spatial Power Combiner
 9:20 Optimization Using the Orthogonal Arrays for Unequally Spaced Linear Array Antennas and Global Numerical Solutions

9:40 Break

Antenna Research and Applications

- 10:00 Design of a Wideband Microstrip Power Divider
 10:20 Doubly-sided Exponentially Tapered Slot Antennas
 10:40 Finite Element-boundary Integral Simulation of Double-sided Rounded Bow-tie Antennas for Uwb Communications
 11:00 Dielectric Resonator Antenna Array for Microwave Breast Cancer Detection
 11:20 A Study on Microstrip Implantable Antennas for Medical Telemetry

Oral Presentations **1:10 PM to 3:20 PM** **(Abstracts pp 96-97)**

Image Processing and Applications

- 1:10 The Automated Image Registration for Multisensor Case
 1:30 An EMI Landmine Detection System Using Pulse-response Measurements Based on Maximal Length Sequence Excitation
 1:50 Image Processing and Target Identification Using Graphical Processing Units
 2:10 Real-time Distortion Invariant Object Classification with SDF Based FJTC

2:30 Break

Wireless Propagation

- 2:40 Performance of Dual-branch Maximal Ratio Combining Diversity over Non-identical Correlated Weibull Fading Channels Using Padé Approximation
 3:00 Outage Probability Analysis in a Cooperative UAVs Network over Rayleigh and Nakagami-m Fading Channels

Divisional Poster Session **3:20 PM** **(Abstract p 97)**

A Novel Technique for Studying Phase Transitions in Granular Materials

Friday, February 24

Location: Meeting Room 4

Oral Presentations **8:30 AM to 10:00 AM** **(Abstracts pp 97-98)**

Future of Energy Resources

- 8:30 How Is the U.S. Industry Doing Quality-wise?
 8:50 Nuclear Fission Energy - the Energy of Choice
 9:10 Nuclear Fusion Energy - the Energy of the Future
 9:30 Violent Celestial Explosions and Gamma Ray Bursts
9:50 Break



Invited Speaker	10:00AM to 11:30 AM	(Abstract p 99)
Waste Wise: Computer Waste		
Oral Presentations	1:00 PM to 2:30 PM	(Abstracts pp 99-100)
Physical Phenomena and Experiments		
1:00 Thermoacoustics of Small Devices		
1:20 Three Different Methods to Account for Lost Vapor from Large Usts During the Summer Months in the Southern States		
1:50 Temperature Gradient Measurement in a Shallow Water Environment		
2:10 Wind Noise Measurements over a Flat Plate		
Awards and Divisional Business Meeting	2:30	

PSYCHOLOGY AND SOCIAL SCIENCES

Thursday, February 23

Location: Meeting Room 3

Oral Presentations	8:15 AM to 11:45 AM	(Abstracts pp 100-103)
8:15 How Do Interracial Copules Strategize Against the Complexities of Racism?		
8:30 Cell Phone Usage and Dependency in Undergraduates		
8:45 Patterns of Cell Phone Usage in Undergraduates		
9:00 Personality Variables and Cell Phone Use in Undergraduates		
9:15 A Wake up Call for Cell Phone Users: Cell Phones and Undergraduate GPA		
9:30 The Color Complex: Relationships Between Self-rated Skin Tone and Self-esteem in African-Americans		
9:45 Incidence of Domestic Violence among Students at the University of Southern Mississippi: an Initial Report of Findings		
10:00 Break		
10:15 The Effect of Parenting Styles on Intimate Relationship		
10:30 Use of Radiographs of Patients with Arthritis and Pain Questionnaire Results in the Identification of Forensic Cases		
10:45 Health Status and Social Stratification at Mangum (22cb584)		
11:00 Patterns of Health among Children in Nineteenth Century Natchez		
11:15 Comparative Analysis of the Relationships of Age, Gender, and Cause of Caucasian Deaths in Late Nineteenth Century Vicksburg and Natchez, Mississippi		
11:30 Population Aging and the Measurement of Dependency: the Case of Germany		
Symposium on Hurricane Katrina	1:15 PM to 2:30 PM	(Abstracts pp 103-104)
The Psychology & Social Science Invited Symposium on Hurricane Katrina		
Disaster Preparedness Plans for Animal Facilities		
2:30 Break		
Oral Presentations	2:45 PM to 3:45 AM	(Abstracts pp 104-105)
2:45 ASL and Schizophrenic Language: Misdiagnosis and Needed Modifications to the Diagnosis Criterion of Deaf Schizophrenics from a Bio-Psychosocial Perspective		
3:00 Effects of L-tryptophan on Food Intake in Bushbabies Are Sex Specific		
3:15 Gender Differences in Attitudes Toward Care and Use of Animals		
3:30 Weight Concern and Body Image among Southern African American Females		
Divisional Business Meeting	3:45 PM	

Thursday, February 23

Location: Exhibit Hall B

Divisional Poster Session	6:00 PM to 7:00 PM	(Abstracts pp 105-108)
Racial Disparities in Tobacco Use and Social Influences in a Rural Southern Middle School		
Integrating Data Analysis in the Sociology Curriculum		
Effects of Modafinil on Working Memory		
Effects of Early Food Restriction on Subsequent Weight Gain		

Health and Activity of a Plaquemine Necropolis in Claiborne County, Mississippi
 Unstable Self-esteem and Psychological Defense
 Teenage Rates Pregnancy among Daughters Whose Mothers Are Incarcerated
 Passengers: Do They Value Their Lives?
 Narcissistic Subtypes and Contingent Self-esteem
 The Influence of Gender Role Identity and Gender Related Traits on the Perceptions of Severity in Same and Cross-Sex Sexual Harassment

SCIENCE EDUCATION

Thursday, February 23

Location: Meeting Room 5

Oral Presentations

8:00 AM to 11:30 AM

(Abstracts pp 108-110)

- 8:00 A Review of the 2005 J.L. Scott Marine Education Center and Aquarium's (MEC&A) Gear-up Mississippi Island Ecology Camp
- 8:15 J.L. Scott Marine Education Center and Aquarium's Educational Programs: Post-*Hurricane Katrina*
- 8:30 What Happened to My Beach?
- 8:45 The Top 10 Invasive Plants of the Mississippi Gulf Coast
- 9:00 Break**
- 9:15 The Production of Two Videos, *The Microscope* and *Plants and Animal Cells*, for Biology Students of Mississippi Gulf Coast Community College
- 9:30 Developing a Database of Teacher Contacts to Aide in Marketing Efforts for the J.L. Scott Marine Education Center and Aquarium's (MEC&A) Project Marine Discovery (PMD) Programs
- 9:45 Creating a Digital Image and Video Database for the J.L. Scott Marine Education Center and Aquarium
- 10:00 Development of a Static Educational Snake Photographic Display for J.L. Scott Marine Education Center and Aquarium's Interim Facility
- 10:15 Break**
- 10:30 Costume Designs for Educational Programs
- 10:45 Exposure of an Artist and His Work Through Film
- 11:00 Pre-service Teachers' Perception of the Particulate Nature of Matter
- 11:15 Math Across the Science, Technology and Social Studies Curriculum

Divisional Business Meeting

11:30 AM

Oral Presentations

1:30 PM to 4:00 PM

(Abstracts pp 111-113)

- 1:30 Ocean Literacy: the Essential Principles and Fundamental Concepts of Ocean Sciences Guide
- 1:45 Living Dinosaurs! The Reclassification of Birds as Theropod Dinosaurs as an Opportunity to Excite Students and Explain Classification Through Cladistics.
- 2:00 A Method to Enhance the Analytical Writing Section on the Graduate Record Exam
- 2:15 Encouraging Scientific Literacy Through the Use of Forensic Science
- 2:30 Break**
- 2:45 Introduction of the Positive Aspects of Microorganisms to College Students
- 3:00 Do Students Who Earn the Grade of "A" in a Community College Microbiology Course Have Different Learning Styles from Classmates Who Earn Lower Grades?
- 3:15 Middle School Science Teachers' Performance in Five Science Courses Designed to Teach Content
- 3:30 Teacher Enhancement Program, Emphasizing Technology Integration, for Middle School and High School Math and Science Teachers
- 3:45 Microsoft Excel Spread Sheet as a Grade Book



ZOOLOGY AND ENTOMOLOGY

Thursday, February 23

Location: Meeting Room 7

Oral Presentations

1:00 PM to 2:40 PM

(Abstracts pp 113-115)

- 1:00 Fire Ant (*Solenopsis Invicta*) Impact on Dragonfly Emergence
- 1:20 Evaluation of Entopathogenic Fungus, *Beauvaria* Bassiana, as a Possible Biocontrol Agent of Tarnish Plant Bug, *Lygus Lineolaris*
- 1:40 The Effects of Body Mass Index and Gender on Hormonal Responses to a Satiating Meal
- 2:00 Comparative Study on the Water Quality of China and Mississippi, Usa
- 2:20 Analysis and Discussion of Outbreak of Lovebugs, *Plecia Nearctica* in Mississippi: Did Katrina and Rita Have a Role

Divisional Business Meeting

2:40

Thursday, February 23

Location: Exhibit Hall B

Divisional Poster Session

3:00 PM to 4:00 PM

(Abstracts p 115)

- Carpenter Ants (Formicidae: Camponotus) of Mississippi
- Rediscovery of a Lost Species, *Argyria Rufisignella* (Lepidoptera: Crambidae), in Bibb County Glades Preserve, Alabama
- A Review of *Symmocinae* (Lepidoptera: Autostichidae) in North America with the Description of a New Species and New Genus

GENERAL SESSION

THURSDAY AFTERNOON

Exhibit Hall A2

3:00 MAS COMMUNITY FORUM: THE MISSISSIPPI ACADEMY OF SCIENCES AND THE POST-KATRINA RECOVERY OF THE GULF COAST RESEARCH LABORATORY

D. Jay Grimes¹, William E. Hawkins¹, and Roy Duhe^{2*}, ¹Gulf Coast Research Laboratory, Ocean Springs, MS 39564 and

²University of Mississippi Medical Center, Jackson, MS 39216

On August 29, 2006, Hurricane Katrina devastated the Gulf Coast Research Laboratory (GCRL), approximately fifty years from the day that the Mississippi Academy of Sciences (MAS) officially dedicated the lab. Total GCRL losses from the storm were more than \$40M including five buildings, data, biological collections, extensive library resources, instrumentation and other equipment and supplies, and the complete loss of the J.L. Scott Marine Education Center and Aquarium. In 1947, the first official summer session for undergraduates marked a milestone in the MAS's contributions to the sciences in Mississippi. The MAS helped launch the GCRL and nurtured its development during the fledgling years, by laying the foundation for the lab to become the state's scientific and educational institution for the advancement of marine and coastal sciences. Paradoxically, Hurricane Katrina now offers the opportunity for the MAS to once again lead the way, both in the sciences of Mississippi's marine and coastal resources and in the support for science education for Mississippi teachers and school children. In the aftermath of Katrina, the GCRL leadership, faculty and staff have worked amid personal and professional hardship to bring facilities and programs back into operation. The devastation caused by Hurricane Katrina creates an unprecedented economic challenge for our state. As the only statewide organization dedicated to the advancement of science in Mississippi, the MAS bears a special responsibility to ensure that the GCRL recovery will be an integral part of Mississippi's coastal renaissance. The purpose of this session is to openly discuss how the MAS can best cooperate with the leadership of GCRL, The University of Southern Mississippi, and the Mississippi Institutions of Higher Learning to fulfill that responsibility.

AGRICULTURE AND PLANT SCIENCE

Chair: William Kingery, Mississippi State University

Vice-chair: Evelin J. Cuadra, Alcorn State University

FRIDAY MORNING

Exhibit Hall B

8:30 GROWTH CONDITIONS AFFECT THE EXPRESSION OF INLB IN LISTERIA MONOCYTOGENES AND LISTERIA SPP

Taejo Kim and Juan L. Silva*, Mississippi State University, Mississippi State, MS 39762

Listeria monocytogenes is a gram-positive, facultative intracellular bacterium that causes listeriosis in humans. The InlB, a 67-kDa surface and secreted protein, is essential for adhesion and mediates the invasion of *L. monocytogenes* into human endothelial cells. The objectives were to assess the effect of different growth conditions on expression of InlB in *Listeria monocytogenes* and *Listeria* spp. The InlB was quantitatively extracted in a solubilized form with 1 M Tris-HCl at pH 7.5. SDS-polyacrylamide gel electrophoresis (PAGE) was done with 12 % polyacrylamide gels and silver stained. The intensity of InlB bands was quantified using an Un-Scan-It software program. The InlB was easily identified as a distinct protein band of 67 k-Da in SDS extracts of *L. monocytogenes* and *Listeria innocua*. However, InlB was not detected in the extract of *L. grayi*. InlB expression of *L. monocytogenes* 19111 in TSB (183 pixels) as determined by band intensity was the highest than in LB (137 pixels) and BHI (173 pixels). All stationary phase culture cells (16 h) of *L. monocytogenes* 19115, 7644, and 19111 produced the highest amount of InlB, 116, 183, and 146 pixels, respectively. Based on this study, it could be speculated that growth conditions may influence the overall expression of InlB and thereby affect the pathogenicity of *L. monocytogenes*.

8:45 EXPRESSION OF 80 KILODALTON LISTERIA ADHESION PROTEIN IN LISTERIA MONOCYTOGENES AND LISTERIA SPP.

Juan L. Silva*, Bang-Yuan Chen, and Taejo Kim, Mississippi State University, Mississippi State, MS 39762

Adhesion and invasion of *L. monocytogenes* into epithelium cells are mediated by internalin A (Inl A), an 80 k-Da surface protein. In this study, the expression of Inl A in *L. m.* 19115, *L. m.* 19111, *L. m.* 7644, *L. grayi* and *L. innocua* was assessed. Inl A was extracted by treatment of bacteria with 1%(w/vol) SDS in 10mM tris-HCl at pH 8.0. The extracted protein was washed by 90% acetone and dissolve in Laemmli buffer. SDS-PAGE was done by the method of Laemmli buffer

with 12% polyacrylamide gels. For staining of the gels, a silver staining kit (Bio-Rad, Munich, Germany) was used. The gel was examined by UN-SCAN_{IT} gel (S.S.C. Version5. 1). Inl A expression was only found in *L. m. 19115* and *L. grayi* with band intensities at 76 and 58 pixel, respectively. Inl A was not detected in the extract of *L. m. 19111*, *L. m. 7644*, and *L. innocua*.

9:00 INFLUENCE OF COOKING METHOD ON MIB OFF-FLAVOR REDUCTION IN FARM RAISED CHANNEL CATFISH

Chonthida Kaewplang, William E. Holmes, Juan L. Silva*, and Taejo Kim, Mississippi State University, Mississippi State, MS 39762

Off-flavor is the most significant problem facing the catfish industry. Cyanobacteria and actinomycetes can produce geosmin (1,10-trans-dimethyl-trans-9-decalo) and MIB (2-methylisoborneol), (1,2,7,7-tetramethyl-exo-bicyclo [2,2,1] heptan-2-ol) which are impart unpleasant earthy/muddy taste and odor into the catfish. The objective of this experiment was to screen cooking methods for their effects on off-flavor reduction. The effect of cooking methods (microwaving, baking, frying, and marinating prior to baking) were studied for their ability to reduce the post-harvest off-flavors in catfish. Sensory evaluation based on intensity of off-flavor was performed utilizing a 5-point hedonic scale. The MIB was quantified in a GC utilizing a SPME procedure. The "frying" and "marinating prior to baking" methods were found to be effective in decreasing off-flavor in the catfish (MIB concentration reduced from 8.2 ppb to 1.2 ppb and 3.9 ppb, respectively). This reduction maybe due to compounds present in the marinating and/or breading.

9:15 EFFECT OF STORAGE TEMPERATURE ACCUMULATION ON QUALITY OF FRESH CHANNEL CATFISH FILLETS

Youkai Lu, Juan L. Silva*, and Taejo Kim, Mississippi State University, Mississippi State, MS 39762

Storage temperature has great influence to the growth of bacteria, hence the shelf life of fresh fish products during storage. The objective of this research was to study the role of storage temperature accumulation on bacterial growth pattern in catfish fillets during refrigerated storage. Fresh catfish fillets were packed in polythene bags and stored on top of ice (WI) or without ice (WO) under refrigeration. They were sampled periodically and analyzed for psychrotrophic bacteria (PPC). Also, ERTCO temperature sensors were used to monitor hourly storage temperature of packed catfish fillets. The temperatures of WO and WI fillets were $5.14 \pm 0.39^{\circ}\text{C}$ and $2.42 \pm 0.78^{\circ}\text{C}$, respectively. When PPC reached 108CFU/g, hourly storage temperature accumulation were 405.8°C in WO fillets and 496.1°C in WI fillets. The correlation coefficients of storage temperature accumulation and PPC were higher than 0.8. Results indicate that temperature accumulation plays an important role

on bacterial growth pattern on catfish fillets, but other temperature profiles such as magnitude and frequency of temperature fluctuation may also play significant roles on bacterial growth pattern and fresh catfish fillet quality during storage.

9:30 REDUCTION OF GEOSMIN AND 2-METHYLISOBORNEOL COMPOUNDS IN CATFISH FILLETS BY PURE LIME EXTRACT TREATMENT FOLLOWED BY LEMON PEPPER MARINATION

Sovann Kin, Juan L. Silva*, William E. Holmes, and Taejo Kim, Mississippi State University, Mississippi State, MS 39763

The effects of pure lime extract followed by lemon pepper marination on catfish fillet samples spiked with geosmin and 2-methylisoborneol compounds were assessed by a descriptive analysis panel and quantitatively by SPME-GC. The panelists were trained to evaluate the intensity of geosmin and 2-methylisoborneol compounds using Labeled Magnitude Scale (LMS). This consists of a vertical line with verbal labels (barely detectable, weak, moderate, strong, very strong and strongest imaginable) for intensity levels spaced in a quasi-logarithmic fashion. Sensory evaluation indicated that there was a reduction in MIB and geosmin off-flavors of treated samples compared with untreated samples. This suggests that both food-grade ingredients may be used to reduce/eliminate off-flavor compounds from catfish at some point after processing. These ingredients appear to mask and not to reduce/breakdown the off-flavors in the fish muscle. These ingredients can be added to a marinade or incorporated in an injection/tumbling solution after catfish fillets are processed.

9:45 THE STUDY OF OXIDATIVE STABILITY OF BIODIESEL AND THEIR FEEDSTOCKS

John McGillivray, Juan L. Silva*, and Rafael Hernandez, Mississippi State University, Mississippi State, MS 39762

The price of gasoline is rising and alternative fuels are now looked at as a solution to the rising prices. Fatty acid esters, more commonly called biodiesel, are transesterified vegetable oils and animal fats. Biodiesel made strictly from saturated animal fats will have cold flow problems, and biodiesel made strictly from unsaturated vegetable oils will be prone to autoxidation which will lead to oxidative rancidity and low-quality biodiesel. The objectives of this study were to examine alternative feedstocks for biodiesel production and measure the oxidative rancidity on these feedstocks caused by specific extraction procedures. Catfish and poultry waste streams were obtained from local processing plants and stored in the refrigerator. These two feedstocks along with ground soybeans were extracted using propane, hexane, and supercritical carbon dioxide. After extraction, the samples were transesterified to form fatty acid methyl esters. The extent of oxidative rancidity was measured using the iodine value (IV), peroxide value (PV), oxidative stability index (OSI), thiobarbituric acid (TBA) and

free fatty acids (FFA), anisidine value (AV), allylic position equivalents (APE), bis-allylic position equivalents (BAPE), and microbial plate count on standard plate count agar. Feedstock quality varied with source but the oils proved to be fairly stable to oxidative rancidity. The use of alternative feedstocks to produce biodiesel will expand the market and allow poultry and catfish producers to utilize their waste by-products.

10:00 INFLUENCE OF SANITATION TREATMENT AFTER HARVEST ON SHELF LIFE OF BLUEBERRIES IN MISSISSIPPI

Wei-Chun Chen, Juan L. Silva*, Jelena Stojanovic, and Taejo Kim, Mississippi State University, Mississippi State, MS 39762

More than one million kilograms of blueberries are produced each year in Mississippi. About 50 percent of Mississippi blueberries are sold wholesale through marketing. Extending shelf life of blueberries has become an important issue in the nation. The objective of this study was to evaluate different pretreatments on shelf life of machine-harvested blueberries in Mississippi. Machine picked blueberries were treated with different concentrations of chemical solutions: chlorine (100ppm, 200ppm), peracetic acid (25ppm, 50ppm), ethanol (20%, 70%), and distilled water (control) for 30s. After treatment, blueberries were drained, blot-dried by air and placed in plastic clamshells. Samples were stored at 2-4 °C in a refrigerator and evaluated after 0, 4, 6, 12, 16, 20, 24, and 30 days. Samples were evaluated for aerobic plate counts and yeasts and molds counts. Aerobic plate counts increased by 1.5 log and yeast and mold counts by 2 log after two weeks. Berries treated with chlorine and ethanol had lower counts than those treated with peracetic acid. Pretreatment in blueberries seem important in keeping the quality and increasing shelf-life of blueberries.

10:15 CHEMICAL AND QUALITY CHANGES OF SWEET POTATO ROOTS DURING SACCHARIFICATION PRETREATMENT WITH AND WITHOUT ADDED ENZYMES TO PRODUCE A SWEET POTATO BEVERAGE

Jelena Stojanovic and Juan L. Silva*, Mississippi State University, Mississippi State, MS 39762

Decreasing starch content of sweet potato (SP) would be crucial step in the processing of a beverage. Our objective was to use endogenous amylases and commercial enzyme mixes to increase sugar content of SP for the production of an acceptable beverage. Sweet potatoes were peeled, minced, mixed with water (75:25), heated and held at 70, °C for 30 min. Samples were analyzed for total amylolytic activity, reducing sugars, PPO, soluble solids, alcohol insoluble solids, total phenolics and moisture every 10 minutes. The commercial α -amylase plus glucoamylase mix was added to the blanched sweet potato slurry and incubated at 55, °C for 30 min. The starch debranching enzyme pullulanase was not present. The process to hydrolyze starch using endogenous enzymes should be carried at 70, °C for

up to 20 min since it produces highest amount of reducing sugars (11g/100g). The PPO activity rapidly decreased in the first 10 min of the treatment thus minimizing browning of the slurry. The commercial enzyme preparation produced the highest amount of reducing sugars but was lower in lightness and hue. Thus, pretreatments of SP prior to extraction of juice can increase sugars and decrease starch thus adding value and new possibilities for the production of an acceptable beverage.

10:30 Break

10:45 EVALUATION OF DIFFERENT TYPES OF MULCHES FOR ORGANIC PRODUCTION OF CUCUMBER

Ravi Chinthakuntla^{1*}, Rao S. Mentreddy², Patrick Igbowke¹, Franklin D. Jackson¹, Frank B. Matta³, O.U.K. Reddy⁴, Molly Jahun⁵, Louis Licata¹, and Smith D. Keltra¹, ¹Alcorn State University, Lorman, MS 39096, ²Alabama A&M University, Normal, AL 35762; ³Mississippi State University, Mississippi State, MS 39762, ⁴West Virginia State University, Institute, WV 25112, and ⁵Cornell University, Ithaca, NY 14853

Organic vegetable production is currently expanding at approximately 20% annually and organically produced vegetables fetch premium prices compared to conventionally produced vegetables. Organic production continues to be a small-scale niche-market enterprise as weeds are a major problem limiting its expansion. Various types of mulches have been shown to increase yields through less weeds, better soil moisture conservation and soil temperature regulation in organic production systems. A field trial was conducted therefore, on a Memphis silt loam soil during the 2005 growing season, with the objective of assessing mulching effects on cucumber in organic production system. The plots were arranged in a split-plot design with three mulching treatments: wood mulch, pine mulch, and control No mulch as the main plots and three cucumber varieties obtained from Cornell University, Ithaca, NY as the sub-plots. Each treatment was replicated three times. All varieties were evaluated for insect and disease resistance, and yield and fruit characteristics. Organic fertilizers (bone meal and blood meal) were applied, whereas insects and diseases were controlled with organic (Neem extraction ferti-lome) triple action. Mulching cucumber with wood chips or pine straw resulted in a total fruit yield of 35.5 and 33.0 kg/plant, respectively, compared to 26.6 kg/plant from control treatment. Among varieties both Marketmore and Poinsett with an average of 4.7 kg/harvest produced a seasonal total yield of 15 kg/plant, whereas, Control plants produced about 9% lesser yield. In this study, mulching boosted the yield of cucumber by 29% over no mulch control.

11:00 UTILIZING RICE FLOUR TO ADD VALUE TO LOW-FAT CHICKEN NUGGETS

V. Jackson, Mark Schilling*, and P.C. Coggins, Mississippi State University, Mississippi State, MS 39762

The objective of this research was to add value to chicken nuggets by utilizing rice flour in the place of wheat flour to produce a low-fat, gluten-free product that can be consumed by individuals with celiacs disease. Raw chicken breast meat was coated in either a rice or wheat dry batter prior to dipping in whole egg, or dipped in rice or wheat wet batter. The breaded nuggets were then either heat processed by baking or frying. Nuggets from each treatment were evaluated for consumer acceptability, cooked color, shear force, moisture, crude fat, and protein content. A randomized complete block design with 3 replications and 6 treatments was utilized to examine the treatment effects ($p < 0.05$) on chicken nugget quality. There was no difference ($p > 0.05$) in consumer acceptability among the six treatments, and all treatments received an average score of like slightly. Consumers were separated into six different consumer clusters with varying chicken nugget preferences using agglomerative hierarchical clustering. Baked nuggets, (wheat and rice flour), had less ($p < 0.05$) fat and more ($p < 0.05$) protein than fried nuggets. Baking the nuggets reduced the lipid percentage from 30 % to about 10 % with no decrease in acceptability. Fat content was also lower ($p < 0.05$) in nuggets coated in wet batter for both rice and wheat flour in comparison to those that were fried. This demonstrates the usability of rice flour in the formulation of low-fat chicken nuggets without diminishing quality and the added value component of usability by people with celiacs disease.

11:15 IMPROVED RICE IRRIGATION TECHNIQUE PROTECTS GROUND WATER SUPPLIES AND REDUCES NPS RUNOFF

Joni Cooks¹, Joseph H. Massey^{1*}, Cade Smith¹, Alton Johnson², Ashley Andrews¹, Jim Thomas¹, Phil Tacker³, Shawn Lancaster³, and Earl Vories^{4,1} Mississippi State University, Mississippi State, MS 39762,²Alcorn State University, Lorman, MS 39096, ³University of Arkansas, Fayetteville, AR 72701 and ⁴USDA ARS Portageville, MO 63873

Over the past two years, studies have been conducted at five rice farms located throughout the Mississippi Delta and parts of northeast Arkansas. The rice fields have been used as a way to examine typical farming techniques used by current rice farmers and introducing them to a more environmentally friendly way to supply water to their fields. Farmers were introduced to an intermittent method of watering which allowed for breaks in watering instead of their typical continuous flooding of the fields. As the watering methods being the only variable between different rice paddies, research has found no difference in rice yields when using the intermittent flooding technique. However, water use was decreased by 30% over continuous flooding. Capture of rainfall was increased by approximately 70%, reducing non-point source runoff from the fields by approximately 50%. Adoption of intermittent rice irrigation would help to protect ground water supplies being used to irrigate most farms in this region.

11:30 Divisional Poster Session

CHELATE-INDUCED SOLUBILITY OF METAL ENHANCES PHYTO-EXTRACTION OF CADMIUM-CONTAMINATED SOILS BY WHEAT (*TRITICUM AESTIVUM* L.)

Jennifer Ntoni*, Maria F. Begonia, Gregorio B. Begonia, Oscar Hundley, Tyronza Lee, and Darla Gilliard, Jackson State University, Jackson, MS 39217

Phytoextraction is gaining acceptance as a cost-effective and environmentally friendly phytoremediation strategy for reducing toxic metal levels from contaminated soils. Cognizant of the potential of this phytoremediation technique as an alternative to expensive, engineering-based remediation technologies, this study was conducted to determine whether the addition of synthetic chelates can further enhance the shoot uptake of cadmium (Cd). Seeds were planted in plastic tubes containing top soil and peat (2:1, v:v) spiked with various levels (0, 250, 500 mg Cd/kg dry soil) of cadmium nitrate. At seven weeks after emergence, aqueous solutions of EGTA and acetic acid were applied to the root zone, and plants were harvested at 0, 5, and 7 days after chelate addition. Results revealed that wheat was relatively tolerant to moderate levels of Cd as shown by non-significant differences in root and shoot biomass among treatments. Root Cd concentration increased with increasing level of soil-applied Cd. Further increases in root Cd were attributed to chelate amendments. Translocation index, which is a measure of the partitioning of the metal to the shoots, was significantly enhanced with chelate addition especially when both EDTA and acetic acid were used. Maximum translocation index occurred at 5 days after chelate addition. This observation coincided with the time when maximum amounts of Cd were bioavailable in the soil solution as shown in a corollary chelate-induced metal solubility study.

PHYTOREMEDIATION OF RDX AND TNT CONTAMINATED SOILS USING NATIVE GRASSES

Afrachanna Butler^{1, 2*}, Victor Medina², and Maria F. Begonia¹, ¹Jackson State University, Jackson, MS 39217 and ²US Army Engineer Research and Development Center, Vicksburg, MS, 39180

Firing range contamination and sustainability are major issues for the United States military. Munition and firing range test sites operate throughout the U.S. and beyond covering acres of land and water. Munitions fired, dropped, and disposed of on those ranges have become harmful to its environment. The chemical constituents and by-products of those munitions pose a toxic threat to public health and natural ecosystems as they move through its natural surroundings. The commonly used explosives, hexahydro-1,3,5-trinitro-1,3,5-triazine (RDX) and trinitrotoluene (TNT) are often found in soil and groundwater from military firing ranges. Because continued training with live ammunition is still needed, the cleanup of these contaminants

may prove to be expensive. Also, the application of environmental maintenance designed to support other uses could interfere with routine training and testing operations. To avoid high cost and site interferences, one alternative being considered to manage military firing ranges is the use of native grasses via phytoremediation. Phytoremediation uses living plants for in situ and ex situ remediation of contaminated soil, sludges, sediments and ground water, and is a promising biotechnology for cleanup of contaminated sites. It has been indicated in other studies that phytoremediation is effective which concludes that it could be a useful approach at active firing ranges. Our research evaluates the biological removal and physical stabilization of RDX and TNT contaminated soils with the addition of *Cyperus esculentus* (Yellow nutsedge). Lysimeters were designed to assimilate natural rainfall to allow for the collection of leachate flowing through the soil as well as runoff from the soil surface. The anticipated result of this research is to stabilize the contaminants and reduce the amount of RDX and TNT in the soil surface runoff and leachate.

SEED TREATMENTS VS. IN-FURROW TREATMENTS FOR NEMATODE, INSECT, AND FUNGI CONTROL

Julie Anna Blessitt* and Gabe L. Sciumbato, Delta Research and Extension Center, Mississippi State University, Stoneville, MS 38776

Insecticide, nematicide, and fungicide seed treatments were compared to the performance of insecticide, nematicide, and fungicide applied in-furrow. Eight trials were planted in DP 444 BG/RR at 4 seed/row ft on multiple dates and in multiple locations. Seedling survival two and four weeks after planting; thrip counts at three and six weeks after planting; reniform nematode populations at planting, midseason, and at harvest; and yield were collected for each trial. Reproductive factors for reniform populations were calculated for comparison. Results will show if seed treatments perform comparative to in-furrow applications of insecticides, nematicides, and fungicides. Few differences were seen in individual trials on any data collected. There were also few significant differences across all trials and locations.

THE DEVELOPMENT OF A GENOMIC LIBRARY OF *PINUS TAEDA*

Annita Avery^{1*}, Daniel Peterson², Zenaida V. Magbanua², Dipaloke Mukherjee², and Supaphan Thummasuwan^{2,1}, Tougaloo College, Tougaloo, MS 39174 and ²Mississippi State University, Mississippi State, MS 39762

Loblolly pines (*Pinus taeda*) have other common names including old-field pine, bull pine, and rosemary pine. Loblolly pine is important to the economics of the southeast United States because it makes up half of the total wood production and about 80% of pine seed production for the United States. Loblolly pine is also a source of renewable fiber, lumber, biofuel, paper, shade, etc. Loblolly pines grow in wet, low places, and are cold tolerant.

The present study of loblolly Pine is in its infancy stage; however, a DNA library was developed to study structure, specific trait, genes, pharmaceutical, and economic value and to find specific gene functions for genetic engineering. We isolated DNA from loblolly pine, and dA re-sidue was added to each fragmented 5' end. pGEM plasmid vector was linearized and a single dT re-sidue was added to each 3' end. Ampicillin was the plasmid's antibiotic resistance gene and lacZ was the reporter gene. *E. coli* was transformed with the resulting Loblolly pine DNA pieces. The colonies were picked using a Q-pix2 picking robot. Future steps are to sequence the clones and analyze the sequence for genes. This project supported by the Mississippi Functional Genomics Network.

MYROTHECIUM VERRUCARIA'S EFFECTIVE ABILITY AS A BIOHERBICAL AGENT AGAINST MORNINGGLORY (*IPOMOEA*) SPECIES

T. McCallister^{1*}, R.E. Hoagland², C.D. Boyette², M.A. Weaver², and Rachel Beecham¹, ¹Mississippi Valley State University, Itta Bena, MS 38941 and ²USDA-ARS, SWSRU, Stoneville, 39776

(MV) is an experimental bioherbicide which has been studied on numerous weeds ranging from kudzu to morningglories. Along with the original strand of MV, an organosilicon surfactant (Silwet L-77) and an invert emulsion were added to the original strand. Selections of morningglories were chosen for the experiment. The species were grown to the first-second leaf stage. At that growth period MV spores were prepared in a mixture of Silwet L-77 or an invert emulsion. The species were sprayed with MV, invert emulsion, or a MV plus an invert emulsion mix. After the application of the fungal mixtures the species were placed in the dew chamber for 15-18 hours and later moved to the greenhouse. The damage of MV was assessed and further tests were conducted to determine more biological reactions to the fungus. Chlorophyll analysis as well as biomass reductions were also conducted. Ivy leaf, moonvine, and palm-leaf morningglories were quite tolerant to the MV, while pitted, multi-color, moonflower, and cypressvine showed extreme injury. MV alone may be tolerant by several species but coupled with an invert emulsion can increase its potency. The invert emulsion plus MV increased the damage to moonvine over just MV. The results of the greenhouse study shows that there are great differences between the bioherbicidal ability to suppress the weeds but used with an invert emulsion may provide to be an effective agent against the bothersome weeds, morningglories (*Ipomoea*) species in some cases.

THE EFFECT OF THE HERBICIDE GLUFOSINATE ON SOIL BIOLOGICAL ACTIVITY

Kamalesh Thanappan^{1*}, Robert M. Zablotowicz², Krishna N. Reddy², and Joseph Wahome¹, ¹Mississippi Valley State University, Itta Bena, Mississippi 38941 and ²USDA-ARS, Southern Weed Science Research Unit, Stoneville, Mississippi 38776

Glufosinate [2-amino-4-(hydroxymethylphosphinyl) butanoic acid] is a derivative of a natural product used as a non-selective herbicide. Transgenic crops resistant to glufosinate have been released and the use of this compound is expected to increase dramatically, thus a need to understand the environmental effects of this compound. The studies were conducted to assess glufosinate effects on soil biological processes as a component of evaluating risks associated with use of this herbicide. The effects of glufosinate on soil respiration, alkaline phosphatase activity and fluorescein diacetate (FDA) hydrolytic (esterase and lipase) activity were assessed in conventional tilled (CT) and no-tilled (NT) Dundee silt loam soil. Soil was treated with glufosinate at 0, 0.83, 1.66 and 3.22 kg ha⁻¹ rates or non-treated. In the NT soil all glufosinate rates increased soil respiratory activity (~ 18%) during 7-day incubation, however glufosinate had no effect in CT soil. All rates of glufosinate reduced FDA hydrolysis in NT soil for only 24 h, while in CT soil FDA activity was significantly reduced for 96 h. Soil phosphatase activity was increased by the two lower rates of glufosinate. Minor detrimental effects of glufosinate on soil biological activity were observed and certain processes such as phosphatase and respiration were actually increased by glufosinate.

GENERATION OF LOBLOLLY PINE DNA LIBRARY

LaShonda Robertson* and Daniel Peterson, Tougaloo College, Tougaloo, MS 39174 and Mississippi State University, Mississippi State, MS 39762

Loblolly pine is classified in several ways. It is in the plant kingdom and in the division of Coniferophyta, the class of Pinopsida and family of Pinace. It is one of the pines native to the southeastern United States. Loblollies are disease resistant, drought resistant, and cold tolerant. Loblolly pines are sometimes called Oldfield pine because they have a rapid growth rate; Bull pine because it is often large in size; and Rosemary pine because it has a distinctive fragrance. Loblolly pine is the model gymnosperm because there is more genetic information for Loblolly pine than for any other gymnosperm. In order to investigate the genomic structure of Loblolly pine DNA we worked on creating a Loblolly pine DNA Library. DNA was isolated from pine needles and sheared to produce 1-2 kb residues. The size of the sheared DNA was checked using agarose gels. The DNA pieces were then inserted into pGEM T-Easy vector that included an ampicillin resistant gene and a LacZ reporter gene. The vectors were transformed into E. Coli and colonies that exhibited a white color, indicating these colonies contained the vector. The colonies were picked using a Q-pix picking robot. 384-well plates containing enriched broth were inoculated with the good colonies. DNA was isolated from these pine clones. The next steps will be to sequence the clones and analyze the sequence for genes. The program was supported by Mississippi Functional Genome Network

DIAGNOSIS, TREATMENT AND PREVENTION OF DISEASE ON FIRST YEAR BLACKBERRY, RUBUS SPP

Edward Heard* and Frank B. Matta, Mississippi State University, Mississippi State, MS 39762

The purpose is to provide local growers with effective methods of disease management for establishment of blackberry crops. Objectives include identification of disease causing organisms, management recommended by Mississippi Extension Service, and preventative methods to reduce incidence of common diseases. The blackberry research plot is located on MAFES North Farm, at Mississippi State. Symptoms and sign of foliar and floral pathogens were identified using a microscope and a moisture chamber at Mississippi State Plant Pathology Lab. Diseases detected are as follows: inter-veinal leaf blotch, *Mycosphaerella confusa*; floral gray mold and dieback, *Alternaria sp.*; and crown gall, *Agrobacterium tumefaciens*. Treatment thresholds were based on stand reduction. Alternated fungicide applications of pyraclostrobin + boscalid (FRAC group 11+7), captan (multi-site) and azoxystrobin (group 11) in late summer and early autumn managed foliar and floral diseases occurring after heavy rains. Preventative pre-plant root dip in *Agrobacterium radiobacter* suspension is recommended to manage crown gall. Suppressive soil disease *Phytophthora* root rot is prevented by minimal irrigation, allowing soil to dry frequently. Limited use of phosphorus fertilizer decreases late season flowers that allow an entry point for pathogens into the plant. Integrated disease management provides effective methods for blackberry crop establishment in Mississippi.

INFLUENCE OF CHELATES ON THE SOLUBILITY AND BIOACCUMULATION OF LEAD BY COFFEEWEED (*SESBANIA EXALTATA* RAF.)

Gloria S. Miller*, Maria F. Begonia, Gregorio B. Begonia, Diahanna Hackett, Jennifer Wallace, and Crystal Tyson, Jackson State University, Jackson, MS 39217

Phytoextraction is gaining popularity as a cost-effective and environmentally benign phytoremediation strategy for reducing toxic metal levels from contaminated soils. This study was conducted to further evaluate the suitability of *Sesbania exaltata* as one of the potential crop rotation species for phytoextraction. Specifically, the objective of this experiment was to determine whether the addition of ethylenediaminetetraacetic acid (EDTA) alone or in combination with acetic acid can further enhance the bioaccumulation of lead (Pb). Seeds were planted in plastic tubes containing top soil and peat (2:1, v:v) spiked with various levels (0, 1000, 2000 mg Pb/kg dry soil) of lead nitrate. At seven weeks after emergence, aqueous solutions of EDTA and acetic acid were applied to the root zone, and plants were harvested at 0, 5, and 7 days after chelate addition. Results revealed that coffee weed was relatively tolerant to moderate levels of Pb as shown by non-significant differences in root and shoot biomass among treatments. Root Pb concentration increased with increasing level of soil-applied Pb. Further

increases in root Pb were attributed to chelate amendments. Translocation index, which is a measure of the partitioning of the metal to the shoots, was significantly enhanced with chelate addition especially when both EDTA and acetic acid were used. Maximum translocation index occurred at 5 days after chelate addition. This observation coincided with the time when maximum amounts of Pb were bioavailable in the soil solution as shown in a corollary chelate-induced metal solubility study.

FRIDAY AFTERNOON

Exhibit Hall B

1:15 PESTICIDE RUNOFF FROM WARM-SEASON TURFGRASS SYSTEMS

Peter Ampim¹, Joseph H. Massey^{1*}, Barry Stewart¹, Cade Smith¹, Alton Johnson², Ashley Andrews¹, Kevin Armbrust¹, Rick Maiers¹, and Joni Cooks¹, ¹Mississippi State University, Mississippi State, MS 39762 and ²Alcorn State University, Lorman, MS 39096

Anticipated rising pesticide use associated with increasing turf area across the nation may impair water quality in urban areas. Improving the accuracy of computer models currently used to predict turf pesticide runoff may enhance urban water systems protection. This study is part of a larger national research effort designed to improve the understanding and modeling of turf pesticide runoff. The specific objectives of the project are to investigate the effects of warm-season turfgrass species, mowing height and plot size on pesticide runoff. The turfgrass species include bermudagrass (*Cynodon dactylon* [L.] Pers. x *Cynodon transvalensis* Burtt-Davy) and zoysgrass (*Zoysia japonica* Steud.). The turfgrass species were maintained as either golf course fairways or residential lawns. The runoff plots were arranged in a split-plot design and were sloped at 3 % with minimal cross slope. Following a standardized field protocol, 2, 4-D herbicide, flutolanil fungicide, and chlorpyrifos insecticide were co-applied at 1.12 kg ai/ha, 2.24 kg ai/ha and 2.24 kg ai/ha, respectively. A conservative tracer, KBr, was also applied at 10 kg/ha immediately before initiation of simulated rainfall. Simulated rainfall was applied to the plots at a rate of 38.1 mm/h for 90 min., 24 h after pesticide application. Runoff water from the plots was collected at approximately five-minute intervals. Collected runoff water and application monitor samples were analyzed by reverse phase High Performance Liquid Chromatography (HPLC) using UV-Vis detection. Maximum observed concentrations (ppb), total masses (g), and percentages of the applied chemicals observed in runoff water will be presented.

1:30 PHARMACEUTICAL SORPTION BY CORAL MUCUS AS A BIO-INDICATOR OF WASTE-WATER CONTAMINATION

Ashley Andrews*, Joseph H. Massey, Kevin Armbrust, and Cade

Smith, Mississippi State University, Mississippi State, MS 39762

In many coastal regions of the world, surface waters are being overloaded with nutrients. There is much controversy between different groups regarding the origin of these nutrients as with the hypoxia zone in the Gulf of Mexico. Researchers have found that coral mucus contains proteins and carbohydrates and is exuded at a rate of ~ 1.7 L/ m² per day. Because of its physicochemical properties, coral mucus may sorbed organic contaminants found only in wastewater effluents. This project will analyze coral mucus for human-related drugs previously detected in wastewater. Analytical methods for drugs such as selective serotonin reuptake inhibitors (SRRIs) will be developed for coral mucus collected off the coast of Florida. If this proves successful, coral mucus has the potential of being used as a biomarker for wastewater effluent.

1:45 BLUEBERRY BIOMASS AND FRUIT QUALITY, AND GROUND WATER QUALITY IN A HEAVY SOIL AS AFFECTED BY ANIMAL AND FOREST WASTE

Girish K. Panicker^{1*}, Ahmad H. Al-Humadi¹, Cedric A. Sims¹, James Spiers², Juan L. Silva³, and Frank B. Matta³, ¹Alcorn State University, Alcorn State, MS 39096, ²USDA Small Fruit Research Station, Poplarville, MS 39470, and ³Mississippi State University, Mississippi State, MS 39762

Consumers are more concerned with health issues than ever before and numerous medical studies point to horticultural crops as a critical factor of healthy diet. While a lot of research and extension activities have been carried out on sustainable production systems in agronomic crops, there have been very few studies on horticultural crops. Rabbiteye blueberry (*Vaccinium ashei* Reade var. Tifblue) was grown on Memphis Silt Loam soil (Typic Hapludalph, silty, mixed, thermic). Two treatments of organic manures (worm castings – W, cow manure – C) were applied in basins around each plant. Control treatment received regular inorganic fertilizer. All treatments received pine bark and pine needle uniformly. No chemicals were applied to control pests, diseases and weeds. Leaf area index (LAI), percent canopy cover, canopy width and height, stem diameter, and yield were significantly higher in organic plants treated with worm castings. There was no significant difference in size, diameter, and degree brix of the fruit. No pathogenic organism from organic manures was found in fruits. Concentrations of nitrate-N and P were higher in the surface soil with organic manures, but there was no trend in N or P enrichment in lower layers of the soil. The leaching of N and P into subsurface layers from inorganic fertilizer was highly significant. The results show that blueberry can be grown successfully on heavy soils with forest waste that can increase soil acidity and worm castings are excellent organic manure for this crop.

2:00 ANALYSIS AT THE MICROSCOPIC LEVEL OF FUNGAL SPORE INOCULA APPLIED TO STRAWBERRY LEAVES FOR FUNGICIDE SCREENING EXPERIMENTS

Maritza Abril^{1*}, Kenneth J. Curry¹, and Barbara J. Smith²,¹University of Southern Mississippi, Hattiesburg, MS 39406 and ²USDA-ARS, Small Fruit Research Station, Poplarville, MS 39470

The artificial inoculation of plants with fungal spores to test fungicide resistance is almost always reported with an inoculum concentration and general mechanism of application. A measure of the inoculum which actually arrives on the test plant is rarely assessed or reported. This opens the possibility of evaluating a fungicide as successfully protective when in fact the level of inoculum actually on the plant was insufficient for macroscopic manifestation of disease. The usual safeguard against this type of misinterpretation is the evaluation of an appropriate control. We have explored qualitatively and quantitatively at the microscopic level the disposition of fungal spore inocula (*Colletotrichum acutatum*) applied to strawberry leaves. Spraying both surfaces of an experimental leaf to the point of runoff with various concentrations of spore inocula invariably leads to a lower concentration of spores than predicted on the adaxial surface of the leaf, and the abaxial surface of the leaf retains almost no spores! Thus the inoculum is considerably less than the experimenter believed it to be. A careful consideration of accuracy and precision in preparing spore inocula and various sources of error inherent in the inoculation process should prove beneficial to anyone undertaking fungicide screening experiments.

2:15 COLLECTING ISOLATES OF *PHYTOPHTHORA CINNAMOMI* FOR SCREENING BLUEBERRY CULTIVARS RESISTANT TO PHYTOPHTHORA ROOT ROT DISEASE

Melinda Miller-Butler^{*}, Ann Curry¹, Kenneth J. Curry¹, and Barbara J. Smith²,¹University of Southern Mississippi, Hattiesburg, MS 39406 and ²USDA-ARS Small Fruit Research Station, Poplarville, MS 39470

Phytophthora cinnamomi causes a severe root rot on many woody plant species including blueberry. We have isolated strains of *Phytophthora cinnamomi* from rabbiteye blueberry (*Vaccinium ashei*) cv. 'Tifblue' to use to identify phenotypes of this root rot fungus that express different levels of pathogenicity. (Milholland [1975] reported that *V. ashei* cultivars are generally more resistant than *V. corymbosum* cultivars.) Infected blueberry roots and soil from an infested field were placed on *Phytophthora* selective culture media containing appropriate antibiotics to inhibit fungi and bacteria. Isolations were also attempted from (1) plant bait traps using root and soil with pieces of leaf tissue from susceptible plants: blueberry, avocado, and rhododendron floated in water, and from (2) roots embedded in apple or pear fruit. Our ultimate goal is use the collected *Phytophthora*

phenotypes to develop plant tissue culture and greenhouse screening techniques to identify blueberry germplasm resistant or at least tolerant to *Phytophthora* root rot that will lead to root rot resistant cultivars which offer a means of controlling this disease in commercial blueberry fields.

2:30 Break

2:45 INFLUENCE OF ZINC COATING PLUG TRAYS ON THE PERFORMANCE OF MARIGOLD *TAGETES PATULA*, ZINNIA *ZINNIA SP* AND VINCA *CATHARANTHUS ROSEUS*

Pam Reid^{*}, Frank B. Matta, and David H. Tatum, Mississippi State University, Mississippi State, MS 39762

The objective of this research was to investigate how zinc chloride influenced growth, levels of IAA, and root cell division of three bedding plant species. Plug trays used for growing Marigold *Tagetes patula*, Zinnia *Zinnia sp* and Vinca *Catharanthus roseus* were treated with Zinc Chloride at 0, 7, 14, 21, and 28 percent using white latex paint as the source of zinc. The plants were grown in a greenhouse at 85° F/65° F (day/night temperature) for 12 weeks. Plants were then harvested and plant and root fresh and dry weights were taken. To determine if indole-3-acetic-acid (IAA) was activated by zinc, tryptophan levels were measured. In addition, root cross-sections were examined microscopically to determine cell division. In this paper, vegetative growth (plant and root), tryptophan (IAA precursor), and the amount of root cell division as influenced by zinc chloride are reported.

3:00 INVESTIGATIONS INTO ITALIAN RYEGRASS (*LOLIUM MULTIFORUM*) RESISTANCE TO GLYPHOSATE

James Blessitt^{1*}, Daniel H. Poston¹, Tom W. Eubank¹, and Clifford H. Koger²,¹Mississippi State University, Mississippi State, MS 39762,²CGPRU USDA-ARS, Stoneville, MS 39776

Glyphosate, most commonly sold under the trade name Roundup, is a non-selective herbicide that is widely used for weed removal prior to planting and also for postemergence weed control in glyphosate-tolerant crops. At several locations in the Mississippi delta in 2005, glyphosate did not control Italian ryegrass prior to planting. At all locations, glyphosate was applied at a commonly used rate that normally controls ryegrass and acceptable control was not achieved. Followup applications were made at all locations usually at a rate 2 times the normally applied dose. Control was still not achieved. Field and greenhouse studies were conducted to investigate the susceptibility of 3 Italian ryegrass populations to glyphosate. Seed were collected in the spring of 2005 from 2 field locations where glyphosate did not provide control. Seed were also collected from a 3rd location that had very little exposure to herbicides and was known to be susceptible to glyphosate. This population was used as a susceptible control. Glyphosate was applied at 0, 0.09, 0.19,

0.38, 0.75, 1.5, 3, and 6 lbs ae/acre. Plants grown from seed collected in fields where glyphosate did not control ryegrass appear to be approximately 3-fold more tolerant to glyphosate than known susceptible plants based on GR50 values derived from dose response curves.

3:15 INVESTIGATIONS ON THE USE OF STEROL INHIBITOR FUNGICIDES AS SEED TREATMENTS TO CONTROL SEEDLING DISEASES AND ASIAN SOYBEAN RUST

Bonnie C. Wells* and Gabe L. Sciumbato, MAFES/DREC, Stoneville, MS 38776

Soybeans are commonly treated with fungicides to control seedling diseases, such as those caused by *Pythium* sp. and *Rhizoctonia solani*. A new threat to the state's soybean crop is Asian soybean rust (ASR), which causes premature defoliation and can reduce yields by 80 percent. Sterol inhibiting fungicides (SI-fungicides) are effective in controlling ASR when applied at the initial stages of flowering. However, foliar fungicides are expensive and ASR may attack prior to flowering. Research was conducted to see if the SI-fungicides are phytotoxic to soybeans and determine their activity against seedling diseases and ASR. Fungicide treatments consisted of two standard seed treatments and eight SI-fungicides used for ASR control. Experimental design was a randomized complete block with four replications. Stand counts were recorded two and four weeks after planting. Yield data were collected. Results show no significant increases in seedling survival or yield for the standard seed treatments azoxystrobin and pyraclostrobin, indicating low disease pressure. All the SI-fungicides, except flutriafol and tebuconazole, significantly decreased seedling survival and yield. Propiconazole proved phytotoxic with an 89 percent average yield loss. No results were obtained for ASR seed treatment controls due to the absence of the disease. Research is in progress to evaluate different rates of flutriafol and tebuconazole to determine how long they are effective in controlling disease when used as a seed treatment.

3:30 SWEETPOTATO PRODUCTION AND UTILIZATION IN MISSISSIPPI

Falisha McDonald*, Patrick Igbokwe, Liang Huam, Juliet Huam, Franklin Chukwuma, Larry Russell, Arkon Burks, and Veronica Igbokwe, Alcorn State University, Alcorn State, MS 39096

Field studies were used in 2001 and 2002 growing seasons to investigate the effect of conventional (intensive-synthetic input) monocropping, transitional (reduced-synthetic input) and organic (non-synthetic input) multiple cropping systems on Beauregard sweetpotato (*Ipomoea batatas*) survival, yield, quality, and soil properties. Sweetpotato potential for becoming raw material for the development of value-added products was also investigated. These studies were conducted on a northern Mississippi Dexter silt loam soil. A randomized complete block (RCB) experiment design, with four replications

of each cropping system (treatment) was used. Data analysis was by the analysis of variance, while means were separated by the Least significance difference (LSD) test. The effect of cropping systems on sweetpotato survival was significant in 2002. Root yield was significant for No.1 and No.2 sweetpotato grades in 2001, but only for No.1 in 2002. Root mineral compositions were significant for phosphorus, potassium, calcium, and magnesium 2001, whereas, root nitrogen, dry matter, protein, crude fiber, fat and ash contents were significant in 2002. In general, soil properties appeared to be improved after the second year of investigation. Taste test results suggest that the value-added products were different in appearance, flavor and texture.

3:45 Divisional Business Meeting

CELLULAR, MOLECULAR AND DEVELOPMENTAL BIOLOGY

Chair: Stephen I.N. Ekunwe, Jackson State University

Vice-chair: Lidija Halda-Alija, University of Mississippi

THURSDAY MORNING

Exhibit Hall A2

8:30 ETHANOL TOXICITY IN JAPANESE MEDAKA DEVELOPMENT

Xueqing Wang¹, Asok Dasmahapatra¹, and John Boyle^{2*}, ¹University of Mississippi, University, MS 38677 and ²Mississippi State University, Mississippi State, MS 39762

Ethanol is well-known as a developmental toxicant; however, the molecular mechanism(s) of this toxicity remains unclear. We have used Japanese medaka (*Oryzias latipes*) development as a model system to determine associations between ethanol metabolism and ethanol-mediated developmental toxicity. Like all other vertebrates, alcohol dehydrogenase (ADH) initiates alcohol metabolism in medaka. Previously, we cloned two full-length cDNAs encoding two ADH isozymes from the liver tissue of adult medaka. Phylogenetic analysis and computer modeling of the deduced amino acid sequence data identified one of them as an orthologue of mammalian Adh5 and the other as an orthologue of zebrafish Adh8. To study the effect of ethanol on regulation of ADH5 and ADH8 protein and mRNA expression during embryonic development of medaka, fertilized eggs were exposed to waterborne ethanol concentrations of 100 and 400 mM during the first two days of development and sacrificed in ovo at 2, 4, and 6 days post fertilization (dpf). Expression of Adh5 and Adh8 mRNAs were separately

determined by semi-quantitative and quantitative real-time RT-PCR. The results indicate that both Adh5 and Adh8 mRNA expression were unaltered in embryos treated with ethanol. The results indicate that ethanol may modulate embryonic development in medaka in a different pathway without affecting ADH locus.

8:45 ANTIBODY TITERS IN FOUR DIFFERENT POPULATIONS OF ATLANTIC BOTTLENOSE DOLPHINS' (*Tursiops truncatus*) SERUM SAMPLES TO *ERYSIPELOTHRIX RHUSIOPATHIAE*

Amaziah Coleman* and Rhonda Patterson, University of Southern Mississippi, Hattiesburg, MS 39406 and Western Kentucky University, Bowling Green, KY 42101

Erysipelothrix rhusiopathiae isolated from a septicemic Pacific bottlenose dolphin (*Tursiops gilli*) provided by the Navy Marine Mammal program was used to perform an enzyme linked immunosorbent assay (ELISA). The ELISA was developed using Frasc (Frasc and Chapman, 1972) extracted antigen of the isolate as the ELISA capture antigen. An indicator system was developed consisting of biotin labeled rabbit anti-*Tursiops truncatus* IgG, alkaline phosphatase labeled avidin, and *para*-nitrophenyl phosphate as the chromogenic substrate. The ELISA was used to evaluate anti-*E. rhusiopathiae* titers in a series of serum samples from four populations of Atlantic bottlenose dolphins (*Tursiops truncatus*). The four dolphin populations indicated consisted of free ranging dolphins from South Carolina living among heavy human traffic, free ranging dolphins from Florida living among low human traffic, captive dolphins from California living among heavy human traffic, and captive dolphins from the Bahamas living among low human traffic. Results indicated that, with the exception of one population, the majority of individuals in each population expressed a titer of 1/1,000. Results further showed that wild dolphins and dolphins living among heavy human traffic had the greatest number of individual dolphins expressing higher titers, while captive dolphins and dolphins living among low human traffic had the greatest number of individual dolphins expressing lower titers.

9:00 THE IMPORTANCE OF C-TERMINUS AXIN

Cherry Lockett¹*, Jie Zheng², and Youming Shao^{2,1} Alcorn State University, Lorman, MS 39096 and ²St. Jude Children's Research Hospital, Memphis, TN 38105

Axin serves as a scaffold protein that binds directly to many proteins involved in the Wnt signaling pathway. It promotes the phosphorylation of β catenin by driving the formation of a complex with APC and GSK3. As such, axin is considered a negative effector of the pathway and functions as a tumor suppressor. However, when the axin-APC-GSK3 mediated degradation of β catenin is inhibited by Wnt signals that activate dishevelled (Dvl) or mutation of components of the Wnt signaling pathway, the concentration of β catenin in the cell increases, leading to an increased cell proliferation and possibly

cancer. Axin contains a Dix domain at its C-terminus, and dishevelled protein contains a Dix domain at its N-terminus. The Dix domains of axin and dishevelled can form a heterodimer that leads to a decrease in phosphorylation of β catenin (Jin 2005). Therefore, the aim of the study is to produce the C-terminus of the axin protein to determine its structure for further observations of the interaction of the Dix domains of axin and dishevelled. A sample that had enough protein for nuclear magnetic resonance, NMR, studies was produced; however, it was not fully refolded and contained impurities. Therefore, it could not be used for the determination of the axin structure. Once the axin NMR structure is determined, it could be used to design a small molecule that will bind and inhibit axin C-terminus Dix domain from forming a heterodimer with dishevelled N-terminus Dix domain. This will hopefully aid in the development of drugs for cancer therapies.

9:15 FLUORESCENCE STUDIES ON THE INTERACTIONS OF TAT-PTD WITH LIPID BILAYER IN VITRO

Venkataswarup Tiriveedhi* and Peter Butko, University of Southern Mississippi, Hattiesburg, MS 39406

Many researchers have shown the transfer of the positively charged protein-transduction domains [PTDs] through the living cells in a rapid and an apparently energy-independent manner by as yet unknown mechanism. Several authors have hypothesized an inverted micelle formation and/or adsorptive endocytosis as possible but not yet proven models to explain the transfer through the lipid bilayer. We used fluorescence spectroscopy to study the interaction between PTD of the HIV-1 TAT protein (TAT-PTD; residues 47–60 of TAT, fluorescently labeled with tryptophan) and the lipid bilayer in the presence of various fluorescence membrane probes. The TAT-PTD tryptophan exhibited a decrease in fluorescence intensity upon interaction of TAT-PTD with negatively charged lipid bilayers. The decrease was proportional with the amount of negative charge in the membrane. When TAT-PTD interacted with small unilamellar vesicles [SUVs] labeled with 1-(4-trimethylammoniumphenyl)-6-phenyl-1,3,5-hexatriene [TMA-DPH], fluorescence resonance energy transfer [FRET] from tryptophan to TMA-DPH with an approximate efficiency of 10% was observed. No energy transfer was detected when the SUVs were labeled with 1,6-diphenyl-1,3,5-hexatriene (DPH), which partitions to the core of the lipid bilayer. No change in fluorescence anisotropy of either TMA-DPH or DPH was observed upon the interaction with TAT-PTD, indicating no significant disruption or perturbation of the lipid bilayer by the peptide. TAT-PTD did not cause dissipation of membrane potential (165 mV, negative inside) in negatively charged large unilamellar vesicles [LUVs]. The data suggest that TAT-PTD associates electrostatically with the bilayer surface and does not significantly perturb, and penetrate into, the bilayer core.

9:30 DETERMINATION OF INTRAMOLECULAR DISTANCES IN THE *BACILLUS THURINGIENSIS* TOXIN Cyt1A BY FRET AND MOLECULAR DYNAMICS SIMULATION

Kerrick Nevels^{1*}, Xiaochuan Li¹, Dexuan Xie², and Peter Butko¹, ¹University of Southern Mississippi, Hattiesburg, MS 39406 and ²University of Wisconsin, Milwaukee, WI 53211

Cyt1A is an insecticidal cytolytic toxin produced by the spore-forming bacterium *Bacillus thuringiensis* var. *israelensis*. Knowledge of molecular details of the toxin's conformation changes in the presence of lipid membranes is important for elucidating the toxin's mode of action. Cyt1A contains a single cysteine residue. Labeling that residue with the fluorescence probe 5-(((2-iodoacetyl)amino)ethyl)amino)naphthalene-1-sulfonic acid (1,5-IAEDANS) allowed for precise determination of the distance between the cysteine and a pair of two neighboring tryptophans by fluorescence resonance energy transfer (FRET). The distance was found to be 2.5 +/- 0.3 nm in Cyt1A in water. The same distance was also determined in silico – in the molecular dynamics model of Cyt1A. The agreement between the two numbers gives credence to our computer model of Cyt1A and at the same time confirms the predicted structure of Cyt1A in water. The magnitudes of FRET and the 1,5-IAEDANS fluorescence varied with increasing concentration of lipid (small unilamellar vesicles of egg phosphatidylcholine). The response was nonmonotonous: an initial increase was followed by a decrease at higher lipid concentrations. Interpretation of these results will be aided by quenching studies and measurements of FRET between 1,5-IAEDANS and membrane probes. Hypothetical lipid-induced conformation changes that are consistent with the experimental and simulation data will be presented.

9:45 CONSTRUCTION OF GENES THAT EXPRESS HISTONE-H1.S-PEPTIDE FUSION PROTEINS

Jason Adams^{1*}, Sonja Clemmons², and Susan E. Wellman², ¹Tougaloo College, Tougaloo, MS 39174 and ²University of Mississippi Medical Center, Jackson, MS 39216

Fusion proteins are proteins created through genetic engineering from two or more proteins. The fusion proteins that we constructed were made from DNA sequences of histone-H1, which codes for the H1 protein, and the S-tag, which codes for the S-peptide. Our overall goal is to understand how H1 histones bind to DNA and how they condense chromatin. H1 proteins are linker proteins involved in the packaging of eukaryotic chromatin. The S-peptide consists of 15 amino acids. To determine if a fusion protein was successfully constructed, the FRETWorks S-Tag Assay was performed on the non-purified H1 protein extract. When adding S-protein to the S-peptide, ribonuclease becomes active. The ribonuclease then cuts up the added substrate of poly C RNA. The released ribonucleotides absorb ultraviolet light and causes an increase in absorption which confirmed the presence of the fusion S-tag-H1 histone. This project was supported by the

Mississippi Functional Genomic Network.

10:00 Break

10:15 LOCALIZATION OF KIN3 AND CHARACTERIZATION OF THE EFFECTS OF KIN3 DELETION IN *SACCHAROMYCES CEREVISIAE*

John Gibson, Michael P. Jackson, and Sarah Lea McGuire*, Millsaps College, Jackson, MS 39210

The Kin3 gene of *Saccharomyces cerevisiae* encodes a non-essential serine-threonine protein kinase which has not been extensively studied. Kin3 is the homolog of the *Aspergillus nidulans* nimA gene, which is essential for mitotic entry downstream of the Cdc2 master mitotic regulator. It has been shown to localize to both chromatin and spindle pole bodies in *A. nidulans* and the fission yeast, *Schizosaccharomyces pombe*. As part of efforts to characterize the Kin3 gene and its effects on cellular processes, we are characterizing the phenotype of a Kin3 deletion strain. Studies to date indicate that growth kinetics of the Kin3 deletion strain are similar to those of wild-type cells; both strains reach log phase growth and stationary phase growth with similar kinetics. However, the average number of cells at both log phase and stationary phase for Kin3 deletion cells is 50% less than that of wild-type cells. This suggests that the Kin3 deletion cells saturate at a lower cell density. In addition, the budding index of cells at log phase averages 62% budded in Kin3 deletion cells, compared to 52% budded in wild-type cells. This suggests that a higher percentage of Kin3 deletion cells have committed to completing cell division than wild type cells; they thus traverse the cell cycle with different kinetics. We are in the process of characterizing the effects of various drugs on the cell cycle of Kin3 deletion cells compared to wild-type cells. In addition, we are generating a YFP::kin3 strain for localization of Kin3 in *Saccharomyces cerevisiae*. This project was supported by NIH Grant Number RR 016476 from the MFGN INBRE Program of the National Center for Research Resources.

10:30 GENOME-WIDE INTERACTIONS AND EFFECTS OF THE [URE3] PRION OF *SACCHAROMYCES CEREVISIAE*

Sidney Taylor^{1*}, Piro Cipi², Amy Newton¹, and Ross Whitwam¹, ¹Mississippi University for Women, Columbus, MS 39701 and ²University of Southern Mississippi, Hattiesburg, 39406

The [URE3] prion of *Saccharomyces cerevisiae* is a misfolded form of the Ure2 protein that forms amyloid fibers and can be transmitted to mating partners and offspring. It serves as a useful model for mammalian prions and amyloidoses. We are investigating two aspects of [URE3] behavior. First, we are using microarray analysis to compare the gene expression profile of prion-containing [URE3] strains to prion-free [ure-o] strains with the goal of identifying differentially-regulated genes which might cause detectable phenotype changes in the two states.

Currently, the only screen for the presence of the [URE3] prion is involves lack of growth when the prion is absent. Second, we are performing a screen of a gene-deletion library of *S. cerevisiae* looking for individual gene deletions which either cure the [URE3] state or facilitate amyloid formation with the goal of identifying genes which either help or hinder [URE3]'s ability to misfold into amyloids. Progress towards these goals will be discussed.

10:45 EXPRESSION ANALYSIS OF THE MOLD-SPECIFIC M46 GENE IN THE DIMORPHIC PATHOGENIC FUNGUS HISTOPLASMA CAPSULATUM

Davida Crossley* and Glen Shearer, University of Southern Mississippi, Hattiesburg, MS 39406

Histoplasma capsulatum, is the causative agent for the respiratory disease histoplasmosis which afflicts an estimated 500,000 Americans each year. The dimorphic fungus grows as a multicellular mold in the soil. Once the soil is disturbed, spores are dispersed and inhaled into the lungs. In the lungs the fungus converts to the unicellular yeast morphotype. This mold-to-yeast conversion, which is a requirement for pathogenesis, can also be accomplished in the lab by switching incubation temperature from 25C to 37C. 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. Recent data have shown that M46 is expressed in the mold morphotype of G186AS and Downs strains, but is transcriptionally silent in G184AS and G217B strains. The reason for this lack of transcription in the latter strains could be due to a promoter lesion, or a missing trans-regulating factor. Currently we are investigating the M46 promoter function for all four strains by fusing the M46 promoter to a LacZ reporter. These promoter-reporter fusions are being tested for expression in both a M46 silent strain (G184AS) and a M46 expressing strain (G186AS). This data will allow us to determine if G184AS and G217B have non-functional promoters or missing trans-acting factors. Based on this analysis, future work will focus on identification of the promoter lesion or isolation of the missing trans-acting factor.

11:00 SIZE IDENTIFICATION OF AMINOACYL-TRNA SYNTHETASES FROM PLANTS

Timothy A. Pursley, Jason Littleton, Joshua K. Gardner, and Jeffrey Evans*, University of Southern Mississippi, Hattiesburg, MS 39406

The existence of a complex of aminoacyl-tRNA synthetases in plants is still in question. We investigated the possibility a plant synthetase complex by examining the size distribution of the enzymes for leucine and proline. These enzymes in animals are known to be in a large molecular weight complex. One source of plant enzymes we used was wheat germ. We extracted the wheat germ with cold buffer, centrifuged the extract to produce a post-organelle extract, and applied this to a

Sephacryl S300 gel column of an HPLC system. The column fractions were assayed for leucyl-tRNA synthetase (LRS) activity. The LRS was found exclusively in the void volume of the column, consistent with its existence in a large molecular weight complex.

11:15 CHARACTERIZATION OF THE GENES INVOLVED IN THE PATHOGENESIS OF STAPHYLOCOCCUS AUREUS

Latrecia Lewis* and Mohamed O. Elasri, The University of Southern Mississippi, Hattiesburg, MS 39406

Staphylococcus aureus is a very versatile pathogen causing a variety of infections ranging from superficial infections (skin lesions) to toxic syndromes (food poisoning) to life threatening conditions (osteomyelitis, septicemia). *S. aureus* has developed resistance to several antibiotics like methicillin and vancomycin, prompting development of new drugs to treat staphylococcal infections. Staphylococcal infections are caused by a wide array of virulence factors. The virulence factors are either surface proteins or secreted proteins. The surface proteins are expressed early and repressed late during infection; the secreted proteins are repressed early and expressed late during the infection. The regulation of virulence factors is under the control of two global regulatory systems, the accessory gene regulator (*agr*) and the staphylococcal accessory regulator (*sarA*). In this study we aim to identify and characterize accessory genes that modulate *sarA* functions. We have used random mutagenesis to identify these genes.

11:30 REGULATION OF STAPHYLOCOCCUS ACCESSORY REGULATOR (*SarA*) IN *STAPHYLOCOCCUS AUREUS*

Karthik Sambanthamoorthy and Mohamed O. Elasri, University of Southern Mississippi, Hattiesburg, MS 39406

Staphylococcus aureus is a versatile pathogen causing a wide variety of infections ranging from superficial infections (skin abscess, wound infections), to toxic syndromes (food poisoning) to life threatening conditions (osteomyelitis, endocarditis). *S. aureus* has developed resistance to an array of antibiotics like methicillin and vancomycin, forcing the need for development of new drugs to combat staphylococcal infections. *S. aureus* expresses a wide variety of virulence factors such as cell bound proteins (e.g., adhesins) or exoproteins (toxins). The cell bound proteins are expressed early to establish infection and repressed after colonization whereas the exoproteins are repressed early and expressed late during the infection. The coordination of the expression of virulence factors is under the control of two global regulatory systems, the accessory gene regulator (*agr*) and the staphylococcal accessory regulator (*sarA*). The *agr* system is a quorum sensing system in which the *S. aureus* cells communicate with each other to coordinate expression of virulence factors. *sarA* regulates the virulence factors via two pathways, an *agr*-dependent pathway in which

sarA activates *agr* at the transition between the exponential and post exponential growth phase and an *agr*-independent pathway in which *sarA* regulates virulence factors directly. There is evidence for the existence of important upstream and downstream factors that modulate *sarA* function. We have identified and characterized a new gene which activates *sarA* transcription and regulates several virulence factors.

11:45 REGULATION OF VIRULENCE BY QUORUM SENSING IN STAPHYLOCOCCUS AUREUS

Antony Schwartz* and Mohamed O. Elasri, University of Southern Mississippi, Hattiesburg, MS 39406

Staphylococcus aureus is a Gram-positive bacterium that causes a wide variety of community-acquired and nosocomial infections. Infections caused by *S. aureus* are increasingly difficult to treat owing to the increasing prevalence of antibiotic-resistant strains. Quorum sensing system, among other mechanisms, allows *S. aureus* to regulate expression of virulence factors according to cell density. The role of *luxS*, a novel quorum sensing system, has not been evaluated in *S. aureus*. In this study, we hypothesized that the *luxS* system regulates the expression of virulence factors and that *luxS* interacts with the accessory gene regulator (*agr*). To test this hypothesis, a *luxS* knock-out was generated via site-directed integration. Reverse transcriptase quantitative polymerase chain reaction (RT-qPCR) was used to compare *luxS* expression in the wild type and the *luxS* mutant. Expression of several virulence factors was also measured in the *luxS* mutant.

THURSDAY AFTERNOON

Exhibit Hall B

6:00 Divisional Poster Session

INHIBITION OF BREAST CANCER CELL GROWTH BY A NEW CLASS OF RING-SUBSTITUTED DIMS

Tamica Collins^{1*}, Kathy Vanderlaag², and Stephen Safe¹, ¹Jackson State University, Jackson, MS 39217 and ²Texas A&M University, College Station, TX 77840

Breast cancer is one of the leading causes of death in women and the mortality rate has not changed for the past five decades. Over the past few decades scientists have developed breast cancer chemotherapeutics that target a diverse range of cellular pathways. A new class of compounds called ring-substituted DIMs (Br and Cl series), was tested for their breast cancer cell growth inhibition potential. A 6-day growth inhibition study was carried out in MCF-7 and MDA-MB-231 human breast cancer cell lines. 4,4'-dibromoDIM was the most potent in the MCF-7 cell line. The other ring-substituted DIMs tested all had similar levels of potency in MCF-7 cells. In the MDA-MB-231 cell line all of the ring-substituted DIMs exhibited a

similar potency in terms of breast cancer cell growth inhibition. To determine how the ring-substituted DIMs are inhibiting breast cancer cell growth, various mechanisms of growth inhibition are currently being explored.

LIGAND BINDING PROPERTIES OF THE BREAST CANCER MOLECULAR TARGET AROMATASE

Jonathan Priester* and Stanley V. Smith, Murrah High School, Jackson, MS 39202 and University of Mississippi Medical Center, Jackson, MS 39216

The goals of our investigations are to better understand the features that govern the binding interactions of selected substrates and inhibitors to cytochrome P450 aromatase. We previously characterized the binding of formestane to aromatase and compared it to that of the natural substrate androstenedione. In our current study, we characterized the binding features of the aromatase inhibitor exemestane. The K_s of exemestane was 112 nM. Compared to the K_s of formestane (233 nM), exemestane exhibited higher binding affinity. However, both exemestane and formestane had lower affinities than the natural substrate androstenedione ($K_s = 63$ nM). The mechanisms of binding by exemestane and formestane were also similar. In addition, we investigated the effects binding of the inhibitors had on the spectroscopic features of the aromatase heme environment. We allowed aromatase to proceed through the catalytic cycle in the presence of substrate and/or inhibitors. We then reduced the samples, added the probe ligand (CO), and performed wavelength scans to identify spectral features. The ferrous carbonmonoxy peak at 450 nm, which is indicative of functional cytochrome P450, disappeared in all cases. The 420 nm peak indicating locally misfolded aromatase was present in all cases. It was most pronounced upon exemestane binding to aromatase. This suggests the possibility of differential stabilization of aromatase by exemestane relative to the substrate testosterone and the inhibitor formestane. Further investigations are underway to better characterize the spectroscopically-observable species and their interconversions. (Supported by the Base Pair Program and American Cancer Society #IRG-98-275-04)

OPTIMIZATION OF BACTERIAL GROWTH CONDITIONS AND ISOLATION TECHNIQUES FOR RECOMBINANT CARBOXYSOMES PRODUCED IN *ESCHERICHIA COLI*

Sara Johnson^{1*}, Rachel Boone², Joseph Sapp¹, Gordon C. Cannon¹, and Sabine Heinhorst², ¹University of Southern Mississippi, Hattiesburg, MS 39406 and ²Texas State University, San Marcos, TX, 78666

Carboxysomes, proteinaceous microcompartments that enhance the catalytic ability of ribulose-1,5-bisphosphate carboxylase/oxygenase to fix CO₂, play an integral part in the metabolism of cyanobacteria and many chemolithoautotrophic bacteria. While investigation into the structure and function of these inclusions has ensued for more than 20 years, research has been hindered by the slow growth rate and complex culture

conditions of the carboxysome producing bacteria. Attempts at expression of the carboxysome operon from *Halothiobacillus neapolitanus* in *Escherichia coli* have been made to ease the research process. To date, proper assembly of carboxysomes in the host bacterium has not been shown; however, transformation with the pGroESL plasmid and pTn1PET vector has produced evidence that the transformants are able to form carboxysome shell plates. To optimize carboxysome expression, manipulation of the growth conditions of the transformed *E. coli* was implemented. Various lysis conditions were employed to determine the most effective procedure for isolation of assembled carboxysomes.

ISOLATION AND CHARACTERIZATION OF ASPARTATE AMINOTRANSFERASE (AAT1) AND SULFITE OXIDASE (SOX1) GENES FROM THE PATHOGENIC FUNGUS HISTOPLASMA CAPSULATUM

Yuan-Chi Lin* and Glen Shearer, University of Southern Mississippi, Hattiesburg, MS 39406

Histoplasma capsulatum is a pathogenic dimorphic fungus which is the etiologic agent of the common respiratory disease histoplasmosis. *H. capsulatum* grows in a differentiated multicellular mold form in the soil and converts to an undifferentiated single cell yeast form in the lungs of the infected individual. Environmental stimuli such as temperature of incubation and nutritional factors are important for the transition between mold and yeast forms. Sulfur metabolism in particular plays a critical role in this dimorphic process. The yeast morphotype but not the mold, for example, has a cysteine dioxygenase activity and is a cysteine auxotroph. To begin studies on the role of sulfur metabolism in dimorphism, we are isolating genes important in the central sulfur metabolic pathway. The focus of this report involves the genes for aspartate aminotransferase (AAT1) and sulfite oxidase (SOX1). Both genes were isolated by 5' RACE (Rapid Amplification of cDNA Ends) PCR and 3' RACE PCR. Currently real-time PCR and northern blot studies are underway to determine the expression of both genes in the mold and yeast morphotypes. Future work will include attempts to knockout these genes to evaluate the effects of loss of function on dimorphism.

GENETIC INTERACTIONS OF THE *SACCHAROMYCES CEREVISIAE* KIN3 GENE

Michael P. Jackson and Sarah Lea McGuire*, Millsaps College, Jackson, MS 39210

Appropriate control of the eukaryotic cell cycle is essential for cell survival. The main goal of our laboratory is to gain a better understanding of the molecular mechanisms involved in controlling the G2-M transition. Our recent studies have focused on characterization of the Kin3 gene of *Saccharomyces cerevisiae*. Kin3 encodes a serine-threonine protein kinase that is the homolog of the *A. nidulans nimA* kinase; Kin3 is a non-essential gene in *S. cerevisiae* that has not

been examined extensively. Because *nimA* appears to affect a variety of processes in *A. nidulans*, we are interested in identifying the various cellular processes with which Kin3 is involved in *S. cerevisiae*. To accomplish this, we are using synthetic genetic analysis in *S. cerevisiae* to identify the non-essential genes with which Kin3 interacts. A Kin3 deletion strain was created and used as a query strain to determine synthetic lethal interactions with known non-essential genes, using an ordered library of strains carrying non-essential deletions and a robotic pinning device. Putative synthetic lethal interactions identified in this mass screening are currently being tested by performing individual genetic crosses with the Kin3 deletion strain to confirm the synthetic lethal interactions. Thus far, the mass screening data indicate numerous cellular processes that interact with Kin3, with identified interacting genes including those involved in mitosis, cell bud growth, actin filament organization, ubiquitin-mediated proteolysis, and DNA repair. These experiments will aid in the elucidation of the cellular and molecular mechanisms affected by Kin3. This project was supported by NIH Grant Number RR 016476 from the MFGN INBRE Program of the National Center for Research Resources.

HYPERTENSION IN MALE GROWTH RESTRICTED OFFSPRING IS ABOLISHED BY CASTRATION SUGGESTING A ROLE FOR TESTOSTERONE IN THE FETAL PROGRAMMING OF HYPERTENSION

Norma Ojeda¹*, Daniela Grigore², Elliott B. Robertson², and Barbara T. Alexander^{2,1} University of Mississippi, University, MS 38677 and ²University of Mississippi Medical Center, Jackson, MS 39216

The fetal environment is now considered a contributing factor in the etiology of cardiovascular disease and hypertension. Our laboratory has characterized a model of intrauterine growth restriction (IUGR) induced by placental insufficiency whereby growth restricted offspring develop hypertension between 4 and 6 weeks of age. After puberty, however, male growth restricted offspring remain hypertensive, whereas hypertension in female growth restricted offspring is abolished. Thus, the purpose of this study was to determine whether testosterone plays a role in mediating sex differences in this model of fetal programming. Mean arterial pressure (MAP) was measured in conscious, chronically instrumented male control and male IUGR offspring from 6 to 12 weeks of age followed by collection of plasma for determination of testosterone (T). MAP (12 weeks: 139±2 vs. 129±2 mmHg) and T (12 weeks: 399±75 vs. 166±30 ng/ml) were significantly increased in male IUGR offspring as compared to male control offspring, respectively. Gonadectomy (CTX) at 10 weeks of age abolished hypertension in male IUGR offspring (MAP measured by telemetry from 13 weeks: 137±1 vs. 117±1 to 16 weeks: 144±1 vs. 123±2 mmHg, CTX vs. Sham, respectively). Thus, these results suggest that testosterone is associated with sex differences in the fetal programming of hypertension in this model of IUGR.

REGULATED PROTEOLYSIS OF MITOTIC PROTEINS IN SACCHAROMYCES CEREVISIAE

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Disruption of the orderly progression of cell cycle events often leads to unrestrained cell growth and predisposition to cancer. Research into the molecular mechanisms that regulate these processes is consequently of great medical and scientific interest. In the budding yeast *Saccharomyces cerevisiae*, Dbf4p initiates DNA synthesis by activating and escorting Cdc7p to origins of replication. Dbf4p is subsequently targeted for destruction by the Anaphase Promoting Complex (APC/C) through D-box motifs, thus preventing reinitiation of DNA synthesis. Many known substrates containing D-box motifs are targeted by the APC/C through one of two necessary mediators, Cdc20p/Fizzy and Cdh1p. We are taking both a genetic and biochemical approach to understand the regulated proteolysis of Dbf4p and selected mitotic proteins in *Saccharomyces cerevisiae*. Confocal microscopy is being used with strains that harbor both *YFP::dbf4* and *GFP::cdc20* or *GFP::cdh1* to establish localization of these proteins through the cell cycle. Two-hybrid assays are also underway to determine if physical interactions between Dbf4p and either Cdc20p or Cdh1p exist. Both deletion and mutational analyses will then be used to identify sites of direct interaction between Dbf4p and the mediator, and TAP-tagged versions of Dbf4p will be used to coimmunoprecipitate the complex in order to ascertain this interaction at the biochemical level. Additionally, synthetic genome analysis is being performed using a temperature sensitive allele of *cdc20* in order to dissect genetic interactions. Characterization of the proteolysis of Dbf4p will help to elucidate the controls involved on the orderly progression of the cell cycle among eukaryotic organisms.

MOLECULAR MECHANISMS FOR THE EXPRESSION, SECRETION AND UNIPOLAR LOCALIZATION OF ICSA IN SHIGELLA FLEXNERI

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IcsA is an outer membrane protein that is essential for the directed intracellular movement and intercellular dissemination of *Shigella* in colonic epithelial cells. IcsA is targeted to the old pole of the bacilli where the bacteria recruit actin filaments for directed movement within and between colonic epithelial cells. IcsA must be expressed at the old pole for the organism to spread effectively. The mechanism for IcsA expression and targeting to the old pole of *Shigella* is not completely understood. *Shigella* leads to an estimated 1.1 million deaths per year and there are currently no reliable vaccines against shigellosis. By understanding the molecular mechanisms responsible for the expression and surface localization of IcsA, this enables one to further understand the mechanism of pathogenesis in *Shigella* spp. and may lead to a more effective vaccine against shigellosis.

The molecular mechanisms involved in the expression and polar targeting of IcsA will be defined through the development of a genetic screen using reporter constructs in a variety of unknown backgrounds or in a mutant library. Mutant libraries were generated using ethylmethanesulphonate (EMS), 2-aminopurine, and ultraviolet light. The purpose of the genetic screen is to identify mutants that either prevent IcsA polar localization or prevent IcsA from being expressed.

ACTIVATION OF THE RENIN ANGIOTENSIN SYSTEM FOLLOWS DEVELOPMENT OF HYPERTENSION IN A MODEL OF INTRAUTERINE GROWTH RESTRICTION INDUCED BY PLACENTAL INSUFFICIENCY IN THE RAT

Daniela Grigore*, Norma Ojeda, Elliott B. Robertson, and Barbara T. Alexander, University of Mississippi Medical Center, Jackson, MS 39216

Reduced uterine perfusion initiated in late gestation in the rat results in intrauterine growth restriction (IUGR) and development of hypertension between 4 to 6 weeks of age in male growth restricted offspring. A role for renin angiotensin system (RAS) involvement in mediating IUGR-induced hypertension is suggested as RAS blockade abolishes hypertension at 12 week of age in adult male growth restricted offspring. The purpose of this study was to examine renal expression of RAS components in male growth restricted offspring. At 6 weeks of age no difference in renal mRNA expression of angiotensinogen (Aogen) or renin as determined by real time PCR was observed in either the cortex or medulla of growth restricted offspring compared to control offspring. At 12 weeks of age renal mRNA expression of angiotensinogen (Aogen) was increased 4-fold in the cortex and 2-fold in the medulla of growth restricted offspring compared to control offspring. Renal mRNA expression of renin was also significantly elevated at 12 weeks of age in both the cortex, a greater than 2.5 fold increase, and medulla, a greater than 2-fold increase, in growth restricted offspring relative to control. Thus, activation of the renal RAS is present after development of hypertension in this model of fetal programming.

EXPRESSION RESULT FROM FIVE ENDOMETRIAL TUMOR/CONSTITUTIVE TISSUE PANELS

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Our aim was to assess if microarray analysis of endometrial tumors can detect altered gene expression associated with this tumor type. We hypothesized that the tumors will show altered gene expression of some genes when compared to uninvolved tissue of the same patient. A connection between altered gene expression and tumorigenesis may facilitate diagnosis, successful therapeutic involvement, and/or lead to the development of effective pharmacogenic agents. We analyzed five endometrial tumor/constitutive tissue panels. Total RNA

was isolated from tumor and uninvolved tissue, reverse-transcribed into cDNA, and labeled with fluorescent dyes, either directly with Cyanine 3- or Cyanine 5-conjugated nucleotides or indirectly with Alexa 488 or Alexa 594 using a two-step method. The tumor and uninvolved samples were labeled with different dyes and then simultaneously hybridized to a microarray. We used "Human SS-H19k7" microarrays from the University Health network which contain 19,008 human Expressed Sequence Tags of 100-150 base pairs. After pre-processing the data, expression ratios were calculated and genes ordered using a Student's t-test and an analysis similar to Statistical Analysis for Microarrays. A nearly equal number of genes were down-regulated (50) as were up-regulated (57). Many of the genes are known to be involved in cell cycle regulation; some are cancer-related genes. We used one-fifth less RNA for each Alexa-labeled sample than for each Cyanine-labeled sample. This research was supported by the Mississippi Functional Genomic Network.

CONSTRUCTION OF A GFP REPORTER VECTOR FOR THE INSERTION INTO XhoI SITE OF *HISTOPLASMA CAPSULATUM* TELOMERE VECTOR pRPUT1

Evangeline Deer^{1*}, Glenn Shearer², and Davida Crossley², ¹Tougaloo College, Tougaloo, MS 39174 and ²University of Southern Mississippi, Hattiesburg, MS 39406

Pathogenic fungi such as *Histoplasma capsulatum* can grow in two different forms: yeastlike or mycelial form based on its environment. This reversible process, known as dimorphism, infects humans and other animals located in temperate, subtropical, and tropical zones in the United States and in some areas of the South and Central America. In order to construct a green fluorescent protein (GFP) reporter vector to be used in the pathogenic fungus *Histoplasma capsulatum*, a DNA fragment containing the glyceraldehyde phosphate dehydrogenase (gpd) promoter, from the fungus *Aspergillus*, was fused to GFP, and later inserted into a *Histoplasma capsulatum* telomere vector (pRPUT1). The gpd-GFP fragment was isolated by agarose gel electrophoresis, and then purified by ZymoClean. Several experiments were conducted to produce clones with the desired insertion isolated, but none prevailed. Continuous work is currently in progress to construct a reporter for this and other fungal pathogens. This project was supported by the Mississippi Functional Genomic Network.

MECHANICAL STRAIN DIFFERENTIALLY ACTIVATES RHO FAMILY GTPASES IN FETAL LUNG TYPE II EPITHELIAL CELLS

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Previous research has shown that mechanical forces play a key role in fetal lung development. The purpose of this study is to determine whether mechanical strain activates the Rho family GTPases in fetal lung type II cells. We hypothesized

that mechanical stretch would activate Rho to induce stress fibers formation in fetal lung type II cells. During intrauterine life, the fetus makes episodic breathing movements that generate ~5% changes of alveolar surface area. The cytoskeleton consists of a complex network of protein filaments that extends throughout the cytoplasm. Mechanical forces applied to the cytoskeleton via integrin receptors induce reorganization of the actin filaments, and trigger a variety of downstream signaling pathways. This regulation of actin polymerization is orchestrated by the Rho family GTPases (Cdc42, Rac, and Rho). Fetal rat lungs were obtained from timed - pregnant Sprague - Dawley rats at E19 of gestation and cultured overnight on silastic membranes pre-coated with laminin. Cells stretched at 5% for 60 cycles/minute for 1, 5, 15, and 30 minutes to stimulate mechanical forces during fetal lung development. Cells were then assessed for Rho family GTPase activation. After protein isolation, samples were incubated with PAK- PBD beads to pull down the activated Rho GTPase protein. Protein samples were separated by one- dimensional 16.5% SDS- PAGE and transferred to nitrocellulose membranes. To detect GTPases, blots were incubated with anti-GTPase monoclonal antibody and detected by enhanced chemiluminescence. As hypothesized, Rho was differentially activated by mechanical stretch. Future experiments will include studying downstream activators of Rho, such as ROCK and myosin light chain (MLC) using an in vitro kinase assay and western blot respectively.

MEASURING THE CELLULAR ADENYLATE ENERGY CHARGE DURING THE DEREPRESSION OF THE PYRIMIDINE PATHWAY

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Pyrimidine metabolism is characterized by a number of synthetic and salvage reutilization reactions. The pyrimidine pathway is repressed in the presence of uracil and derepressed in its absence. An important measure of metabolic transition inside the cell is that of the adenylate energy charge. The energy charge is calculated from the three adenylates ATP, ADP and AMP intracellular concentrations. The goal of this research is to measure the cell's energy charge during the derepression of the pyrimidine pathway at different time intervals. HPLC analyses of cellular extracts were taken during different time intervals following derepression to quantify the energy charge that reflects the relative number of high-energy charge phosphate bonds in the adenylate pool. The energy charge of a cell can vary mathematically from 0 (all AMP) to 1 (all ATP). The healthy cell has an energy charge greater than 0.8 and the cell is non-functional when it reaches a value of approximately 0.5. The metabolic nucleotide pools were analyzed by HPLC. The concentrations of AMP and ADP decreased following the removal of uracil and the derepression of the pyrimidine pathway. ATP increased after the removal of uracil. These

results are indication that during the derepression of the pyrimidine pathway in bacteria that the AEC increases. This research was supported by NIMH-COR grant MH-16926.

ISOLATION AND EXPRESSION OF RECOMBINANT FUSION PROTEIN OF LECTIN LIKE TRANSCRIPT-1 (LLT1)
JeT'aime Ross^{1*}, Porunelloor Mathew², Stephen Mathew², and Nowland Bambard²,¹Jackson State University, Jackson, MS 39217 and ²University of North Texas, Fort Worth, TX 761071

Natural killer cell functions are regulated by signals through activating and inhibitory receptors. One of these receptors is lectin-like transcript (LLT1), which is a member of the novel lectin superfamily. This research focuses on the use of a purified plasmid DNA pSec-LLT1 to transfect into mammalian cells to produce the fusion proteins. The recombinant fusion proteins containing the extracellular region of LLT1 were then used to screen various cell lines for expression of the ligand for LLT1. Purified plasmid DNA of pSec-LLT1 was isolated and purified by double cesium chloride DNA maxiprep. The DNA was digested with restriction enzymes BamHI and XhoI to check the LLT1 insert. The purified DNA was then transiently transfected into B16F10 cells and the supernatants containing the fusion proteins were concentrated and run on a SDS-PAGE gel and confirmed by western blot. The fusion protein was used to check the expression of the ligand on various mammalian cell lines. Preliminary flow cytometric analysis with some of the mammalian cell lines showed binding with the fusion protein. The recombinant fusion protein would enable us to investigate natural ligand of LLT1.

POSTNATAL DEVELOPMENT, BEHAVIOR, AND MOTOR FUNCTION IN GROWTH RESTRICTED OFFSPRING
Antoinette Dawson^{1*}, Norma Ojeda², Daniela Grigore², Elliott B. Robertson², and Barbara T. Alexander²,¹Murrah High School, Jackson, MS 39202 and ²University of Mississippi Medical Center, Jackson, MS 39216

Reduced uterine perfusion initiated in late gestation in the rat results in intrauterine growth restriction (IUGR) and hypertension in growth restricted offspring. The purpose of this study was to examine the effects of IUGR on postnatal development, behavior, and motor function in growth restricted offspring. Two groups of animals were tested; normal birth weight (control) offspring from the control pregnant rats and growth restricted offspring from pregnant rats who underwent reduced uterine perfusion in late gestation. After delivery, evaluation for developmental milestone was performed in pups from 1 to 21 days of age. Beginning at day one, pups were weighed daily and assessed for neonatal milestones. In the pre-weaning stage, control offspring mastered open field assessment and negative geotaxis earlier than growth restricted offspring. However, growth restricted offspring mastered rooting earlier than control offspring. In another group of animals, open-field and rotarod tests were assessed at four and six weeks of age. Neurobehavior-

al evaluation of growth restricted offspring revealed no alterations in motor function (rotarod) and activity level (open-field). These results suggest that reduced uterine perfusion results in IUGR that is not associated with motor deficiency.

EFFECT OF μ -OPIOID RECEPTOR ANTAGONIST, β -FUNALTREXAMINE ON METHAMPHETAMINE-INDUCED STEREOTYPED BEHAVIORS IN MICE

Simira Carothers* and Xine Shen, Tougaloo College, Tougaloo, MS 39174 and University of Mississippi Medical Center, Jackson, MS 39216

This study is to determine the role of μ -opioid subtype in methamphetamine-induced stereotyped behaviors by using a μ -opioid receptor antagonist, β -funaltrexamine. We hypothesized that β -funaltrexamine reduces methamphetamine-mediated behavioral responses through a disinhibitory mechanism to alter dopaminergic activity. It is well known that repeated use of methamphetamine at high dose can produce stereotyped behaviors. Stereotypic behaviors in mice include constant sniffing and grooming. Mice were injected with methamphetamine (10 mg/kg, i.p.) for 7 continuous days. On day 10, mice received an i.c.v. injection of β -funaltrexamine (μ g) or saline (control) and were challenged with an injection of methamphetamine (10 mg/kg) 24 hours after β -funaltrexamine injection. No significant effect of a single i.c.v. injection of β -funaltrexamine on methamphetamine-induced stereotyped behaviors was detected in the limited experiment animals. The results need to be verified by increased animal numbers. This project was supported by the Mississippi Functional Genomic Network.

IDENTIFICATION OF SNPS ON LDH-B GENE IN BOVINE
Deanna Baker*, and Rachel Beecham, Mississippi Valley State University, Itta Bena, MS 38941

Lactate dehydrogenase (LDH) converts lactate to pyruvate in the reverse direction and pyruvate to lactate in the forward direction. LDH is used in the body through to process of glycolysis. This process continues do to LDH turning NAD back into NADH through the reaction equation: Pyruvate + NADH $\rightarrow$ LDH $\rightarrow$ lactate + NAD. Two genes control the production of LDH and have been named LDH-A and LDH-B. The experiment started out with 20 samples at 20 ng/ μ L of: pure Angus, pure Brahman, Angus/Brahman crossbreed, and Brahman/Angus crossbreed. The 80 samples came from an agriculture research farm in Booneville, AR. The samples were amplified using PCR (polymerase chain reaction) procedure. After this, the PCR products are purified through a 1% agarose gel and electrophoresis (for 1 hour/100 volts). The samples are then extracted from the gel using the Qiagen MiniElute Kit for PCR products. The samples were analyzed and 5 SNPs were found on the LDH-B gene in cattle. Out of those 5 SNPs there were 2 that changed the amino acid chain. These SNPs could be used to further research on the association between them and LDH activities in cattle.

CHARACTERIZATION OF THE *SNXB1* MUTATION OF *ASPERGILLUS NIDULANS*

Michael Yablick and Sarah Lea McGuire*, Millsaps College, Jackson, MS 39110

The *snxB1* mutation has been isolated as an extragenic suppressor of the *nimX2* mutation of the filamentous fungus *Aspergillus nidulans*. It affects the cell cycle and causes compact, hyper-septating colonies when grown on rich media. To better understand its role in the cell cycle and identify what other molecules SNXB might interact with, a series of characterization assays and cloning attempts with the AMA-NotI genomic library have been undertaken. A time-course microscopy assay measured relationships between germination, branching, and septation. It provided a numerical characterization of *snxB1*, and data suggest that colonies are not hyper-branching, and that septation may be uncoupled from nuclear division. A plate-growth assay in the presence of the DNA damaging agents hydroxyurea and camptothecin investigated defects in cell cycle checkpoints and possible interactions of SNXB with ANKA^{WEE1} and NIMT^{CDC25}. Data show camptothecin sensitivity of the *snxB1/nimT23* mutant, which suggests an interaction with NIMT that may mediate the damage response between the ATR pathway and tyrosine phosphorylation of NIMX^{CDC2}. Unsuccessful cloning attempts of *snxB* have provided insight into a more efficient transformation protocol that will likely work in the future. Understanding *snxB* may allow us to better understand similar cell cycle controls in humans, and provide insight into mechanisms that cause cancer.

GROWTH INHIBITION IN JAPANESE MEDAKA (*ORYZIAS LATIPES*) FISH EXPOSED TO TETRACHLOROETHYLENE

Hattie Spencer^{1*}, Wedad R. Hussein², and Paul B. Tchounwou², ¹Mississippi Valley State University, Itta Bena, MS 38941 and ²Jackson State University, Jackson, MS 39217

A recent study in our laboratory has demonstrated that tetrachloroethylene (TCE) is acutely toxic to Japanese medaka (*Oryzias latipes*) larvae with a 96 hr-LC50 of 18 (17-19) mg/mL (Spencer et al, 2002). In the present study we hypothesize that TCE exposure induces a developmental effect in Japanese medaka. Growth and age specific sensitivity of Japanese medaka larvae were studied with four age groups (7, 14, 21 and 28 days old) to determine tetrachloroethylene effects on these parameters. The medaka larvae were exposed for 96 hours in a single concentration (10 mg/mL) of TCE. The toxic endpoints evaluated were larvae weight, length, water content and protein concentration. The study revealed that exposure of medaka larvae to this sub-acute concentration of TCE significantly reduced length and weight in the treated group. The difference in growth between control and treated groups was more obvious in age versus length, than in age versus weight. The dry weight-fresh weight ratio (dw/fw) was shown to be higher in the control group. Water content in TCE-treated medaka was higher than in the control group, and younger fry had more water content than

older ones. A higher protein concentration was also observed in TCE-treated medaka compared to the control group. These results indicate that TCE has a profound effect on the growth and development of Japanese medaka larvae.

FRIDAY MORNING

Meeting Room 1

8:30 PLATELET POLYMORPHISMS IN RELATION TO VON WILLEBRAND FACTOR SIGNALS

Shawna Clark^{1*}, Mohan S. Chitta², Qi Zheng², and John C. Kermod², ¹Tougaloo College, Tougaloo, MS 39174 and ²University of Mississippi Medical Center, Jackson, MS 39216

Cardiovascular disease is the most frequent cause of death in the United States. Prior studies have identified several risk factors for this disease, including natural genetic variations (polymorphisms) of proteins involved in coagulation, thrombosis and lipid metabolism. This study focused on polymorphisms in platelet glycoprotein GpIb, a receptor for von Willebrand factor (VWF). There is tentative evidence that two polymorphisms in platelet GpIb may influence the risk of an individual developing cardiovascular disease. One causes a change from threonine (Thr) to methionine (Met) at amino acid residue 145 in the GpIb α -chain. The other affects the number of tandem repeats of a 13-residue sequence in the extracellular portion of GpIb. The goal of this study was to develop a reliable method to assay the Thr/Met polymorphism and conduct a preliminary assessment of its effect on signaling in VWF in the platelet. Blood was drawn from healthy volunteers. Platelets were isolated and RNA was extracted from them. The RNA was converted into cDNA by reverse transcription. By using PCR, different polymorphic variants of GPIB α together with GPIX were cloned. Now we are currently working on expressing these variants in mammalian cells to study how they affect the signaling of VWF. [Supported by the Mississippi Functional Genomics Network, National Science Foundations, and the American Heart Association (Southeast Affiliate)]

8:45 NEOPLASTIC TRANSFORMATION OF THE CD30^{HIGH} LYMPHOMAS USING MDV-TRANSFORMED LYMPHOMAS IN CHICKENS AS A MODEL

Jeremy Whitten^{1*}, Jorma Buza², and Shane Burgess², ¹Mississippi University for Women, Columbus, MS 39701 and ²Mississippi State University, Mississippi State, MS 39762

We are conducting proteomic studies to investigate genes critical to the neoplastic transformation of the CD30^{high} lymphomas using Marek's disease virus (MDV) transformed lymphomas in chicken as a model. We investigated the clonality of CD30^{high} MD lymphoma cells based on RNA expression for

T-cell receptors and immunofluorescence of lymphoma sections. Twenty five chicks were infected with MDV strain GA at a dose of 500 pfu through the intraperitoneal route. Twelve chicks were kept as uninfected control and housed separately. Infection was confirmed two weeks later by amplification of MDV DNA fragment in peripheral blood mononuclear cells using polymerase chain reaction. The infected chicks started showing clinical signs of MD starting 4 weeks after infection. Lymphomas were found in kidney, spleen, heart, liver, sciatic nerve, ovary and testis, from which samples were collected, snap frozen in liquid nitrogen and later transferred to -80C to be used in immunofluorescence studies. Samples for studies on RNA expression were collected from 10 non-infected control chicks and 10 infected chicks (from lymphomatous and non-lymphomatous organs). The organs sampled included heart, proventriculus, liver, spleen, kidney, lung, sciatic nerve, brachial nerve, ovary and testis. Further work on these samples will be done at later date.

9:00 DEVELOPMENT OF ELASTIN-LIKE POLYPEPTIDE AS A MACROMOLECULAR CARRIER FOR A CYTOTOXIC PEPTIDE

Preeti Kumar* and Drazen Raucher, Mississippi College, Clinton, MS 39058 and University Medical Center, Jackson, MS 39216

Chemotherapy, the 21st century's most popular treatment for cancer, exhibits nonspecific, off-target toxicity. Chemotherapy tends to kill not only the cancer cells, but other healthy cells in the body also. Therefore, there is a need for specific targeting. The tumor vasculature is more permeable to diffusion of large molecules from the bloodstream than normal capillary beds, and lymphatic drainage is limited. This phenomenon is called the enhanced permeability and retention effect, and leads to the accumulation of macromolecular drugs at the tumor site. This study uses a macromolecule called PEN-ELP-(KLAKLAK)₂, which is a thermally responsive polypeptide capable of inducing apoptosis in target cells. The root of this macromolecule is Elastin-like Polypeptide (ELP), which forms aggregates when heated above body temperature. The hypothesis is that systemically circulating ELP will aggregate and accumulate at the tumor site where local hyperthermia will be applied. Attached to ELP in this study is penetratin (Pen), a 16 amino acid peptide known to facilitate transport of the macromolecule across cell membranes, and a pro-apoptotic peptide (KLAKLAK)₂, known to induce mitochondrial swelling, cytochrome c release, and apoptosis. PEN-ELP-(KLAKLAK)₂ was designed and genetically engineered in the lab. The protein was expressed in E.Coli and then purified using inverse transition cycling. Toxicity of Pen-ELP-(KLAKLAK)₂ was demonstrated in melanoma (SK-MEL-2 and Malme-3M), ovarian (SK-OV-3), breast (MCF-7), and cervical (Hela) cancer cell lines. Each of the cell lines responded to a 72 h exposure to the polypeptide with a concentration-dependent inhibition. Growth inhibition was also

demonstrated in MCF-7 cells by a cell growth curve. The in-vitro toxicity of Pen-ELP-(KLAKLAK)₂ demonstrated here shows promise for this molecule as a future thermally-targeted therapy.

9:15 GENERATION OF CARDIOMYOCYTES STABLY OVEREXPRESSING THE LEPTIN RECEPTOR

Roshni Trehan* and David Stec, Tougaloo College, Tougaloo, MS 39174 and University of Mississippi Medical Center, Jackson, MS 39216

There are several genes that have been linked to obesity. Among them is the (ob) obese gene. This gene encodes the leptin hormone. The objective of this research is to create cardiomyocytes which overexpress the leptin receptor to determine if leptin can protect cardiomyocytes from damage caused by exposure to excess fatty acids. Initial methods used were RNA isolation from a cardiomyocyte cell line (H9C2) stably overexpressing the long form of the rat leptin receptor (ObRb).. Increased expression of the ObRb mRNA was determined in 3 different stable cell lines from each method by real-time PCR using primers specific to long form of the rat leptin receptor. The Fold Induction results for clone 1, 2, and 3 were as follows respectively: 2.35, 4.59, 4.59. Based on the results from the RT-PCR, on the basis of the threshold cycles, the cardiomyocytes transfected with cytomegalovirus promoter and had higher levels of leptin are the 285/264 cells, clones 1, 2 and 3. Program Supporter: Jackson Heart Study

9:30 IMPLEMENTATION OF A CHEMICALLY INDUCIBLE RNAI CONSTRUCT FOR POST-TRANSCRIPTIONAL SILENCING IN ARABIDOPSIS THALIANA

Scott Walper*, Gordon C. Cannon, and Sabine Heinhorst, University of Southern Mississippi, Hattiesburg, MS 39406

To avoid the potential of a lethal effect from constitutive expression of an RNAi construct in *Arabidopsis thaliana*, a chemically inducible vector was utilized to study the effects of a gene knockout for the plastid nucleoid protein DCP68. This construct contains regulatory regions upstream of a constitutive promoter that inhibits expression of the RNAi construct in the absence of B-estradiol. Once induced, the expressed construct forms a double stranded RNA molecule homologous to exon 2 of the DCP68 gene. The plant immune response to this dsRNA molecule results in the destruction of the mRNA for the DCP68 protein, limiting or eliminating synthesis of the protein in vivo. Phenotypic effects of this knockout in transformants will be compared to characteristics of non-induced wild-type plants.

9:45 USING THE VARIABLE REGIONS OF THE RDNA CLUSTER OF HISTOPLASMA CAPSULATUM FOR AN ANTISENSE APPROACH TO GENE SILENCING

Melissa Adams* and Glen Shearer, University of Southern

Mississippi, Hattiesburg, MS 39406

The dimorphic fungus *Histoplasma capsulatum* is the causative agent of histoplasmosis. The saprophytic multicellular mold form is found in the soil at 25°C. When spores are inhaled a shift occurs and the mold becomes a unicellular yeast in the lungs of the infected individual. The yeast form is the "pathogenic form" and thus the mold-to-yeast shift is critical for pathogenesis. Determining which genes play a role in the dimorphic shift and what role the genes play is vital to our understanding of the molecular basis of this developmental shift and may yield data useful to develop new therapeutic modalities. Current methods to create genetic knockouts to study the role of particular genes is difficult and time-consuming in this organism. The use of an antisense ribosome, as reported by Sweeny and Yao in *Tetrahymena* (Proc Natl Acad Sci U S A. 1996. 93:8518-23), can be an alternative to these labor intensive gene knockouts. For most organisms, the antisense ribosome would not be an option because of the high copy numbers of rDNA. Preliminary data indicate that *Histoplasma* has a low or single copy number. Antisense ribosomes contain a small fragment of antisense target gene cDNA inserted into a non-essential region of the large subunit rDNA. Hybridization of this sequence with mRNA during translation results in post transcriptional gene silencing. The rDNA cluster of *Histoplasma* has been isolated and compared with other organisms to identify these non-essential (variable) regions. The D2 (divergent region #2), a likely candidate for replacement with antisense cDNA, has now been isolated and experiments are currently underway to determine the validity of such an antisense ribosome approach in *H. capsulatum*.

10:00 Break

10:15 THE STRUCTURE AND FUNCTION OF CsoS2 PROTEIN IN THE CARBOXYSOME

Zhicheng Dou*, Gordon C. Cannon, and Sabine Heinhorst, University of Southern Mississippi, Hattiesburg, MS 39406

Carboxysomes play a very important role in the assimilation of CO₂ by some photo- and chemoautotrophic prokaryotes. One of the proteins that comprise the carboxysome shell is CsoS2, which is expressed in two different forms (CsoS2A and CsoS2B) of approximately 85 and 130 kDa, respectively. Understanding the molecular differences between these two CsoS2 variants and determining the protein's three-dimensional structure can help to elucidate the function of CsoS2 in the carboxysome shell and the role the protein may play in carboxysome assembly. To obtain large amounts of CsoS2 protein, the *csoS2* gene was inserted into several different prokaryotic expression vectors and recombinant CsoS2 protein was produced. In the pPROEX system, CsoS2 protein was expressed as two polypeptides that correspond to CsoS2A and CsoS2B. Only the CsoS2B form was expressed in the IMPACT system. Various strategies are being explored to address solubil-

ity and concentration of purified recombinant CsoS2 protein in preparation for X-ray crystallography studies.

10:30 EFFECT OF A MUTATION IN THE GENE ENCODING CARBONIC ANHYDRASE ON CO₂ FIXATION IN HALOTHIOBACILLUS NEAPOLITANUS CARBOXYSOMES

Sandipan Dawn*, C. Daniel Murin, Sabine Heinhorst, and Gordon C. Cannon, University of Southern Mississippi, Hattiesburg, MS 39406

In chemolithoautotrophic bacteria like *Halothiobacillus neapolitanus*, CO₂ fixation is catalyzed by ribulose-1,5-bisphosphate carboxylase/oxygenase (RuBisCO), which is packaged into polyhedral proteinaceous microcompartments called carboxysomes. The only carbon substrate for RuBisCO is CO₂, so cytosolic HCO₃⁻ must be converted to CO₂ before the enzyme can utilize it as a substrate. A carbonic anhydrase (CA) in the carboxysome shell, the CsoS3 protein, ensures this rapid conversion between inorganic carbon species and is believed to provide RuBisCO with a substrate concentration that supports optimal activity. To test the premise that carboxysomal CA has an enhancing effect on RuBisCO activity, carboxysomes from a *csoS3* mutant, which produces inactive CA due to an insertion of a kanamycin resistance cassette within its coding sequence, were assayed for RuBisCO activity. Preliminary evidence suggests that in the mutant, which requires elevated CO₂ levels for growth, carboxysomal CO₂ fixation is only one third as efficient as it is in wild type carboxysomes. Taken together with the ability to complement the mutant phenotype with a wild type copy of the *csoS3* gene, these results strongly suggest that the carboxysomal CA plays a crucial role in the catalytic enhancement of RuBisCO.

10:45 QUANTITATIVE EVALUATION OF CARBOXYSOME GENE EXPRESSION IN HALOTHIOBACILLUS NEAPOLITANUS AT TRANSCRIPTIONAL LEVEL

Fei Cai*, Sabine Heinhorst, and Gordon C. Cannon, University of Southern Mississippi, Hattiesburg, MS 39406

Carboxysomes are polyhedral bodies found in cyanobacteria and in chemoautotrophic bacteria. This microcompartment is surrounded by a monolayer protein shell, with RuBisCO (D-ribulose-1,5-bisphosphate carboxylase/oxygenase) sequestered inside. The carboxysome genes of *H. neapolitanus* are arranged in a putative operon. However, stoichiometric analysis showed large differences between individual peptide components in purified carboxysomes, suggesting that the expression of individual genes in the operon must be differently regulated. To understand the molecular mechanism of carboxysome gene regulation, quantitative transcript analysis by real-time RT PCR is underway. The mRNA copy number differs from one to one by one to two orders of magnitude before individual genes suggesting that

carboxysome gene expression is regulated at the transcriptional level.

11:00 THE MOLECULAR MECHANISMS FOR THE EXPRESSION, SECRETION, AND UNIPOLAR LOCALIZATION OF ICSA IN *SHIGELLA FLEXNERI*

B. N. Roberts, K. M. Ellis, L. D. Brandon, Mississippi University for Women, Columbus, MS 39701

The Gram negative bacterium *Shigella flexneri* causes shigellosis, a form of dysentery, leading to 1.1 million deaths world wide per annum. It expresses a virulence protein, IcsA that responsible for the motility of the bacterium within the infected cell and from one cell to another. By understanding the molecular mechanisms responsible for the expression and surface localization of IcsA, this enables us to further understand the mechanism of pathogenesis in *Shigella spp.* Mutant libraries were generated using ethylmethanesulphonate (EMS), 2-aminopurine, and ultraviolet light in a mutagenic screen to study the affects of these mutations on the expression, secretion, and unipolar localization of IcsA. Acknowledgments: MFGN-INBRE NIH grant.

11:15 THE EFFECTS OF SEVERAL SELECTED BREAST CANCER DRUGS ON AROMATASE ACTIVITY

Heather J. Hilderbrand^{1,*}, Tina G. Smith², and Stanley V. Smith²,¹Delta State University, Cleveland, MS 38733, and ²University of Mississippi Medical Center, Jackson, MS 39216

Cytochrome P450 aromatase is involved in converting androgens to estrogens. It is a member of the cytochrome P450 superfamily of heme protein enzymes. Aromatase is a molecular target for breast cancer therapy in scenarios where estrogen signaling is driving the cancer cell proliferation. By inhibiting aromatase activity from peripheral tissues, estrogen levels and ultimately cell proliferation are greatly decreased. The goals of our studies were to develop a protocol for an HPLC-based assay of aromatase activity and to use this protocol to investigate effects of selected breast cancer drugs on aromatase activity. Assay mixtures contained aromatase, cytochrome P450 NADPH reductase, a NADPH-regenerating system, testosterone (substrate), deoxycortisol (internal standard), and appropriate buffers. We assayed at 37° C for 30 minutes, extracted the mixtures with acetonitrile, and performed HPLC. We used a C18 reverse-phase column to resolve products and identified them by absorbance detection in conjunction with comparison to standards. In agreement with previous binding studies, both anastrozole and letrozole inhibited activity at micromolar concentrations with letrozole being the more potent inhibitor. The steroidal inactivators exemestane and formestane inhibited aromatase activity at all concentrations tested. The early generation inhibitor aminoglutethimide demonstrated stereospecific inhibition with the R-isomer being more potent than the S-isomer. The results provide confirmation of the ligand binding results obtained in our laboratory. (Supported by the Mississippi

Functional Genomics Network REO program and the American Cancer Society #IRG-98-275-04)

11:30 INVESTIGATION OF THERMAL DENATURATION AS A TOOL FOR STUDYING H1_E- DNA BINDING

Channing K. Sly^{1,2*} and Susan E. Wellman¹,¹University of Mississippi Medical Center, Jackson, Mississippi 39216 and ²Murrah High School, Jackson, Mississippi 39202

Histone H1_E is involved in the folding and compaction of DNA in cells. This histone is the most abundant type in mammalian cells. Previous studies of binding using H1_E yielded inconsistent results. We investigated the possibility that the inconsistent results were due to a technical problem. The method that was used was thermal denaturation of DNA. In this method, solutions of DNA containing various concentrations of H1_E are monitored in a UV spectrophotometer as the solutions are heated. DNA denatures into single strands when it is heated, and the denaturation is accompanied by an increase in UV absorbance. Proteins that bind to DNA will inhibit the denaturation and therefore the thermal denaturation curve will be changed in the presence of DNA-binding proteins. We conducted experiments to determine the effects of 1) equilibrating solutions for longer periods of time before beginning experiments and 2) equilibrating longer at each temperature during thermal denaturation. Our results indicated that there was no difference in data gathered when solutions were heated at one degree per minute or one degree per five minutes. We observed that the thermal denaturation curves were different for solutions incubated for less than about 24 hours. After one day, no changes were seen in the thermal denaturation curves. (Support was provided through BasePair.)

11:45 ELUCIDATING THE MECHANISTIC BASIS FOR REDOX-REGULATION OF JANUS KINASE 2

John K. Smith¹, Naila M. Mamoon¹, Sheeyong Lee¹, Kiranam Chatti², and Roy Duhe^{1,*},¹University of Mississippi Medical Center, Jackson, MS 39316 and ²State University of New York at Stony Brook, Stony Brook, New York 11794

Our laboratory has shown that the catalytic activity of the protein-tyrosine kinase JAK2 is reversibly regulated by oxidizing and reducing reagents. Upon oxidation, the enzyme is no longer catalytically active, and catalytic activity is restored upon reduction of the enzyme. However, there are other reports suggesting that JAK2's activity is stimulated by intracellular oxidation, although it is unclear whether this phenomenon occurs through direct or indirect mechanisms. We propose that the oxidative inhibition of JAK2 occurs directly via thiol-disulfide interconversions of critical cysteine residues. This hypothesis has been tested by site-directed mutagenesis of JAK2. Eighteen of the twenty-seven cysteines were eliminated from consideration through deletion mutagenesis experiments which demonstrated that those cysteines were superfluous for

direct redox regulation. The remaining nine cysteine residues were individually and combinatorially converted to serine residues, which identified four cysteines near the catalytic pocket that cooperatively maintain JAK2's catalytic activity. The essential role of these residues was corroborated by alanine substitution and additional biochemical characterizations.

12:00 Divisional Meeting

CHEMISTRY AND CHEMICAL ENGINEERING

Chair: Dionne Fortenberry, Mississippi University for Women
Vice-chair: Mudlagiri Goli, Mississippi Valley State University

THURSDAY MORNING

Exhibit Hall A1

8:30 PREPARATION OF HOMOCHIRALLY SIMILAR SERINE ANALOGS FROM A COMMON INTERME- DIATE

Dale Rosado* and Douglas S. Masterson, University of Southern Mississippi, Hattiesburg, MS 39406

Recently, there has been much research in the area of unnatural (β , γ , and δ) amino acids. It has been shown that incorporation of such unnatural amino acids into protease specific sites in small peptides (such as peptide hormones) increases the in vivo half life of the peptide. This behavior could make such peptides powerful site specific drug delivery systems to cells, such as cancerous cells, which produce and use relatively large quantities of peptide hormones composed of natural (α) amino acids. Currently, synthetic routes to synthesize the unnatural analogs of the α -amino acids easily, inexpensively, and with sufficient enantiomeric yields does not exist. The goal of this project is to develop a method to synthesize the unnatural serine analogs via a common synthetic intermediate. Furthermore, the synthetic path chosen allows for synthesis of both enantiomers in sufficient chemical and enantiomeric yields. This synthetic path uses derivatized prochiral malonate diesters (Diethyl-2-[(benzyloxy)methyl]-2-methyl malonate), on which a desymmetrization enzyme (i.e. Esterases) can be used to hydrolyze one of the ester substituents to a carboxylic acid. This produces a chiral propanoic acid derivative with an enantiomeric excess of either the R or S enantiomer. The acid substituent can then be derivatized via combination of several well-known synthetic paths (Curtius, Wolff, Wittig), to give the unnatural serine analogs.

8:45 PHOTO-INDUCED POLYMERIZATION OF IONIC LIQUID MONOMERS

Zulma Jimenez^{1*}, John A. Pojman¹, Hui Zhou¹, Charles Hoyle¹, Andrew B. Lowe¹, and Mark Paley²,¹University of Southern Mississippi, Hattiesburg, MS, 39406 and ²A-Z Technology, Marshall Space Flight Center XD42, Huntsville, AL 35812

Real Time FTIR was used to measure the maximum photo-polymerization rates of tributylmethylammonium acrylate, methacrylate and (2-methacrylate)ethyl phosphate, which are novel ionic liquid monomers. These were compared with the rates for the component acids at 25 and 80 °C.

9:00 COMPARISON OF THE CORROSION EFFECT UPON WIRES AND PIPES UTILIZED IN SHIP- BUILDING

Matt Sword^{1*}, Steven Manis¹, and Ulises B. Chavez^{2,1}, Mississippi Gulf Coast Community College, Gautier, MS 39533, National Aeronautics and Space Administration, Stennis Space Center, MS 39522 and ²Northrop Grumman, Pascagoula, MS 39581

Northrop Grumman is one of the largest shipbuilders in the country and continues to deal with corrosion and conductivity of wires and cables used in ship construction. Cable and wire were stored at various locations on ships in preparation for installation when *Hurricane Katrina* flooded the shipyard. This resulted in over 5,000 reels of cable and electric wire being exposed to salt water for several days in varying degrees. Cable must pass certain manufacturer quality control requirements, i.e., chlorides not greater than 100 ppm. The testing for this requirement is outlined in Naval Testing Protocol. The Pascagoula Northrop Grumman staff is testing the rolls of cable to see what rolls can be saved or must be discarded. Northrop Grumman and the cable manufacturers supervised all testing to insure consistency, standardization, and test techniques.

9:15 AMIDE AND THIOAMIDE BASED RECEPTORS FOR ANIONS

Md. Alamgir Hossain, Jackson State University, Jackson, MS 39217

Design and synthesis of neutral receptors for anions are of current intense interest from the view of their sophisticated application in both environment and medicine. Amide based synthetic receptors provide necessary binding sites for anions through acidic NH groups. Because such receptors are soluble in organic solvent, therefore they could be useful in the application oriented field for separation and removal of anions of environmental relevance. We devised macrocyclic receptors containing four amido groups that show very strong affinity for both sulfate and phosphate. We also converted the macrocyclic amides to macrocyclic thioamides to increase the acidity of NH groups. Studies indicated that thioamide based macrocycles show superior binding affinity for anions. The details of the synthesis of new receptors, NMR binding studies and crystallo-

graphic structures will be presented.

9:30 A NOVEL METHOD TO SYNTHESIZE UNNATURAL CYSTEINE ANALOG

Kinkini Roy and Douglas S. Masterson*, University of Southern Mississippi, Hattiesburg, MS 39406

The aim of this project is to synthesize a wide variety of unnatural cysteine analogs (alpha, beta, gamma, delta) from a common synthetic intermediate. This should allow for the construction of amino acids in optically pure form and for the parallel preparation of both enantiomers. The general approach will be as follows: 1) preparation of the prochiral intermediates of malonic acid by using tert-Butylchloromethylsulfide 2) Using esterase to perform a desymmetrization of the prochiral intermediates 3) Analysis of the resulting chiral half ester intermediates 4) Formation of different amino acids : α (Curtius), β (Wolff, Curtius), γ (Wittig, Curtius), δ (Wolff, Wittig, Curtius) from that half ester. Once the synthesis has been achieved we can use that to prepare unnatural peptides with potential biological or enhanced biological activity.

9:45 DESIGN OF A PHOTOACTIVATED DNA-CLEAVING AGENT

Wolfgang H. Kramer*, B. Woods Curry, David T. Cutter, and Tiffany R. Hammond, Millsaps College, Jackson, MS 39210

The design of a photoactivated DNA-cleaving reagent has to combine the actual cleaving functionality and the DNA-binding properties in the same molecule. We used a fragmentable N-O bond as the cleaving functionality that produces an alkoxy radical and an heteroaromatic radical cation. Intercalators such as ethidium bromide have been widely used to bind to DNA but the actual binding properties of a variety of synthesized derivatives have been poor. Pyrrolo-[1,4]-benzodiazepines are groove-binders that require exact stereochemistry to have optimal binding properties. The synthesis of pyrrolo-[1,4]-benzodiazepines involves an interesting photochemical cyclization step that shows a remarkable memory of chirality effect via a 1,7-triplet biradical. This control of the stereochemistry enables the design of optimized pyrrolo-[1,4]-benzodiazepines where the cleaving functionality can be added.

10:00 Break

10:15 AQUEOUS ACYCLIC DIENE METATHESIS (ADMET) AS A NEW SYNTHETIC APPROACH FOR WATER-SOLUBLE MATERIALS WITH ANTIMICROBIAL ACTIVITY

Curtis Coumbe*, and Hans J. Schanz, University of Southern Mississippi, Hattiesburg, MS 39406

Water-soluble polymers with antimicrobial properties possess a broad application spectrum and the use of Acyclic Diene Metathesis (ADMET) as synthetic technique for these materials has yet to be explored. ADMET has to offer several

advantages over other polymerization methods, namely straightforward monomer synthesis, thermodynamically driven polycondensation kinetics, in ideal cases living character (lack of abortion mechanisms), and a high versatility and reactivity towards structurally very different substrates. Quaternary Ammonium Compounds (QAC's) are some of the most commonly used antimicrobials. Common polymeric materials bear positively charged ammonium groups as functional part of the side chains of a polymeric (usually polyacrylate) spine. In our investigations, we target the synthesis of diallyl or dipropenyldiammonium and diimidazolium salt monomers. Upon ADMET polymerization these monomers will be converted into linear polymeric materials incorporating the functional positively charged into the chain. In this presentation, we will discuss catalyst designs, synthetic concepts and initial results of our investigations.

10:30 PREPARATION OF HOMOCHIRALLY SIMILAR LYSINE ANALOGS FROM A COMMON INTERMEDIATE

Jessie Geoghegan and Douglas S. Masterson*, University of Southern Mississippi, Hattiesburg, MS 39406

The objective of this project is to develop a way to synthesize unnatural analogs of the amino acid, Lysine, from a common intermediate. The ultimate goal is to use these Lysine analogs to make small peptides which may potentially aid in cancer treatment. The unnatural amino acid analogs can be substituted into peptides in the place of the natural amino acids. It has been shown that the peptides with the unnatural analogs have a longer half life in serum than the peptides with the natural amino acids. These peptides may potentially be used to specifically deliver drugs to cancer cells. Diethyl methyl malonate is used as the starting material. N-(4-Bromobutyl)-phthalimide is then introduced as a protective side chain. This gives a prochiral diester. One of the ester groups is then hydrolyzed to a carboxylic acid to obtain a chiral ester/acid. From this, the enantiomeric excess can be determined. Several paths can then be used to convert the acid to unnatural α , β , γ , and δ amino acids. These paths include those of Curtius, Wolff, and Wittig.

10:45 ANALYSIS OF WOMBAT GASES INJECTED INTO AND ABSORBED BY SCRUBBING SOLUTIONS

Veronika Viner* and David L. Wertz, University of Southern Mississippi, Hattiesburg, MS 39406

Scrap tires filling landfills is a worldwide environmental problem and continues to grow every day. Although the rubber from these tires can be converted into useful low-grade rubber products or combined with asphalt to make roads, the rubber portion that still contains large amounts of steel is a problem and not easily recyclable because of the steel imbedded in it. The WOMBAT method is a viable process for converting high-steel tire chips into WOMBAT powder and other useful products. The gases synthesized from the process are passed

through a series of scrubbing solutions (aqueous KOH and water) and converted into potassium nitrate, a good fertilizer. FTIR was used to determine which gases were injected into but not absorbed by the scrubbing solutions. The spent KOH solution was evaporated until only crystals remained, and then WDXRD (Wavelength Dispersive X-ray Diffraction) and XRF (X-ray Fluorescence) were done to determine what the crystals were and what metal impurities they might contain. To quantify how much gas was actually being absorbed by the first scrubbing solution, the change in pH of the first scrubbing solution was measured and the solution was backtitrated to ~7 to determine the number of acidifying gas absorbed.

11:00 ASYMMETRIC CHROMIUM MEDIATED EPOXIDATION: A DETAILED INVESTIGATION USING MANUAL PARALLEL REACTION TECHNIQUES

Hans J. Schanz, University of Southern Mississippi, Hattiesburg, MS 39406

The asymmetric epoxidation of electron-rich olefins with chiral salen manganese and chromium complexes has been investigated thoroughly over the last decade. Despite many similarities between Cr and Mn-assisted epoxidation reactions such as structure and oxidation state of the active species, there are distinct differences in their spin states which result in different substrate selectivity for both metals. Most notably, the reactive oxo-Cr(V) species can be isolated and used as a reagent in a stoichiometric epoxidation reaction. In our investigations, we have employed parallel reaction techniques to determine the influence of various parameters (temperature, concentration of substrate, additive and catalyst) on product yield and enantiomeric excess for the catalytic and stoichiometric epoxidation of cis- β -methylstyrene. We have established important dependencies between catalyst performance and these parameters for one catalyst and based on these results, we suggest an expansion of the formulated epoxidation mechanism.

11:15 ELECTROGENERATED CHEMILUMINESCENCE OF BENZOPHENONE USING BENZOPEROXIDE AS THE COREACTANT

Wujian Miao, University of Southern Mississippi, Hattiesburg, MS 39406

Electrogenerated chemiluminescence (ECL) is a process of light generation by electrode reactions. ECL produced from electrochemically oxidized and reduced species is called "annihilation ECL", while "coreactant ECL" is produced from the interactions between electrochemically reduced or oxidized luminophore and a strongly oxidizing or reducing intermediate formed after the chemical decomposition of an electrochemically reduced or oxidized coreactant. We report here the coreactant ECL of benzophenone (BP) using benzoperoxide (BPO) as the coreactant. In acetonitrile (MeCN) containing 0.10 M tetrabutylammonium perchlorate (TBAP), BP displayed a

reversible redox process with a half potential value of ~-2.1 V vs Ag/Ag⁺ (10 mM) at a Pt electrode. Under the same experimental conditions, a broad irreversible reduction wave with a peak potential of ~-1.1 V vs. Ag/Ag⁺ was observed. Coreactant ECL of BP was obtained when a mixed BP and BPO MeCN solution was scanned between 0 and -3.0 V vs Ag/Ag⁺ at a Pt electrode. The ECL appeared immediately after BP reduction. Potential pulsing between 0 and -3.0 V vs Ag/Ag⁺ with a pulse period of 2 s was used to continuously generate the ECL so that the ECL spectrum centered at ~590 nm can be recorded with a CCD camera at -101 °C. In contrast, when the reaction medium was changed from MeCN to dichloromethane (DCM), only an irreversible reduction of BP at ~-2.1 V vs Ag/Ag⁺ was observed, although no significant change in cyclic voltammetry was found for BPO. Coreactant ECL of BP-BPO in DCM was observed but the light intensity was 3~4 times less than that obtained from MeCN. In addition, the ECL spectrum peak was shifted from ~590 nm in MeCN to ~630 nm in DCM. The relevant ECL mechanism will be proposed.

11:30 SOIL ANALYSIS OF LAND AFFECTED BY A CHEMICAL SPILL

Jennifer Ford^{1*}, Paul Wallace^{1*}, Steven Manis¹, and Mark Woodrey², ¹Mississippi Gulf Coast Community College, Gautier, MS 39553, National Aeronautics and Space Administration, Stennis Space Center, MS 39522, and ²Grand Bay National Estuarine Research Reserve, Moss Point, MS 39562

This project compared the soils of two designated sites on the Grand Bay National Estuarine Research Reserve. The first site was affected by a chemical spill from Mississippi Phosphates; the second site remained under normal conditions, with no chemical damage. The second site was used for comparison purposes. Phosphates and acidity are of interest as certain low pH levels prevent the soil from bonding with aluminum causing free radicals that kill biota. The extent of the soil damage was not analyzed prior to this investigation. The damage to the plant life was extensive indicating the contaminants were present, but the levels were unknown. This project will aid in the determination of the damage resulting from the spill and possibly help in the recovery process.

11:45 Divisional Business Meeting

THURSDAY AFTERNOON

Exhibit Hall A1

1:30 EVOLUTION OF TRANSIENT INTERFACIAL PHENOMENA IN MISCIBLE AND PARTIALLY MISCIBLE SYSTEMS

Gloria Viner* and John A. Pojman, University of Southern Mississippi, Hattiesburg, MS 39406

This study focused on the unusual interfacial phenomena of two different systems: IBA(isobutyric acid)/water and butanol/water. For this research project, how barodiffusion, temperature, and initial concentration affected these systems' diffusion process and interfacial tension are examined. Two different techniques to study interface dynamics were used: Laser Line Deflection (LLD) and Spinning Drop Tensiometer (SDT). Laser Line Deflection is a method in which a laser is used to measure diffusion coefficients via large concentration gradients and refractive index gradient at 1 g's. Spinning Drop Tensiometer is a method that involves interfacial tension measured at 50 g's. From these two methods, different behaviors were observed for IBA/water and butanol/water: IBA/water, in both LLD and SDT, had the aqueous phase "eating" the acidic phase while the butanol/water, for LLD, had the organic phase "eating" the aqueous, but, for SDT, the butanol/water's aqueous phase "ate" the organic phase. Despite some different behaviors for IBA/water and butanol/water, similar behaviors, such as sharp transition zones, were also observed.

1:45 X-RAY DIFFRACTION ANALYSIS OF SOIL FOR CLAY-MINERAL IDENTIFICATION

Patrick Heidingsfelder*, Patricia Villalta, and David L. Wertz, University of Southern Mississippi, Hattiesburg, MS 39406

Clay minerals have been identified in order to determine the viability of construction in specific areas. The presence of water-swelling clay minerals could have a negative impact on the structural integrity of the resulting structures. Clay fractions were separated from the bulk soil samples using a dispersing agent. The upper portion of this suspension was then collected in order to obtain the clays of the sample. The resulting slurry was then mounted on microscope slides. The clay particles were mounted as oriented aggregate mounts to force all particles to become linear. This packing was done for greater intensity of peaks when analyzed using X-ray diffraction. This must be done due to the random orientation of clays in nature. The XRD peak's were compared to known values to determine the composition of the clays.

2:00 RIBOFLAVIN-SENSITIZED PHOTOTRANSFORMATION OF BENZO[A]PYRENE

Xueheng Zhao*, Huey-Min Hwang, and Xiaoke Hu, Jackson State University, Jackson, MS 39217

Riboflavin (Vitamin B2) is a natural dye-sensitizer habitually present in natural waters. Effects of riboflavin as photosensitizer on the transformation of benzo[a]pyrene (BaP) in the aqueous-organic solvent (water/acetonitrile/methanol 50/40/10) were investigated in this study. We hypothesized that the behavior of BaP in the solvent was similar to that in water. The photolysis half-life of BaP (10 μ M) in solution containing 50 μ M riboflavin was 5 min, compared to 98 min in the absence of riboflavin. The rate of phototransformation of BaP increased as the concentration of riboflavin was raised from 10 μ M to 100

μ M under both natural sunlight and UVA irradiation. The half-life of BaP in the presence of 50 μ M riboflavin was 10.6 min and 43.1 min when exposed to visible range of natural sunlight and UVA irradiation respectively. Riboflavin decomposes under natural sunlight. Lumichrome, a principal photoproduct of riboflavin, was shown to photosensitize BaP under natural sunlight after photolysis of riboflavin. Our study indicated that other photoproducts from riboflavin, such as lumiflavin, were also involved in the phototransformation of BaP under sunlight when riboflavin diminished. The major photoproducts in the photolysis of BaP were determined as 1,6-benzo[a]pyrene-dione, 3,6-benzo[a]pyrene-dione, 6,12-benzo[a]pyrene-dione by using high performance liquid chromatography (HPLC). All these products were detected in the samples which were irradiated under different light sources and in the presence or absence of riboflavin. The possible phototransformation mechanism will be discussed. [supported by NIH-SCORE S06GM08047 (to JSU) and U.S. Department of the Army # DAAD 19-01-1-0733 and # W911NF-04-1-0327 to JSU].

2:15 DETERMINING THE INTERFACIAL TENSION USING A SPINNING DROP TENSIO METER

Elizabeth Parker* and John A. Pojman, University of Southern Mississippi, Hattiesburg, MS 39406

The interfacial tension of the isobutyric acid and water system was determined by using a spinning drop tensiometer (SDT). SDT utilizes high rotation speeds to measure the interfacial tension between a small drop of a light phase and a surrounding heavier phase. The specific method known as end-pinching was used to analyze the system. The end-pinching phenomenon occurs when the speed of rotation in the capillary is suddenly decreased. This reduction of rotational speed causes the drop to retract and breakup into smaller drops. The effective interfacial tension was determined by using the beginning and final drop size and the rate of retraction.

2:30 GRUBBS-TYPE METATHESIS CATALYSTS WITH FUNCTIONALIZED CARBENES FOR APPLICATIONS IN AQUEOUS MEDIA

Adam Roberts* and Hans J. Schanz, University of Southern Mississippi, Hattiesburg, MS 39406

The true potential of aqueous metathesis, i.e. its scope and limitations, has yet to be explored. The concept, while proven to be feasible for certain ruthenium (Ru)-based Grubbs-type catalysts, we find that water-soluble examples of such catalysts with an excellent performance profile remain elusive. This project targets the synthesis of novel Ru-based metathesis catalysts which bear functionalized carbene moieties which should enhance catalyst solubility in aqueous solvents. Therefore, we will exchange the initial carbene of highly active metathesis catalysts using functional olefins. For our investigations, we synthesize highly metathesis-active Ru-catalysts as reactive precursors for our investigations. Metathesis reactions

are predominantly thermodynamically driven and mechanistically represent a series of carbene exchange reactions. Carbene exchange with functionalized, monosubstituted olefins should afford catalysts with functionalized carbenes which ideally provide sufficient catalyst solubility in aqueous media. In our investigations, we determine catalyst activity and stability for aqueous ring opening metathesis polymerization (ROMP) reactions of water-soluble norbornene derivatives.

2:45 PHOTOCHEMICAL SYNTHESIS OF PYRROLO-[1,4]-BENZODIAZEPINES

David T. Cutter*, B. Woods Curry, Tiffany R. Hammond, and Wolfgang H. Kramer, Millsaps College, Jackson, MS 39210

Pyrrolo-[1,4]-benzodiazepines have been shown to be efficient DNA groove-binding reagents. Photochemically synthesized pyrrolo-[1,4]-benzodiazepines exhibit a remarkable Memory of Chirality effect over the course of the photochemical cyclization step. This control of the stereochemistry allows the design of novel pyrrolo-[1,4]-benzodiazepines with the use of the cheap building block anthranilic acid. Aromatic imides serve as chromophors and are introduced in the first step of the synthesis. Coupling with α -acids out of the chiral pool is adding a chiral element to the photochemical precursor which is then cyclized in the decarboxylative photocyclization.

3:00 MONITORING ISOTHERMAL FRONTAL POLYMERIZATION IN THIN-LAYERED CELLS VIA LASER LINE DEFLECTION

Chip Fillingane* and John A. Pojman, University of Southern Mississippi, Hattiesburg, MS 39406

The purpose of this research is to develop a method of monitoring fronts in isothermal frontal polymerization in a sample with minimal width using laser line deflection. As a part of this research a thin-layered cell is being developed, as well as a methods of increasing the resolution of laser line deflection. The thin-layered cell is being developed is designed to be inexpensive, in order to reduce costs incurred from the breakage of the cuvettes currently used. Lastly, the methods of analysis involved have been automated. This will open up opportunities to observe more systems, as well as systems where minimal quantities of material must be used due to expense.

6:00 Divisional Poster Session – Exhibit Hall B

MECHANISTIC ENZYMOLOGY OF 3-HYDROXY-ANTHRANILATE-3,4-DIOXYGENASE (HAD)

Amanda Mims¹*, Antonette Walker², and Aimin Liu², Tougaloo College, Tougaloo, MS 39174 and ²University of Mississippi Medical Center, Jackson, MS 39216

A key enzyme in tryptophan catabolism is 3-hydroxy-anthranilate-3,4-dioxygenase of HAD. Within tryptophan catabolism, the kynurenine pathway works to form quinolinic acid (QUIN). Quinolinic acid is effective in producing neuron

excitation in the central nervous system. Excessive levels of QUIN have been shown in patients with AIDS dementia, depression, Huntington's disease, and Alzheimer's. HAD is the last enzyme in the pathway. This enzyme utilizes a non-heme Fe and dioxygen to convert 3-hydroxyanthranilic acid (3-HAA) to 2-amino-3-carboxymuconate-6-semialdehyde (ACMS). These steps create QUIN non-enzymatically. In the past, several inhibitors have been used to reduce the activity or the formation of quinoline. Two specific inhibitors are 2-aminophenol and 3-ASA. Using a 20 micromolar concentration of each, the inhibitors were tested on two mutants of HAD, I142A and D49A, along with 1 microliter of a Fe solution and a 20 micromolar solution of 3-HAA. There were positive effects resulting in the further study of the inhibition of the enzyme. This research was supported by Mississippi Functional Genomics Network.

EVALUATION OF TECHNIQUES FOR DRYING AMORPHOUS PRECIPITATED SILICA

Cardell Givens* and Charles Smithhart, Delta State University, Cleveland, MS 38733

Synthetic amorphous precipitated silicas are used in many areas including free-flow additives for food, flattening agents in paint formulations, and fillers for tire and rubber applications. This material is often prepared by HCl or H₂SO₄ acid addition to aqueous sodium silicate solutions. As such, the silica requires some form of drying treatment before use. Commercial silicas contain up to 10% residual water even after drying. Though considered a non-hazardous nuisance dust, amorphous precipitated silica can be transformed through traditional convective/conductive heating into crystalline forms such as cristobalite that are known respiratory hazards. This study compares the effects on crystallinity and ignition loss when a commercial amorphous precipitated silica is heated using both a conventional convection/conduction muffle furnace and a microwave oven. The results indicate that microwave drying may offer a comparable drying method that does not induce crystallinity.

SYNTHESIS AND CHARACTERIZATION OF DIORGANO TIN COMPLEX OF ACETONE 4-ETHYL -3-THIOSEMICARBAZONE

Lungile Sitole¹, Ramaiyer Venkatraman^{1*}, Razaq Sweise², and Bohari M. Yamin^{2,1}, Jackson State University, Jackson MS 39217 and ²Universiti Kebangsaan, 43600, Bangi, Selangor, Malaysia

The reaction between 4N ethyl-3-thiosemicarbazide, Hetsc and diphenyl tin(IV) dichloride, Sn(C₆H₅)₂Cl₂ yielded crystalline compound, [Sn(C₅H₅)₂(eptsc)Cl]. Single crystal study of this compound revealed to be a monoclinic crystal system (space group P2(1)/n with a = 8.2500(12), b = 20.617(3), c = 12.5839(18) Å, V = 2039.4(5) Å³ and Z = 4). The monomeric form of the complex has a five-member chelated ring structure with distorted trigonal bipyramidal (TBP) geometry. The two phenyl-carbon atoms and the sulfur atom are located at the equatorial position whereas the chlorine and the azomethine

nitrogen atoms are present at the axial position. Elemental analysis, IR, proton NMR spectroscopy and electrical conductivity methods were used to characterize these complexes. The molar conductivity value of the complex suggests the existence of a 1:1 nonionic type of the complex.

THE SCOPE AND PRINCIPLES OF GREEN CHEMISTRY

Anil K. Sharma* and Shanise Brown, Mississippi Valley State University, Itta Bena, MS 38941

Chemistry is used in all walks of life. It is used in the production of all man-made materials from medicines to cleaning products. While these products seem to make life easier, the truth is that they may be more harmful than helpful. When some chemicals are made, more wasteful products are produced than useful. This results in money being lost through finding ways to get rid of or treat the waste. The waste could enter bodies of water or the air causing serious damage to organisms. Chemical substances were not looked at as a threat until the years around 1960. In later years several command and control laws were instituted. These laws deal with correcting the problem after it has occurred. Green Chemistry's purpose is to prevent the pollution problem before it starts. Green Chemistry is defined as "the utilization of a set of principles that reduces or eliminates the use or generation of hazardous substances in the design, manufacture, and application of chemical products." There are twelve principles of Green Chemistry and they are: prevention, atom economy, less hazardous chemical synthesis, designing safer chemicals, safer solvents and auxiliaries, design for energy efficiency, use of renewable feed stocks, reduce derivatives, catalysis, design for degradation, real time analysis for pollution prevention, and inherently safer chemistry for accident prevention. These twelve principles give the whole scope of Green Chemistry. Today Green Chemistry is being explored constantly. The world could be a cleaner and much safer place if Green Chemistry techniques were put into play for all actions everywhere.

THIOLATED POLYMERS (THIOMERS), NEW POTENTIAL MUCOADHESIVE DRUG DELIVERY VEHICLES?

Xiao Deng*, Andrew B. Lowe, and Robert C. Bateman, Jr., University of Southern Mississippi, Hattiesburg, MS, 39406

The purpose of the present study was to investigate the possibility and the benefit of thiolated polymers (thiomers) as new potential mucoadhesive drug delivery vehicles which facilitate and enhance the absorption and thus bioavailability of orally-administered therapeutics. We tried two kinds of thiomers. (1) Covalently bound L-cysteine to poly (acrylic acid). (2) Covalently bound L-cysteine to poly (4-vinylbenzyl chloride). A very low concentration of DBBr could label some of the thiol groups, while the thiomers still had lots of free thiol groups which could conjugate with hydrophobic drug. The next step is to conjugate hydrophobic drug with the thiomers, then check their mucoadhesive properties. We expect to find much improved

cohesiveness which is attributing to the formation of intermolecular covalent disulfide bonds between the free thiol functional groups on the thiomers. Such improved cohesiveness is a desirable feature since it reduces presystemic degradation (smaller exposed surface area of delivery vehicle), prolongs drug release, and improves patient compliance.

ELECTROCHEMICAL SYNTHESIS AND PHOTO-CONDUCTIVITY STUDIES OF POLY(N-VINYL CARBAZOLE)

Houssam Hajj Houssein, Delta State University, Cleveland, MS 38733

The green-colored conducting forms of poly(n-vinyl carbazole) (PVK) have well known photoconductive properties in the ultraviolet region of the EM spectrum. This study examines the electrochemical synthesis of PVK films doped with HSO_4^- and NO_3^- . Experimental variables included the use of ethanol and dichloromethane solvents under various conditions of monomer/dopant concentration, several electrode materials and geometries, and different voltage/current parameters. Photoconductivity response in the x-ray spectral region ($1.5 \text{ \AA}$) was also measured.

PREPARATION AND STRUCTURAL STUDIES ON THE DIORGANOTIN (IV) COMPLEXES WITH THIOSEMICARBAZONES OF CYCLOPENTANONE

Ramaiyer Venkatraman* and Alicia M. Beatty, Jackson State University, Jackson, MS 39217 and Mississippi State University, Mississippi State, MS 39762

The reaction of SnPh_2Cl_2 with cyclopentanone-3-thiosemicarbazone (HCptsc), and cyclopentanone-4-ethyl-3-thiosemicarbazone (HCpetsc) in methanol yielded the formation of penta-coordinated complexes $\text{Sn}(\text{Cptsc})\text{Ph}_2\text{Cl}$ (1) and $\text{Sn}(\text{Cpetsc})\text{Ph}_2\text{Cl}$ (2) respectively. The complexes were characterized by microanalysis, conductivity, IR and NMR spectroscopic methods. The X-ray diffraction study revealed that the complexes possess a trigonal bipyramidal geometry and crystallizes in the monoclinic crystal system, space group $P2_1/c$, with (1) $a = 8.5509(14)$, $b = 14.092(2)$, $c = 16.371(3) \text{ \AA}$, $\beta = 100.176(3)^\circ$, $V = 1941.8(6) \text{ \AA}^3$ and $Z = 4$, and (2) $a = 9.0459(14)$, $b = 22.922(4)$, $c = 11.3037(17) \text{ \AA}$, $\beta = 110.081(2)^\circ$, $V = 2201.3(6) \text{ \AA}^3$ and $Z = 4$.

PHOTOCHEMICAL SYNTHESIS OF DNA GROOVE-BINDING PYRROLO-[1,4]-BENZODIAZEPINES

Bentley Curry*, Tiffany R. Hammond, David T. Cutter, and Wolfgang H. Kramer, Millsaps College, Jackson, MS 39210

Pyrrolo-[1,4]-benzodiazepines have been shown to be efficient DNA groove-binding reagents. The correct twist is important to maintain the groove-binding properties. The decarboxylative photocyclization is offering an efficient way to synthesize a variety of pyrrolo-[1,4]-benzodiazepine derivatives. The stereochemistry is controlled by a memory of chirality effect

via the 1,7-triplet biradical intermediate during the photochemical key step. Variation of chromophor and linker allow access to new structures with different DNA-binding properties.

FRIDAY MORNING

Meeting Room 2

8:30 SEPARATION OF METALLIC NITRIDE FULLERENE (MNF) NANOMATERIAL MIXTURES VIA SELECTIVE ORGANIC FUNCTIONALIZATION

Helen Yu^{1*}, Katie Carpenter², Janice Paige Phillips¹, and Steven Stevenson^{1*}, ¹University of Southern Mississippi and ²Mississippi University for Women, Columbus, MS 39701

The recent discovery of metallic nitride fullerenes (MNFs) has led to an exploration of their fundamental properties and application areas. Enthusiasm is due, in part, to the unique structural arrangement of atoms. Namely, the inorganic metallic nitride nanocluster is trapped inside a carbon fullerene cage to form the MNF structure. The charge transfer of the cluster to the cage combined with the presence of transition and 4f block metals creates a new type of molecular structure for study. However, the availability of purified MNF samples for research is hampered. The expense and low throughput from HPLC and the difficulty in their isolation are due to a complex soot extract mixture containing empty-cage fullerenes (e.g. C₆₀, C₇₀, C₇₆, C₇₈, C₈₂, C₈₄, etc), classical metallofullerenes (e.g. no nitrogen encapsulated, Sc@C₈₂, Sc₂@C₈₄, Gd@C₈₄, etc), and MNFs (e.g. Sc₃N@C₈₀, Gd₃N@C₈₀, etc). In this research presentation, we describe an alternative approach to overcome these separation hurdles by taking advantage of differences in cage surface reactivity. Namely, we have discovered and developed selective reagents which preferentially bind to contaminant fullerenes but to a lesser degree the desired MNF nanomaterials. Results indicate the removal of significant quantities of contaminant fullerenes with isolable amounts of unreacted MNFs.

8:45 TOWARDS THE SYNTHESIS OF A PERYLENE-DIIMIDE WITH TRIPLE TAILS ATTACHED TO IMPROVE ITS SOLUBILITY

Amarachukwu Imediegwu^{1*}, Ramakrishna Samudrala², and Daniell L. Mattern², ¹Mississippi University for Women, Columbus, MS 39701 and ²University of Mississippi, University, MS 38677

Donor-sigma-acceptor-lipid molecules can be used as part of a miniature electrical circuit. If the donor and acceptor are chosen correctly, the circuit can rectify current (pass electricity in only one direction). A common acceptor molecule used is perylene-diimide, which can be attached to the donor molecule through one of its imide nitrogens. However, perylene-diimide is known to be very insoluble and so a lipid tail is attached to the other imide nitrogen to make the molecule soluble. The lipid tail

also aligns the molecules in a monolayer for electrical testing. Double "swallowtails" work particularly well. So we attempted to synthesize a triple swallowtail to see if it would work better. We began by displacement of a tetrabromide with three alkoxide groups. The plan was to then displace the fourth bromide with azide and then follow-up with the reduction of the azide to create a primary amine with triple swallowtails. The first reaction appears to have proceeded only part way. More vigorous conditions may be needed to replace three bromines.

9:00 SPHERICALLY-PROPAGATING THERMAL POLYMERIZATION FRONTS IN A SEQUENTIAL INTERPENETRATING POLYMER NETWORK

John A. Pojman^{1*}, Burcu Binici¹, Dionne I. Fortenberry², Kayce C. Leard¹, Marcus Molden¹, Nesrin Olten³, and Sam Popwell¹, ¹University of Southern Mississippi, Hattiesburg, MS 39406; ²Mississippi University for Women, Columbus, MS 39701, and ³Kocaeli Universitesi, Izmit Turkey

We demonstrate for the first time spherically-propagating frontal polymerization that also exhibits spin modes. We developed an interesting system in which we prepare a sequential IPN using the amine-catalyzed Michael addition of a trithiol to a triacrylate to create a rubbery gel. The gel suppresses convection and bubble formation during front propagation. A peroxide is also present to act as a thermal initiator. The front propagates via free-radical polymerization of the remaining triacrylate after being initiated photochemically in the center of the reactor. It is possible to prepare the rubbery gel in any shape and then initiate thermal frontal polymerization. So called 'spin modes' were observed for the first time in spherically-propagating fronts in which waves of polymerization propagate on the expanding spherical front.

9:15 RELIABLE SYNTHESIS OF A VERSATILE GRUBBS-TYPE METATHESIS PRECURSOR

Erika Shaffer* and Hans J. Schanz, Loyola University New Orleans, LA 70118 and University of Southern Mississippi, Hattiesburg, MS 39406

Over the past four decades, metathesis has evolved to become a highly valuable and versatile tool in organic and polymer synthesis. Since the early 1990s ruthenium-based Grubbs-type metathesis catalysts, in particular Grubbs' first and second generation catalyst and Hoyveyda-Grubbs catalyst, have immensely broadened the application spectrum of this reaction due to their high tolerance towards functional groups as well as moisture and molecular oxygen compared to homogeneous molybdenum-based systems. In our research project, we targeted the reliable synthesis of a well-known ruthenium complex with a 3-phenylindenylidene carbene moiety which is precursor to a highly active class of Grubbs-type catalysts. The advantages of the corresponding catalyst class is not only economically much more feasible than commercially available Grubbs-catalyst but also displays unique thermal stability combined with equal or

even surpassing catalytic activity. Moreover, the prepared catalyst precursor is much more robust than the according precursor to Grubbs' catalysts and therefore, has much more potential for catalyst modifications. Up to our research efforts, the shortcoming was the unreliable synthesis published in the literature which afforded a dimeric species more often than the desired complex. We have identified the dimeric species plus one intermediate of the formation for the precursor and developed a straightforward and reliable protocol its synthesis.

9:30 THE SYNTHESIS OF NEW AMINO-2-PYRIDINE CARBOXYLIC ACIDS AS LIGANDS FOR DESIGNING CRYSTALLINE HOST-GUEST MATERIALS

Ramadan Ali Bawa* and Alicia M. Beatty, Mississippi State University, Mississippi State, MS 39762

The design and synthesis of crystalline host-guest materials has recently been a topic of interest for a number of research groups. Hydrogen bonds are a significant tool in crystal engineering as they can be resilient enough to tolerate entering and departing guest molecules. Controlling the cavities of layered metal complexes is very important, since such materials can produce tunable electronic, magnetic, optical, catalytic and storage properties. Bidentate ligands such as 2,4- and 2,5-pyridine dicarboxylic acids have been studied and shown promising results with both Ni(II) and Co(II) salts. In order to combine metal-containing dicarboxylic acids with metal-containing amines, pyridine-based bidentate ligands containing amino groups will be synthesized. The resulting Ni(II) and Co(II) complexes and each of these bidentate ligands will be used to create pillared layered metal complexes. These new solids will be compared to previous complexes in terms of thermal stability, the strength of hydrogen bonding and flexibility toward accommodating the entering and departing of guest molecules.

9:45 TOWARD THE ORGANIC SYNTHESIS OF WATER-SOLUBLE PRECURSORS FOR METALLIC NITRIDE FULLERENE (MNF) PHARMACEUTICALS

Praveen Madasu*, Erin Fortenberry, Ryan Stephen, Janice Paige Phillips, and Steven Stevenson*, University of Southern Mississippi, Hattiesburg, MS 39406

Metallic Nitride Fullerenes (MNFs) of medical interest include the Gd₃N@C₈₀ structure, which contains an entrapped trimetallic gadolinium nitride nanocluster inside a carbon cage of 80 atoms. If it can be rendered water-soluble, the Gd₃N@C₈₀ MNF is of prime interest as an MRI contrast agent. However, as the MNF carbon cage surface is hydrophobic, it is necessary to develop a synthetic approach to impart water-solubility to the MNF cage via hydrophilic functionalization. In this presentation, we describe results for the synthesis of desired water-soluble precursor reagents. Upon preparation of these precursors, the hydrophilic functionality can be attached to the cage surface

using cycloaddition chemistry.

10:00 POLYMERIZATION SYSTEMS USING MICRO-ENCAPSULATED REACTION COMPONENTS

Sammy Popwell*, Brian McFarland, and John A. Pojman, University of Southern Mississippi, Hattiesburg, Mississippi 39406

Microencapsulation is a process by which a liquid or solid core material is surrounded by a continuous layer of polymeric material. Encapsulation offers the benefit of compartmentalizing individual reaction components, resulting in an increase in pot life for many systems as well as a controlled release to some degree. A significant increase in pot life of frontal polymerization systems has been achieved through the microencapsulation of thermal free-radical initiators via an interfacial polymerization process. Interfacial polymerization has also been used to successfully encapsulate Ruthenium based catalyst for use in metathesis polymerization. Current work focuses on encapsulating a tertiary amine via a novel encapsulation technique based on thiol addition chemistry. The amine would catalyze its own encapsulation by addition of a trithiol to a multifunctional acrylate to form a crosslinked polymer shell.

10:15 OXIDATION OF BENZO[A]PYRENE BY IMMOBILIZED LACCASE OF *TRAMETES VERSICOLOR* ON FUNCTIONALIZED KAOLINITE

Xiaoke Hu*, Xueheng Zhao, and Huey-Min Hwang, Jackson State University, Jackson, MS 39217

Benzo[a]pyrene (BaP) have toxic, mutagenic and/or carcinogenic properties and promote the great environmental concerns of contamination of soils and aquifers. Laccase of *Trametes versicolor* can oxidize aromatic compounds in the presence of mediator such as 2, 2'-azino-bis-3-ethylbenzothiazoline-6-sulfonic acid (ABTS). The laccase of *Trametes versicolor* was immobilized on the functionalized kaolinite particles in order to enhance the stability of the free enzyme. The functionalization of the kaolinite was demonstrated by using organosilane namely 3-aminopropyltriethoxysilane (APTES), which modified the surface properties of the kaolinite, enabling the kaolinite to be an effective support for immobilization of biological molecules. The results showed that the half life time ($t_{1/2}$) of the immobilized laccase to oxidize substrate is 58.5 h. After 87 hours oxidation, the amount of BaP in the reaction system was decreased to 36% of the initial concentration of 20 μ M. According to the HPLC analysis, the oxidation products including 1, 6-benzo[a]pyrene dione (1,6-BaQ), 3, 6-benzo[a]pyrene dione (3,6-BaQ) and 6, 12- benzo[a]pyrene dione (6,12-BaQ) were identified. The spread plate method was used to measure the cytotoxicity of the products mixture of BaP after oxidation by the immobilized laccase. The results indicated that the viability counts of heterotrophic bacteria assemblages of river water increased 18.3 times after the oxidation. Therefore, cytotoxicity of the products mixture was decreased significantly

after treatment with the immobilized laccase. This research was supported by (1) the U. S. Department of the Army grant # W911NF-04-1-0327 and (2) the National Institutes of Health (SCORE S06 GM08047) to Jackson State University.

10:30 Break

10:45 STABILITY OF CURCUMIN UNDER DOMESTIC COOKING CONDITIONS AND SYNTHESIS OF WATER-SOLUBLE CURCUMIN

Tamara Williams, Kristie Blair, and Jiben Roy*, Mississippi University for Women, Columbus, MS 39701

Curcumin is a bioactive compound found in the *Curcuma longa* plant (commonly known as turmeric spice) that is now considered to be a potential candidate for future drug for many diseases including cancer and Alzheimer's. As turmeric has been used as spice in many countries, it would be interesting to see the stability of curcumin under domestic cooking conditions. On the other hand, curcumin is insoluble in water, so water-soluble curcumin and its stability will be a plus to pharmaceutical and cosmetic industry. Curcumin was found to be stable when cooked in vegetable oil or refluxed in water. The detail results on the stability of curcumin as well as the synthesis of water-soluble curcumin by glycosylation in presence of Lewis acids will be presented.

11:00 HPLC OF METALLIC NITRIDE FULLERENE (MNF) CYCLOADDITION REACTION MIXTURES

Katie Carpenter¹*, Ryan Stephen², Janice Paige Phillips², and Steven Stevenson²*, ¹Mississippi University for Women, Columbus, MS 39701 and ²University of Southern Mississippi, Hattiesburg, MS 39406

The Metallic Nitride Fullerene (MNF) nanomaterials consist of an encapsulated trimetallic nitride cluster trapped within a carbon cage housing. Metals which can be encapsulated include Group IIIB and lanthanide elements. The carbon cage (e.g. 80 carbon atoms) surface reactivity can be "tuned" by judicious selection of the internal metal atoms. Results indicate that Sc₃N@C₈₀ and Gd₃N@C₈₀ MNFs have different reactivities and kinetics in cycloaddition reactions. Their reaction product mixtures contain an array of species including unreacted MNFs, monoadducts and higher adducts. Of interest is the bonding sites of the adduct to the cage carbons. To address questions of regiochemistry, we must obtain purified samples from reaction mixtures for X-ray crystallography studies. Results indicate that HPLC can successfully separate unreacted MNFs and their adducts.

11:15 HOT SCIENCE: COLD MOLECULES

Michael S. Elioff, Mississippi University for Women, Columbus, MS 39701

Ion imaging, developed by David Chandler of Sandia National Laboratories and Paul Houston of Cornell University,

is a technique for determining the velocity distribution of molecules or molecular fragments and then using that distribution to deduce the dynamic properties of the parent molecule. The technique has been applied to problems of chemical reaction dynamics, photofragment formation, inelastic scattering, and, more recently, cold molecule formation. In particular, the technique was used to measure the translational temperature of nitric oxide molecules translationally cooled via single collisions with argon atoms. We have produced significant numbers (10^8 - 10^9 molecules cm^{-3} per quantum state) of translationally cold NO(²_{1/2}, j'=7.5) molecules in a specific quantum state with an upper-limit laboratory velocity of 15 ± 1 m/s, corresponding to an 406 ± 23 mK upper-limit of temperature, in a crossed molecular beam apparatus. The technique, which relies on a kinematic collapse of the velocity distributions of the molecular beams for the scattering events that produce cold molecules, is general and independent on the energy of the colliding partner.

11:30 WATER DISPERSED MATERIALS

Jola Marszalek* and John A. Pojman, University of Southern Mississippi, Hattiesburg, MS, 39406

The focus of this study is to prepare hydrophobic polymeric materials in which an aqueous phase is distributed throughout the polymer matrix as droplets. Depending on the composition of the aqueous phase, the resulting material could respond to various external stimuli, such as magnetic fields, electric fields, or volatile compounds. The thin films are prepared via reverse microemulsion polymerization of a surfactant, water, and monomer mixture. The surfactant, Aerosol-OT is employed to encapsulate the nanometer-sized aqueous molecules within a surfactant monolayer. In determining the area of two-phase reverse microemulsion a phase diagram is created.

11:45 N-CHIRAL NICKEL COMPLEXES: HIGH DIASTEREOMERIC RESOLUTION UPON COORDINATION OF DIHYDROSALLEN LIGANDS WITH A CHIRAL BACKBONE

Ken Long* and Hans J. Schanz, University of Southern Mississippi, Hattiesburg, MS 39406

C₂-symmetrical 1,2-trans-diamines display remarkable versatility as chiral backbones with respect to their use in Asymmetric Synthesis. One of the most widely used ligand classes are C₂-symmetric salens, double Schiff base derivatives from chiral, vicinal diamines and two salicylaldehyde units. These tetradentate ligands are successfully used in manganese and chromium mediated asymmetric epoxidation reactions as well as the asymmetric, Co-mediated hydrolysis of racemic epoxides. In an effort to develop more powerful ligand designs, we synthesized an array of C₁-symmetric dihydrosalen ligands. In their corresponding Ni(II) complexes, the metal center is coordinated by an sp³-nitrogen atom, and subsequently, inversion at this nitrogen atom is terminated. As a result, a new chiral

center is formed, and in respect to the given chirality in the backbone, the two possible N-configurations result in two possible diastereomers. In our investigations, we have found a high degree of diastereomeric resolution for almost all complexes. The presentation will convey ligand and metal complex syntheses.

12:00 APPLYING SNELL'S LAW TO FRONTAL POLYMERIZATION

Shanna Lavergne^{1*}, Burcu Binici¹, Nesrin Olten², and John A. Pojman¹,¹University of Southern Mississippi, Hattiesburg, MS 39406 and²Kocaeli Universitesi, Izmit Turkey

Snell's Law gives the relationship between the angles of incidence and refraction for a wave passing through two media with different refractive indices. Different indices means different front velocities. We studied thermal fronts of triacrylate polymerization containing a clay filler. Two domains were created in which the concentration of peroxide initiator was different. The angle of the front at the interface was measured. Reasonable agreement with predictions of Snell's Law were found.

12:15 WATER-SOLUBLE N-HETEROCYCLIC CARBENE (NHC) LIGANDS: ACCESS TO WATER-SOLUBLE LATE TRANSITION METAL COMPLEXES

Matthew Anderson* and Hans J. Schanz, University of Southern Mississippi, Hattiesburg, MS 39406

Transition metal mediated catalysis based on complexes bearing water-soluble phosphines has become a widely investigated field. In contrast, research on the chemistry of NHC ligands, also called phosphine mimics, which provide solubility in aqueous media is still in its infancy. The complete or partial substitution of phosphine versus NHC ligands has expanded the application spectrum of several catalytic processes, namely Ru-mediated olefin metathesis and Pd and Ni-mediated C-C and C-N bond formation reactions. In our investigations, we have synthesized various water-soluble NHC ligand precursors by reacting N-substituted imidazoles with propane sultone or 3-bromopropanoic acid in a straightforward procedure. The resulting imidazolium salts readily form the respective bis-NHC silver(I) complexes upon reaction with Ag₂CO₃. We currently also investigate the use of these ligands for Grubbs-type Ru-based olefin metathesis catalysts. The presentation will convey the ligand and complex syntheses.

ECOLOGY AND EVOLUTIONARY BIOLOGY

Chair: Clifford Ochs, University of Mississippi

Vice-chair: Tom Mohrman, University of Southern Mississippi

THURSDAY MORNING

Meeting Room 7

8:30 Introduction to Session

8:45 THE INFLUENCE OF TESTOSTERONE AND MIGRATION ON THE RELAPSE OF *PLASMODIUM RELICTUM* IN EXPERIMENTALLY INFECTED GRAY CATBIRDS (*DUMETELLA CAROLINENSIS*)

Amanda Jo Williams^{1*}, Jennifer C. Owen¹, and Mary Garvin²,¹University of Southern Mississippi, Hattiesburg, MS 39406 and²Oberlin College, Oberlin, OH 44074

Birds chronically infected with avian malaria often experience relapse in the spring, but the mechanism behind this phenomenon is poorly understood. Two possible triggers of spring relapse are the elevation of testosterone (T) associated with the breeding season and stress from spring migration. To investigate the individual and synergistic effects of these variables, I will use the malaria parasite *Plasmodium relictum* and gray catbirds (*Dumetella carolinensis*). Fifty male hatch year gray catbirds (GRCA) will be infected via intramuscular inoculation, and ten uninfected birds will serve as negative controls. Spring migration will be simulated by photoadvancing birds in January to induce migratory restlessness. Testosterone will be elevated to levels observed during the breeding season with surgically inserted implants. Birds will be equally divided among the following six treatments: migratory with T-implant, migratory with placebo implant, non-migratory with T-implant, non-migratory with placebo implant, non-migratory with no implant, and negative controls (non-migratory with no implant). Prevalence and intensity of relapse will be monitored by microscopy of stained blood smears. I predict that relapse will occur at a greater rate in treatments undergoing migration and / or receiving T, with the greatest prevalence and intensity in the treatment receiving both.

9:00 VARIATION IN WHITE BLOOD CELL COUNT IN RELATION TO INTENSITY OF MALARIA INFECTION IN A PASSERINE BIRD

Ashley DeCoux*, Amanda Jo Williams, and Jennifer C. Owen, University of Southern Mississippi, Hattiesburg, MS 39406

The gray catbird (*Dumetella carolinensis*), a migratory passerine bird, is known to be infected with the blood parasite *Plasmodium relictum*. Poultry studies demonstrate that white

blood cells (WBC), particularly lymphocytes, increase in response to infection by *Plasmodium* spp. As part of a larger study, female catbirds will be infected with a frozen stabulate of *P. relictum* that will be passaged three times to increase parasite virulence. The goal of the present study is to determine the effect of multiple passages on the intensity of *P. relictum* infections and to assess the catbirds' immune response to the parasite infection by measuring WBC counts. Hatching year catbirds were captured in Ohio and blood was collected immediately following capture to obtain baseline data on parasite load. Birds were housed in individual cages located in University of Southern Mississippi's Biodafety Level 3 Animal Research Facility. After infection, birds will be bled daily until parasitemias become patent and every third day thereafter until parasitemias are no longer detectable by microscopy. To identify and count parasites and WBCs, a thin smear of blood will be made on a glass slide and stained using Hema-3 stain. Absolute counts of parasites and WBCs will be performed under oil immersion. We predict a positive correlation between parasite intensity and WBC count.

9:15 USE OF DREDGE MATERIAL ISLANDS BY PASSERINE MIGRANTS: IMPLICATIONS FOR CONSERVATION AND RESTORATION OF STOP-OVER HABITAT

Sarah Wheelless* and Frank R. Moore, University of Southern Mississippi, Hattiesburg, MS 39406

Conservation of habitat for Nearctic-Neotropical migratory birds should include not only tropical wintering and temperate breeding grounds, but also habitats in which birds rest and refuel during migratory journeys. Quality stopover sites are crucial to the survival of migratory birds, especially when sites are adjacent to large geographic barriers (e.g. Gulf of Mexico, Atlantic Ocean). Dredged material islands, many of which are located on the northern coast of the Gulf of Mexico, have traditionally been maintained as habitat for colonially nesting waterbirds or threatened and endangered species (Landin 1986). We suggest that these islands may aid in local and regional conservation of stopover habitat for migratory landbirds. Research was conducted on the Greenwood Island Mitigation Site, a dredge material island on the Mississippi Gulf Coast Gulf in Pascagoula, Mississippi. Transect surveys were conducted during the spring and fall migratory periods of 2004 and 2005. Over forty species of Nearctic-Neotropical landbird migrants were documented on the site. Passerine migrants were more often found in shrub habitats, while waterfowl and wading birds were distributed throughout the wetland and marsh habitats. On Greenwood Island and other dredge material islands, restoration efforts can include both the maintenance of marsh and wetland habitats as well as the establishment of native shrubs and fruiting vegetation, thereby providing quality habitat for both waterbirds and landbird migrants.

9:30 USE OF WEATHER RADAR IN STUDIES OF BIRD MIGRATION IN THE SOUTHWEST: OVERCOMING RADAR BEAM OBSTRUCTION

Rodney Felix*, Robert H. Diehl, and Frank R. Moore, University of Southern Mississippi, Hattiesburg, MS 39406

Much of what is known about migrating birds in North America has been inferred from studies in the eastern United States; little effort has been spent investigating migration west of the American Great Plains. My work is part of an effort, in collaboration with the U.S. Geological Survey, to understand flight behavior and habitat use during migration across the southwestern United States. The large scale of this study and nocturnal habits of migrating birds make traditional field-based data collection techniques logistically impractical. Alternatively, weather radar technology has proven valuable in studies of bird movement and is well suited for this research-- it can collect data across large spatial scales, operate continually, and automatically archive data for no-cost retrieval by the public. Unfortunately, mountainous terrain (which is common throughout the Southwest) can interfere with or block a radar's beam, and so contribute to inaccurate data collection. As a prerequisite for using radar data to address biological questions associated with migration in the Southwest, I am developing GIS-based methods for establishing where the data most reliably quantify migrating songbirds. By combining in a GIS archived weather radar data of migrating birds with models of how terrain features may interfere with a radar's beam, I have generated filters that conservatively determine which data are least effected by radar beam obstruction due to terrain. This represents a critical early step to preparing weather radar data for use in addressing biological questions important to understanding migration through the Southwest.

9:45 THE REGULATION OF GENDER EXPRESSION IN *CERATOPERIS RICHARDII* GAMETOPHYTES

Robert Hamilton, Mississippi College, Clinton, MS 39058

There are two basic morphologies among gametophytes of *Ceratopteris richardii*, the large meristic hermaphrodite and the small ameristic male. In vitro studies have indicated that the small male morphology is characteristic of multispore cultures, with single-spore cultures resulting in large hermaphrodites. The pheromone antheridiogen is known to cause the induction of the small ameristic male phenotype in *C. richardii* gametophytes. We investigated the effect of competition for nutrients on gender expression and the timing of the appearance of morphological changes associated with the antheridiogen response. Competition for nutrients had no effect on gender expression in our experiment. Morphological changes associated with the antheridiogen response were apparent upon the emergence of a 2 dimensional gametophyte from the spore wall. If the antheridiogen response is derived from competition for nutrients, there is no apparent remnant of an effect of competition for nutrients on gender expression in *C. richardii*. The appearance of a size dimorphism

that is associated with the antheridiogen response in the earliest stages of gametophyte culture suggests that the factors that trigger the antheridiogen response begin to affect gametophyte development at the earliest stages.

10:00 Break

10:30 TEMPORAL AND SPATIAL VARIATION OF METHANE (CH₄) EMISSION IN A SPRING-FED FORESTED WETLAND

Hong-Suk Koh, University of Mississippi, University, MS 38677

Methane emission rates from a spring-fed forested wetland in northern Mississippi were measured during the growing months (May- September 2005) using a field chamber method. There were significant differences in emission rates from the four different habitats in the wetland: submerged vegetation site, emergent vegetation site, seasonally flooded forest site, and upland forest site. The highest emission rates (average 19.27 mg CH₄/m²/hr) were recorded in June and July in the submerged vegetation site. The lowest emission rates (average 3.24 mg CH₄/m²/hr) were observed in May and September in the seasonally flooded forested site where water was drained. Methane consumption occurred at the upland forest site during all studied months (average -3.00 mg CH₄/m²/hr), suggesting that forest soils function as sinks of atmospheric methane. Methane emission rates were positively correlated with soil water content, standing water depth, and soil organic matter content. The movement of methane from anaerobic sediments through emergent plants into the atmosphere was found to provide a significant pathway for the emission of methane. Chambers enclosing plants had higher emission rates than plant-free chambers (controls) in the two dominant emergent species (*Festuca* spp. and *Hydrocotyle umbellata* L.) of the wetland. Positive correlations of methane emission rates with plant biomass and stem density indicate that vascular emergent plants play an important role as conduit of methane transport from the sediment to the atmosphere.

10:45 EFFECTS OF THE LIGHT ENVIRONMENT ON PRODUCTION OF BACTERIOPLANKTON AND PHYTOPLANKTON UNDER VARIOUS DEGREES OF NUTRIENT-LIMITATION

Clifford A. Ochs* and Fortune E. Ogbebo, Department of Biology, University of Mississippi, University, USA, 38677

In nutrient limited lakes, there is likely to be competition for nutrients between heterotrophic bacterioplankton and phytoplankton. If, as studies indicate, bacterioplankton and phytoplankton have differential susceptibilities to photoinhibition, the degree of nutrient competition will vary with light intensity and spectral composition. In summer 2003 we conducted a field experiment and laboratory experiments to test the hypothesis that the light environment interacts with the chemical environment to differentially impact phytoplankton and

bacterioplankton growth rates. The field experiment was conducted in Oxford, MS using 18-liter mesocosms under natural sunlight, with UV blocked or not, for seven days. The lab experiments were conducted using lamps allowing us to better control intensities of UVB, UVA, and PAR. Organic carbon and phosphorus were supplied to create either C or P-limitation, or neither C nor P limitation. In both kinds of experiment, there were significant main and interaction effects of UV and the UV-nutrient combinations on phytoplankton and bacterioplankton production. The magnitude of these effects on bacterioplankton and phytoplankton were unequal and varied with time of incubation. Our results suggest that the light environment can influence competitive interactions between phytoplankton and bacterioplankton.

11:00 CONTROLLING FACTORS OF SUBMERSED AQUATIC VEGETATION (SAV) IN GRAND BAY NATIONAL ESTUARINE RESEARCH RESERVE (NERR), MISSISSIPPI

Hyun Jung Cho* and Christopher A. May, Jackson State University, Jackson, MS 39217 and Grand Bay National Estuarine Research Reserve, Moss Point, MS 39562

Healthy beds of Submersed Aquatic Vegetation (SAV) protect shoreline, improve water quality, and provide food and nursery habitat for aquatic organisms. The extensive wildlife habitat of Grand Bay National Estuarine Research Reserve (GBNERR) offers educational, research, and recreational opportunities. However, little is known about factors that control and limit the SAV distribution and growth in GBNERR. We surveyed the SAV depth distributions along transects at five sites in June and October 2005 to assess the current areal coverage, species composition, and seasonality of the SAV beds. SAV growth was restricted to 1.3 m water depth. We will use our biweekly monitored PAR measurements to compute the annual mean light level at the maximum depth to find the SAV light requirement in GBNERR. The species composition differed between summer and the fall. *Ruppia maritima* dominated in summer surveys and *Halodule wrightii* replaced *R. maritima* in most of the sites by fall. Impacts of Hurricane Katrina were greater in areas exposed to the direct sedimentation. Sedimentation caused by storms is reported to directly bury SAV beds, but it also stimulates SAV growth in some cases by depositing new propagules and seeds in the transported sediment. Future surveys will explain the long-term effects of the recent hurricanes on Grand Bay NERR SAV.

11:15 EFFECTS OF MALATHION ON CHOLINESTERASE ACTIVITY IN BLUE CHANNEL CATFISH (*ICTALURUS FURCATUS*)

Winfred Aker*, Xiaoke Hu, Yuquan Zheng, and Huey-Min Hwang, Jackson State University, Jackson, MS 39217

The use of insecticides to protect crops from the ravages of insects is practiced worldwide. Organophosphates

(OPs) may exert their toxicity on insect pests by inhibiting the critical body enzyme cholinesterase. Unfortunately, they cannot discriminate in the exercise of their toxicity against unintended target organisms including humans. Therefore, an assessment of the danger posed to unintended targets is warranted. Of particular concern to aquaculture farmers in the state of Mississippi is the impact upon the catfish farming industry from OPs. Cholinesterases have been widely used as a biomarker for the assessment of exposure to organophosphate insecticides. In this study, Blue Channel Catfish (*Ictalurus furcatus*) were exposed to the following concentrations of the organophosphate insecticide Malathion: 0, 0.5, 1.0, 2.0, 2.5, 5, 7, 10 and 15 ppm. After 96 hours, the surviving catfish were sacrificed after using 0.1% 2-Phenoxyethanol as anesthesia. Brain, liver and muscle tissues were extracted and homogenized in pH 8.0 phosphate buffer. The supernatant of the homogenization was analyzed for cholinesterase activity using the Ellman Method. We hypothesized that all cholinesterases are inhibited after exposure to malathion. The results showed that the LC_{50} for the fingerling Blue Channel Catfish is between 10 and 15 ppm. The acetylcholinesterase activity was significantly inhibited in brain tissue especially at the concentrations > 5 ppm. The butyrylcholinesterase activity in muscle and liver tissues was not significantly inhibited. This research was supported by the U.S. Department of the Army Research and Development grant # W912H2-04-2-0002 to Jackson State University.

11:30 ENVIRONMENTAL VARIABLES AFFECTING ANT (FORMICIDAE) COMMUNITY COMPOSITION IN FOUR HABITATS IN MISSISSIPPI

JoVonn Hill*, Richard L. Brown, and Joe A. MacGown, Mississippi State University, Mississippi State, MS 39762

Numerous species of ants have habitat preferences and respond quickly to disturbances to their environment, making them valuable for habitat monitoring. However, the effects of various environmental variables remain uncertain. This study investigates the relationship of ant community composition to various habitat characteristics by comparing ant communities and 12 environmental variables across four habitat types in Mississippi. The four habitat types include pasture, prairie, and oak-hickory forests in the Black Belt and forests in the Flatwoods physiographic region. Ants were sampled using pitfall traps, litter sampling, baiting and hand collecting. NMS and ANCOVA both revealed three distinct ant communities (pasture, prairie, and "forests") between the four habitat types based on species composition and mean abundance per habitat type. Principal component analysis (PCA) partitioned the environmental variables into four axes with eigenvalues > 1 . Axis 1 divides the site into two types (open and forests), while axis two separates pasture from prairie. Multiple regression models using the four significant PCA axes revealed that total species richness was significantly affected by variation in the first two PCA axes. Forested sites

supported approximately nine more species of ants than prairies, and 21 more than pastures ($p = .0001$). Comparisons of ant functional group abundance were also made between the four habitat types with multiple regression models to investigate how the environmental variables affected certain groups of ants.

11:45 Divisional Business Meeting

GEOLOGY AND GEOGRAPHY

Chair: Barbara Yassin, MDEQ - Geology

Vice-chair: David Ufnar, University of Southern Mississippi

THURSDAY MORNING

Meeting Room 6

10:00 NATURAL DISASTERS IN MISSISSIPPI'S PAST AND FUTURE

Michael B. E. Bograd, Mississippi Office of Geology, Jackson, MS 39289

Mississippi has experienced natural disasters in the past, including earthquakes, hurricanes, tornadoes, floods, ice storms, droughts, and storm surges. With today's understanding of uniformitarianism, we can expect to suffer such events in the future. These events cause loss of life, property damage, crop damage, and significant economic impacts. Geologists are extending the record of these events into the geologic past through studies of sedimentological evidence left by hurricanes, dendrochronological evidence of hurricanes and droughts, paleoseismological studies of past earthquakes, and other methods. Mississippi will be impacted also by effects of long-term trends such as climate change (warmer/cooler, wetter/drier), sea level rise, rising sea surface temperatures, and cycles of increased numbers or severity of tropical storms. We will experience increasing flood disasters as growing populations develop coastal properties and flood plains, and as urbanization increases flash flooding. Geologists will engage these trends through: (1) geologic mapping; (2) studies of coastal erosion and accretion, coastal flooding, and barrier island migration; (3) geological engineering responses to natural hazards; and (4) by disseminating information about hazards and areas at risk. The challenge is to develop predictive capability and a distribution mechanism for information about hazards, based in the philosophy of Walter Hays that "natural hazards are inevitable but natural disasters are not."

10:20 HURRICANE KATRINA GIS RESPONSE

Barbara Yassin, Mississippi Office of Geology, Jackson, MS 39289

The GIS response to hurricane Katrina was prompt and well organized considering there was no structure to guide it. Agencies and private companies offered their data for use faster than we could download it. Problems arose as volunteers changed and sources and quality of data were not recorded. Some much-needed data had to be sought or created. We can examine what layers were used and at what stage of the response they were needed so we have a preparation guide for the future. Search and rescue maps, cell phone towers, power outages, and road/bridge closures were a top priority. Ice and water distribution soon followed and keeping track of shelters and their populations was ongoing. As responders started going door to door, parcel data were needed. The maps were given to the press, the Governor of Mississippi, and the President of the United States. With this guide we will know what layers to keep updated and archived in numerous places in the event of a future disaster of any scale. Also needed, but more difficult to provide, would be GIS contacts for the data and metadata, which gives the background and quality of the data. Ideally, these data would be held in a common clearinghouse for any responder to access whether or not the provider is available. We thought Camille was the worst, but Katrina proved that assumption wrong. We want to be ready for the next disastrous flood, tornado, earthquake, and hurricane.

10:40 THE IMPACT OF HURRICANE KATRINA ON THE PEARL RIVER MARSH

Jennifer Kuykendall* and Charlotte A. Brunner, University of Southern Mississippi, Stennis Space Center, MS 39529

The purpose of this study is to ascertain the damage caused to the Pearl River marsh by Hurricane Katrina. The marsh, which is located at the southern border of Mississippi and Louisiana, consisted of >5250 contiguous acres in relatively good condition. On August 29, 2005 Hurricane Katrina made landfall at the mouth of the Pearl River, with winds of 60 to 100 kts and storm surge ~8 m in height. Storm erosion reduced the surface area of the marsh by ~10%, based on aerial surveys reported by the U. S. Geological Survey (Smith, 2005). Visual inspection of the marsh confirmed the USGS report that Katrina greatly impacted the marsh. Observations showed that the marsh grasses thinned dramatically on the marsh surface, and ripped-up grass blades were strewn on high-marsh shrubs and high-ground trees. Tufts of grass have been exhumed such that the grass sits above the current sediment surface. Similarly, the mudflat was found to be concave up, indicating the removal of sediments. Channels through the marsh have widened due to slumping and the erosion of levees. Fresh downcutting on creek walls was also observed. A flood-deposited mud layer lies above the natural peat; the flood deposit is variable in thickness. Overall the impact of Hurricane Katrina's storm surge on the Pearl River

marsh is substantial, resembling the damage caused by a tsunami.

11:00 THE OAK HILL LIGNITE IN SOUTHEASTERN MISSISSIPPI: A POSSIBLE SOURCE FOR COAL-BED METHANE

David T. Dockery III and James E. Starnes, Mississippi Office of Geology, Jackson, MS 39289

Rising natural gas prices have fueled an exploration boom for new gas resources, including coal-bed methane. In the subsurface of southeastern Mississippi, Tertiary lignite seams with thicknesses greater than seven feet are candidates as possible sources of coal-bed methane. The most promising of these is the major seam in the Oak Hill Member of the Naheola Formation, a seam known as the Oak Hill lignite. This lignite occurs at depths of 2,700 to 3,000 feet in north-central Jasper County, where it is the target of an exploration well by Penn-Virginia Oil & Gas. Here the Oak Hill lignite varies from 10 to 20 feet in thickness. The geophysical log characteristics of this lignite are illustrated in Mississippi Office of Geology, Circular 3, p. 22, fig. 2, well #3. A continuous core of Tertiary strata will be taken in the Penn-Virginia Oil & Gas exploration well from 2,300 feet below the surface to 3,040 feet and will be stored at Mississippi State University. Important tops (below surface) in a nearby well, C. & H. Drilling #1 Board of Supervisors, include: Meridian Sand at 1,130', Hatchetigbee at 1,180', Bashi at 1,570', Tuscahoma at 1,600', Big Shale and top of Nanafalia at 2,120', Coal Bluff and top of Naheola at 2,690', Oak Hill at 2,810', Matthews Landing at 3,110', and Porters Creek at 3,125'.

THURSDAY AFTERNOON

Meeting Room 6

1:00 DRIER IN THE SUBTROPICS AND WETTER IN THE MID- TO HIGH LATITUDES: MODELING THE ALBIAN GREENHOUSE WARMING IN NORTH AMERICA

David Ufnar* and Greg A. Ludvigson, University of Southern Mississippi, Hattiesburg, MS 39406 and Kansas Geological Survey, Lawrence, KS 66047

The oxygen isotopic values of pedogenic, and exposed peritidal carbonates of the upper Glen Rose Formation provide a proxy record of meteoric-vadose evaporative enrichment. The isotopic values of the pedogenic calcites yield positive linear covariant trends (PLCTs) in $\delta d^{18}O$ vs. $\delta d^{13}C$ values. A 2-meter thick, sequence-bounding paleosol developed at the top of the Glen Rose Formation near Kerrville, Texas yields a meteoric calcite line (MCL) with a mean $\delta d^{18}O$ value of -3.8‰, and $\delta d^{13}C$ values that range from -3.7 to -4.8‰ VPDB. Pedogenic carbonate nodules and micrite-dominated domains yield a PLCT that

extends from the MCL to $\delta d^{18}O$ values of +1.1‰ and $\delta d^{13}C$ values of -2.7‰ VPDB. The PLCT results from pedogenic calcite precipitation from vadose fluids that were isotopically-enriched through evaporation. The PLCT trends have been used to estimate zonally-averaged evaporation rates at 25°N paleolatitude during the Albian greenhouse-warming. Terrestrial "greenhouse-world" paleosol-carbonate proxy records and quantitative reconstructions of the mid-Cretaceous hydrologic cycle show that heat transfer through the atmosphere via water vapor played a greater role in cooling the tropics and warming the high latitudes than at present. Albian moisture deficits between 7.5 and 30°N latitude were up to 3.6 x greater than present. The tropical moisture deficit in the upper Glen Rose Formation is estimated to represent an average heat loss of approximately 22 W/m² at 25°N paleolatitude (present heat loss via evapotranspiration is 8.5 W/m²). The increased amount of heat removed from the tropics was transferred poleward and released via condensation and contributed to increased polar warmth.

1:20 GREENHOUSE WORLD PROXY RECORDS IN THE LOWER TUSCALOOSA FORMATION, MISSISSIPPI

Michael A. Haney* and David Ufnar, University of Southern Mississippi, Hattiesburg, MS 39406

Siderite nodules (sphaerosiderites) in paleosols of the Lower Tuscaloosa Formation of southwestern Mississippi have oxygen isotopic values that are a proxy record for low-latitude precipitation oxygen isotopic values during the mid-Cretaceous greenhouse warming. This investigation will refine an existing model for the mid-Cretaceous hydrologic cycle of the Cretaceous Western Interior Basin (KWIB) and yield quantitative estimates for ancient precipitation rates and latent heat flux values. The oxygen isotopic values of paleosol siderite nodules have been analyzed from 35°N to 75°N paleolatitude in the KWIB, and they are a proxy record for mid-Cretaceous meteoric water isotopic values. The latitudinal trend in the mid-Cretaceous isotopic values is interpreted to be the result of an intensified hydrologic cycle, and has been quantified with a stable isotope mass-balance model. The intensified hydrologic cycle enhanced the transfer of tropical heat towards the poles, and preliminary quantitative estimates of latent heat flux (LHF) have been generated from the modeling results. The quantified LHF values are significantly greater than present, and may help resolve a long-standing data misfit between general circulation models of past greenhouse climates and empirical data. A critical limitation to the mass-balance modeling is a lack of data from the low latitudes. Sphaerosiderites in the Lower Tuscaloosa Formation will extend the paleolatitudinal gradient in meteoric $\delta d^{18}O$ compositions 10° further south to 25°N paleolatitude. These data will greatly improve the mass-balance model, and yield better quantitative estimates of paleoprecipitation, evapotranspiration, and LHF.

1:40 AN EXPERIMENTAL LAB EXERCISE USED TO DETERMINE IF MISSISSIPPI'S SCIENCE FRAMEWORK IS ADEQUATELY PREPARING HIGH SCHOOL GRADUATES TO MAKE INFORMED DECISIONS ABOUT GROUNDWATER

Rodney W. Beasley*, James H. May, and Darrel W. Schmitz, Mississippi State University, Mississippi State, MS 39762

According to the National Science Standards, eighth graders should possess appropriate knowledge about groundwater and its role sustaining life on Earth. There are two groups of students studied, Mississippi eighth graders and earth science students at Mississippi State University. Both groups are tested to identify what types of ideas they possess about groundwater. This information can be invaluable information for high school and post-secondary science teachers in addressing students' prior conceptions. In addition, the data could in so far give science educators insight on where curriculum revisions in the science framework are needed. Both groups were given one multiple choice question and one drawing exercise. The multiple choice question and drawing were both scored by a rubric for the evidence of understanding the formation, movement, and storage of groundwater. It is to be noted that from 5 Mississippi Public Schools, 92 percent of the eighth graders have naive conceptions concerning groundwater. At this point in time, the college student data for this exercise is still being analyzed.

2:00 Divisional Poster Session

COMPARISON OF TWO CANDIDATE SITES FOR GAS HYDRATES SEA FLOOR MONITORING

Carol Lutken^{1*}, Tom McGee¹, Allen Lowrie², Charlotte A. Brunner³, John C.⁴, Rudy Rogers⁵, Leonardo Macelloni¹, Allesandro Bosman⁶, Ken Sleeper¹, Jennifer Dearman⁵, J. R. Woolsey¹, and Leo Lynch⁵, ¹University of Mississippi, University, MS 38677, ²Picayune, MS 39466, ³University of Southern Mississippi, Hattiesburg, MS 39406, ⁴Stennis Space Center, MS 39529, ⁵Mississippi State University, Mississippi State, MS 39762, and ⁶University of Rome, Rome, Italy

Two known hydrates sites were examined by the Gulf of Mexico Hydrates Research Consortium for suitability for a seafloor station to monitor changes in the gas hydrate stability zone. Common at the surface and in the shallow subsurface of the world's continental slopes, hydrates of hydrocarbon gases represent a potential energy resource. Changes in temperatures and/or pressures can cause hydrates to dissociate into their component gases and water, altering stability of the sea floor and concentrations of gases in sea water, and, eventually the atmosphere. We compared sites of contrasting hydrate and depositional environments: Mississippi Canyon (MC) block 798 in a minibasin on the slumped west flank of the Mississippi Canyon and MC 118, ~75km east of the MC in a region largely unaffected by slumping. The locales were surveyed using several seismo-acoustic systems. Gravity and piston cores were ana-

lyzed for pore fluid chemistry, clay mineralogy, foraminiferal biostratigraphy, physical properties, and other variables. In MC798, methane hydrates occur removed from vent structures and apparently associated with near-surface muds; MC118 contains clear evidence of gas hydrates only in proximity to its vent. Sedimentation rates at MC798 were 3 to 7 times faster than those at MC118, possibly connected to increased delivery of organic carbon to drive bacterial methanogenesis in near-surface mud facies.

MISSISSIPPI WATERSHED CHARACTERIZATION AND RANKING TOOL

John J. Storelli, Information Management Systems, Vicksburg, MS 39180

The MWCRT uses geographic information systems (GIS) to assess the environmental parameters within the river basins of Mississippi. The general parameters of the tool are to assess readily available statewide spatial data layers within the sub-basins or 12 digit hydrologic unit codes. The assessments are used to characterize the sub-watersheds within each river basin. Each spatial layer will be placed into a broad category to determine its resource value on the environment, its human welfare component and to assess the stressors placed on each sub-watershed. These characterizations are used to calculate a score for each sub-watershed. The score of each sub-watershed is based on raw spatial data in the form of points, lines and polygons. The raw point, line and polygonal data are calculated as observations, miles and acres of data. Raw data values are normalized and weighted by relative importance to create the ranking system. Each data layer can then be assessed individually or combined to produce a ranking of each sub-watershed. The MWCRT provides a way to identify watersheds of interest, make meaningful decisions and to prioritize watersheds for protection and restoration activities. The purpose of MWCRT is to provide the Mississippi Department of Environmental Quality (MDEQ) and its state and federal agency partners with a tool to help manage the state's water resources.

2:30 Divisional Business Meeting

HEALTH SCIENCES

Chair: D. Michelle Tucci, University of Mississippi Medical Center

THURSDAY MORNING

Exhibit Hall B

Session 1: Cardiovascular, Chair: Lisa Haynie

8:00 Opening Remarks

8:02 MATRIX METALLOPROTEASE ACTIVITY IS INCREASED IN OBESE DOG KIDNEYS

Katrice Martin* and Jeffrey R. Henegar, Tougaloo College, Tougaloo, MS 39174 and University of Mississippi Medical Center, Jackson, MS 39216

Obesity is associated with changes in the extracellular matrix in the kidney including increases in collagen IV, glomerulosclerosis, and interstitial fibrosis. The extracellular matrix is maintained by a balance of production of matrix components by mesangial cells and fibroblasts and degradation of matrix components by matrix metalloproteases. It is unknown if the increase in extracellular matrix in the kidneys in obesity is due to an increase in production of or a decrease in degradation. Thus, the purpose of this study was to determine if matrix metalloprotease levels and activity are altered in obesity. We hypothesized that matrix metalloprotease activity would decrease thus allowing accumulation of extracellular matrix. Matrix metalloprotease activity was measured by zymography. Briefly, extracts of renal tissue were run on polyacrylamide gels containing either gelatin or casein. Gels were incubated in development buffer and lytic bands were visualized after staining with Coomassie Blue. The results show that both the 62kD collagenase and the 92kD gelatinase have increased activity in obese kidneys. There were no differences in the other metalloproteases present. These data suggest that metalloprotease activity is not responsible for the accumulation of extracellular matrix in obesity and, in fact, is working to decrease the amount of matrix. Thus, we conclude that extracellular matrix production and not decreased matrix metalloprotease activity is responsible for matrix accumulation in obese kidneys. This project was supported by the Mississippi Functional Genomic Network.

8:15 ROLE OF ALDOSTERONE IN MEDIATING HYPERTENSION AND TARGET ORGAN INJURY DURING OBESITY

Paul Brown* and Elizabeth Brandon, Tougaloo College, Tougaloo, MS 39174 and University of Mississippi Medical Center, Jackson, MS 39216

Obesity is a major risk factor for cardiovascular disease particularly hypertension. With the mechanisms involved still unclear, two studies were performed to examine the pathological changes associated with obesity. First, we tested whether obesity causes collagen accumulation in coronary arteries, leading to fibrosis and coronary artery dysfunction. Cardiac tissue from lean dogs and obese dogs fed a high fat diet for 6 weeks was stained with picrosirius red labeling collagen. An area of interest was defined using light microscopy and included the border of collagen around each coronary artery. To obtain the border containing collagen, the cross-sectional area of the artery was subtracted from the total artery area. In obese dogs, perivascular

collagen was 17.5% greater than in lean dogs, indicating early fibrosis in coronary arteries after only 6 weeks of high fat diet. The second study tested the hypothesis that down-regulation of 11 β -hydroxysteroid dehydrogenase 2 (11 β -HSD2), an enzyme that inactivates cortisol in the kidney, may contribute to obesity and hypertension by permitting renal mineralocorticoid receptor (MR) activation by cortisol. Western blots for 11 β -HSD2 were performed using kidneys from 4 lean and 4 obese dogs. While two obese dogs had high levels of 11 β -HSD-2, two had levels similar to the lean dogs. Preliminary results do not permit firm conclusions about the changes in 11 β -HSD2 during obesity.

8:30 EXPRESSION LEVELS OF ALLOGRAFT INFLAMMATORY FACTOR-1 (AIF-1) AND INTERLEUKIN-18 (IL-18) MIGHT PREDICT ALLOGRAFT REJECTION AFTER CARDIAC TRANSPLANTATION

Laura Piazza^{1*}, Charles Moore², Tammy Thomas², Sebron Harrison¹, Andy Barker¹, and D. Olga McDaniel²,¹University of Mississippi School of Medicine, Jackson, MS 39216 and²University of Mississippi Medical Center, Jackson, MS 39216

Background: Coronary vasculopathy (CV) is a major factor in long-term survival of heart transplantation. Inflammation might be a common background for both allograft rejection and CV. Cytokine gene arrays showed allograft inflammatory factor-1 (AIF-1) and interleukin-18 (IL-18) to be over-expressed in patients with severe rejection episodes. The specific objective was to determine the association of pro-inflammatory cytokines, specifically AIF-1 and IL-18, with allograft rejection scores to investigate their usefulness as prognostic markers. **Hypothesis:** Abnormal increases in pro-inflammatory cytokines may promote allograft rejection and vasculopathy following cardiac transplantation. **Methods:** Allograft recipients with varied rejection episodes were classified by histopathologic rejection assessment (grade 1A—3A/3B) and coronary vasculopathy. PBMCs were tested for AIF-1 and IL-18 expression using Reverse Transcriptase-PCR. Amplified DNA fragments were visualized using 2.0% agarose gel, and mRNA transcript levels quantified using UVP-8000 gel-base program. **Results:** mRNA transcript levels for IL-18 and AIF-1 expression were higher in samples from patients experiencing grade 3A allograft rejection compared to the same patient's expression in grade 0-1A and grade 2 rejections. A 1.1-fold increase in IL-18 and AIF-1 mRNA transcripts was observed in grade 3A rejection compared to grade 2 rejection, and 1.15-fold increase compared to grades 0-1A rejection. **Conclusions:** A direct correlation in the expression of AIF-1 and IL-18 and the clinical transplant results could provide a useful prognostic marker for the management of allograft rejection following heart transplantation.

8:45 THE IMPACT OF OBESITY ON VENOUS THROMBOSIS WHEN ASSOCIATED WITH TRAVEL

Kimberly C. Palmer, University of Mississippi Medical Center,

Jackson, MS 39216

Background: There are estimated 200,000 new cases of venous thrombosis each year. Obesity and extended travel are two major risk factors. With the high prevalence of overweight/obesity in Mississippi, this study explored the link between extended travel, obesity, and the risk for venous thrombosis. **Objectives:** This study investigated the risk of developing VTE due to extended travel and obesity, and associated risk factors. **Methods:** The qualitative technique of ethnography was utilized. Two field observations were conducted at 1) the airport in Jackson, MS; and 2) truck stop in Brookhaven, MS. Both locations were assessed based on gender, race, estimated age, health status, and estimated travel. **Results:** Estimated 50% of the passengers at the airport were overweight/obese. Smoking status could not be determined. It was observed at the truck stop, that 65% of truckers were overweight while 30% were obese. Ninety percent of the truckers had the risk factor of being smokers. Most of the truckers were extended travelers from other states. In comparing the observations, at least half of all participants were overweight/obese. The truck drivers appear to be more at risk due to the known overweight/smoking combination. **Conclusion:** There is a need to make the public, especially extended travel truckers, aware of their risk for venous thrombosis due to existing risk factors. Many cases of venous thrombosis could be avoided if the public were more educated on the importance of mobility during extended travel. More research is needed to explore the risk among truckers.

9:00 ADENOSINE A1 RECEPTORS IN THE METABOLIC SYNDROME AND CORONARY ARTERY DISEASE

Alexis Hand^{1*}, Michael Sturek², Pamela Llyod², and Joseph A. Cameron¹,¹Jackson State University, Jackson, MS 39217 and²Indiana University, School of Medicine, Indianapolis, IN 46202

In atherosclerotic cardiovascular disease (CVD), arteries are narrowed or completely blocked by atherosclerotic plaque. Metabolic syndrome, in humans, increases CVD risk. Previous studies from our lab have shown that activation of the adenosine A1 receptor (A1R) induces coronary smooth muscle cell proliferation; however, the association of A1R to CVD is unknown. Thus, the purposes of this study were to: 1) compare the effects of a high fat diet on development of metabolic syndrome and CVD in swine models and 2) determine whether A1R expression is altered by a high-fat diet. Male Yucatan and Ossabaw swine were treated for approximately 45 weeks with a normal low fat control diet (C) or a high fat/cholesterol (HF; 2% cholesterol) diet. Blood glucose and insulin during glucose tolerance test were obtained. Neointima formation was quantified using Verhoeff-Van Gieson stain of the left main coronary artery as an index of CVD. A1R receptor mRNA levels were measured in the left anterior descending coronary artery (LAD)

using real-time RT-PCR. Insulin to glucose ratios and neointima thickening were greater in the Ossabaw compared to the Yucatan swine, although no significant difference in A1R mRNA expression was found between C and HF swine. These results suggest that Ossabaw swine are a better model for metabolic syndrome and CVD, but the role of A1R is not clear. Supported in part by Am. Diab. Assoc., NIH RR013223, HL062552, R25 GM067592 and P01 AI56097-02S1.

9:15 Break

9:30 Poster Session 1, Chair: Lisa Haynie

SURVEILLANCE OF GRAM NEGATIVE BACTERIA IN NON ICU SETTINGS: ANTIMICROBIAL SUSCEPTIBILITIES AND PREVALENCE

Erin C. Wiggers*, Mallory Phillips, and Donna C. Sullivan, University of Mississippi Medical Center, Jackson, MS 39216

Infections due to multidrug resistant gram negative bacteria are very common in the ICU but have been generally less common in the non ICU setting. This report presents results from the first 2 years of a 5 year study to determine the pattern of infection and antimicrobial resistance in non ICU settings. We collected 100 gram negative bacterial isolates from hospitalized, non ICU patients. Isolates were identified, speciated, and resistance patterns were determined. Bacteria were grown in Mueller Hinton broth and stored in glycerol at -80°C . Standardized microtiter minimal inhibitory concentration (MIC) panels for 13 antibiotics were used. Most isolates were cultured from urine (43% in 2004; 37% in 2005), miscellaneous wound sites (29% in 2004; 26% in 2005), respiratory sites (22% in 2004; 25% in 2005), and blood (9% in 2004; 13% in 2005). The distribution of sites of isolation, particularly urinary tract and wound infections, reflects the type of patient in non-ICU settings. In 2004, the most common isolates were *Escherichia coli* (39%), *Pseudomonas aeruginosa* (22%), and *Enterobacter cloacae* (12%). In 2005, the most common isolates were *E. coli* (33%), *P. aeruginosa* (16%) and *Klebsiella pneumoniae* (15%). Rates of resistance to various antibiotics increased across the board in all species tested in 2005 compared to 2004, following national trends of increased resistance in both hospital and community acquired pathogens.

EVALUATION OF THREE POLYPHENOLS AS POTENTIAL CHEMOTHERAPEUTIC AGENTS

Katie Womack*, Maxine Anderson, Michelle Tucci, and Hamed A. Benghuzzi, University of Mississippi Medical Center, Jackson, MS 39216

Polyphenols are compounds that are natural plant antioxidants. Antioxidants have been shown to prevent damage caused by free radicals to DNA and other molecules. Polyphenols have demonstrated several cancer preventive properties. In addition to antioxidant activity, these compounds

may reduce abnormal cell growth and inflammation; help the body get rid of cancer-causing agents; and restore communication between different cells in the body. The objective of this study is to compare nontoxic phenols as cancer chemotherapeutic agents and to apply these agents in treating human cancers. In this study the effects of a single dose of 10 μM Green Tea Extract (ECGC), 5 μM Tannic Acid (TA), or 5 μM Thymoquinone (TQ) on Hep-2 cells were determined. Compounds were evaluated in their effectiveness to reduce cell number. The cells were also evaluated for membrane damage, and alterations in cellular morphology after 24, 48, and 72 hours in culture. The results showed a 50% reduction in Hep-2 cell numbers after 24 hours in TQ treated cells. After 48 hours, the cells treated with TQ and TA exhibited a four-fold decrease in total cell number compared to the control and ECGC treated cells. Cell numbers were similar in all treatment groups by 72 hours. At 48 hours the only significant increase in cell damage was seen in cells treated with ECGC. The results indicated that naturally occurring polyphenols given in a bolus dose could alter cellular viability. It appears the drug is either utilized by the cells or chemically degraded in the media leading to increased cell numbers back toward control values with time in culture. In order for the compounds to be effective chemotherapeutic agents, the data also suggests a need for continuous administration over bolus dosing.

DIFFERENTIAL EFFECTS OF CORTISOL ON NORMAL MRC-5 FIBROBLASTS AND HYPERTROPHIC LL-29 FIBROBLASTS

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Cortisol is a glucocorticoid secreted by the adrenal cortex that helps facilitate the body's response to stress and regulate the immune system. Glucocorticoid receptors can be found on most cell types and as a consequence, cortisol hormone plays an essential role on the bodies physiologic systems. Corticosteroids are commonly employed in the treatment of inflammatory and fibrotic pulmonary disorders. It is unclear as to whether cortisol elicits differing responses from normal fibroblasts in comparison to hypertrophic fibroblasts. The purpose of this experiment is to analyze the differential effects of cortisol on normal MRC-5 lung fibroblasts and hypertrophic LL-29 lung fibroblasts from a patient with idiopathic pulmonary fibrosis. The objectives of the experiment were to obtain and culture normal and hypertrophic lung fibroblasts, to treat cells with hypophysiological, physiological, and supraphysiological doses of cortisol for 24, 48, and 72 hour incubation periods and to analyze cellular activity using the methods of cell count, protein assay, MDA, and morphological evaluation. In LL-29 cells, supraphysiological levels of cortisol stimulated cell growth only in the 24 hour incubation period without showing any changes in protein levels or cell damage. In contrast, MRC-5 cells showed increased growth at 48 hours with a dose specific

increase and also had significantly increased protein levels. The largest increase in cell number was seen at the physiological concentration of cortisol in the MRC-5 cells. In conclusion, the two cell lines differ in their response to cortisol concentration in a dose and time dependent manner. Cortisol concentrations did not induce cellular damage throughout the experiment, and may be reflective of cortisol's role in membrane stabilization.

AQUEOUS *V. AMYGDALINA* EXTRACTS ALTER MCF-7 CELL MEMBRANE PERMEABILITY AND EFFLUX

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Breast cancer is the second leading cause of cancer related deaths of women in the United States. Several treatment strategies have been developed over the past decade to reduce cancer morbidity and mortality rates. While mortality rates have declined in some ethnic populations, overall cancer incidence continues to grow. It was recently reported for the first time that, cancer has surpassed heart disease as the leading cause of deaths in the U.S. Therefore, novel chemotherapeutic agents are needed to improve cancer treatment outcome. Previous studies show that low concentration (microgram/ml) of water soluble leaf extracts of a Nigerian edible plant, *V. amygdalina* (VA), potentially retarded the proliferative activity of human breast cancerous cells in vitro in a concentration-dependent fashion. Other reports show that the anti-proliferative activity of VA may be mitogen-activated protein kinase (MAPK)-dependent. The purpose of this study was to evaluate other mechanisms that could contribute to VA inhibitory actions. We hypothesized that VA exposure may compromise cell membrane resulting in alteration of efflux. To test this hypothesis, cells were incubated with 1 μ Ci/ml [3H] thymidine for six hours at 37°C. After incubation, cells were washed with PBS, medium was replaced with a fresh medium, and [3H] thymidine release into the supernatant was determined. Our results showed that exposure of cells to VA decreased [3H] thymidine uptake in a concentration-dependent manner ($P < 0.03$) but increased [3H] thymidine release into the supernatants ($P < 0.05$). Thus suggesting that the membranes in the VA treated cells have been compromised. Studies to access effects of VA on apoptosis are underway in our Laboratory. Acknowledgement: This work was supported in part by Research Centers in Minority Institution (RCMI)/NIH grant # G122RR13459-07S1; National Center for Minority Health Disparities (NCMHD)/NIH grant # P20MD000534-01; and JSU Center for University Scholars Program.

ACTIVATION OF Na^+/H^+ EXCHANGER AND ALKALIZATION AS A MEDIATOR FOR ALDOSTERONE-INDUCED VASCULAR FIBROSIS

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Background: Increased aldosterone is believed to

stimulate vascular fibrosis but the mechanisms involved are not clear. One mechanism that may link aldosterone with vascular fibrosis is activation of the Na^+/H^+ exchanger (NHE). The NHE transports Na^+ out of the cell in exchange for H^+ and is believed to regulate cell proliferation. In vivo studies have demonstrated that aldosterone can increase NHE activity and intracellular pH (pHi) in vascular smooth muscle cells (VSMC) and treatment with the mineralocorticoid inhibitor, spironolactone attenuates these effects. Whether these effects of aldosterone are mediated via hemodynamic effects, such as increased blood pressure, by sodium retention, or by direct effects on VSMC are uncertain, and whether aldosterone-induced vascular fibrosis is mediated via the activation of the NHE is also poorly understood. Objectives: To determine whether aldosterone directly stimulates NHE and increases pHi in VSMC. Methods: Vascular smooth muscle cells (VSMC) from rat aorta were isolated grown to confluence in cell culture media. Once confluent, the cells were made quiescent for 24 hrs and then treated with 10^{-9} M aldosterone or 10^{-9} M aldosterone plus 10^{-6} spironolactone for 24-hrs. Untreated control cells were studied for comparison with the treated cells. After 24-hrs, pHi was measured using a spectrofluorometer. To determine pHi, a non-carbonate solution and BCECF, an intracellular fluorescent dye, were used and the light density was found using a spectrofluorometer. Nigericin equilibrates pHi and pHe, and a calibration curve with known pH of 6.8, 7.2, and 7.4 was constructed in order to determine pHi. Student's t-test was used to analyze the data. Results: Aldosterone significantly increased pHi (7.8 ± 0.12) compared to the control (7.5 ± 0.08) group, and the aldosterone and spironolactone group (7.4 ± 0.08) had a significantly lower pHi compared to the aldosterone group. There were no significant differences between the control and aldosterone and spironolactone group. Conclusion: Aldosterone directly increases intracellular pH in VSMC and this effect was prevented by spironolactone.

SEXUAL DIMORPHISM IN RENAL NADPH OXIDASE ACTIVITY IN DAHL SS

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Salt sensitivity (SS) of blood pressure is a common occurrence in African American and aging individuals. SS Hypertension (SSHT) has been observed in the Dahl salt-sensitive rat (DS), and male DS develop higher blood pressure on high salt diet (HSD) than do females. Although HT is associated with increased oxidative stress (OxSt), its role in the sex differences in SSHT is unknown. Therefore, the hypothesis was tested that superoxide and NADPH oxidase activity are higher in kidneys from male DS. Methods: DS males and females were placed on HSD (8%) for 4 weeks. Rats were anesthetized, kidneys perfused and dissected into cortex and medulla, and homogenized. OxSt was measured by incubating homogenates with lucigenin (5 μ M) for chemiluminescent detection of superoxide. NADPH oxidase activity was measured

by adding NADPH (100 μ M). Results: After 4 weeks of HSD, basal superoxide was not different in cortex or medulla of male vs. female DS (cortex: 91.91 ± 1.42 vs. 94.40 ± 6.22 RLU/mg protein; medulla: 110.9 ± 25.31 vs. 117.4 ± 12.80 RLU/mg protein). NADPH-stimulated activity was also similar in cortex of males and females (792.25 ± 13.4 vs. 931.89 ± 79.93 RLU/mg protein), but was significantly higher in medulla of females than males (977.82 ± 64.92 vs. 1640.53 ± 155.12 RLU/mg protein, males vs. females ($p < 0.05$)). Conclusion: These data suggest that OxSt may play a role in SSHT in DS independent of the sex, but that the sex differences in NADPH oxidase activity cannot account for the sexual dimorphism of SSHT in DS rats.

EFFECTS OF SYNTHETIC FIRE ANT VENOM ALKALOIDS ON HUMAN CELLS

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The antibacterial activity of synthesized solenopsins, components of red imported fire ant venom, have been studied in our laboratory. These compounds were evaluated on the human monocyte line U937 to determine whether they are toxic for human cells at concentrations toxic for microorganisms. Viability of U937 cells following exposure to varying concentrations of solenopsin B and isosolenopsin B was determined by staining with trypan blue. Briefly, 1×10^6 U937 cells were plated in triplicate for six different concentrations (3, 10, 13, 20, 23, and 30 μ M) of solenopsin tested. U937 cells in media alone and in 3 and 10 μ M concentrations of solenopsin B continued to replicate, increasing half a $\log_{10}$ over 48 hours. Between 4 and 24 hours, cell counts and viability remained constant at 13 μ M concentrations and decreased at all other concentrations of solenopsin B. At 48 hours, cell viability was decreased by more than one and a half $\log_{10}$ at 30 μ M concentrations. Isosolenopsin B was less toxic with half a $\log_{10}$ decrease observed at 23 and 30 μ M after 24 hours when compared to media control. Thus, solenopsin B has a more profound and earlier detrimental effect on U937 cells than isosolenopsin B.

NERVE GROWTH FACTOR REGULATION OF ACID-SENSING ION CHANNEL 3 IN VASCULAR SMOOTH MUSCLE CELLS

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In the peripheral nervous system, the Acid-Sensing Ion Channels (ASICs), members of the Degenerin/Epithelial Na⁺ Channel protein family (DEG/ENaC), are putative mechanosensitive ion channel proteins found in some sensory neurons of the Dorsal Root Ganglia (DRG). Although the physiological role of ASIC proteins remains uncertain, they may

play a significant role in pain perception following tissue acidosis since ASIC channels are activated by decreases in pH. Dr. Drummond's lab has recently identified ASIC message and proteins (1, 2, and 3) are expressed in vascular smooth muscle cells (VSMC). In DRG neurons, Nerve Growth Factor (NGF) stimulates the expression of ASIC3. We want to determine if NGF also stimulates ASIC3 expression in VSMCs since the effect of NGF remains unknown. We performed reverse transcriptase-polymerase chain reaction (RT-PCR) to amplify ASIC3 message expression in cultured VSMCs treated with or without NGF overnight. The VSMCs were treated with NGF concentrations at 10 ng/ml and 50 ng/ml to compare any possible increases due to higher application of NGF. PCR products were separated by gel electrophoresis. We could not detect an increase in ASIC3 expression following treatment with NGF. This result suggests NGF may not regulate ASIC3 expression in cultured VSMCs. Future experiments will determine if cultured VSMCs express functional receptors for NGF by a method of Real-Time PCR, which will provide quantitative assessments.

EFFECTS OF CORTISOL ON RHESUS MONKEY KIDNEY CELL VIABILITY IN CULTURE

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Glucocorticoids are known to affect a variety of physiological functions e.g. stress response, and metabolic processes, e.g. gluconeogenesis, proteolysis and lipolysis, in specific tissues, particularly liver, skeletal muscle and adipose. However, the direct effects of glucocorticoids in kidney cell cultures have not been studied extensively. The purpose of this investigation was to further investigate the action of glucocorticosteroids at the cellular level and provide knowledge regarding the potential use of kidney cells to counteract the effects of kidney failure that often results from alteration or dysfunction of kidney tissues. Specifically the present study examined the effects of cortisol on the viability of Rhesus Monkey Kidney cells (RMKC) cells in culture. Rhesus monkey kidney cells were obtained from Diagnostic Hybrids, Inc. in Athens, OH. Cells were cultured for 24 and 72 hours in the absence and presence of cortisol (.1 ug/dl and 2 ug/dl) in Diagnostic Hybrids, Inc. pre-prepared media at 37°C in a 5% CO₂ incubator. At termination, cells were analyzed with the MTT assay for cell viability using a microplate reader at a wavelength of 550 nm. The results showed that cortisol slightly enhanced or maintained cell viability at 24 hours and 72 hours compared to control. These data suggests that the effects of cortisol on cultured kidney cell survival and metabolic functions may vary according to dose and duration of culture. Supported in part by NIGMS R25 GM50117.

THYMOQUINONE PROTECTS A549 CELLS EXPOSED TO LOW OXYGEN CONCENTRATION FROM CELLULAR DAMAGE

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Lung represents a unique tissue as it is exposed to various oxygen tensions and oxidants depending upon disease status and environment. Reactive oxygen species that are produced as byproducts of cellular metabolism, are toxic, and at low concentrations they are known to function as messengers in the signal transduction processes. Thymoquinone (TQ) is considered a potent antioxidant that has been used in traditional medicine to help alleviate symptoms and induce healing in respiratory disease processes. The goal of the project was to mimic lung disease process by reducing the cellular oxygen levels to 3% from normal 21% and evaluate the cell for cell viability as well as for cellular membrane integrity by MDA analysis and cellular morphology in the presence of TQ. The result of the investigation clearly show an increase in cellular damage in the low oxygen treated cells by 72 hours, which was reversed with the addition of TQ back toward control values. It is possible that TQ works to scavenge ROS induced by normal metabolic processes of the cells when held at low oxygen tension. If ROS is produced it can result in significant cellular peroxidation as seen in the low oxygen treated group as evidenced by increasing MDA levels. Low oxygen treatment of cells in the presence of TQ reduced these levels back toward control values. The data clearly supports the use of TQ as adjuvant in the treatment of respiratory diseases. Supported in part by NIGMS R25 GM50117 and REAP, NAS.

HEME OXYGENASE-1 DECREASES ANGIOTENSIN II DEPENDENT REACTIVE OXYGEN SPECIES PRODUCTION IN MOUSE THICK ASCENDING LOOP OF HENLE CELLS

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Heme oxygenase-1 (HO-1) induction can attenuate the development of angiotensin II (Ang II)-dependent hypertension. However, the mechanism by which HO-1 can lower blood pressure in this model is not clear. The goal of this study was to test the hypothesis that induction of HO-1 in the kidney can reduce the increase in oxidative stress in the thick ascending loop of Henle (TALH) during Ang II-dependent hypertension. Studies were performed on an immortalized cell line of mouse TALH cells. Cells were exposed to Ang II (10-12M) for 1 hour and the production of reactive oxygen species (ROS) were measured by the increase in dihydroethidium (DHE) fluorescence using confocal microscopy. HO-1 was induced in cultured mTALH

cells by treatment with cobalt protoporphyrin (CoPP), hemin (50 μ M) or by transfection with a plasmid containing the human HO-1 isoform. Treatment of mTALH cells with 10-12M Ang II increased DHE fluorescence from 35.5 ± 5 to 136 ± 18 RFU/ μ m². Induction of HO-1 via CoPP, hemin, or overexpression of the human HO-1 isoform significantly reduced Ang II induced DHE fluorescence to 64 ± 5 , 64 ± 8 , and 41 ± 4 RFU/ μ m², respectively. In order to determine which metabolites of HO-1 may be responsible for reducing Ang II mediated increases in ROS production in mTALH cells, cells were preincubated with bilirubin or the carbon monoxide (CO) releasing molecule, CORMA1 (100 μ M each) prior to exposure to Ang II. DHE fluorescence averaged 80 ± 7 RFU/ μ m² after incubation with Ang II and was significantly decreased to 55 ± 7 and 53 ± 4 RFU/ μ m² after pretreatment with bilirubin and CORMA1. These results demonstrate that induction of HO-1 in mTALH cells reduces the levels of Ang II mediated ROS production through both the production of bilirubin and CO.

SURVEILLANCE OF GRAM NEGATIVE BACTERIA IN THE ICU: ANTIMICROBIAL SUSCEPTIBILITIES AND PREVALENCE

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Infections due to gram negative bacteria are very common in the ICU. Increasing antimicrobial resistance has made such infections very difficult to treat. This report presents results from the first 3 years of a 5 year study to determine the pattern of infection and antimicrobial resistance in the ICU. We collected 100 gram negative bacterial isolates from the ICU. Isolates were identified, speciated, and resistance patterns were determined. Bacteria were grown in Mueller Hinton broth and stored in glycerol at -80°C . Standardized microtiter minimal inhibitory concentration (MIC) panels for 13 antibiotics were used. Most isolates were cultured from sputum (43% in 2003; 33% in 2004; 51% in 2005), respiratory sites (33% in 2003; 34% in 2004; 22% in 2005) and blood (10% in 2003; 18% in 2004; 9%). In 2003, the most common isolates were *Enterobacter cloacae* (20%), *Pseudomonas aeruginosa* (16%) and *Klebsiella pneumoniae* (14%). In 2004, *E. coli* accounted for 20%, *K. pneumoniae* 14%, and *P. aeruginosa* 12% of the isolates compared to *K. pneumoniae* (22%), *E. coli* (18%), and *P. aeruginosa* (17%) for 2005. In 2003, susceptibility of the most common isolates to ciprofloxacin was 91.4% but dropped to 81% in 2004 and 72% in 2005, following the national trend of 76%. Additional changes have been noted and analysis of prescribing patterns in patients from whom isolates were obtained is ongoing.

ASSESSMENT OF SURVIVAL RESPONSES OF A549 CELLS TO MODULATION OF INTRACELLULAR ENERGETICS

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Studies showed that tumor growth and abnormal cell survival was associated with a number of metabolic abnormalities. Glucose metabolism deranged, lipoprotein-lipase activity depressed and protein metabolism showed abnormality as revealed by changes in plasma amino acid profile and evidenced by increased plasma free tryptophan levels in patients with breast, lung, colon, stomach, and other cancers from various origins. Glucose was established to be the main energy source in cancer cells. However, cancer cells were not able to utilize aerobic respiration due to either defective mitochondria or hypoxia within the tumor microenvironments. The role of energy modulation and the use of glycolytic inhibitors on cancer cell survival are not clearly established in the literature. Therefore, the purpose of this study was to evaluate five glycolytic inhibitors namely, sodium ascorbate, oxalic acid, oxaloacetic acid, sodium citrate and fructose diphosphate (FDP) on A549 cell line exposed to 10, 100, 400 and 800ul of a 1% solution of each for 48h and tested with phase contrast microscanning to determine their influence on cell survival. Oxalic acid and oxalacetic acid both influenced the PH of the medium and resulted in massive cell debris within the exposure period and at 400 and 800 ul levels. Sodium ascorbate, Sodium citrate and FDP did not cause PH changes or massive cell debris even at the highest concentration. However, they caused detectable cell disfigurement and the cells generally remained attached. Future studies will focus on the mechanisms of survival/death in response to modulation of cellular energetics in cancer. Supported by NIGMS R25 GM50117 and RISE NIH

ASSOCIATION OF SERUM TOTAL BILE ACID CONCENTRATIONS WITH INCIDENCE OF FATTY LIVER HEMORRHAGIC SYNDROME AND F-STRAIN *MYCOPLASMA GALLISEPTICUM* INFECTION IN COMMERCIAL LAYING HENS

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Fatty Liver Hemorrhagic Syndrome (FLHS) incidence in chickens may be increased by F-strain *Mycoplasma gallisepticum* (FMG) infection and may also result in decreased egg production. The plasma enzymes aspartate aminotransferase, lactate dehydrogenase, and glutamate dehydrogenase have increased profiles in birds with liver damage and could possibly be used to diagnosis FLHS. In this study, we investigated whether or not total bile acid levels in the serum of egg-laying chickens change with FMG inoculation and incidence of FLHS. Day-old Single Comb White Leghorn pullets of a single genetic strain (Hy-line W-36) were obtained from a commercial source

that was monitored certified free of MG and *Mycoplasma synoviae* (MS). At 22 wk of age, 120 sham- (control) and 120 FMG-inoculated (treated) birds were randomly assigned to individual cages in one of two enclosed and isolated ends of a caged layer facility. At 58 wk, all bled birds were euthanized, and livers from both groups were examined for FLHS. Serum total bile acid concentration was determined in serum from birds in control and FMG-vaccinated groups with and without FLHS. There were no significant main effects or interactions due to FLHS incidence or FMG treatment on serum total bile acid concentration.

COMPARISON OF HEP-2 CELLULAR FUNCTION FOLLOWING EITHER A BOLUS ADMINISTRATION OR CONTINUOUS SUSTAINED RELEASE OF IP-6

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Inositol 6-phosphate (IP-6) has demonstrated novel anti-cancer activity using several different tumor models. IP-6, or phytic acid, has antioxidant properties that directly act to inhibit cancer cell growth. In previous experiments cells treated with a single treatment dose of IP-6 (1 mM) showed a decrease in number only at 72 hours. The goal of this experiment was to deliver IP-6 in a sustained continuous manner for periods of 24, 48 and 72 hours to Hep-2 cancer cells and compare the changes in cell growth and morphology with a single bolus dose of IP-6. Our results indicated that IP-6 administered as a bolus dose or in a sustained continuous manner was unable to reduce Hep-2 cell numbers after 24 hours. By 48 and 72 hours an approximate 50% increase in cell numbers were seen in both IP-6 groups. The dose of IP-6 given did not induce changes in cellular protein concentrations nor increase cellular membrane change. Morphologically, the cells appeared small, round to cuboidal with dark eccentric nuclei and scant cytoplasm, and when given IP-6, the cells showed degeneration with irregular cell borders and hyperchromatic nuclei. Overall, IP-6 induced Hep-2 cell proliferation; however, further evaluation of the Hep-2 cytology revealed significant cellular degenerative changes.

DEVELOPMENT OF A FISH MODEL TO STUDY ALCOHOLIC LIVER DISEASE

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Alcoholic liver injury is generally divided into four stages, hepatic steatosis (fatty liver) early fibrosis, alcoholic hepatitis and cirrhosis. The prevalence of cirrhosis in chronic alcoholics is relatively low, about 18% of individuals that drink heavily over extended periods of time develop cirrhosis. Since many individuals that drink heavily do not develop alcoholic cirrhosis other genetic or environmental factors must contribute to cirrhosis in addition to the amount and period of alcohol use. Identification of genetic or environmental factors that contribute

to alcoholic liver disease has been hampered by the lack of alcoholic disease models that can be both manipulated genetically and controlled environmentally. Rodent models have proven ineffective as rodents do not readily consume alcohol and under most conditions do not develop end stage alcoholic liver disease. Models based on primates are expensive and are not suitable for genetic studies. Small fish such as the zebrafish offer a convenient model. The fish can be treated with ethanol simply by adding it to the aquarium water, and since the fish are inexpensive, large numbers of the fish can be housed and treated. Extensive information is available relating to genetics of zebrafish, and it has been proven efficient as a subject for gene manipulation techniques. Preliminary studies have demonstrated that zebrafish can be treated with 50 mM ethanol for up to 5 months without morbidity. The liver increases in size dramatically, and undergoes significant morphological changes. Fatty acids isolated from livers of ethanol treated fish are more saturated and the chain length is longer as compared to the untreated livers. The ethanol treated fish consumed food slower than controls, but no significant difference in body weight was measured.

MERCURY-INDUCED EXTERNALIZATION OF PHOSPHATIDYLSERINE IN HUMAN LIVER CARCINOMA CELLS

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Programmed cell death (apoptosis) is a normal physiologic process, which occurs during embryonic development as well as in the maintenance of tissue homeostasis. It functions as a mechanism to eliminate unwanted or irreparably damaged cells. However, inappropriate induction of apoptosis by environmental agents has broad ranging pathologic implications and has been associated with several diseases including cancer. The toxicity of several heavy metals such as mercury has been attributed to their high affinity to sulfhydryl groups of proteins and enzymes, and their ability to disrupt cell cycle progression and/or apoptosis in various tissues. The aim of this study was to assess the potential for mercury to induce early-stage apoptosis in human liver carcinoma (HepG₂) cells. Annexin-V assay was performed by flow cytometry to determine the extent of phosphatidylserine externalization in mercury-treated HepG₂ cells. Cells were exposed to mercury for 10 hours at doses of 0, 1, 2, and 3 µg/mL based on previous cytotoxicity results in our laboratory indicating an LD₅₀ of 3.5 ± 0.6 µg/mL for mercury in HepG₂ cells. The study data indicated a dose response relationship between mercury exposure and the degree of early apoptosis in HepG₂ cells. The percentages of cells undergoing early apoptosis were 0.03 ± 0.03%, 5.19 ± 0.04%, 6.36 ± 0.04%, and 8.84 ± 0.02% for 0, 1, 2, and 3 µg/mL of mercury respectively, indicating a gradual increase in apoptotic cells with increasing doses of mercury. Supported in part by NIH 12RR13459,

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RESEARCH TO ASSIST SINGING RIVER HOSPITAL'S CANCER CENTER MEDICAL STAFF IN DEVELOPMENT OF A CLINICAL RESEARCH TRIAL INVOLVING RADIATION THERAPY FOR PATIENTS WITH BONE METASTASES

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The Singing River Hospital System (SRHS) Cancer Grants Program developed a clinical research trial testing a radiation therapy treatment dose schedule of 550 cGy for each of three treatments as palliative therapy for cancer patients with bone metastases. The student was involved in researching and writing the background section supporting the proposed treatment dose schedule. In addition, the student assisted the investigators in writing and formatting the study document for final review and approval by the Scientific Review Committee at the SRHS. The final aspect of this project involved working with the regulatory staff in the cancer clinical research office to write the informed consent form for the study, complete the Institutional Review Board (IRB) application and submit the study with application to the SRHS IRB for approval and activation.

DEVELOPMENT OF THE PHARMACEUTICAL POLICIES, PROCEDURES, AND TRACKING FORMS FOR STUDY-RELATED AND SUPPLIED DRUGS OR DEVICES FOR THE CANCER CENTER CLINICAL RESEARCH OFFICE STAFF OF SINGING RIVER HOSPITAL

Victoria Olson^{1*} and Marguerite Clarkson^{2,1} Mississippi Gulf Coast Community College, Gautier, MS 39533, National Aeronautics and Space Administration, Stennis Space Center, MS 39522, and²Singing River Hospital Cancer Research Center, Pascagoula, MS 39581

The Singing River Hospital (SRHS) Cancer Center Office of Clinical Research (OCR) needed to establish policies, procedures and tracking systems for the pharmaceuticals and devices supplied by the study sponsors for clinical trials activated for patients in the cancer center. The internship involved research of the NHI, FDA, and study sponsor regulations relating to study drug procurement, monitoring, dispensing and auditing. Using the regulations, guidelines were given to the OCR staff and SRHS pharmacy staff for revising and updating existing policies for study drugs. The project allowed the pharmacy and OCR staff to set up a monitoring and tracking system (paper as well as computer).

THE EFFECTS OF INCREASING H₂O₂ CONCENTRATIONS ON THE VIABILITY AND MORPHOLOGY OF A549 CELLS
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Before the discovery of antibiotics in the 1920's, physicians were infusing hydrogen peroxide to help fight infections. Hydrogen peroxide is a natural substance manufactured in all our bodies. It is a product of what is called intermediary metabolism in the body and it participates in a significant number of biochemical reactions in the body. The body causes a rapid reduction of hydrogen peroxide to water and by an enzyme, called catalase, which catalyzes (breaks down) the reaction of hydrogen peroxide plus water to oxygen plus two water molecules. However, the practice remains controversial.

The aim of this increase in oxidative reactions in the body is to help regulate tissue repair, cellular respiration, immune functions, the energy system, most hormone systems and the production of cytokines. Therefore, the objective of this study was to determine the effects of low (44.1 µM), medium (88.2 µM) and high (220 µM) concentrations of hydrogen peroxide on cellular viability and morphology after periods of 24, 48 and 72 hours. The results of the experiment show that low and high levels of hydrogen peroxide affected initial cellular numbers. By 48 hours the low-level treatment had numbers similar to control, and by 72 hours the low-level treatment resulted in higher number of cells. This suggest that low level treatment may actually stimulate cellular repair mechanisms. Cellular damage was evident in the medium and high treatment doses by 48 and 72 hours. Cellular morphology showed the greatest changes in the high and medium dose treatments by 48 and more substantial degradation of the cell by 72 hours. Low dose treatment by 72 hours showed increased number of cells, which appeared similar to control in cellular detail. The data suggests that low level hydrogen peroxide treatment does not cause significant cellular damage, and may also help stimulate cellular repair mechanisms as indicated by increased cell numbers by 72 hours. Supported in part by NIGMS R25 GM50117 and REAP.

METHODS USED FOR DETECTING BACTERIAL CONTAMINATION IN PLATELET PRODUCTS BY BLOOD SUPPLIERS TO SOUTH MISSISSIPPI AND LOUISIANA
Lori Mosley, University of Southern Mississippi, Hattiesburg, MS 39406

Bacterial Contamination of platelet products has become the number one risk associated with transfusion-transmitted infections in the United States. This heightened risk is due to the storage requirements of platelet products. These products must be stored at room temperature, which provides an excellent environment for bacterial growth. To date, there has been no

common methodology determined in which to test platelet products for bacterial contamination. However, in March 2004, the American Association of Blood Banks (AABB) implemented a policy which stated that all transfusion services must have a method to determine bacterial contamination in their platelet products. Several of the large blood suppliers in South Mississippi and Louisiana were contacted to see which methods are utilized in these facilities. Results showed the methods were based on the type of platelet products the facility produces, either random donor platelets or single donor platelets. In each case, the methodology chosen proved to be efficient in detecting bacterial contamination, and in most cases, positive units were found to be from improper donor arm disinfection and handling of the platelet products during preparation.

11:00 Break

Session II: Microbiology, Chair: Tina Martin

11:15 ANTIBIOTIC PROPERTIES OF SPICE EXTRACTS
Sarah Ali* and Sabine Heinhorst, Oak Grove High School, Hattiesburg, MS 39402 and University of Southern Mississippi, Hattiesburg, MS 39406

Because of the existing controversy about natural antibiotic properties of spices, this project attempted to determine how compounds extracted from ground cloves, ginger, garlic, pepper, cinnamon, and from chili and curry powder affect the growth of *Staphylococcus aureus* and *Escherichia coli* as representatives of Gram-positive and Gram-negative bacteria, respectively. Organic and aqueous extracts, as well as dried and fresh spices were compared. Several spice extracts stimulated bacterial growth. Of all spices tested, only garlic had a growth inhibitory effect on both bacteria. The active compound(s) in garlic appeared to be sensitive to heat.

11:30 ANALYSIS OF HUMAN COMPLEMENT FACTOR H BINDING TO *STREPTOCOCCUS PNEUMONIAE* CLINICAL ISOLATES

Chinwendu Onwubiko*, Lisa R. Quin, Stephanie Carmicle, and Larry S. McDaniel, University of Mississippi Medical Center, Jackson, MS 39216

Streptococcus pneumoniae is responsible for most cases of community acquired pneumonia. Pneumococcal surface protein C (PspC) plays a role in allowing the pneumococcus to evade innate host immune responses. PspC binds factor H (FH), a protein involved in the regulation of complement activation. This binding inhibits the alternative pathway of complement thus increasing the survival of the pneumococcus within the host. We previously demonstrated variation in binding of FH to PspC by different pneumococcal isolates. This variability in binding occurred across different PspC groups and was independent of capsular serotype. The goal of this study was to determine if the variability in FH binding was based on differ-

ences in the anatomical source of the pneumococcal isolate. Using flow cytometry, we examined 89 clinical isolates, divided into 3 groups based on source type (respiratory, systemic, or carriage). The mean fluorescence intensity of respiratory strains was 66.3, of systemic strains was 100.2, and of carriage strains was 165.2. The difference in binding by respiratory versus carriage strains was statistically significant ($p < 0.05$). These results suggest that strains isolated from asymptomatic carriage individuals bind more FH than those pneumococci causing respiratory disease.

11:45 ANALYSIS OF *STREPTOCOCCUS PNEUMONIAE* FROM MIDDLE EAR EFFUSIONS OF CHILDREN IN MISSISSIPPI USING PSPA FAMILY TYPING AND BOX PCR BASED DNA FINGERPRINTING

Courtney Shires*, Lisa R. Quin, and Larry S. McDaniel, University of Mississippi Medical Center, Jackson, MS 39216

Because *Streptococcus pneumoniae* is the leading bacterial cause of otitis media which is frequently seen in young children, a vaccine that will be both affordable and protective is in great demand. Pneumococcal surface protein A (PspA) has potential to be included in a vaccine that would be broadly protective. While the gene encoding PspA is variable among isolates, 95% of previously examined clinical isolates fall into two family groupings. We determined the PspA family type of pneumococcal isolates from middle ear effusions of children in Mississippi. Isolates from middle ear effusions of 31 patients (30 were under the age of 5 years) were analyzed. Seventy one percent of the isolates belonged to PspA family type 1, 13% belonged to family 2, and 13% belonged to family 1 and 2. We also performed BOX PCR characterization of the isolates using the BOX A1R primer. The isolates were placed into 24 different groups based on banding patterns, allowing a 2% difference in the fragment base pair length. Some fragments were more common than others with one fragment present in 77.4% of strains, one in 32.3 %, and another in 29%. We conclude that a vaccine targeting PspA families 1 and 2 would cover 97% of the pneumococci in the middle ear effusions of children in our study.

THURSDAY AFTERNOON

Exhibit Hall B

Symposium 1: Nursing, Chair: Michelle Tucci

1:00 HISTORY OF NURSING: PAST, PRESENT, AND FUTURE

Mary Tan, University of Mississippi Medical Center, Jackson, MS, 39216

The purpose of this lecture is to discuss nursing past, present, and future. Nursing has undergone dramatic changes in response to societal needs and influences. From the beginning of

time, women have cared for infants and children; thus, nursing could be said to have its roots in "the home." Religion also had a significant role in the development of nursing. During the third and fourth centuries, wealthy matrons of the Roman Empire converted to Christianity and used their homes to provide for the sick. Throughout history, inadequacy of care during the Crimean, American Civil and World Wars have accentuated the need for nurses. Nursing's image before the 1800's is reflected in Charles Dicken's (1896) writings of Sairy Gamp as "neglecting, stealing, and physically abusing the sick." Florence Nightingale's Angel of Mercy established respectability for nursing in the latter part of the 19th century. To understand nursing as it is practiced today and how it will be practiced tomorrow requires understanding social forces affecting the entire health system. Nurses are challenged to care for more acute illnesses, decreased length of stays and less contact time with clients than ever because of shifts from inpatient to outpatient care. With the establishment of health care reform, computerized charting, and telenursing we are confronted with the new nursing era. Registered nurses make up the largest group of health care providers. Yet for the future the supply of nurses is inadequate to meet the demand.

1:15 EDUCATION PREPARATION IN NURSING

Tina Mitchell Martin, University of Mississippi Medical Center, Jackson, MS 39216

Nursing is the nation's largest health care field with 2.7 million registered nurses nationwide. There are various educational routes for becoming a nurse. The purpose of this lecture is to discuss multiple entry points to nursing practice. Educational programs prepare nursing assistants and licensed practical nurses (LPNs) for roles in the health care delivery system. Nursing assistants are certified after completing a specific course of study. LPNs practice under the supervision of a registered nurse after completing a program of study (usually 12 months) and successfully passing a licensing examination. There are three major educational paths that prepare graduates to take the licensing examination for registered nursing: diploma, associate degree (AD), and baccalaureate (BSN). These basic programs of nursing vary in specific courses offered, program duration and cost. A brief description of each approach will be discussed as well as the various career opportunities open to nurses as they acquire experience and continue their education. Master's and doctoral degrees offer potential leadership positions in the profession. Nurses with advanced degrees may be researchers, nurse practitioners, nurse anesthetists, clinical specialists, educators or administrators. Trends in nursing education, including emergence of the practice doctorate, will be discussed. In addition, the various nontraditional approaches to nursing education that have evolved will be mentioned.

1:30 NURSING: "SO MANY OPTIONS, WHICH ONE TO CHOOSE?"

Lisa A. Haynie, University of Mississippi Medical Center, Jackson, MS 39216

The profession of nursing is the most diverse of all healthcare professions. It is a recognizable role in some form in every culture. Nurses have never been more vital to the health care industry than they are today. They must be well-educated, adaptable, and ready for change at all times. Fortunately, there is a strong demand for nurses and the career prospects are plentiful. In the United States there are a multitude of specialty areas within nursing. These opportunities encompass care throughout the lifespan and are based on patient needs. There are over 200 nursing specialties and sub-specialties; examples include: surgery, emergency, pediatric, psychiatric, school, public health, OB-GYN, neonatal, nurse midwifery, and others. Nurses who choose a specialty for which they focus can become certified in that area, signifying that they possess expert knowledge of the specialty. Additionally, certified nurses often earn a salary differential over their non-certified co-workers, and research has shown that these nurses have higher rates of patient satisfaction, as well as lower rates of work-related errors in patient care.

1:45 RESPONSIBILITIES OF AN ADVANCED CLINICAL PRACTICE NURSE

Anne Afeman Norwood, University of Mississippi Medical Center, Jackson, MS 39216

Advance practice nurses have been an integral part of the health care system for years, and today, there are more and more nurses who are returning to school to complete a master of science in nursing to attain one of these highly sought opportunities within this diverse profession. Several advance practice nursing opportunities include: nurse educator, nurse anesthetist, and nurse practitioner. These three areas of nursing have grown to be more and more popular, primarily due to floor nurses becoming overworked and fatigued on the job due to the increased acuity level of patients in our hospitals. Furthermore, men and women are attracted to these types of positions because it allows more flexibility, more control, and of course, more financial security. Nurse practitioners are practicing in a variety of settings and perform similar duties as the physician. These areas include the emergency departments, after-hour clinics, and industries, as well as school clinics and primary care settings. The experiences nurse practitioners come upon in these areas are anywhere from routine physical assessments and decision making processes to unbelievable, incredible, exciting, and challenging incidents that create life long impressions. Whatever the experience, nurse practitioners are truly the epitome of holistic care!

2:00 Symposium I – Panel Discussion

3:00 Poster Session II, Chair: Ibrahim Farah & Olga McDaniel

INHIBITORY EFFECT OF CORTISOL IN HUMAN LUKEMIA CELLS

DeAna Davis^{1,2}, Erica McClendon^{1,2}, Clement C. Yedjou², Michelle Tucci³, Hamed A. Benghuzzi³ and Joseph A. Cameron², ¹Hinds Community College, Raymond, MS 39154, ²Jackson State University, Jackson, MS 39217, and ³University of Mississippi Medical Center, Jackson, MS 39216

Cortisol is an adrenal corticosteroid hormone that is released in the body during stressed or agitated states. It increases blood pressure and stimulates protein catabolism to release amino acids for use in repair, enzyme synthesis, and energy production. However, the mechanisms of action underlying its effects, particularly at low doses, on some mammalian cell lines including Jurkat cells are still largely unknown. To address this issue, the MTT assay was performed to assess the Jurkat cell viability upon exposure to cortisol. Cells were cultured for 24 and 48 hours in the absence and presence of cortisol (0.1 $\mu\text{g/dL}$ and 2 $\mu\text{g/dL}$) in media at 37°C in a 5% CO₂ incubator. At termination, cells were analyzed with the MTT assay for cell viability using a microtiterplate reader at a wavelength of 550 nm. Study results indicated that cortisol significantly ($p < 0.05$) reduced the viability of Jurkat cells. Upon 24 hours of exposure, the percentages of cell viability were recorded to be 100%, 22%, and 37%, for 0, 0.1, and 2 $\mu\text{g/dL}$ of cortisol, respectively. In addition, the percentages of cell viability computed for 48 hours of exposure were 100%, 28%, and 65% for 0, 0.1, and 2 $\mu\text{g/dL}$ of cortisol, respectively, suggesting a time and dose dependent response. Interestingly, the data showed significant reduction of cell viability in cortisol-treated Jurkat cells as compared to the control upon 24 hrs, but demonstrated a slight increase in cortisol-treated Jurkat cells upon 48 hrs of exposure as compared to 24 hours. These results suggest an inhibitory effect of low doses of cortisol on Jurkat cell viability that declines in a time dependent manner. Supported in part, by the National Institutes of Health Grant No. 1G12RR13459 through the Center for Environmental Health and in part by NIGMS R25 GM50117.

THE EFFECTS OF FRUCTOSE-1,6-BISPHOSPHATE ON LUNG CELLS AT REDUCED OXYGEN LEVELS

Derrick Huang^{1*}, Ameze Adah¹, Michelle Tucci², and Hamed A. Benghuzzi², ¹University of Mississippi, Oxford, MS 38762 and ²University of Mississippi Medical Center, Jackson, MS 39216

Background and significance: MRC-5 cells are lung fibroblast cells. Two well-known diseases involving the lung are cystic fibrosis and asthma. Both conditions can result in altered oxygen delivery to the lung tissue. Leaving either of these conditions untreated for an extended period of time could result in the loss of lung function. Fructose-1,6-bisphosphate (FDP) is a glycolytic intermediate that has been used to protect

tissues in various hypoxic and ischemic conditions. Under ischemic conditions where ATP levels are much lower than normal, bypassing the initial steps of glycolysis offers protection by allowing the cell to produce ATP without expending energy. Hypothesis: Exogenously added fructose-1,6-bisphosphate to MRC-5 fibroblast cells under ischemic conditions will allow the cells to grow similarly to untreated cells maintained at ambient air. Objectives: (1) To provide increasing concentrations of fructose-1,6-bisphosphate for 24, 48, and 72 hours under ischemic and ambient conditions and compare growth characteristics of cells under the similar conditions, and (2) To evaluate the cell viability and damage. Results: Under ambient conditions, FDP increased cell number in a dose dependent fashion at 24 hours. Cell number was similar at 48 and 72 hours. Cellular glutathione levels were decreased in all treatment groups as early as 24 hours, and MDA was increased in the medium and high dose treatment group for the duration of the study. Under ischemic conditions, FDP reduced cell numbers by 50% in the medium and high dose group at 24 hours. Cell numbers were not different at 48 and 72 hours of treatment. Cellular glutathione levels were not significantly different from control. Cellular MDA levels were increased in the medium and high dose levels. Conclusions: Overall FDP was able to protect cellular glutathione levels under ischemic conditions. Increasing concentrations of FDP regardless of oxygen concentration resulted in increased evidence of cellular damage.

ASSESSING THE VARYING CAUSES AND RISK FACTORS ASSOCIATED WITH PEDIATRIC HYPERTENSION

Joshua Champion* and Jimmy Stewart, Murrah High School, Jackson, MS 39202 and University of Mississippi Medical Center, Jackson, MS 39216

Background. Pediatric hypertension is making a significant increase among the youth of Mississippi. Rising numbers of adolescents are being diagnosed with hypertension at younger ages each year. In many areas of Mississippi these young people are being exposed to unhealthy lifestyles and are not concerning themselves with the importance of cardiovascular health. The major objective of this study is finding the associations of a child's environment, demographics, education, religion, daily diet, physical activity, and heredity on his or her heart health. The results of this survey were expected to reveal the associations of unhealthy life practices and hypertension at early age and hopefully influence individual and community efforts in reducing childhood hypertension. **Methods.** One hundred children were selected to take part in this study. Fifty hypertensive and fifty normotensive patients ages 10 -18 were given questionnaires. All of them were normal routine patients of the University Medical Center Hypertension Clinic and North Clinic, in Jackson, MS. Each of these adolescents was asked to complete a short telephone survey of 44 questions. The information used in the survey was compiled from sources such as the Behavioral Risk Factor Surveillance Survey (BRFSS), and The Jackson

Heart Study questionnaires. **Results.** The study did not give a full proof result in all areas. The survey showed that the habits of young people are improved after they have the disease. The youth represented in this survey lead very healthy lives now that they have confirmed hypertension. **Conclusions.** In the areas of religious practice and education we are still in need of more research. These areas will be studied more closely this year in an effort to conclude more insightfully, their affects on hypertension.

THE EFFECTS OF PMMA PARTICLE NUMBER ON MG-63 OSTEOBLAST CELL FUNCTION

Heather DeLaSalle*, Hamed A. Benghuzzi, Robert Deville, and Michelle Tucci, University of Mississippi Medical Center, Jackson, MS 39216

Implants used for joint replacement are often cemented into place to increase stability. As the person ambulates the implanted materials slide against each other producing small wear debris particles. There is increasing evidence that wear debris particles that are present in periprosthetic tissues have direct effects on osteoblasts. Particles resulting from polymethylmethacrylate (PMMA) cements used for fixation may also be involved directly in aseptic loosening of implants. However, it is not known if these particles have a direct or indirect affect bone formation. The objective of this study was to determine the effect of PMMA particle number on osteoblast cells. MG63 osteoblast-like cells were challenged with 200 µg/mL, 20 µg/mL and 2 µg/mL PMMA diluted in culture medium. Cells were incubated with the particles for 24, 48 and 72 hours. MG-63 cellular proliferation was unaffected at 24 and 48 hours regardless of the concentration. However, at 72 hours the low and high dose treatments resulted in a 50% reduction in cell numbers. Interestingly, at 72 hours cellular protein levels were increased in all treated groups by at least 50%. Cellular damage was evident as early as 24 hours in all treatment groups and continued for the duration of the study. Morphological observations showed significant vacuole formation in all treatments. Also, there was an overall increase in cell size that coincided with increasing levels of PMMA with noted macronucleoli at the highest dosage. The increase in macronucleoli may be reflective of increased cellular protein concentration. Overall, a PMMA particle challenge resulted in significant membrane perturbations, and the overall effects on cell number are PMMA dose and time dependent.

EBSTEIN-BARR VIRUS: EPSTEIN-BARR VIRUS: CLONING, EXPRESSION, AND PURIFICATION OF GP350

Jonathan Batty¹*, Joyce Fingeroth², and Shawn Clark²,¹Tougaloo College, Tougaloo, MS 39174 and ²Harvard Institute of Medicine, Boston, MA 02215

The general objective of this research is to prevent the Epstein-Barr virus from attaching to human cells. By studying protein structure through crystallization it is hoped a drug can be

produced to prevent cellular attachment of EBV and thereby prevent or reduce infection. Hence, the cloning, expression, and purification of gp350 were performed in this particular research. A truncated form of glycoprotein 350 was cloned and expressed in Cho-Lec and 293T cell lines. The cellular supernatants of the cell cultures were purified using Concanavalin A matrix. A Sodium Dodecyl Sulphate-Polyacrylamide gel electrophoresis analysis was executed on the purified eluate to separate proteins and to verify the presence of the purified glycoprotein in the supernatant. The glycoprotein was cloned and expressed as a fusion protein with RFP in Cho-Lec and 293T cells. During the purification process, the protein was retained on the columns used for purification. One part of the SDS-Page analysis was the western blot technique, which made it possible to develop film that demonstrated the molecular weight of the purified protein alone. In addition, the Coomassie Blue staining added tint to each band on the polyacrylamide gel to make each band visible for molecular weight determination by another method that showed whether contaminating proteins were present or not. To date, single cell cloning has been performed and there is high expression of glycoprotein in cells. Partial purification of the protein has been achieved.

NEURON SPECIFIC ENOLASE (NSE) AND FERRITIN COMPARED WITH ELEVEN OTHER TUMOR ANTIGENS FOR THE SERODIAGNOSIS OF PANCREATIC AND GASTRIC CANCER

Rasheeda Crowell^{1*}, Tammy Sims-Davis¹, Sharae Johnson¹, Mary Guo¹, Wileen Cooksey¹, Slobodanka D. Manceva¹, Sabrina Bryant¹, Margaret Jackson¹, James T. Johnson¹, Harold Schultze¹, Shawn Clinton¹, Kevin Beason¹, Cynthia Wilson², Debbie Fortenberry¹, Cynthia Bright¹, Helen Hua¹, Jiarong Ying¹, Paul Sykes¹, Kay Hollifield³, Charlton Vincent³, and Margot Hall¹, ¹University of Southern Mississippi, Hattiesburg, MS 39406, ²University Medical Center, Jackson, MS 39216, and ³Laurel Clinic for Women, Laurel, MS 39442

With 32,180 (pancreatic) and 21,860 (gastric) new cases and 31,800 (pancreatic) and 11,550 (gastric) deaths estimated during 2005, pancreatic and gastric cancers are important pathologies in the USA. Tumor antigens have been used in combination with other methods for diagnosis. The objective of this study was the comparison of NSE and ferritin with eleven other tumor antigens for diagnostic efficacy in pancreatic and gastric cancer. Sera from 554 patients (16 pancreatic cancer, 12 gastric cancer, 331 other cancers, and 195 non-cancer) were assayed for the presence of tumor antigens and the results correlated with diagnoses established pathologically. Immunoassay test kits from Diagnostic Automation (NSE, Ferritin, CA242), Hybritech (CEA, CA195), Centocor/Fugirebio Diagnostics (CA125, CA19-9, CA72-4, CA15-3, CA27.29, Cyfra21-1), CIS Biointernational (CA50), and Abbott (AFP) were used to test for the concentration of these antigens. Using the manufacturers' decision values the following diagnostic

sensitivities were obtained: Pancreatic cancer: NSE 0.0%, Ferritin 50.0%, CEA 37.5%, CA19-9 66.7%, CA195 100.0%, CA50 66.7%, CA242 66.7%, CA72-4 31.3%, CA125 40.0%, CA 15-3 26.7%, CA27.29 40.0%, AFP 18.2%, Cyfra21-1 26.7%; Gastric CA NSE 0.0%, Ferritin 11.1%, CEA 50.0%, CA19-9 63.6%, CA195 58.3%, CA50 70.0%, CA242 70.0%, CA72-4 27.3%, CA125 40.0%, CA 15-3 45.5%, CA27.29 30.0%, AFP 22.2%, Cyfra21-1 9.0%. Diagnostic specificities were >75%. From these data we conclude that ferritin was a possible marker for pancreatic cancer but not for gastric cancer and that NSE was not a useful marker.

DEVELOPMENT OF A DNA IDENTIFICATION PROGRAM FOR ELEMENTARY STUDENTS BASED ON PARTICIPATION IN THE *BASE PAIR* SUMMER RESEARCH INSTITUTE

Erin C. Wiggers*, Susan Bender, Cindy Cook, Robin R. Rockhold, and Donna C. Sullivan, University of Mississippi Medical Center, Jackson, MS 39216

Senior Projects have been instituted in many Mississippi Public Schools as teaching and training tools. Senior high school students identify mentors who will help them select topics for research that will result in a product that can provide a community service. Students prepare a research paper, develop personal portfolios, and present PowerPoint-based talks to describe their projects to community, business and school leaders. The Howard Hughes Medical Institute-supported *Base Pair* Summer Research Institute at the University of Mississippi Medical Center provides training for middle and high school science teachers as well as hands-on activities for high school students. The program is responsible for the development of the Crime Scene Investigation teaching module adopted by many science teachers throughout the state. Following participation in this program, an extension of such a teaching module was developed for use in an elementary school setting. A lesson plan for elementary students concerning the use of DNA as a method of identification was developed. This program has been incorporated into the agenda of the Northshore Elementary School as partial fulfillment of the Senior Project. The lesson plan includes both a classroom presentation and the use of DNA collection kits for each elementary student in the class. (Supported by the Howard Hughes Medical Institute)

SYNTHESIS AND CHARACTERIZATION OF COMPLEXES OF CU(II), ZN(II), NI(II) AND SN(IV) WITH ACETONE N(4)-PHENYLTHIOSEMICARBAZONE (HAPTSC)

Derrick D. McNutt^{1,2}, Mantrako F. Crockett^{1,2}, Ramaiyer Venkatraman¹ and Joseph A. Cameron¹, ¹Jackson State University, Jackson, MS 39217 and ²Hinds Junior College, Raymond, MS 39154

Thiosemicarbazones exhibit a broad spectrum of pharmacological properties, including antibacterial, antiviral, antifungal, antimalarial, and antineoplastic activities. In solution,

thiosemicarbazone molecules can exist in thione-thiol tautomeric form. The unique property of thiosemicarbazones is related not only to the presence of many electron donors centers in the structure but also to the bonding characteristics. As a ligand, thiosemicarbazones are well known to behave as chelating agent towards a wide range of metallic ions forming structurally different complexes. In many instances, thiosemicarbazones act as a bidentate ligand and bind to the metals through the sulfur and hydrazinic nitrogen atom. Further, metal complexes often display enhanced activities when compared with the parent compound. Thiosemicarbazones can easily be modified by variation of parent aldehyde or ketone used for their synthesis. For this reason, there has been a steady growth in the synthesis, structure and reactivity studies of heterocyclic thiosemicarbazones and their metal complexes. However, relatively little is known about the complexing behavior of aliphatic thiosemicarbazones with metal ions. In this research, we have synthesized and characterized copper, zinc, nickel and tin metal complexes of acetone phenylthiosemicarbazone using it as a ligand. The synthesized compounds were characterized using thermal, spectral and molar conductivity methods. The molar conductivity studies indicate that the complexes exist in the nonionic form. Solubility studies indicate the non-polar nature of the complexes. Further, structural characterizations were carried out using infrared, UV-Visible and proton NMR techniques. The results indicate the formation of five coordinate chloro-complex of the formula, $[M(\text{aptsc})_2\text{x}]$ (where $M = \text{Cu, Ni, Zn, Sn}$ and $x = \text{Cl}^-$) with the participation of thione sulfur and hydrazinic nitrogen atoms from the ligand molecule. The metal complexes exhibit trigonal bipyramid geometry, which is typical for non-aromatic thiosemicarbazones. Supported in part by NIGMS R25 GM50117.

THE EFFECT OF GREEN TEA EXTRACT ADMINISTERED BOTH PREVENTATIVELY AND UPON INFECTION IN TRYPANOSOMA LEWISI INFECTED RATS

Alan Jarrett and Laura Herrington*, Belhaven College, Jackson, MS 39202

Trypanosoma lewisi, a blood parasite found in rats, has many similarities to the trypanosome species causing human trypanosomiasis. For this reason, experimental data from studies involving *T. lewisi* could be valuable in the search for new treatments for human trypanosomiasis. Green tea has been used in many recent cancer studies because it contains natural antioxidants which are known to target rapidly dividing cells. Because blood parasites establish and maintain parasitemia in the host by rapid division, green tea extract was administered to rats: 1) fifteen days prior to infection (preventative group) and 2) upon establishment of infection (treatment group) to determine its effects on parasitemia. Both the treatment and preventative groups were divided into subgroups receiving different dosages of tea extract. The treatment group experienced a significant decrease in parasitemia, the highest dosage showing the greatest

difference compared with the control, followed by the moderate and low dosages respectively. The preventative group showed no significant decrease in parasitemia.

EFFECTS OF POLYSTYRENE PARTICLE NUMBER ON TYPE II PNEUMOCYTES

Constance R. Gassion*, Sommer Welsh-Guedon, Michelle Tucci, and Hamed A. Benghuzzi, University of Mississippi Medical Center, Jackson, MS 39216

Studies into the effects of ultrafine particles in the lung have shown adverse effects and are considered to be due in part to the particle size. Inhalation of small particles is associated with exacerbation of respiratory diseases in epidemiological studies. Ultrafine particles have been hypothesized to play an important role, but it is unclear as to whether a dose response type of relationship exists. The aim of the present study was to investigate the role of ultrafine particle number on lung cells and to describe the effects due to phagocytosis of particles by the cells. A549 cells are a transformed cell line similar to type II lung pneumocytes. These 5×10^4 cells were treated with 1000, 5000, and 10,000 polystyrene particles and incubated at 37°C for periods of 24, 48, and 72 hours. Cell number, protein, and MDA levels were determined on the treated cells and compared with untreated controls. The lung cells were also observed microscopically to assess cell damage. Lung cells treated for 24 hours with 1000 and 5000 particles showed the greatest increase in cell number. Cellular protein levels were similar for all groups ($p > 0.05$) for the duration of the study. MDA levels for treated groups at 24 and 72 hours were not statistically different from the control groups. Cells treated at 48 hours with 5000 and 10,000 particles showed slight increases in the MDA levels above low particle number and control treated groups. Morphological evaluation of the cells revealed increased inclusions with increasing dose. The results from this study indicate the ability of A549 cells to respond to a challenge with ultrafine particles. The concentrations tested caused an initial stimulation cell proliferation at 24 hours followed by increased damage at 48 hours. Future studies will focus on the inflammatory products formed by ingestion of the ultrafine particles.

THE EFFECT OF CURCUMIN & BET A-GLUCAN INDIVIDUALLY & IN COMBINATION ON TRYPANOSOMA LEWISI INFECTED RATS

Gabrielle Pickle*, Brian Kirby*, and John Shapiro*, Belhaven College, Jackson MS, 39202

Trypanosomiasis is the infection of vertebrates by hemoflagellated parasites known as trypanosomes. *Trypanosoma brucei*, the causative agent for African sleeping sickness, is one of the leading causes of death in Africa, and current treatments are either costly or toxic to the host. Two herbal supplements, beta-glucan and curcumin, were used in this experiment because of their availability and low cost. Recent literature has shown the effectiveness of beta-glucan, a derivative of yeast cells, in

immune system enhancement. Curcumin, a substance found in curry, has shown success in inhibiting blood parasites. In this experiment, a rat-specific trypanosome, *Trypanosoma lewisi*, was used to inoculate laboratory rats. Beta glucan and curcumin injections were administered to test groups, both separately and together, to determine inhibitory effects on the infection and possible synergistic effects of the drugs. The results were extremely variable. Unfiltered beta-glucan resulted in lesions in several rats, however these rats showed decreased trypanosome counts. Neither beta-glucan nor curcumin appeared to have any effect on the parasitemia. However, rats that developed an infection following the first inoculation showed decreased trypanosome counts after the second inoculation. Further studies might provide evidence on correlations between decreased trypanosome counts and beta-glucan or curcumin.

METABOLIC EFFECTS OF FRUCTOSE 1,6-BISPHOSPHATE IN NORMOXIC AND HYPOXIC STATES OF MG63 OSTEOSARCOMA CELLS

Ameze Adah¹, Hamed A. Benghuzzi², Michelle Tucci²,¹University of Mississippi, University, MS 38677 and ²University of Mississippi Medical Center, Jackson MS 39216

Glycolysis is a very important process that contains very intricate steps that play a role in cellular performance and viability. Fructose 1,6-bisphosphate (FBP) is a glycolytic intermediate that has proven to be replete in literature in improving cellular conditions under hypoxic and ischemic conditions. Osteoblasts are key regulators of skeletal matrix synthesis and degradation. Thus, considering FBP's positive effects on ameliorating hypoxia-induced injuries, the objective of this study was to determine its effects and comparative effects on osteoblast cells under normoxic and hypoxic states. MG63 osteoblast-like cells were cultured in 24-well culture plates and treated with high, medium and low dosages of FBP at 24, 48, and 72 hours. At the end of each time period, cellular number, damage (MDA), and glutathione levels were evaluated. There was a significant increase in cell number for the low level of FBP in normoxia at 48 hours ($p < 0.05$). For the cells in hypoxia, there was a significant decrease in cell number for the medium level at 48 hours ($p < 0.05$). At 48 hours there was a significant decrease in cell damage for the cells in normoxia and hypoxia when compared to the control. Cellular damage was not evident in the supernatant in either oxygen condition for the duration of the study. A significant decrease in glutathione levels was also noted for the cells in hypoxia. Cellular morphology included multiple nucleoli, vacuolated cytoplasm, abnormal cells, and web-like cytoplasm. The results indicate that FBP does protect bone cells exposed to hypoxic injuries, and while doing so, ameliorating the states of the cells in shock.

NEURON SPECIFIC ENOLASE (NSE) AND FERRITIN COMPARED WITH TWELVE OTHER TUMOR ANTIGENS FOR THE SERODIAGNOSIS OF BREAST CANCER

Sharae Johnson^{1*}, Rasheeda Crowell¹, Tammy Sims-Davis¹, Mary Guo¹, Wileen Cooksey¹, Slobodanka D. Manceva¹, Sabrina Bryant¹, Margaret Jackson¹, James T. Johnson¹, Harold Schultze¹, Shawn Clinton¹, Kevin Beason¹, Cynthia Wilson², Debbie Fortenberry¹, Cynthia Bright¹, Helen Hua¹, Jiarong Ying¹, Paul Sykes¹, Rafat AlKurd¹, Kay Hollifield³, Charlton Vincent³, and Margot Hall¹,¹University of Southern Mississippi, Hattiesburg, MS 39406, ²University Medical Center, Jackson, MS 39216, and ³Laurel Clinic for Women, Laurel, MS 39442

With 212,930 new cases and 40,870 deaths estimated during 2005, breast cancer is the major cancer in females for the USA. Tumor antigens have been used in combination with other methods for diagnosis. The objective of this study was the comparison of NSE and ferritin with twelve other tumor antigens for diagnostic efficacy in breast cancer. Sera from 554 patients (87 breast cancer, 272 other cancers, and 195 non-cancer) were assayed for the presence of tumor antigens and the results correlated with diagnoses established pathologically. Immunoassay test kits from Diagnostic Automation (NSE, Ferritin, CA242), Hybritech (CEA, CA195, CA549), Centocor/Fugirebio Diagnostics (CA125, CA19-9, CA72-4, CA15-3, CA27.29, Cyfra21-1), CIS Biointernational (CA50), and Abbott (AFP) were used to test for the concentration of these antigens. Using the manufacturers' decision values the following diagnostic sensitivities were obtained: NSE 0.0%, Ferritin 40.0%, CA 15-3 63.4%, CA27.29 39.3%, CA549 40.3%, CEA 22.4%, CA195 31.8%, CA19-9 12.2%, CA50 22.2%, CA72-4 12.9%, CA125 12.1%, Cyfra21-1 12.2%, AFP 21.8%, CA242 29.3%. Diagnostic specificities were $>75\%$. From these data we conclude that ferritin was inferior to CA15-3, equal to CA27.29 and CA549 (traditional breast cancer markers) and superior to all other markers for the diagnosis of breast cancer.

NEURON SPECIFIC ENOLASE (NSE) AND FERRITIN COMPARED WITH ELEVEN OTHER TUMOR ANTIGENS FOR THE SERODIAGNOSIS OF LEUKEMIA AND LYMPHOMA

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Leukemia and lymphoma are serious pathologies. The American Cancer Society estimates that there will be 34,810 and 63,740 new cases respectively and 22,570 and 20,610 deaths respectively from these cancers in the USA during 2005. Classical tumor antigens have been used for therapeutic monitoring but not for diagnosis of the blood cancers. The objective of

this study was the comparison of NSE and ferritin with eleven other tumor antigens for diagnostic efficacy in these cancers. Sera from 554 patients (13 leukemia, 16 lymphoma, 330 other cancers, and 195 non-cancer) were assayed for the presence of tumor antigens and the results correlated with diagnoses established pathologically. Immunoassay test kits from Diagnostic Automation (NSE, Ferritin, CA242), Hybritech (CEA, CA195), Centocor/Fugirebio Diagnostics (CA125, CA19-9, CA72-4, CA15-3, CA27.29, Cyfra21-1) CIS Biointernational (CA50), and Abbott (AFP) were used to test for the concentration of these antigens. Using the manufacturers' decision values the following diagnostic sensitivities were obtained: Leukemia: NSE 0.0%, Ferritin 58.3%, CA27.29 7.7%, CA195 7.7%, CA19-9 0.0%, CA50 0.0%, CA72-4 7.7%, CA125 0.0%, Cyfra21-1 0.0%, CEA 15.4%, CA15-3 15.4%, AFP 27.3%, CA242 30.8%; Lymphoma: NSE 0.0%, Ferritin 66.7%, CA27.29 25.0%, CA195 12.5%, CA19-9 12.5%, CA50 12.5%, CA72-4 0.0%, CA125 12.5%, Cyfra21-1 0.0%, CEA 12.5%, CA15-3 43.8%, AFP 6.7%, CA242 6.3%. Diagnostic specificities were >75%. From these data we conclude that ferritin was useful for the diagnosis of leukemia and lymphoma and that all other markers were not.

PROJECT F.I.R.M. (FAMILY-BASED INSULIN RESISTANCE MANAGEMENT)

Erin Reynolds^{1*}, Scott McIntosh², LaKeyah Quinn², and Cammie Hilliard²,¹Tougaloo College, Tougaloo, MS 39174 and²Rochester, New York 14642

The objective of this pilot study is to assess the needs of the overweight residents of the underserved areas in Rochester, New York and gain qualitative details on the best procedures for prevention of type 2 diabetes mellitus in these populations. Ten families were referred by participating doctors based on children being overweight or displaying risk factors for becoming overweight. The families were then followed to study for the necessary methods of intervention, or prevention of overweight resulting in type 2 diabetes mellitus. In order to expand on ways to improve the outcome of the study and/or the health of its participants, contributing doctors were interviewed with qualitative questions about Project FIRM. The responses to the questions were analyzed to determine the merit of the study. These consultations were effective ways to evaluate the study as a whole and identify the necessary improvements for future research. Overall, participants are aware that Project FIRM is an invaluable tool in decreasing the prevalence of overweight and obesity in the underserved areas of Rochester, New York. Along with other health issues, children who are overweight, obese, or have the risk factors for becoming overweight or obese are at risk for developing type 2 diabetes mellitus. If this health concern can be mended in these underserved areas in Rochester, it can serve as a model for cities nationwide in an effort to decrease the frequency of pediatric obesity resulting in the development of type 2 diabetes mellitus.

6:00 Poster Session III

THE ROLE OF (-) EPIGALLOCATECHINE GALLATE (EGCG) AND THYMOQUINONE ON THE PROLIFERATION OF PANC-1 CELL LINE IN CULTURE

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The limited ability of current treatments to control pancreatic cancer prompted us to examine the effect of antioxidants (EGCG and thymoquinone) on pancreatic cell proliferation in vitro. Cultured human pancreatic cancer cells (PANC-1) were exposed to EGCG or thymoquinone alone or in combination for 24, 48, and 72 hours. Selected dosages for EGCG and thymoquinone (5, 25, 50 ug/dL) were delivered both by direct administration and a drug delivery system using TCPL ceramic capsules for 24, 48, and 72 hrs. Ceramic capsules were gas sterilized and prepared using standard procedures. Data collected from this study indicated a dose dependent relationship with direct administration of EGCG alone or in combination with thymoquinone. Conversely data collected from sustained delivery of EGCG alone or in combination with thymoquinone was dose independent. All selected dosages did affect the proliferation of PANC-1 cells during the direct administration and ceramic drug delivery. However a rebound effect was observed after 48 and 72 hours exposure to both EGCG and thymoquinone using direct delivery method. These results indicate that direct administration or ceramic drug delivery of thymoquinone ($P < 0.05$) or EGCG ($P < 0.05$) alone or in combination can limit PANC-1 cell proliferation. These findings suggest that specific dosages of (-) epigallocatechin gallate and thymoquinone tested significantly reduces the growth of PANC-1 cells and therefore has a strong potential as a useful therapeutic regimen for inhibiting pancreatic cell proliferation.

DIFFERENTIAL EFFECTS OF CYCLOSPORINE A ON RHESUS MONKEY KIDNEY EPITHELIAL CELLS IN CULTURE

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Cyclosporine A (CsA) is extracted from *Tolypocladium inflatum* Gams, which is metabolized through the superfamily of hepatic isoenzymes P-450. CsA has a mean life of 6.4-8.7 h, although this varies among different individuals. Ninety percent of the drug is withdrawn through biliary excretion and only 6% appears unchanged in the urine. The exact mechanism of action of CsA is unknown; however, CsA has the ability to act on the immune system by blocking the biosynthesis of some lymphokines produced by T lymphocytes and interleukin-2 synthesis at the transcriptional level. It has been suggested that CsA acts by interacting with cytoplasmic membrane and activates the intracellular calcium pathway, or binds to cytoplasmic proteins (Cid, 2003). The specific objective of this study was to investigate the effects of various concentrations of CsA

on the proliferation and viability of Rhesus Monkey Kidney epithelial cells (RMKEC) in culture. Thirty-five wells were plated with RMKEC and sub-divided into five equal groups. Group 2 was treated with 10mL of ETOH (vehicle for CsA). Groups 3-5, were treated with 5, 25, and 0.50 μ M of CsA, respectively. Data obtained suggested the following: (1) The 24 hour phase, showed no significance difference in cell number in the CsA 10 μ M and CsA 25 μ M in comparison to the control. (2) The use of 50 μ M CsA suppressed cell proliferation as early as 24 hours in comparison to the control and caused an increase in all biochemical markers) MDA, protein, and glutathione). (3) Interestingly, the vehicle resulted in an increase in cell proliferation and a decrease in the biochemical markers MDA and Glutathione at 24 hours. The data suggested the need for further studies need to be conducted to determine the full impact of CsA on Kidney Epithelial function.

MECHANICAL STRENGTH REPERCUSSIONS OF VARIOUS FIXATIVE STORAGE METHODS ON BONE

Graham Calvert, Scott Wingerter*, Michelle Tucci, Hamed A. Benghuzzi, and Aaron Puckett, University of Mississippi Medical Center, Jackson, MS 39216

This study compensates for the lack in literature on the actual effects that various fixative storage methods have on the mechanical strength characteristics of bone. Researchers usually operate under the assumption that fixation of bone in formalin has no effect on such material properties. Such assumptions could introduce error into a great number of bone fracture studies if a disparity in the mechanical properties of fixed bone versus *in vivo* does actually exist. Furthermore, such assumptions could go on to pose clinical risks for patients. This study focuses on the mechanical strength testing of four different groups of rat femurs that were extracted at various times and subject to differing storage procedures. The first, Group N, are fresh, new femurs extracted just days before testing. The second, Group F, are femurs that have been fixed in a 10% formalin bath for just over a year prior to testing. The third, Group W, are femurs that have also been fixed in 10% formalin for just over a year but were washed out just prior to testing. The fourth, Group P, are femurs that have been taken from rats that were perfused with formalin immediately following euthanasia. Mechanical strength tests on the four groups revealed that fixing bone in a 10% formalin bath significantly reduces the mechanical fracture strength properties of the bone regardless of whether the formalin is washed out prior to testing. The tests also revealed that bone from perfused animals behave mechanically like fresh bones from non-perfused animals suggesting that the formalin did not entirely infiltrate the bone and permanently fix the material. These results could have profound implications on how studies equate the behavior of *in vitro* bone to *in vivo* bone which could manifest as clinical complications for patients.

PATHOPHYSIOLOGICAL RESPONSES OF MRC-5 CELLS EXPOSED TO VARIOUS DOSES OF X-RAY RADIATION

Pamala Jones*, La'Toya Ross Richards, Hamed A. Benghuzzi, and Michelle Tucci, University of Mississippi Medical Center, Jackson, MS 39216

The numbers of x-ray technology procedures used as diagnostic tools is on the rise, the radiation effect from these procedures are said to be minimal, however there is a significant increase in developing cellular damage, that may lead to cellular aberrations. The objective of this study was to expose MRC-5 cells to various doses of x-ray radiation and evaluate its effects on the proliferation and morphology of the cells. The doses were 2, 6 and 10 (Gy), evaluated after 24, 48 and 72 hours of incubation. The results indicated a slight decrease in the cell number after 48 and 72 hours ($p < 0.05$), in all groups exposed to either dose of radiation. After 24 hours, there was not a statistically significant difference between the groups exposed to either dose of radiation. Morphologically, the cells exhibited significant changes when exposed to either, 2, 6 or 10 Gy of radiation. The cells showed multiple nucleoli with all doses, and mitotic figures were observed with a dose of 2 Gy. After a dose of 6 Gy, hydropic swelling was noted as well as multiple nucleoli within the nucleus of the cells. After 48 and 72 hours, severe vacuolization with various degree of pleomorphism was noted with a dose of 10 Gy. Further analysis revealed that the higher the radiation dose, morphologically the more severe the damage after 48 and 72 hours, however, significant damage was evident with all doses, even as low as 2 Gy. The role of free radicals as a major factor in cell membrane damage is still being uncovered by current research.

ROLE OF NITRIC OXIDE IN DOMOIC ACID INDUCED HIPPOCAMPL DEGENERATION

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Nitric oxide (NO) acts as a transynaptic retrograde messenger in the nervous system. The initial observation from our earlier studies showed that NO inhibitors (LNAME and 7NI) potentiated Domoic Acid (DA) induced stereotypic seizures indicating that NO may possess anticonvulsant properties. The immunohistochemical studies from CA1/2 regions of hippocampus immunostained for glial fibrillary acidic protein (GFAP) showed large number of reactive glial cells in DA treated animals and in groups treated with NO Inhibitors compared to controls. Loss of calbindin D28k positive neurons in CA1/2 regions were also observed in 7NI and LNAME treated animals indicating neuronal damage in the hippocampus. In the present study, to quantify the earlier data we ran western blots to assess the specific biochemical changes in the hippocampus. Cytosolic fraction was prepared from brain tissue obtained from animals treated with DA, DA+LNAME, DA+ 7NI. Frozen hippocampal

tissue samples were homogenized in homogenization buffer and centrifuged. The cytoplasmic protein fractions were prepared using cytosol-nuclear fractionation kit. The cytosolic fractions with equal amount of protein were run on gels for immunoblot analysis for Beta-III-tubulin, GFAP and calbindin (CaB). GAPDH was used as house-keeping protein. No significant changes were observed from the immunoblot analysis for beta-111-tubulin. The western blot analysis for GFAP also showed no significant changes in treated samples as compared to control, the reason could be use of the total hippocampus and not specific regions. Sampling of specific area, where we observed immunohistochemical changes could have demonstrated some changes. There was a marked decrease in the expression of CaB in animals treated with NO inhibitors LNAME and 7NI compared to control and DA alone treated animals. The loss of calbindin positive neurons and further reduced expression of CaB on Western blots in animals treated with nitric oxide inhibitors suggest a positive role of NO in DA induced toxicity.

STEM CELL COLLECTION METHODS AND THE STEM CELL RESOURCES IN MISSISSIPPI

Anna Stevens, University of Southern Mississippi, Hattiesburg, MS 39406

I performed a study of the various types of stem cells in the human body and the methods used to collect those stem cells. I also researched the institutions in Mississippi that collect stem cells and the type of stem cells they utilize. The three main sources of stem cells in use today are bone marrow, peripheral blood, and umbilical cord blood. Bone marrow is the traditional source of stem cells, but peripheral blood is being utilized more often. Stem cells are collected from the peripheral blood via apheresis. The newest source of stem cells is umbilical cord blood. Mississippi has only one facility that collects and transplants stem cells. The University of Mississippi Medical Center in Jackson, MS is the location of the UMC Hematopoietic Cell Transplant Program. UMC's facility only collects bone marrow and peripheral blood stem cells; however they do utilize cord blood for pediatric cases. The UMC Hematopoietic Cell Transplant program is a member of the National Marrow Donor Program, which allows them to send out stem cells and also bring in stem cells that they need. UMC is providing Mississippi with a much needed service.

CHRONIC BLOCKADE OF VEGF RECEPTOR 2 CAUSES PROLONGED INCREASES IN VEGF EXPRESSION IN SKELETAL MUSCLES OF TREADMILL-EXERCISED MICE

Janelle Pryor*, A.J. Thibodeaux, P.B. McDonnell, and T.H. Adair, University of Mississippi Medical Center, Jackson MS 39216

Long-term exercise causes a VEGF-mediated increase in angiogenesis in skeletal muscle. The VEGF mRNA response consists of an initial large increase in expression (days 1-7), which returns to nearly normal levels after 14-28 days when the

muscle capillarity has adapted to the exercise. This temporal relation between muscle capillarity and VEGF expression supports the contention that VEGF production may be regulated by a negative feedback mechanism. Presumably, the increase in capillarity induced by VEGF returns tissue oxygenation to normal, and VEGF expression, in turn, returns to nearly normal levels. To test the hypothesis that VEGF is subject to negative feedback regulation, we attempted to "open" the feedback loop using a VEGF receptor inhibitor, PTK787 (Novartis) to prevent angiogenesis in skeletal muscle during exercise conditioning. Male C57BL/6J mice were treated with PTK787 (50 mg/kg/day, oral), or an equivalent volume of vehicle, and exercised on a motorized rodent treadmill for 1 hr/day at 18 m/min with a 10 degree incline. After 14 days, VEGF mRNA expression in gastrocnemius muscle was 2-fold higher in exercised mice treated with PTK787 (n=8) compared to exercised mice treated with vehicle (n=4). These results suggest that inhibition of VEGF receptor function in the face of chronically increased metabolic demand leads to chronically elevated expression of VEGF. NHLBI (HL-51971)

TIME COURSE OF PROANGIOGENIC GROWTH FACTOR EXPRESSION DURING EXERCISE CONDITIONING IN MICE

Janelle Pryor*, P.B. McDonnell, and T.H. Adair, University of Mississippi Medical Center, Jackson, MS 39216

Male C57BL/6 mice (6-7 weeks old) were exercised on a rodent treadmill (18 m/min, 10 degree incline, 1 h/day). Gastrocnemius muscles were collected 1-2 h after exercise; age-matched sedentary mice of the same strain served as controls. Relative mRNA expression of angiogenic growth factors was assessed by real-time RT-PCR. Vascular endothelial growth factor A (VEGF-A) mRNA expression was significantly increased in exercised mice compared to control on days 1 and 4, but not significantly different from control levels on day 14. Similar temporal changes in mRNA expression patterns were observed for angiopoietin-2, VEGF receptor-1, and the angiopoietin receptor, Tie-2. Angiopoietin-1 and VEGF receptor-2 mRNA expression in gastrocnemius muscle did not change significantly during the 14 days of the experiment. These results suggest that VEGF, as well as several other growth factors and their receptors, may be subject to negative feedback regulation during exercise conditioning, and that significant adaptation of skeletal muscle to exercise conditioning occurs by day 14 in C57BL/6 mice. NHLBI (HL-51971).

THE EFFECTS OF ESTROGEN ON THE VIABILITY AND PROLIFERATION OF CERVICAL TUMOR CELL LINES, SW 756 AND HELA, AND NORMAL CERVICAL CELLS, ECT 1/ E6E7 IN CULTURE.

Melissa P. Daniel* and Hamed A. Benghuzzi, University of Mississippi Medical Center, Jackson, MS 39216.

Cervical cancer remains a major health threat and the

role of steroid hormones in cervical cancer is not clearly defined. This study investigated the effects of the steroid hormone, estrogen, on the viability and proliferation of two cervical tumor cell lines, SW 756 and HeLa, and normal cervical cells, Ect 1/E6E7 cells, that were HPV transformed. In this study, all cell lines were treated with physiological and supraphysiological doses of estrogen (EP and EH) and examined biochemically and morphologically at 24, 48, and 72 hours. Biochemical assays performed at all time periods, included the MTS Assay to determine actual cell counts, the MDA and LDH Assays to evaluate cellular damage, and the Pierce BCA Protein Assay to determine total protein. In addition, morphological characteristics were evaluated using Papanicolaou and H&E staining. All values were compared to an appropriate control. Highlights of the results from this study indicated the following: Proliferation rates (MTS) were higher than the controls at all time periods in the HeLa cell line following EP ($P < 0.05$, Dunnett's Test, at 24 and 72 hours) while the SW 756 cell line matched the control values. MTS values were lower than the controls at all time periods in SW 756 cells following EH ($P < 0.05$) while the reverse was true for HeLa cells. MDA and LDH levels were higher in SW 756 cells following treatment with EH at 24, 48, and 72 hours ($P < 0.05$); however, MDA levels did not differ from the controls in HeLa cells following EH at any time period. Cellular protein levels (Pierce BCA Protein Assay) were unremarkable at both doses for all time periods. Papanicolaou and H&E stains provided information on the cellular morphology of these cell lines. Conclusions were that the HPV-transformed tumor cell line (HeLa) was more resistant/robust than the HPV-negative tumor cell line (SW 756).

THE EFFECTS OF GROWTH FACTORS ON THE PRODUCTION OF BONE MATRIX PROTEINS

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The bone morphogenetic proteins (BMPs) and transforming growth factor-beta s (TGF-beta), are a group of structurally related proteins which have been shown to stimulate bone formation *in vivo*. Since these proteins are concentrated in the organic matrix of bone and would be released during bone resorption, they are likely to have a profound effect on the remodeling bone and may provide a link between bone resorption and bone formation. Osteopontin is a phosphorylated glycoprotein that is abundant in bone mineral matrix and accelerates bone regeneration and remodeling of bone. Osteocalcin, or bone gla protein, is a noncollagenous protein in mature bone. It is synthesized by osteoblasts and incorporated into bone matrix, although a fraction of the newly synthesized osteocalcin is released into the circulation. Osteocalcin is metabolized mainly in the kidney and to a lesser extent in the liver, the half-life in the circulation is about five minutes. Osteocalcin production is dependent on 1,25 dihydroxy vitamin

D; vitamin K; and vitamin C. Serum osteocalcin correlates with bone formation. Osteoblast like cells were challenged with either OP-1, demineralized bone matrix proteins or IGF-1 for 24, 48 and 72 hours. After each incubation period, ELISA assay determined the levels of Osteopontin and Osteocalcin production and collagen type-I were determined by immunocytochemistry. The results clearly demonstrated an increase in Osteopontin and osteocalcin production by DBX as early as 24. All three treatments resulted in increased collagen type-I. This information is important for understanding the signaling pathways that may be innervated in the osteoblast following stimulation with growth factors.

THE EFFECTS OF GLUCOSAMINE, CHONDROITIN, AND THYMOQUINONE ON HTB-93 SYNOVIAL CELLS

Marilyn May*, Hamed A. Benghuzzi, and Michelle Tucci, University of Mississippi Medical Center, Jackson, MS 39216

Glucosamine, chondroitin, and thymoquinone (TMQ) are the complementary medicines under investigation in this study. Glucosamine is a naturally occurring glycoaminoglycan that contributes to the development of proteoglycans needed for the development of cartilage development and regeneration. Chondroitin is also a naturally occurring glycoaminoglycan that seems to support the efforts of glucosamine as well as provides chondroprotection while serving as a 'water magnet' within the joint matrix. Thymoquinone is derived naturally from the black seed plant that is extremely popular within Middle Eastern countries. Its benefits are multiple, including both antioxidant and anti-inflammatory properties. These products were administered to HTB-93 synovial cells and cell viability, damage and alterations in morphology were analyzed after 72 hours. Preliminary results revealed that chondroitin increased cell number in the high treatment group with increased nitric oxide production and decreased glutathione content compared to control, glucosamine and TMQ. Decreased glutathione levels were seen in the medium and high doses of both glucosamine and chondroitin. Increased levels of glutathione were seen with increasing TMQ, with out changes in cell numbers or nitric oxide. The data indicates that medium and high doses of glucosamine and chondroitin may be cytotoxic to HTB-93 synovial cells.

PREVALENCE OF ANTIBODIES TO HEPATITIS C VIRUS IN A UNIVERSITY SETTING

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The purpose of this study was to determine the prevalence of antibodies to the Hepatitis C Virus (HCV) in a volunteer sample of university students and then compare the rate of infection to that of the general public of the United States (1.8%). The occurrence of HCV in this age population has been not been widely reported. Such studies are of value to health

care providers, health educators and to blood donor centers. A sample of convenience utilized students visiting the on campus health care service. Volunteers donated a blood sample and completed a researcher developed survey. Two hundred seventy six students participated. Blood samples were tested at a major blood center for antibodies to HCV using Abbott Laboratories EIA 2.0 methodology. Positive samples were repeated in duplicate. Students testing positive were contacted and received counselling regarding further testing. The mean age of the participants was 23 +/- 5 years. Characteristics of the group included: 63% female, 57% Caucasian, 38% African American, 29% with tattoos, 67% had pierced ears, and 19% had other body piercings. Participants also reported having other sexually transmitted diseases (17%) and 53% had multiple sex partners. Despite reported risks, only 2 of the 276 students tested EIA positive. On further testing by RIBA both were shown to be negative. The prevalence of anti-HCV in this population was 0%. Therefore, the incidence of HCV in this sample of university students was much lower than the prevalence in the general population.

THE PHYSIOLOGICAL EFFECT OF CONVENTIONAL TREATMENT WITH EPIGALLOCATECHIN-3-GALLATE, THYMOQUINONE, AND TANNIC ACID ON THE LNCaP CELL LINE

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Several antioxidants have been discussed for use in prevention and treatment of prostate carcinoma. Epidemiological evidence has indicated that these antioxidants may reduce the risk of prostate cancer by underlying mechanisms that remain unclear. The aim of this study was to use the androgen-dependent LNCaP human prostate cancer cell line as a cell model to evaluate the physiological effects to conventional treatments with both low (LD) and high doses (HD) of epigallocatechin-3-gallate (EGCG), thymoquinone (TQ), and tannic acid (TA). Following treatment, cells were incubated and the various groups were evaluated at 24, 48, and 72 hours. After 24, 48, and 72 hours of incubation, all groups suppressed the cells, but the TQHD treated group seemed to be the most potent. The TQHD group also demonstrated the greatest decrease in total protein levels in comparison to the control. According to one-way analysis of variance (ANOVA), significant differences were observed ($P < 0.001$). Upon observation of the PSA values, all groups showed decreased levels; however, the TQHD treated group showed an initial suppression after 24 hours and then finally portrayed adaptation after 48 and 72 hours. Malondialdehyde (MDA) values were also assessed at the same three time periods (24, 48, and 72 hours) as an indicator of membrane integrity. After 24 hours of incubation, the TAHD group demonstrated the greatest increase in MDA levels. Morphologically, the cells demonstrated significant changes upon antioxidant exposure. These

findings reveal that antioxidants may serve as agents for prostate cancer prevention; however, further experiments are needed to understand the interactions involved.

IMMUNOSTAINING TO DETERMINE OSTEOCYTE APOPTOSIS BY CASPASE-3

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Caspases are cysteine proteases that play a critical role in apoptosis. Activated caspase-3 is a downstream cell death signal. Thus, immunostaining by caspase-3 can be used as an effective tool for the assessment of osteocyte apoptosis. The specific intent of this work was to optimize caspase-3 immunostaining protocol. Working antibody dilution, method of epitope retrieval, peroxidase inactivation, and blocks were examined through various series of antibody runs. 1:300 appears to be a good working dilution for the caspase-3 antibody. It produced a high signal to noise ratio with minimal nonspecific expression. Of the retrieval techniques analyzed, DeCal retrieval appeared to limit nonspecific staining the most. We have yet to determine the significance of peroxidase inactivation with 3% H_2O_2 in methanol. Casein appears to be a better blocking agent than serum. Caspase-3 immunostaining is a vital tool in the evaluation of apoptosis. By considering the previously mentioned variables, we hope to have a protocol for a more accurate measure of osteocyte apoptosis. Supported in part by NIH R25 GM067592-02.

EFFECTS OF AMBULATION WITH STANDARD WALKER AND/OR ROLLING WALKER WITH PLATFORMS ON CARDIOPULMONARY FUNCTIONS AND BIOCHEMICAL STRESS MARKERS IN NON-WEIGHT BEARING INDIVIDUALS

Veronica Taylor, Jim Garrett, Jason Reeves, Leann Staton, Hunter Stark, Ameze Adah, and Derrick Huang, Hamed A. Benghuzzi, and Felix Adah*, University of Mississippi Medical Center, Jackson MS 39216

Research shows an increase in cardiopulmonary demands with exercise. Patients with traumatic injuries referred for Physical Therapy may be placed on non-weight bearing (NWB) on the affected limb for healing to occur. Few studies have explored the physiological impact of various walkers in a non-weight bearing individuals. The purpose of this study was to examine the effects of ambulation with a standard walker (SW) and a platform walker with wheels (RW) using cardiopulmonary parameters and biochemical stress markers in one legged ambulation. The study consisted of 2 phases using male and female students ($n=14$), age 23 to 27 years (mean $\pm$ SE of 24.21 ± 1.24). Phase I consisted of the participants ambulating with a SW and RW for 6 minutes. The heart rate (HR), respiratory rate (RR), systolic blood pressure (SBP), and diastolic blood pressure (DBP) before and after were recorded.

Phase II consisted of the same participants and measurements, but instead of ambulating for 6 minutes, they ambulated for 12 minutes. In addition, urine and saliva samples were collected before and after ambulation in Phase II. Results indicated a statistically significant difference between before and after measurements of HR, SBP, and RR for SW & RW for the 6 minute-walk and 12 minute-walk levels and DBP for the RW for 12 minutes walk ($p < 0.05$). The cardiovascular demands were not statistically different using each type of walker and walking for 6 or 12 minutes ($p > 0.05$). There was no significant difference in cortisol levels in Phase II (12 minutes walk) in both the saliva and urine. Our study suggests that ambulation using the types of walker used in this study for short and long period of walk resulted in increased cardiovascular demands.

POXVIRUS PHOSPHATASE VH1 ALTERS IFN-GAMMA REGULATED GENE EXPRESSION IN MACROPHAGES

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Poxviruses including Variola (small pox), and Vaccinia, which is used to vaccinate against small pox have developed numerous methods for altering and/or evading an immune response. One such way is by the ability of the viral VH1 phosphatase to alter signaling cascades, which is vital for viral replication and may play a key role in the invasion of host defense during infection. Our studies focus on understanding if either the Vaccinia or Variola VH1 protein blocks interferon-gamma induced STAT1 regulated gene expression in macrophages. It is our hypothesis that the Variola protein will function more efficiently than Vaccinia in blocking STAT 1 function and may contribute to the pathogenicity of the smallpox virus. We first wanted to show that VH1 is present in the virus prior to infection. Results using RT-PCR showed that VH1 was expressed in Vaccinia virus that was used to infect cells. Next, a comparison of transfection reagents showed that Gene Porter 2 was optimal for our experiments in the macrophage cell P388D1. A series of co-transfection experiments showed that transfection of a VH1 expression plasmid reduced the STAT1 regulated reporter gene expression of the TAP-1 promoter. These data suggest that VH1 in the virus may prevent the induction of interferon-gamma regulated genes in macrophages during viral infection. Supported in part by NIH R25 GM067592-02 and P01 AI56097-02S1.

THE EFFECTS OF GROWTH FACTORS ON CELLULAR PHOSPHOLIPIDS

Laura Franklin*, ShaDonna Jefferson, Michelle Tucci, Hamed A. Benghuzzi, and Rodney Baker, University of Mississippi Medical Center, Jackson, MS 39216

Signals are transduced across the cell membrane through a series of events that are triggered by the activation of receptors or opening of ion channels. It is evident that the

stimulation of cells can elicit a series of catabolic cascades, which cause degradation of several membrane phospholipids. Several breakdown products participate directly in the intracellular signaling cascade. The objective of this study was to establish the changes in phospholipid membrane fractions of MG-63 cells following stimulation with growth factors (DBX, OP-1, and IGF-1) for 15 and 30 minutes. After collection of the cells, methods were performed to isolate cellular phospholipids and final analysis of each phospholipid fraction by thin-layer chromatography and liquid scintillation counting. The results showed OP-1 and IGF-1 treatments at 15 and 30 minutes caused a 50% decrease in phosphatidylcholine fraction and increased phosphatidylserine and phosphatidylethanolamine fractions compared to DBX and control. DBX had 25% increase in phosphatidylinositol fraction when compared to control, OP-1 and IGF-1. Levels of phosphatidic acid and phosphatidylglycerol remained unchanged. Understanding the dynamics of the membrane may help in establishing the intracellular signaling pathways which are activated by various growth factors.

EFFECTS OF DRUGS ON THE DIFFERENTIATION OF PC12 CELLS

Ujjwal K. Rout*, Laura Vick, Dirk M. Dhossche, and John R. Gosche, University of Mississippi Medical Center, Jackson, MS 39216

Epidemiological studies show that autism may result from exposure to valproic acid, thalidomide or alcohol during gestation. This commonality in the behavioral outcomes resulting from the exposure of different teratogens suggests that autism may result from disturbances in developmental process common to these teratogens. Normal brain development requires intricate balance amongst proliferation, differentiation, migration and apoptosis of different cell types in the developing tissues that are regulated by changes in the expression pattern of genes. Therefore autism-like symptoms resulting from these teratogens may derive from changes in the expression and function of genes regulated by common genetic elements. To test this possibility, we examined effects of these teratogens on the activity of transcription factor EGR that is known to regulate differentiation of several cell types. PC12 cells were cultured on laminin-coated plates. At 1h of incubation, cells were induced to differentiate into neuronal phenotype by the addition of nerve growth factor (NGF) in the culture medium. At the same time, cells were treated with alcohol, thalidomide or valproate and incubated for additional 3h. EGR activity was determined in the nuclear extracts of untreated and treated cells by a fluorescent based method using Luminex-100 instrument. Effects of low and higher concentrations of teratogens were examined on the activity of EGR. NGF increased EGR activity in all experimental conditions, and higher concentrations of teratogens elevated NGF-induced EGR activity. Results suggest that exposure to these teratogens may cause excessive and premature differentiation of neurons during brain development resulting in abnormal

neural positioning or connection. Our data indicate that EGR may be a common target of these teratogens in the developing brain.

THE NEWEST MEMBER OF THE INHIBITORS OF APOPTOSIS FAMILY, IAP LIKE PROTEIN 2 DEMONSTRATED GROWTH FACTOR REGULATION IN CD34+ AND MO7E CELLS

Leshundra Young^{1,*}, Seiji Fukuda², Janardhan Sampath², and Louis M. Pelus^{2,1} Jackson State University, Jackson, MS 39204 and ²Indiana University Purdue University at Indianapolis, Indianapolis, IN 46202

Inhibitors of apoptosis proteins are a family of natural inhibitors of cysteine proteases that regulate apoptosis through caspase dependent and independent mechanisms. ILP2 (IAP-like protein-2) is the newest member of the IAP family. ILP2 regulates apoptosis by restricted specificity for caspase-9 and neutralization of the Smac/Diablo complex. It is expressed in the testis and in lymphoblastoid and other transformed cell lines. Of the eight members of the IAP family, only Survivin is growth factor regulated in normal human CD34⁺ stem and progenitor cells and the human hematopoietic cell line, MO7e. In order to determine if ILP2 is similarly expressed and regulated, we examined mRNA and protein expression of ILP2 before and after incubation with growth factors in CD34⁺ and MO7e cells and examined if ILP2 expression was associated with cell cycle progression and apoptosis. Western analysis and quantitative-RT-PCR revealed that ILP2 was expressed in MO7e and CD34⁺ cells and that growth factor starvation reduced ILP2 protein and mRNA. Addition of stem cell factor (SCF) or granulocyte-macrophage colony-stimulating factor (GM-CSF) blocked down-regulation of ILP2 protein induced by growth factor deprivation and enhanced cell survival and cell cycle progression in MO7e cells. ILP2 mRNA was significantly up-regulated by the early acting cytokine SCF but not by the late acting cytokine GM-CSF. ILP2 mRNA was down-regulated by the combination GM-CSF + SCF, suggesting that ILP2 may be regulated with differentiation. These results suggest that ILP2 may be involved in the growth factor mediated proliferation, survival or differentiation of primitive hematopoietic cells. Supported in part by NIH R25 GM067592-02 and P01 AI56097-02S1.

FRIDAY MORNING

Exhibit Hall A1

Session III: Biology, Chairs: Joseph A. Cameron & Ham Benghuzzi

9:00 Opening Remarks

9:02 MARKERS OF INFLAMMATION AND OXIDATIVE STRESS IN ALZHEIMER'S DISEASE

Christopher Bennett* and March Ard, Alcorn State University, Lorman, MS 39096 and University of Mississippi Medical Center, Jackson, MS 39216

Alzheimer's disease (AD) is a neurodegenerative disease that affects millions of people throughout the world. The risk of obtaining AD usually increases after the age of 70 due to increased levels of oxidative stress and inflammatory processes. Oxidative stress and inflammation may cause AD. Amyloid beta-protein plaque accumulation is believed to initiate the main events that are believed to cause AD. The purpose of this study is to investigate links between oxidative stress and inflammatory processes in AD. Blood samples were collected to measure oxidative stress through lipid peroxidation measurements. The blood samples were from the age groups of 20-40 and 60-80. Brain tissue samples were also used in this study. The brain tissues were collected from AD patients and from controls, which did not have AD. The brain sections were immunostained for light microscopy to determine if inflammatory and oxidative stress related molecules were in the Alzheimer brain tissue. Electron microscopy (EM) was also used to determine if there were auto-antibodies, which are inflammatory molecules in Alzheimer brain tissue. These experiments usually revealed certain areas that were specific for staining, proving that there were some AD related molecules in that section. The lipid peroxidation measurements on plasma samples didn't show a difference in the amount of oxidative stress between the two age groups. EM and light microscopy showed immunostained neurons and cells, which could be indicators of AD related molecules. The molecules found in the brain sections could be responsible for the development or progression of AD.

9:15 EFFECTS OF BUTORPHANOL ON NEURONAL ACTIVITIES OF THE RAT LOCUS COERULEUS

Matthew Burford* and Hong Zhu, University of Mississippi, University, MS 38677 and University of Mississippi Medical Center Jackson, MS 39216

The brain noradrenergic locus coeruleus (LC) has been shown to play an important role in the development of physical dependence on opioids. Butorphanol is a mixed agonist/antagonist opioid analgesic. The dependence liability of butorphanol has been considered to be low when used within the therapeutic dose range. However, a marked physical dependence liability has been observed in humans and animals when larger doses were administered for a prolonged period. In the present study, using a multiple-electrode recording technique, we examined the effects of butorphanol on LC neuronal activities in adult Sprague-Dawley rats. A multi-wire electrode was implanted into the nucleus LC. This technique allows us to monitor several LC neurons simultaneously. A cannula was implanted into the lateral cerebroventricle for drug injections. LC neuronal activities were recorded before and after butorphanol injection under halothane anesthesia. We found that a relative high dose of butorphanol (78 nmol) significantly inhibited the

firing rates of LC neurons. In a subpopulation of the LC neurons, butorphanol also induced synchronous oscillatory burst activities. The inhibitory action and synchronous burst activities can be reversed by opioid receptor antagonist naloxone, indicating the involvement of opioid receptors. These results suggest that changes in LC neuronal activity may be involved in the development of butorphanol dependence. (supported by NIDA 016440 and Center for Psychiatric Neuroscience in the UMC)

9:30 ROLE OF CYTOCHROME P-450 3A4 (CYP 3A4) GENES IN THE DEVELOPMENT OF BREAST CANCER

Crystal Berry^{1*}, Angela Lewis¹, Steven Bigler¹, Paula Smith¹, Henry Barber¹, Teandria Burns², Joseph Cameron², and Iga McDaniel¹, ¹Univ. of MS Medical Center, Jackson, MS 39216 and ²Jackson State University, Jackson, MS 39217

Background: Cytochrome P-450 3A4 has been implicated in the etiology of breast cancer. A transition of A to G at position -290 of the CYP 3A4 gene has an effect on the level of gene transcription and has been associated with several disease conditions. Goal of Study: We sought to determine the frequency distribution of this variant and its effect on gene expression in breast cancer. Methods: Patients undergoing lumpectomy, needle localization, simple mastectomy and modified radical mastectomy were recruited. Genotypes were detected by a PCR-base approach using SNP analysis of human CYP 3A4 gene. Expression levels of mRNA transcripts were determined by RT-PCR. Results: The homozygous GG allele had a 2-fold increase in patients with malignant tumors. The AA allele was present in 50% and 33% of patients in stages 0 and I, respectively, while 67-100% in stages II and III carried AG or GG alleles. The expression levels of CYP 3A4 transcript appeared to be higher in PBMCs of patients with benign tumors as compared to malignant tumors ($p < 0.03$). Conclusions: Patients who were homozygous GG genotype may have an increased risk of developing breast cancer. CYP 3A4 genotype analysis may predict likelihood of developing breast carcinoma, and might allow earlier detection and more effective treatment of breast cancer. (Crystal Berry, 2nd year medical student, is recipient of the 200 Dean's Summer Research Fellowship Program.)

9:45 DEVELOPING NEW CLASSES OF ANTIDEPRESSANT MEDICATION

John Stoker^{1*}, Mark Hamann², Rae Matsumoto², Jamal Shaikh², Jia Jia Wang², and Matt Brammer³, ¹Alcorn State University, Lorman, MS 39096, ²University of Mississippi, University, MS 38677 and ³University of Oklahoma, Norman, OK 73019

Antidepressant drugs that are used to treat depression take up to several weeks before becoming effective. Not only do they take too long before they become active, but they have some major or minor side effects. This research is being conducted to identify new and better antidepressant medications for treating depression with less side effects. The new compounds were

chosen because they presently show potential new treatments for cancer and infectious diseases. Two of the new compounds show some resemblance in their chemical structure to those of current antidepressant medications or to serotonin, the brain chemical that they target. Even though the others have different chemical structures, we feel that if antidepressant-like actions are displayed, then these compounds may target different receptors. The new compounds were tested for antidepressant-like activity in mice using the forced swim test, the most established animal model for predicting antidepressant-like activity. Reductions in immobility time served as the indicator of antidepressant-like activity. The results from the new compounds were compared to the compounds that were used as the positives controls. The positive controls used in the experiment were fluvoxamine and desipramine. Two of the new compounds had significant antidepressant-like actions, while the others did not. These two compounds represent potential new antidepressant drugs.

10:00 EFFECTS OF HUMAN UMBILICAL CORD BLOOD REGULATORY T CELLS ON EFFECTOR CD8⁺ T CELL DIFFERENTIATION

Pamela L. Ruffin^{1,2}, Young-June Kim², and Hal E. Broxmeyer², ¹Jackson State University, Jackson, MS 39217 and ²Indiana University, School of Medicine and the Walther Cancer Institute, Indianapolis, IN 46202

CD8⁺ T cells are crucial for host defense against virus and tumor cells. Upon antigen recognition, CD8⁺ T cells acquire effector functions. CD4⁺CD25⁺ regulatory T cell (Treg) has been known to suppress CD8⁺ T cell-mediated anti-tumor immune responses. The mechanisms which Treg suppresses CD8⁺ T cell-mediated effector responses remain unclear. Contrast to Treg, signal through NKG2D receptor promotes CD8⁺ T cell effector responses to tumor cells as an activating co-stimulatory receptor. We investigated whether Treg and NKG2D counteract the effector CD8⁺ T cell activity using naïve CD8⁺ T cells isolated from human umbilical cord blood (CB). Induction of granzyme B is a hallmark of CD8⁺ T cell effector differentiation. By co-culturing Treg with CD8⁺ T cells, we determined an effect of Treg on induction of granzyme B expression in the CD8⁺ T cells through flow analysis. Unexpectedly, we found that Treg did not suppress but promoted induction of granzyme B. NKG2D has been known to be downregulated by tumor cell-derived ligand binding in cancer patients. Thus, we hypothesized that Treg might inhibit induction of NKG2D in CD8⁺ T cells. We mimicked the ligand-induced downregulation of NKG2D by culturing CD8⁺ T cells on anti-NKG2D-coated plates. Downregulated NKG2D expression was gradually restored. We examined whether Treg affected restoration of NKG2D on CD8⁺ T cells by culturing anti-NKG2D on CD8⁺ T cells with/without Treg. Similar to Treg on granzyme B, Treg enhanced the NKG2D expression. In summary, Treg isolated from CB enhanced induction of granzyme B and NKG2D expression in CD8⁺ T cells. Supported in part by NIH R25 GM067592-02 and P01

AI56097-02S1.

10:30 Break

Symposium II: Drug Delivery, Chairs: Kenneth Butler & Felix Adah

11:00 CONVENTIONAL AND SUSTAINED DELIVERY L-DOPA AND THYMOQUINONE ON SH-SY5Y HUMAN NEUROBLASTOMA CELLS

Tina Mitchell Martin*, Hamed A. Benghuzzi, and Michelle Tucci, University of Mississippi Medical Center, Jackson, MS 39216

L-dihydroxyphenylalanine (L-dopa) toxicity has been associated with the production of high levels of quinones. The reactive oxygen or nitrogen species generated in the enzymatic oxidation or auto-oxidation of L-dopa induce apoptotic or non-apoptotic cell death or neuronal damage. Thymoquinone is the major active component in *N. sativa* and has significant cytoprotective, anti-inflammatory and antioxidant actions. It is thought that thymoquinone may act on the oxygen free radicals and quinones from L-dopa cytotoxicity and/or auto-oxidation thereby decreasing L-dopa neurotoxicity. OBJECTIVE: The objective of this study was to determine the effects of thymoquinone on the viability and metabolic activity of SH-SY5Y human neuroblastoma cells alone or challenged with levodopa (L-dopa) using conventional and sustained drug delivery. RESULTS: Cell numbers were relatively maintained with conventional delivery thymoquinone at 24 and 48 hours and in sustained thymoquinone delivery routes at 24, 48 and 72 hours. A reduction in cell number in thymoquinone/L-dopa cells was seen at 72 hours in the conventional delivery group. Cell numbers, however, were relatively maintained in conventional at 24 and 48 hours and in sustained drug delivery routes at 24, 48 and 72 hours suggesting a possible protective effect of thymoquinone. CONCLUSION: When thymoquinone and L-dopa were administered together using sustained drug delivery, cell counts were similar to thymoquinone given alone at 24 and 48 hours Thymoquinone has proven to have cytoprotective and antioxidative properties and therefore, may prove beneficial in neuroprotective strategies of Parkinson's disease.

11:15 THE EFFECTS OF CORTISOL AND ENDOTOXIN EXPOSURE ON RC/4B PITUITARY ADENOMA CELLS

Lisa A. Haynie*, Michelle Tucci, and Hamed A. Benghuzzi, University of Mississippi Medical Center, Jackson, MS 39216

Pituitary adenomas are benign tumors that arise exclusively within the anterior pituitary. Many of these tumors can respond to cortisol levels that are physiologic or supraphysiologic. The objective of this study was to develop a model system to study the effects of hypocortisolism, hypercortisolism alone or at different points of endotoxin

administration and compare those with physiological cortisol concentration. RC/4B cells were challenged with LPS either 30 minutes prior to or post cortisol exposure. The cells were evaluated at 24, 48 and 72 hours following the challenge.

Regardless of the cortisol dose + the pre or post exposure to LPS, RC/4B cells were viable throughout all experimental periods. Also, the conventional delivery of cortisol 30 minutes after LPS exposure on the RC/4B cell line appeared to reduce the production of hydroxyl ion radical, which suppressed the membrane lipid peroxidation. Additionally, future considerations are warranted to investigate whether LPS directly triggers reactive nitrogen intermediates.

11:30 EFFECT OF EXOGENOUS STEROID HORMONES ON CYTOKINE EXPRESSION IN FIBROUS TISSUE SURROUNDING TCP BIO-CERAMIC IMPLANTS

Kenneth R. Butler and Hamed A. Benghuzzi, University of Mississippi Medical Center, Jackson, MS 39216

Cytokines are the mediators of the inflammatory response. Previous studies have indicated that certain cytokines are expressed during acute and chronic phases of inflammation. The purpose of this study was to study the effect of testosterone, dihydrotestosterone, and androstenedione on the expression of IL-1 β , IL-2, IL-6, and TNF α at 90 days post-implantation. Twenty animals in four experimental groups (n=5/group) were implanted with one tri-calcium phosphate (TCP) device each. Group I animals were implanted with sham TCP ceramics (control) containing no hormone. Group II animals received a ceramic loaded with testosterone. Group III animals were implanted with a dihydrotestosterone-loaded TCP ceramic. Group IV animals received the TCP bioceramic loaded with androstenedione. At 90 days post-implantation, the animals were euthanized. The fibrous tissue surrounding the implants were evaluated microscopically after staining with hematoxylin and eosin and antibodies to IL-1 β , IL-2, IL-6, and TNF α . The results of this study indicate that cytokine expression in Groups I, II, & III were similar. Specifically, testosterone and dihydrotestosterone did not adversely effect expression of these cytokines. In Group IV, androstenedione inhibited the expression of IL-1 β , IL-2, and IL-6. TNF α was the only cytokine that was positive in this group. These findings suggest that the effect of exogenous hormones on thickness and cellular composition of the fibrous tissue may be dependent on cytokine expression.

11:45 EFFECTS OF SUSTAINED RELEASE OF STATIN BY MEANS OF TRICALCIUM PHOSPHATE LYSINE DELIVERY SYSTEM IN A DEFECT AND SEGMENTAL FEMORAL INJURIES ON CERTAIN BIOCHEMICAL MARKERS IN VIVO

Felix Adah¹, Hamed A. Benghuzzi¹, Michelle Tucci¹, George Russell¹, Audrey Tsao¹, and Barry England²,¹University of Mississippi Medical Center, Jackson, MS 39216 and ²University

of Michigan Medical School, Ann Arbor, MI 48109

Statins, which are 3-hydroxy-3-methylglutaryl coenzyme A (HMG-CoA) reductase inhibitors are widely used for the treatment of hyperlipidemia, and recent studies and animal data suggest that statins promote osteogenesis and increase bone strength. However, little is known about the effects of statins delivered by sustained delivery system to a target site of a defect and segmental bone fractures on certain biochemical markers including reproductive hormones. The purpose of this study was to develop a targeted statin delivery system using Tricalcium Phosphate Lysine (TCPL) for defect and segmental femoral injuries and evaluate the effects on alkaline phosphatase, total protein, malinodialdehyde, glutathione, total cholesterol, testosterone, luteinizing hormone, statins, and follicle-stimulating hormone. Because of the influence oral intake of statins might have on certain body organs, we also examine the histomorphology of the vital and reproductive organs of the animals receiving statins for a period of 30 days and 12 weeks post surgery. Simvastatin used in this study significantly increased fracture healing and without significant influence on the body weights and the weights and morphology of the vital and reproductive organs. There was a significant reduction in the cholesterol levels on the 3rd week in both phases of the study and at the conclusion of the study the difference in the cholesterol levels was no more significant in both phases. Other biochemical markers including plasma LH, FSH and testosterone levels were not affected by active treatment with simvastatin. In conclusion, short and long-term simvastatin treatment delivered at a fracture target site did not influence vital and reproductive organs, the systemic levels of the biochemical markers studied, but was able to effectively stimulate bone formation in simple and complicated segmental fractures.

FRIDAY AFTERNOON

Exhibit Hall A1

- 1:00 First Aid Panel Discussion
- 2:15 Divisional Business Meeting & Awards

HISTORY AND PHILOSOPHY OF SCIENCE

Chair: Bud Donahou, Northwest Community College
Vice-chair: Maritza Abril, University of Southern Mississippi

FRIDAY MORNING

Meeting Room 3

8:30 THE ADVANTAGES OF DEVELOPMENTAL SYSTEMS IN BIOLOGY

Court Lewis, University of Southern Mississippi, Hattiesburg, MS 39406

Many geneticists, and many in the scientific community, accept the notion that the genotype (genetic makeup) is the sole cause of an organism's phenotype (physical attributes). However, developmental biology, particularly developmental constructionism, has gained considerable acceptance in the world of science by putting forth a compelling argument for developmental systems, which play down the primary role of DNA in development and support a more relational and contextual setting between the organism and its environment. I will argue that the developmental systems approach (i.e. developmental constructionism) is an acceptable view in both biology and philosophy of biology. To prove my argument, I will examine the five tenets of the developmental constructionist challenge, proposed in Paul E. Griffiths and Robin D. Knight's article "What is the Developmentalist Challenge?" The goal of the examination will be to illustrate the advantages of developmental systems in biology over the more accepted approach of placing DNA as the primary mover in genetic development. In addition to Griffiths and Knight's essay, I will address the major criticisms, concerning developmental systems, raised by Kenneth Schaffner, Martin Mahner, and Mario Bunge. After illustrating the criticisms of developmental constructionism, I will conclude that it is not only an acceptable but also advantageous approach for both biologists and philosophers of biology.

9:00 ON THE CONCEPT OF 'A LIFE': A BIO-PHILOSOPHICAL ANALYSIS

Malachi Martin* and Michael Dodge*, University of Southern Mississippi, MS 39406 and University of Mississippi, MS 38677

The conceptual notion of *a life*, despite receiving little overt biophilosophical attention, remains intriguing nonetheless. Philosopher Peter van Inwagen, in his book *Material Beings*, asks: "What is a life?" For philosopher John Locke, each living thing's constituents participate in a *common life*, viz. the life of the whole organism. Jack Wilson, in his book *Biological Individuality*, is concerned with the individuation of *lives*.

Perhaps the most general account of a *life* would include both the vertical and horizontal spatiotemporal dimensions of a biological organism. In this presentation we will explore all of the nuances of the question of a *life*. Many pertinent biophilosophical considerations ensue. The ontological question is of what sorts of things *lives* are. For example, are *lives* mereological sums? Are *lives* events? The epistemological question of what exactly our purported knowledge of *lives* consists of beckons us to consider how we can know something about a *life*. Ethical considerations impel us to ponder the moral dimensions of biological birth and death as well as the value we impart to kinds of bioentities (both human and nonhuman). Folk ideas express usages of a *life* that typically convey social realities or potentialities (enter the notion of "building a life"). A precise biophilosophical grasp would anchor the social to the biological. Armed with philosophical scrutiny and general biological knowledge as a guide, it will be our goal to seek to attain some precision on the concept of a *life*.

9:30 CONTINUITY VS. CONTEXTUALITY: THE CONTRIBUTION OF ANNELIESE MAIER (1905-1971) TO THE HISTORY AND PHILOSOPHY OF SCIENCE.

Michael Fitzgerald, Independent Scholar, Hattiesburg, MS 39402

In this presentation I will discuss the contribution of Anneliese Maier to the History and Philosophy of Science. A great conundrum for the History and Philosophy of Science is how to evaluate the contribution of medieval natural philosophers, if any, to the history and philosophy to what is called modern science. Modern science is typically thought by many contemporary scientists to have begun *ex nihilo* with the rejection of medieval Aristotelian natural philosophy in the 17th century, the rise of atomism, and the innovations of Galileo that placed the new scientific world-view on a more precise mathematical footing. The great French physicist Pierre Duhem, with his turn of the 20th century studies of pre-Da Vincian physics, shocked modern scientists by arguing that what was referred to as modern science was merely a continuation of developments in late-medieval natural philosophy. Duhem argued that modern science actually arose in the 14th century, in the cosmologies and mechanics of the Parisian Masters: John Buridan and Nicolas Oresme. Buridan's "Theory of Impetus" and Oresme's diagrammatic presentations of mathematical results were seen by Duhem as anticipations of the Law of Inertia and Cartesian analytic geometry. Anneliese Maier criticizes Duhem position as anachronistic because it failed to take into account the 14th philosophic context of Buridan's and Oresme's views. She concluded the 14th century thinkers may have indeed rejected particular claims of Aristotelian natural philosophy, but never its basic philosophical principles, e.g. hylemorphism etc. The final break only occurred in the 17th century. The contributions of the medieval natural philosophers, she maintains, has to be understood within that context of its basic Aristotelian principles.

10:00 Break

10:30 PARADIGMS OF LIFE: HISTORICAL CONCEPTIONS AND EVOLUTIONS

Michael Dodge, University of Mississippi, University, MS 38677

Humanity has often pondered the 'nature' of life: What is it? What is its origin? How do we identify it? These questions have snared the attention of scholars throughout time, and it is the intention of this presentation to elucidate at least a minority of the more historically potent conceptualizations. From Plato and Aristotle to Darwin, Mendel, and beyond, the concepts surrounding life and its origins have been constructed, traded, altered, construed, disassembled, shaped, and drawn by philosophers and scientists to fit the body of knowledge native to their respective eras. One notable caveat: the question, "what is life" is entirely distinguishable from the sibling question, "what a life is". Though the two are assuredly interrelated, this presentation focuses on the former inquiry, relegating many pertinent biophilosophical questions to a secondary, albeit no less important position, relative the historical instances here delineated. Are the properties of life purely natural and physical, or is a supranatural component necessary—an element that imports *élan vital* to an otherwise empty husk? Equally important are the origins of life, and theories like spontaneous generation, 'divine' creation, random combination, and evolutionary competition, will all receive proper evaluation. Lastly, I intend to emphasize that like 'life' itself, humanity's answers to these questions are hardly static; indeed, they inch serpiginously forward, tempting each generation to sit satisfied with the triumph of knowledge that follows from solid models, yet reminding us all that such models have often been built on shaky foundations.

11:00 THE UTILITY OF EXTENSIONAL COMPLEXITY MODELING FOR THE BIOLOGICAL SPECIES AS A NATURAL KIND

Kenneth J. Curry* and Paula Smithka, University of Southern Mississippi, Hattiesburg, MS 39406

We frequently view the world as hierarchically structured. Stanley Salthe has developed a "scalar hierarchy" model which we apply here to analysis of the biological species. We take biological species to be natural kinds that fit specifically the notion of a homeostatic property cluster kind (HPCCK) as proposed by Richard Boyd. Our refinement of Boyd's views cast species as a coherent group of organisms characterized by a lineage and identified by a level of cohesion conferred by both literal and figurative homeostasis. Extensional complexity, which the scalar hierarchy models, refers to a part to whole nested hierarchy characterized by intransitivity across levels, i.e., processes associated with entities at a lower level do not affect a higher level, although collectively amplified processes at a lower level do perturb the higher level and each level places

constraints on adjacent levels. Seen in this model of scalar hierarchy, homeostatic properties of individual, organismal physiology that constrain an individual have no effect on homeostatic constraints at population levels which in turn have no impact on the species level, but can perturb and constrain each higher level. These constraints are seen as a result of differences in scale. The scalar hierarchy model allows us to understand species as a complex system where we analyze the parts without losing sight of the whole.

11:30 STRING THEORY AND AUM

S. Kant Vajpayee, University of Southern Mississippi, Hattiesburg MS 39406

Our desire to understand the universe remains strong and unfulfilled. Both science and philosophy continue to struggle to get us the ultimate answer to the perennial question: whether we have evolved or been created. Science has made great strides in the last hundred years. But the creationists have not given up. The latest theoretical physics thought, claimed to be capable of explaining the universe--simply and elegantly--is called string theory. It is being cultivated as the "theory of everything". It is based on a fundamental string of finite spatial extent, which could be open or closed like a loop. Everything in the universe is a manifestation of these enormously tiny strings. The original ideas, born some twenty years ago, have been modified into a superstring theory. The basis of the theory is the variety of vibrations emanating from the fundamental strings and their interactions. This presentation will attempt to link the underlying principle of the string theory with the sound that is created when the Sanskrit word "aum" is spoken. "Aum" is pervasive in Hinduism; it is associated with all its scriptures, hymns, and "mantras". It is considered the origin of the universe. It may be that the vibrations generated by reciting "aum" and the vibrations of the string are one and the same thing. If so, the "rishis" of Hinduism--probably the oldest religion of the human race--will be proved to be philosophical scientists of the first order, possessing divine qualities.

FRIDAY AFTERNOON

Meeting Room 3

1:00 THE UTILITY OF INTENSIONAL COMPLEXITY MODELING FOR THE BIOLOGICAL SPECIES AS A NATURAL KIND

Paula Smithka* and Kenneth J. Curry, University of Southern Mississippi, Hattiesburg, MS 39406

The biological species taken as a natural kind is a conceptual construct rather than a concrete particular (individual). The construct is refined by interpreting it through Richard Boyd's homeostatic property cluster kind (HPCK) which imposes figurative and literal homeostasis on individuals within the species to explain the necessary level of cohesion that seems

to characterize a species. Stanley Salthe has developed a model he calls a specification hierarchy (SPH). SPH models what Salthe calls "intensional complexity" which is characterized by a group of embedded classes organized by layers of intensional definition. Levels closer to the scale of the observer have more detailed definitions and are privileged. A major feature of SPH is the logical transitivity across levels. The observer simultaneously perceives an entity at any level (e.g., an individual oak tree simultaneously as a set of cells, an autonomous system, part of a forest (population), and a member of *Quercus* sp.) Levels in SPH are constrained by law-like processes, ontologically, but it is important to remember that SPH is an epistemic model. One aspect of SPH is that it casts the levels as developmental stages with irreversible trajectories of individuation (think of the incipient species becoming a [humanly] recognized species which ultimately gives rise to another species lineage). It is the utility of this model for HPCK that will be investigated.

1:30 INTUITION, SCALE, AND NOMINAL AND PARTICULATE THINGS: THE CONFUSING TERMINOLOGY OF PLANT PATHOLOGY

Maritza Abril* and Kenneth J. Curry, University of Southern Mississippi, Hattiesburg, MS 39406

The language of science requires an arsenal of precise terms, the meanings of which are held in common agreement by all members of a given discourse community, in order to effect useful dialogue. Engaging correctly in this specialized discourse can be a daunting task for the professional and novice alike. Plant pathology is an excellent example in which technical language is needed to describe the various relationships between host plants and their pathogens. However, the technical use of terms sometimes conflicts with our intuitive understanding of these terms. Here we consider the notions of host resistance and fungal pathogenicity considering the technical uses of the terms aggressiveness, virulence, and pathogenicity applied to fungal parasites and the terms susceptibility/resistance, sensitivity/tolerance, and vulnerability applied to plant hosts. The issues that confound the use of these terms even among plant pathologists is found in distinctions between the technical and common meanings of these terms, differences in scale between whole organismal and molecular assessment of disease processes, and the subtle confusion between nominal and particulate things (e.g., virulence is the absence of a gene product, and therefore, is in name only, not a particulate thing; avirulence, which common sense indicates is the absence of something, is a gene product, a particulate thing). We suggest that the road to clarity starts by understanding the source of confusion.

2:00 CLADISTICS, A SYSTEMATICS METHODOLOGY REALIZING DARWIN'S "GREAT TREE OF LIFE"

John D. Davis, Mississippi Museum of Natural Science, Jackson MS 39202

Darwin's 1859 statement that "community of descent

is the hidden bond which naturalists have been unconsciously seeking and not some unknown plan of creation, and the mere putting together and separating objects more or less alike" redefined natural groups of organisms as historical entities, evolutionary branches of "the tree of life," and not just an assemblage of "similar" creatures. Beginning with Ernst Haeckel, attempts to develop a truly natural or "treelike" classification system continued for a century, but no coherent, testable methodology appeared until the German entomologist, Willi Hennig, developed Cladistics in 1950. Cladistics establishes monophyletic groups including a common ancestor and all of its descendants. Organisms are grouped by relative recency of common ancestry. A group of organisms all descended from a common ancestor forms a clade, or "branch". Group branching diagrams or cladograms are constructed using features most recently derived (Synapomorphies) rather than shared primitive characters (Plesiomorphies). Character states are determined by comparisons with closely related outgroups. The history of cladistics includes Hennig's initial work, the development of statistical methods for determining the most parsimonious arrangement, conflict with "traditional" and numerical systematists, controversy over application to fossils, and such "triumphs" as the reclassification of birds as living dinosaurs! Cladistic organizing principles are now "making sense of such "difficult" groups of organisms as spiders as systematists trace out Darwin's "Great tree of life".

2:30 DOES NATURAL SELECTION EXPLAIN *FUNCTION*?

Robert Waltzer, Belhaven College, Jackson, MS 39202

It is claimed that natural selection can provide an analysis of the teleological concept of *function* strictly in terms of efficient causation (Buller). I want to challenge this view in four ways. I first want to consider a thought experiment in which a hypothetical designer directs natural selection. I will try to show from this that the source of the *function* in organisms is derived from the designer and not the process itself. Secondly, natural selection expressed without tautology cannot use the directional terms "fitness" and "advantage", which are required for an account of function. Thirdly, "fitness" and "advantage" are based upon a potentially changeable environment. Therefore under different circumstances what was once an advantage might then become a disadvantage. Such relativism is not sufficient as a framework for *function*. Fourthly, one must ask the question, "Is natural selection itself based solely upon efficient causation?" In natural selection there is 1) a living organism 2) which fits the environment, 3) is able to extract resources, 4) can reproduce, and 5) has variability which can lead to an improvement. If any of these factors were missing, natural selection would not occur. Their presence requires some explanation other than "that's the way it is". From this I conclude that natural selection as a source of teleology related to *function* is not adequate. *Function* makes more sense as a result of intention which can only come from an

agent such as a designer.

3:00 Divisional Business Meeting

3:30 "SCIENTIFIC" CREATIONISM AND THE END OF MODERN SCIENCE

George Phillips, Artesia, Mississippi 39736

Modern science and the scientific method are under attack, and the assault threatens centuries of advancement in reason and rationalism. The threat to science and reason comes from Creationist apologetics (CA)—a growing movement among Evangelical fundamentalists holding that the Christian Bible, interpreted literally, has supreme authority over all instruction including the ability to observe and interpret natural phenomena. CA is reaching the Christian consumer in the form of books, A/V media, WWWeb sites, "science" museums, home schools, church "educational" programs, and itinerant speakers via a familiar apologetics crusade called "scientific" creationism (SC). Although this oxymoronic institution of scriptural literalism may be of no immediate concern to the rational public mindset, SC proponents have recently found another inroad into the U.S. public school curriculum in the form of Intelligent Design (ID), an 'origins' movement claiming to be neutral on the subject of religion. Publicly, the ID movement advocates the study of design in nature without attributing design to any specific designer. However, any inquiry into 'design' necessitates contemplation of a 'designer'—i.e. a quest for supernatural explanations for natural phenomena. Although also populated by agnostics, theistic evolutionists, and those otherwise religiously neutral on origins, the ID movement is heavily supported by CA/SC advocates, who believe that all scientific inquiry should be subsumed under and interpreted through strict scriptural exegesis. Unlike modern science, CA/SC doctrinal "science" begins with Biblical conclusions and entertains only those facts that support inerrant scripture.

MARINE AND ATMOSPHERIC SCIENCES

Chair: Paulinus Chigbu, Jackson State University
Vice-chair: Judith William, USM-Gulf Coast
Research Lab

THURSDAY MORNING

Meeting Room 2

9:00 CHARACTERIZATION OF MID-SHELF CURRENT VARIABILITY

Colleen Finnegan^{1*}, Stephan Howden¹, and William

Teague²,¹University of Southern Mississippi, Stennis Space Center, MS 39529 and ²Navel Research Laboratories, Stennis Space Center, MS 39529

Current variability in the western Mississippi Bight will be characterized using in situ data from a mid-shelf location. In this region, fresh water input is substantial, tides are relatively weak, coastline geometry is complex, and Loop Current eddies at the shelf break have been observed to advect water far across the shelf. Analysis will include a descriptive discussion involving the forcing mechanisms upon mid-shelf waters, such as eddies and winds. Various statistical and graphical representations will be used to describe the data set collected from the Central Gulf of Mexico Ocean Observing System (CenGOOS) buoy between mid-December 2004 and August 2005. Current variability and shelf water circulation in the Mississippi Bight region will be characterized by basic statistics including season and monthly averages, standard deviations, and speed analysis for both depth averaged data and individual bin depths. The results of the described study will be presented and are expected to further the research and understanding of coastal processes, shelf circulation, biological phenomenon, pollutant dispersion and impact of forcing mechanisms on the transport of shelf waters.

9:15 ANALYSIS OF HEME OXYGENASE IN SHEEPS-HEAD MINNOWS, *CYPRINODON VARIEGATUS*

Christina Vorhoff¹*, Matthew A. Reudelhuber¹*, Rachel Ryan², Erik Carlson², and Marius Brouwer²,¹University of Southern Mississippi, Long Beach, MS 39560 and ²Gulf Coast Research Laboratory, Ocean Springs, MS 39564

Inadequate dissolved oxygen can be a major stressor in estuarine habitats. Hypoxic conditions often result from increasing urban development, agricultural runoff, and industrial pollution. This laboratory is currently using the sheepshead minnow, *Cyprinodon variegatus*, as a model for the molecular response of fish to hypoxia exposure. For this study, the hypoxia-responsive gene, *heme oxygenase*, was cloned and its expression monitored during laboratory exposures. The role of heme oxygenase in cytoprotection cascades makes it an integral part of hypoxia response. A partial sequence of heme oxygenase was obtained using degenerate primers based upon previously-published, homologous sequences in other teleost fish species. Degenerate primers were designed using Basic Local Alignment Search Tool (BLAST) engine hits and compiled to form a sequence with the Consensus – Degenerate Hybrid Oligonucleotide Primers (CODEHOP) algorithm. The sequence was then added to ongoing research through the creation of a qRT-PCR assay to obtain preliminary data on levels of expression in different tissues. Current experiments include the integration of heme oxygenase into microarray assays and Rapid Amplification of cDNA Ends (RACE) to determine heme oxygenase regulation and expression. These studies will allow for more in-depth analyses of hypoxia response mechanisms in aquatic organisms.

9:30 MEASURING BUBBLE VOLUME USING AN ELECTROMAGNETIC DETECTOR

Kevin Martin* and Vernon Asper, University of Southern Mississippi, Stennis Space Center MS 39529

This study looks at a new technique to quantify the bubbling volumes using an inductive conductivity cell. The principle behind this device is that a bubble passing through the inductive cell will displace seawater, changing the conductivity of the volume detected by the sensor. The changes in conductivity can be empirically related to bubble volume. The prototype device, based on a Brancker analogue conductivity cell, uses a Tattletale Model 8 data logger to digitize and record the analogue signal. Using calibrated volumes of air, under laboratory conditions of 1 atm, 20°C and S=40-15 (changing by 5), results confirm the expected drop in conductivity resulting from a bubble displacing the volume of seawater detected by the sensor. These conductivity changes appear to be proportional to the bubble volume. Furthermore, by adding a salinity factor error between the actual gas volume and the calculated volume from the sensor, output is less than 5%, in most cases. Field test of the system at Cape Lookout, NC, where methane seeps naturally from the seafloor, yielded excellent results.

9:45 MATRIX ELIMINATION USING HYDROFLUORIC ACID FOR ANALYSIS OF BIOGENIC CARBONATES BY ICP-MS

Zikri Arslan, Jackson State University, Jackson, MS 39217

Spectral and matrix interferences originating from molecular ions of calcium oxide and hydroxides hinder accurate determination of trace elements from calcium carbonate minerals by inductively coupled plasma mass spectrometry (ICP-MS). It is therefore critical to alleviate the effects of the interferences by removing calcium from sample solutions. We have investigated precipitation of calcium as calcium fluoride by micro liters of concentrated hydrofluoric acid. Precipitation efficiency was as high as 99.5% with successful determination of 11 trace elements. Recoveries for the trace elements ranged from 90 to 103%. Performance characteristics of pneumatic nebulization and electrothermal vaporization (ETV) sample introduction techniques were evaluated. The procedure was validated by analysis of otolith reference material and samples from different fish.

10:00 DEVELOPING A REGIONAL MODEL OF THE INDONESIAN SEAS CIRCULATION BASED ON THE POM

Kieran T. A. O'Driscoll*, Vladimir M. Kamenkovich, and Dmitri A. Nechaev, University of Southern Mississippi, Stennis Space Center, MS 39522

A regional numerical model of the circulation of the Indonesian Seas, based on the Princeton Ocean Model, has been developed. The model reproduces satisfactorily the fundamental features of the circulation. The horizontal grid cell size is on the

order of 10 km which allows for the resolution of all important flows within straits and passages in the region. The model has horizontal extent of 250 x 250 grid cells with 29 sigma levels in the vertical. The sigma levels have been carefully chosen for proper resolution of surface and bottom Ekman boundary layers and the salinity maximum and minimum located at 150-250m. The ETOPO5 bottom topography was properly smoothed to retain all important passages, sills and straits. The model has four open ports; three in the Pacific part of the domain and one in the Indian Ocean part of the domain. The open ports correspond to three well known currents in the Pacific ocean and a transport out of the model domain in the Indian ocean. Transports through the open ports have been calculated from observations and are used to provide simple barotropic boundary conditions at these open ports. Baroclinic boundary conditions of the Orlanski type are used at the open ports, where the velocities have been nudged toward observed values. The effects of tidal friction are not included explicitly in the model, however some additional friction has been added to the model to incorporate implicitly this important effect. Model results with no wind stress and with mean annual wind stress are presented and discussed.

10:15 CLIMATE VARIABILITY, FECAL COLIFORM DYNAMICS AND SHELLFISH MANAGEMENT IN MISSISSIPPI SOUND

Paulinus Chigbu^{1*}, Scott Gordon², and Thomas Strange³,
¹Jackson State University, Jackson, MS 39217, ²Mississippi Department of Marine Resources, Biloxi, MS 39530, and
³Radiance Technology, Inc., Stennis Space Center, MS 39529

Fecal coliform (FC) levels in Mississippi Sound are strongly correlated with local rainfall amounts and Pearl River (a major inflow into the western Mississippi Sound) stage. For shellfish harvesting waters to meet the approved criteria for harvest, in addition to a FC geometric mean of <14 MPN per 100 ml, no more than 10% of the water samples collected during the shellfish harvesting season while the area is open for harvesting should have FC counts of 43 MPN per 100 ml. We used eleven years of data to determine mean Pearl River stage beyond which the geometric mean FC level of 14 MPN per 100 ml would be exceeded in each shellfish growing area of Mississippi Sound. Our results indicate that FC levels would exceed the geometric mean MPN of 14 when Pearl River stage is > 9.5 ft (for area II-D), > 10 ft (for areas I-B, II-A, II-B), >12.5 ft (for area II-C) and >13 ft (for areas III and VIII-B). These area-specific Pearl River stage values beyond which shellfish harvesting areas would be closed are generally consistent with the criteria currently being used for managing shellfish areas in Mississippi Sound.

10:30 Break

10:45 Divisional Poster Session

COPRECIPITATION OF TRACE ELEMENTS BY SODIUM

HYDROXIDE FOR ELEMENTAL DETERMINATION IN FISH OTOLITHS

Stephanie Daniels* and Zikri Arslan, Jackson State University, Jackson MS 39217

Otolith structures in the head of vertebrate fish are calcium carbonate accretions on a proteinaceous material. These structures are very inert in nature and grow throughout the fish's life. During the growth, trace metals from the surrounding water incorporate into the otoliths. It is assumed that trace element composition of the otoliths reflect that of the resident water, and therefore has been used to delineate fish populations and to draw inferences about the fish's life history. Otoliths are, however, complex samples containing low levels of trace metals. Moreover, when dissolved otolith solutions become very saline due to the presence of calcium matrix that reduces the accuracy and measurement capabilities of inductively coupled plasma mass spectrometry (ICP-MS). In this study, we have investigated the possibility of coprecipitating the trace elements in otolith solutions by using sodium hydroxide to alleviate the interferences of calcium matrix and thereby to achieve accurate determination of trace elements by ICP-MS. Because otoliths are predominantly (e.g., 96% CaCO₃), optimization of the precipitation conditions were carried out with CaCO₃ (99.999%). Several elements, including iron, arsenic, manganese, chromium and cadmium were quantitatively precipitated as hydroxides at pH above 12. The precipitation of the calcium was controlled by optimizing the volume of sodium hydroxide. The procedure was applied to the analysis of fish otolith reference material for the determination of abovementioned by ICP-MS.

A NUMERICAL STUDY OF THE MESOSCALE VARIABILITY IN THE NORWEGIAN COASTAL CURRENT

Jens Christian Roth^{1*}, Patrick J. Hogan², and Vladimir M. Kamenkovich¹,¹University of Southern Mississippi, Stennis Space Center, MS 39529 and ²Naval Research Laboratory, Stennis Space Center, MS 39529

The Norwegian Coastal Current (NCC) is located off the coast of Norway, and flows north through the North Sea and the Norwegian Sea. It is influenced partly by winds and partly by a large freshwater flux from the Baltic Sea and a large number of rivers. One particular aspect of the NCC is a tendency to develop instabilities and to generate eddies. The subject of this study is to simulate the mesoscale variability of the NCC with a numerical model, and to investigate the impact of different forcing terms on the behavior of the NCC. A comparison between results from our numerical model, the HYbrid Coordinate Ocean Model (HYCOM), with 1/12 degree horizontal resolution and 26 vertical layers, and observed data, demonstrates that the model reproduces the major features, such as the polar front, the Norwegian Atlantic Current and the NCC. The vertical and horizontal distributions of salinity and temperature are in good agreement with observations. Seasonal variations in the NCC are also captured by the model, and compare well with

earlier research performed in the area. Results from model runs show that during summer, increased freshwater flux to the NCC and less intense winds act to stabilize the NCC. As a result, there are less instabilities formed during the summer period compared to the winter period. Figures of the horizontal distribution of mixed layer velocity show that the instabilities formed in the NCC are mainly of a baroclinic character, with a lifespan of about three to four days.

A STUDY OF OCEAN-ATMOSPHERIC INTERACTIONS AND HURRICANE PREDICTIVE INDEX (HPI) ASSOCIATED WITH LAND FALLING HURRICANE CHARLEY

R. Suseela Reddy*, Arundhati Surakanti, and Haritha Chekuru, Jackson State University, Jackson, MS 39217

Previous studies by Reddy et.al., (1998, 2003) have indicated a strong Ocean-Atmospheric coupling during the development of tropical cyclone/hurricane activity over the Gulf of Mexico. We extend these investigations to the hurricane Charley, which developed over the Caribbean and made land fall over the west coast of Florida during August 9-14, 2004. NOAA GOES satellite, NDBC Buoy and NHC dropsonde data for sea surface temperature and meteorological variables including air temperature, wind speed and sea level pressure were used for computations. A Hurricane Predictive Index (HPI) has been developed for land falling hurricane forecast of Charley over the Gulf of Mexico. HPI computes air-sea interface over the marine boundary, pressure tendency, intensity change and stability using the satellite and buoy data. A positive index indicates the weakening of the system and a negative index indicates developing the system into hurricane activity. The study suggested strong heat flux before and during the formation of the hurricane with an evidence of 2-5 day oscillations in heat flux. These findings are in conformity with the previous studies. The HPI indicated a strong negative index during the development of hurricane Charley.

THE EFFECTS OF TRICLOSAN ON MARINE ALGAE SPECIES

Melanie McHenry*, Vasile Suchar, and Paulinus Chigbu, Jackson State University, Jackson, MS 39217

Triclosan, an antibacterial agent found in three-quarters (3/4) of liquid soaps and one-quarter (1/4) of bar soaps as well as in various other products, has been reported in surface waters, fish and other aquatic biota. Studies show significant reductions of freshwater algae such as *Chlamydomonas* and *Sphaerocystis* at concentrations >0.15 $\mu\text{g/L}$ and 1.5 $\mu\text{g/L}$, respectively. Reduction in algal species richness has been observed with increasing concentrations from 0.015 $\mu\text{g/L}$ to 1.5 $\mu\text{g/L}$. Little is known about the toxicity of triclosan to marine microalgae. Two marine algae species, *Tetraselmis chuii*, and *Nannochloropsis oculata* were exposed to concentrations of triclosan, ranging from 0 to $250\mu\text{g/L}$ for 96 hours to assess toxicity. The seven concentration treatments had three replicates. The initial algae density was

100,000 algae/mL. Salinity was at 25ppt, temperature ranged from $23 - 27^{\circ}\text{C}$, and light intensity was 4,000 lux. After 72 hours, percent inhibition due to treatments varied from 8.9% at $0.2\mu\text{g/L}$ to 65.8% at $250\mu\text{g/L}$ for *Tetraselmis*, and from 4.9% at 0.2 $\mu\text{g/L}$ to 55.9% at $250\mu\text{g/L}$ for *Nannochloropsis*. The EC_{50} values increased from 0.72 $\mu\text{g/L}$ (24 hr) to 72.93 $\mu\text{g/L}$ (72 hr), and 3.52 $\mu\text{g/L}$ (24 hr) to 387.6 $\mu\text{g/L}$ (72 hr) for *Tetraselmis* and *Nannochloropsis*, respectively. Values are higher than the 72 hr EC_{50} values (0.7 to 4.5 $\mu\text{g/L}$) reported for freshwater algae, *Scenedesmus* sp., *Anabaena flos-acuae* and *Selenastrum capricornutum*. Triclosan significantly inhibited the growth of *Tetraselmis* and *Nannochloropsis* ($p < 0.001$) thereby triclosan can significantly impact phytoplankton production. The results suggest that *Tetraselmis* is more susceptible than *Nannochloropsis*.

THURSDAY AFTERNOON

Meeting Room 2

1:30 Divisional Business Meeting

MATHEMATICS, COMPUTER SCIENCE AND STATISTICS

Chair: Andrew Harrell, CEWES-GM

Vice-chair: Elgenaid Hamadain, Jackson State University

THURSDAY MORNING

Meeting Room 1

9:00 MODIFIED ALPHABET OVERLAP GRAPHS

Veranda Moffett, Mississippi Valley State University, Itta Bena, MS 38941

A graph is a collection of points and lines connecting some subset of these lines or points. The points of a graph are most commonly known as graph vertices, but may also be called nodes or points. Similarly, the lines connecting the vertices of a graph are most commonly known as graph edges, but may also be called arcs or lines. The purpose of this paper is to give an example of how to construct a regular graph from an Alphabet Overlap graph. Throughout this research I studied Alphabet Overlap graphs where the $k \times n$ vertices are labeled with the sequences of length n from an alphabet of size k . Two vertices

u and v are joined by an edge if and only if the first w digits of u are identical to the last w digits of v. The Alphabet Overlap graph that I studied is denoted by $AO(2, k, k-1)$ where a- is the size of the alphabet, k- the length of the sequence, and t- the length of the overlap. In this presentation I will show under what conditions it is possible to modify a size two Alphabet Overlap graph, so that it is a regular graph of degree four. I will also compare what is known about large cubic graphs and compare any possible results of the cubic graphs to the modified Alphabet Overlap graph.

9:30 ALGEBRAIC PROPERTIES OF SUM ONE MATRICES

Lenton McLendon* and Joseph Kolibal, University of Southern Mississippi, Hattiesburg, MS 39406

The Sum One Matrices (SOM), i.e., those whose columns or rows sum to one, have useful algebraic properties. This class subsumes the stochastic matrices, which are of interest in constructing stochastic interpolation and approximation methods. We examine some of these properties in relation to the problem of stochastic interpolation, with particular interest in improving the numerical efficiency of these methods.

10:00 ESTIMATE AND HANDLE DATA ERRORS IN GEOGRAPHIC INFORMATION SYSTEM: A LITERATURE STUDY

Nicholas Black and Lixin Yu*, Alcorn State University, Lorman, MS 39096

The precision and accuracy of spatial data are important factors that may influence the reliability of the Geographic Information Systems output. This research project surveyed the related documents of the past ten years to identify the issues that have been studied to improve the precision of the spatial data and to reduce the data errors. It used several case studies to demonstrate the importance of being able to estimate the impact of the data errors. It also surveyed the techniques used to reduce data errors in the GIS applications. The literature study shows how GIS, GPS, and digital elevation model technologies are used together to make measurement. In some cases, digital calculation is used in replacement of the actual measurement in order to reduce the demand of resource, knowing that this practice could introduce some random errors. This can be done as long as the impact of the errors is correctly estimated and the degree of errors is within an allowable range.

10:30 INTERPOLATION SCHEMES FOR SENSOR DATA FROM SURFACES WITH FRACTAL TEXTURE

Andrew W. Harrell, Engineering Research and Development Center, Vicksburg, MS 39180

This talk with discuss various ways to interpolate data from information on sensor surfaces using 1 and 2 dimensional fractal generation programs. MATLAB programs were written to plot dimensional Brownian motion surfaces from their Hurst

exponents using inverse Fourier transforms. Histograms of the power spectrum of the original data and the data from the interpolated surface were compared. The effects of using different types of Gaussian functions and white noise function in the subroutine that generates the Brownian motion data were investigated. Programs in MATLAB to do mid-point interpolation algorithms were written and the results compared, in terms of the histograms of the power spectrums, with the inverse fourier transform approach. Also, programs that use multi-fractals to do the interpolation were written and the effect of the lacunarity parameter of the fractal investigated as to the goodness of fit of the interpolated surface with the original sensor data.

11:00 WEIGH IN MOTION (WIM) INTERFACING WITH TC-AIMS II AND AALPS

Sabrina Phillips, Mississippi Valley State University, Itta Bena, MS 38941

The Department of Energy, Oak Ridge Operations Office (DOE-ORO) oversees advanced research and development programs through its management and operating contractors. One of those contractors, UT-Battelle, LLC, manages and operates the Oak Ridge National Laboratory (ORNL) for DOE-ORO. ORNL has highly specialized, and often unique, scientific, and information technology capabilities available to solve nations level problems including critical national technology challenges. ORNL's highly specialized multi-disciplinary and comprehensive approaches offer solutions that are not available elsewhere in the public private sectors. Additionally, ORNL approaches are unbiased and independent of commercial considerations. Currently the Army manually identifies the vehicles and enters this information into the joint Transportation Coordinators' Automated Information for Movement System II (TC-AIMS II). The Army also weighs vehicles, manually calculates vehicle individual axle weights, total vehicular weight and manually measures the length of the vehicle. They then calculate the center of balance data and manually mark this information on the vehicle. This information is then manually transferred to the Automated Air Load Planning System (AALPS) personnel who manually enter it into the AALPS system. Each of these steps in the process is prone to human error. By establishing (1) an automated data exchange between the vehicle Radio Frequency Identification (RFID) tags and WIM; and (2) an automated data exchange link between WIM and TC-AIMS II/AALPS, identification planning data can be automatically transferred from TC-AIMS II to WIM and "actual" weight data from WIM to AALPS thus eliminating those human errors and at the same time expediting the process. Critical to the establishment of this data exchange is the modeling, design, and implementation efforts that are documenting the data/information process flow through the system. Key Use Cases, Activity Diagrams, Sequence Diagrams and Collaboration Diagrams capturing the data/information flows are pre-



sented herein

11:30 REGULARLY STRUCTURED SUM ONE MATRICES

Lenton McLendon, University of Southern Mississippi, Hattiesburg, MS 39406

In this research we examine the properties of classical examples of full matrices, concentrating on sum one matrices, attempting to develop more fully the properties of row stochastic matrices with cyclic row symmetries. This pattern in the coefficients of a matrix is typical of the algebraic structure which arises from working with the discretization of symmetric integral operators, such as those associated with discrete deconvolution.

THURSDAY AFTERNOON

Meeting Room 1

2:00 Divisional Business Meeting

3:00 Divisional Poster Session – Exhibit Hall B

ROBOTIC FORMATION: CORRECTING BOE-BOT'S ERROR BY TRIAL INSTALLATION

Tisha Brown, Mississippi Valley State University, Itta Bena, MS 38941

Military strategists use robotic formation as a defense tactic in many battle field maneuvers. Consequently, the superior government funded technology and machines used in their research are a far cry from resources of the average researcher. This research will use a Stamp Module microcontroller to perform specific platform activities and logical formation. The programming language used to obtain feedback is similar to the BASIC software. The software editor provides a step-by-step reference and seamless installation programs. Subsystem testing is essential to the detection of errors prior to construction of Board of Education, chassis and module. The brain of the operation is a module that use artificial intelligence in an attempt to accurately and successfully program the controlled machines at optimum performance levels. However, before this can be achieved research must be implemented to test the light, touch, sensory and navigational skills of the robot in a real world environment. A proposed method to detect moderate to maximum behavioral commands is the assumption of programming the Stamp Module to execute exercises using straight line, triangular, figure-eight, photo resistors and infrared interference: Lead-Shadow accuracy Boe-Bot testing. Therefore, an attempt to view all aspects of the features included on the Boe-Bot is analyzed, critiqued and recorded.

A METHOD TO PROPERLY COLOR AN ALPHABET OVERLAP GRAPH

Glenda Span, Mississippi Valley State University, Itta Bena, MS 38941

We define a graph G to be an alphabet overlap graph denoted by $G=AO(a,k,t)$, where the letters a , k , and t represent the size of the alphabet, length of the sequence, and length of the overlap and where AO stands for "alphabet overlap". The a^*k vertices are each labeled with one of the sequences of length k from an alphabet of size a . Two vertices are adjacent if the corresponding tags are the same. While studying the particular graph $G=AO(2, k, k-1)$, methods for finding the chromatic number were explored. In this work, we give an algorithm for properly coloring the Alphabet overlap graphs $G=AO(2, k, k-1)$.

AUTOMATED SOFTWARE TESTING USING RATIONAL ROBOT

Cedric Foster, Mississippi Valley State University, Itta Bena, MS 38941

Automated testing is the use of strategies, tools and artifacts that reduce the need for manual and human involvement when trying to perform a specific task. Rational Robot is a licensed automated testing tool that is developed by IBM. It is a functional and performance test tool for software developing teams that want to automate regression testing. The research conducted this summer consisted of testing NASA's RAMS SQL software using Rational Robot. RAMS SQL is the software application that documents the authorization and performance of work that is done on the Space Shuttle Main Engine. The general purpose of this research was to execute functional and regression testing on the RAMS SQL software to test how new revisions applied to the application interacted with its pre-existing functionalities. These functional tests were carried out using test cases which gave instructions on how to test the software by executing different keystrokes and mouse clicks. Rational Test Manager played a huge part in during this research also. Rational Test Manager allowed me to do distributed functional testing, run suites, and view test logs immediately after testing was completed to see whether the RAMS SQL application failed or passed the testing it was under. While experimenting with Robot, I learned how to install license keys, create projects, run test scripts in series, and access projects from different computers.

FRIDAY MORNING

Exhibit Hall A2

Special Subsession on Supercomputing and Concurrent Poster Session

8:30 CARR-PARINELLO MOLECULAR DYNAMICS BENCHMARK PERFORMANCE

Alexandr Isayev and Taner Pirim*, Jackson State University,

Jackson, MS 39217 and Mississippi Center for Supercomputing Research, University, MS 38677

Carr-Parinello Molecular Dynamics (CPMD) is a well-parallelized, plane wave/pseudopotential software implementation of Density Functional Theory. CPMD has been certified to run on many architectures including 32-bit Intel clusters of PCs, SGI's Altix 3000 family of global shared-memory, 64-bit Itanium2, and high performance compute servers. However, there are many variances in how the source code may be installed on a given architecture, and configuration information on successful Altix installations is not yet readily available. The potential performance of a particular CPMD problem on a given system is influenced not only by the hardware architecture of the system itself, but also on such variables as the brand and version of compiler used in the installation, and the implementation and version of third-party math libraries called by the CPMD code. At the Mississippi Center for Supercomputing Research (MCSR), it is important that chemistry researchers run their calculations using the application, system, and processor/disk/CPU settings that will maximize their efficiency and throughput. In this study, CPMD's own benchmarks are used to investigate the relative performance of CPMD installation on MCSR's SGI Altix 3700 global shared-memory system, and comparison of the results obtained has been made to the results of various UNIX platform high performance computers such as CRAY as well as Beowulf Linux Cluster.

8:55 IMPLEMENTING A TABU SEARCH ALGORITHM FOR THE CONTACT MAP ALIGNMENT PROBLEM USING OPENMP AND MPI

Jason Hale* and Wei Liu, University of Mississippi, University, MS 38677

An unconstrained binary quadratic programming (UBQP) model has been proposed by Liu (2005) to solve the contact map alignment problem in protein structure comparison. This research explores parallel tabu search algorithms for the contact map alignment problem, and for UBQP problems in general. The algorithms are coded in C++, and executed on a shared-memory supercomputer, and a distributed memory computer cluster, at the Mississippi Center for Supercomputing Research. Results are empirically evaluated.

9:20 AN ALGORITHM TO DETERMINE THE SEQUENCE OF STABLE MULTICAST TREES IN MOBILE AD HOC NETWORKS

Natarajan Meghanathan, Jackson State University, Jackson, MS 39217

Given the source node, the set of receivers of a multicast session, and the knowledge of future topology changes, we propose an optimal polynomial-time algorithm called OptTreeTrans to determine the minimum number of multicast tree transitions during a multicast session in mobile ad hoc networks (MANETs). Algorithm OptTreeTrans operates based

on the following greedy heuristic: Whenever a multicast tree is required to connect a source to all its receivers, choose the tree that will exist for the longest time. The above strategy is repeated over the duration of the multicast session. A sequence of such stable multicast trees is called the stable mobile multicast tree (SMMT). Though there are only heuristics to approximate the minimum number of links in a multicast tree, we prove that algorithm OptTreeTrans gives the optimal number of tree transitions, and simultaneously yields the SMMT. We also introduce the notion of "look-ahead window size", as the time for which information about future topology changes are known. We study the performance of OptTreeTrans in terms of the number of tree transitions and tree size (i.e., number of links constituting the multicast tree) for different values of look-ahead window size, node mobility, network density and multicast group size. Results indicate that the stability of multicast trees in MANETs could be improved significantly by looking at the near future. For a given node mobility, we also observe a tradeoff between number of tree transitions and tree size in terms of look-ahead window size, network density and multicast group size.

9:40 MISSISSIPPI CENTER FOR SUPERCOMPUTING RESEARCH (MCSR) USER ADVISORY GROUP MEETING, POSTER SESSION, AND SPECIAL SUBSESSION ON SUPERCOMPUTING

David G. Roach, University of Mississippi, University, MS 38677

The Mississippi Center for Supercomputing Research was established in 1987 by the Mississippi Legislature and the Institutions of Higher Learning (IHL) in order to provide high performance supercomputing (HPC) support for research and instruction at all state universities. The Mississippi Supercomputer User Advisory Committee (MSUAG) was established by the IHL Research Consortium to provide user input and advice to MCSR management and technical staff on policies and procedures for the Center's operations. It includes member representatives from all IHL institutions. The Advisory Group will meet at this MAS conference. Mr. David G. Roach, Director of the MCSR, will conduct the meeting. The agenda includes an update on MCSR HPC facilities and services, introduction of new MCSR staff members, and site reports and ongoing research updates by MSUAG representatives. A poster session, showcasing research projects that utilize MCSR facilities and services, will follow the Advisory Group Meeting. A Special HPC Subsession of the Mathematics, Computer Science, and Statistics Division, sponsored by the MCSR, will also be held to serve as a forum on supercomputing in which faculty and graduate student researchers will have the opportunity to describe their research projects that involve HPC, Internet2, Grid Computing, Visualization, Network Security, Computer Systems Administration, and the use of MCSR resources. IHL faculty and graduate students, with an interest in HPC and/or MCSR facilities and services, are also invited to



attend and participate.

10:30 Break

Regular Session Resumes

10:45 COMPARISON ANALYSIS OF HUMAN PROTEIN DATABASES AND APPROACH TO DATABASE INTEROPERABILITY

Arvinder Kang, University of Mississippi, University, MS 38677

There are growing number of different proteomic databases available. However the data and curation in each database differs to a large extent. This research discusses three different such databases and the difference in their XML structure. The scope of interoperability is discussed and Human Proteome Organization's Proteomics Standards Initiative is looked at as a promising approach. Biobuilder, a database development and functional annotation platform, powering Human Protein Reference Database, is an implementation of these new standards favoring synchronization and interoperability.

FRIDAY AFTERNOON

Exhibit Hall A2

12:30 Voting on Awards for Best Presentation and Poster and Presentation of Awards

1:00 MATHEMATICS, COMPUTER, AND INFORMATION SCIENCES ALUMNI SURVEY ONLINE FORM

John Stepney, Mississippi Valley State University, Itta Bena, MS 38941

In this project an online MCIS alumni survey form is created that connects to an Oracle database and automatically creates an online report. The MCIS alumni survey allows the alumni of Mississippi Valley State University's Mathematics, Computer, and Information Sciences department alumni to complete the survey and submit their data online. The database is created using Oracle database management system and the Structure Query Language. After the information enters the Oracle database then an online report is automatically generated based on the data from the database. The purpose of this project is to allow the MCIS department to generate summative data about the department and its graduates. The MCIS online survey will make retrieving the alumni's information faster and more efficient. The MCIS alumni survey will be transferred to the Mississippi Valley State University server to allow MCIS alumni to access the form off campus.

PHYSICS AND ENGINEERING

Chair: Alexander B. Yakovlev, University of Mississippi

Vice-chair: S. Kant Vajpayee, University of Southern Mississippi

THURSDAY MORNING

Meeting Room 4

Advances in Numerical Modeling Techniques

8:00 ELECTROMAGNETIC SCATTERING FROM CHIRAL MEDIA USING THE FINITE DIFFERENCE FREQUENCY DOMAIN TECHNIQUE

Lokman Kuzu¹, Veysel Demir^{2*}, Atef Z. Elsherbeni², and Ercument Arvas¹, ¹Syracuse University, Syracuse, NY 13244 and ²University of Mississippi, University, MS 38677

The analysis of chiral materials has recently been an important topic in computational electromagnetics. Numerical analysis of chiral materials has been carried out using a variety of numerical methods, such as the method of moments (MoM), the finite-difference time-domain (FDTD) method, boundary value solutions (BVS) and so forth. In this paper, The finite difference frequency domain (FDFD) formulations have been developed for chiral materials analysis, and the validity of the formulations for one and two dimensional scattering problems has been proved by comparing the numerical results to exact solutions whenever possible. The influences of the chirality on the scattering are investigated. Numerical results for bistatic echo widths are presented and compared with reference solutions and it is found that the proposed FDFD method shows good agreement. It is realized that the presented method is relatively easy to program and can be applied to a wide variety of problems of complex and composite structures efficiently.

8:20 HYBRID FDFD AND MOM TECHNIQUES IN CONJUNCTION WITH THE ITERATIVE MULTI-REGION ALGORITHM FOR THE SOLUTION OF LARGE ELECTROMAGNETIC PROBLEMS

Mohamed Al Sharkawy*, Veysel Demir, and Atef Z. Elsherbeni, University of Mississippi, University, MS, 38677

This work presents a hybrid technique, which combines the desirable features of two different numerical methods, finite difference frequency domain (FDFD) and the method of moments (MoM), to analyze large-scale electromagnetic problems. This is done by using the two techniques individually on separate regions of the scattering problem domain and then applying an iterative procedure between these regions, to calculate the total scattering from the entire domain. This

iterative procedure is referred to as iterative multi-region (IMR) technique, which requires the solution of fields in the sub-regions a number of times instead of one solution of the complete computational domain. This technique effectively reduces the size of the required memory, especially for practical and three-dimensional problems. In this work the presented technique is applied on two-dimensional scatterers, and the bistatic echo widths are calculated. This hybrid FDFD/MoM approach takes advantage of the capability of the FDFD to analyze inhomogeneous bodies with arbitrary material properties and that of the MoM to model large metallic structures with less computational memory requirements. Both numerical methods provide a much stable solution relative to other available methods and a more convenient procedure for performing the interaction between the sub-regions based on well-known theorems

8:40 SOLUTION OF MAXWELL'S EQUATIONS ON BOUNDARY-FITTED GRIDS USING A CONVOLUTIONAL PERFECTLY MATCHED LAYER TECHNIQUE AS AN ENERGY ABSORBING BOUNDARY CONDITION

Terry Gerald* and Atef Z. Elsherbeni, University of Mississippi, University, MS 38677

The finite difference time domain (FDTD) is extended to boundary-fitted grids by transforming Maxwell's equations defined on a curvilinear physical grid to a modified form defined on a uniform Cartesian grid. The FDTD method is used to solve the transformed Maxwell's equations on the uniform Cartesian grid. The solution thus obtained is then mapped back to the original physical grid. Elimination of wave reflections at grid boundaries is accomplished by augmenting the uniform Cartesian grid with a convolutional perfectly-matched layer (CPML) absorbing boundary condition. The method is applied to several boundary-fitted grids representing irregular physical domains. Results obtained indicate the method is capable of generating an accurate estimate of the time-varying electromagnetic field distributions throughout a physical region.

9:00 FDTD ANALYSIS OF A PROBE-FED DIELECTRIC RESONATOR ANTENNA ARRAY WITH HARD HORN FOR SPATIAL POWER COMBINER

Yizhe Zhang*, Ahmed A. Kishk, Alexander B. Yakovlev, and Allen W. Glisson, University of Mississippi, University, MS 38677

Probe-fed dielectric resonator antenna (DRA) arrays with hard horn excitation are investigated in an oversized dielectric loaded waveguide for their use in waveguide-based spatial power combining systems. Dielectric loaded oversized rectangular waveguide and hard horn are first utilized to achieve a uniform field distribution across the horn aperture at the design frequency. Then, 3×3 DRA array is studied in the whole environment. Metal plates inset into the oversized waveguide are used to decrease the E-plane mutual coupling between the array

elements. Design of inter-element antenna spacing, length of inset plates, and the distance of the hard horn walls to the array elements are investigated to optimize the system for scattering and coupling characteristics. The coupling from the horn to each of the nine DRA elements is approximately -10 dB, which indicates that every element obtains 1/9 power. The Finite-Difference Time-Domain (FDTD) approach with region-by-region discretization scheme is proposed for the analysis of the entire system to reduce memory requirements and simulation time. Numerical Results for the scattering parameters are demonstrated for the example of 3×3 DRA array excited by a hard horn and compared with the results obtained using the commercial software HFSS.

9:20 OPTIMIZATION USING THE ORTHOGONAL ARRAYS FOR UNEQUALLY SPACED LINEAR ARRAY ANTENNAS AND GLOBAL NUMERICAL SOLUTIONS

Wei-Chung Weng*, Fan Yang, and Atef Z. Elsherbeni, University of Mississippi, University, MS 38677

The robustness of the use of orthogonal arrays (OAs) for optimization is described in this study. The OAs help provide high performance evolutionary optimization method. Using the systematic and efficient features of OAs, one can solve n-dimensional, linear, and nonlinear optimization problems. Compared to other optimization techniques, such as the genetic algorithm and particle swarm optimization, the OAs based optimization procedure is much easier to implement and requires less computational resources. Two test cases characterized as nonlinear and two-dimensional functions are analyzed using the procedure presented here to verify the performance for finding the global maximum. The results show that the global maximum can be found among many local maxima after few iterations. Linear antenna arrays have received great attention in the electromagnetic community. In this study, we also have utilized the OAs optimization procedure in order to suppress the undesired sidelobe levels (SLL) and at the same time to narrow down the beamwidth for a ten-element unequally spaced linear array of isotropic radiators. The results show that lower SLL and narrower beamwidth are achieved. The results also show that the algorithm presented here can be used not only for signal-objective global optimization but also for multi-objective global optimization.

9:40 Break

Antenna Research and Applications

10:00 DESIGN OF A WIDEBAND MICROSTRIP POWER DIVIDER

Veysel Demir, Dalia Elsherbeni*, Darko Kajfez, and Atef Z. Elsherbeni, University of Mississippi, Oxford, MS 38677

Power dividers are passive RF components that are

commonly used to split and distribute power in various proportions to different components of networks. Usually, power dividers support narrow band. However, for wideband operations the limited band of power dividers prevents the use of network in its maximum capacity; e.g. a wideband antenna array will operate only in the frequency band of the supporting network. In this contribution, a power divider is proposed and designed that can support the wideband operation of the terminal network. In a power splitting circuit, in which the input line feeds two output lines, the input power on the 50 Ohms line faces a mismatch of 25 Ohms at the intersection of the input line and the two output lines. In order to eliminate this mismatch over a wideband a Klopfenstein taper is designed to match 50 Ohms to 25 Ohms for the frequencies above 2.3 GHz with a maximum reflection of -30 dB using simulation tools. Then, a junction from a 25 Ohms line to two 50 Ohms lines is designed. These two designs are cascaded to form a wideband high-pass power divider that effectively operates above 2.3 GHz. The designed circuit is built and measurements were performed. The measurement results agree very well with the simulations and verify that the proposed power divider design can be used in a bandwidth from 2.3 to 10 GHz.

10:20 DOUBLY-SIDED EXPONENTIALLY TAPERED SLOT ANTENNAS

Zach Hood and Erdem Topsakal*, Mississippi State University, Mississippi State, MS 39762

This paper compares a traditional single-sided double exponentially tapered slot antenna (DE TSA) for use in ultra-wideband (UWB) applications to a new double-sided configuration. Applications for UWB (3.1-10.6 GHz) technology include broadband wireless communications, which benefit greatly from increased bit rates available to higher bandwidth. Tapered slot antennas have long shown great promise for achieving wide bandwidths. It has also been demonstrated that by exponentially tapering both the inner and outer edges of the traditional Vivaldi antenna, the bandwidth and other characteristics may be greatly improved. While traditional bowtie antennas lack the ability to operate over the full UWB range, a double-sided printed bow-tie antenna was introduced with bandwidth exceeding the required 3.1-10.6 GHz. By applying this concept and some scaling techniques to the DE TSA, a compact UWB antenna is created. The antenna is capable of operation over the UWB band as well as higher frequencies, which opens it to the possibility of use in future applications. The antenna also exhibits strong directivity in along its central axis, as well as above and below the E-plane, as is expected from an end-fire design. While the double-sided DE TSA does offer performance at least on par with single-sided configurations, the main advantage of the antenna is its extremely compact dimensions. Results for an optimized version of the double-sided DE TSA will be presented.

10:40 FINITE ELEMENT-BOUNDARY INTEGRAL

SIMULATION OF DOUBLE-SIDED ROUNDED BOW-TIE ANTENNAS FOR UWB COMMUNICATIONS

Tutku Karacolak and Erdem Topsakal*, Mississippi State University, Mississippi State, MS 39762

Finite Element-Boundary Integral Method (FE-BI), which is a very powerful numerical technique for radiation and scattering analysis of antennas, has been applied to a double sided rounded bow-tie antenna covering the spectrum from 3.1 GHz to 10.6 GHz for Ultra Wide Band (UWB) communications. Distorted hexahedral elements are widely used in analyzing complex 3-D electromagnetic problems. Because of the distorted shape, they offer higher flexibility, and are more suitable to automatic mesh generation of 3-D regions compared to other type of finite elements. For validation purposes, we also simulated the antenna with a commercial software HFSS, which uses Finite Element Method with tetrahedral elements. The antenna has omni-directional radiation characteristics and return loss below -10 dB for the whole frequency band. Rounded bow-tie patches work better than the conventional ones for the UWB communications. Results regarding antenna parameters such as return loss, radiation pattern and gain will be presented.

11:00 DIELECTRIC RESONATOR ANTENNA ARRAY FOR MICROWAVE BREAST CANCER DETECTION

Wei Huang* and Ahmed A. Kishk, University of Mississippi, University, MS 38677

Breast cancer is the most leading cause of cancer death (other than lung cancer) of women according to the recent released statistics by the American Cancer Society. Early detection of breast cancer is key element for reducing the mortality. Currently X-ray mammography is the most widely used tool to diagnose and evaluate breast cancer. However, mammography and other ionizing X-ray based methods are not safe for the patients since the ionizing radiation properties of the X-ray may induce a new breast tumor. Also mammography is not precise since it is very sensitive to lesions (but not all lesions are cancerous). Moreover, mammography is too costly especially for low-income women and women live in developing countries. As a new promising non-ionizing and noninvasive radar-based breast detection method, microwave breast cancer detection based on the contrasts in dielectric properties between healthy ($\epsilon_r=9$ and $\sigma=0.4\text{S/M}$) and malignant ($\epsilon_r=50$ and $\sigma=4\text{S/M}$) tissue, can achieve early detection and has the advantages of low health risk, noninvasive and comfortable, and cost effectively. One of the biggest challenges of microwave breast cancer detection is to design a right antenna for this application. In present paper, we design a compact microwave sensor based on compact wideband dielectric resonator antenna array element ($14\text{mm}\times 14\text{mm}\times 6\text{mm}$). The design is based on numerical simulations using commercial software. The compact antenna array with

wide bandwidth is presented. The comparisons of tissue with tumor and without tumor cases are shown in both frequency domain and time domain.

11:20 A STUDY ON MICROSTRIP IMPLANTABLE ANTENNAS FOR MEDICAL TELEMETRY

Jose Pvallalta and Erdem Topsakal*, Mississippi State University, Mississippi State, MS 39762

Today, implantable antennas are increasingly used in medical fields. Some of these applications include cardiac pacemakers, radio frequency identification (RFID), ultra low power wireless devices for in-body monitoring, muscle stimulators, electromagnetic hyperthermia for cancer treatment etc. As designers develop new implanted medical devices taking advantage of RF technology to improve the quality of care for patients, antennas are key to these new systems. Numerical simulation tools that are fast and accurate are crucial in developing reliable and efficient implantable antenna systems. In this study, we present two common microstrip antennas; spiral and serpentine, with different design parameters. They are evaluated for the 402-405 MHz Medical Implant Communications Service band (MICS). The effects of the shape, length, size, location of feed point, substrate and superstrate materials, and their thicknesses are evaluated. The antenna is then embedded in the forearm and simulations are carried out using a robust Finite Element Boundary Integral Technique. Results regarding the antenna return loss, near and far fields will be presented for variety of antenna locations and diverse antenna parameters.

THURSDAY AFTERNOON

Meeting Room 4

Image Processing and Applications

1:10 THE AUTOMATED IMAGE REGISTRATION FOR MULTISENSOR CASE

Adnan Orduyilmaz* and Nareenart Raksuntorn, Mississippi State University, Mississippi State, MS 39762

A 3-band multi-spectral sensor system has been developed for acquiring remotely sensed aerial imagery using unmanned aerial vehicle (UAV). In this system 3 different cameras are recording images at different bands (Green, Red, and Near-Infrared (NIR)). Since the multi-spectral data are acquired using three different digital cameras, these three frames of imagery should be spectrally co-registered before the other products such as false color composites (FCC) or vegetation indices are generated. Advanced image processing techniques can be utilized to automate this process. The area-based method is used for the registration problem. This approach has four main steps. At the first step, the control points are selected using

spectral variance. Second step is searching the corresponding windows using correlation coefficient similarity metric. At the third step, the parameters of affine transform are calculated. Last step is applying the transformation and filling the blank pixels by the nearest neighbor (NN) method. The control points are selected from the areas, which have the highest spectral variance. The centers of windows are defined as control pairs. The windows in the base image with different sizes will be selected. The optimum window size is computed after testing all windows size from 11 pixels to 61 pixels. The quality of the registered images are done by visually and using the distance difference between the distinct objects such as roads or houses in registered images and base image. The results of the registration process will be presented.

1:30 AN EMI LANDMINE DETECTION SYSTEM USING PULSE-RESPONSE MEASUREMENTS BASED ON MAXIMAL LENGTH SEQUENCE EXCITATION

Ying Chi* and Paul M. Goggans, University of Mississippi, University, MS 38677

The use of the maximal length sequence (MLS) method to measure the pulse response of linear systems is well established in areas such as room acoustics where it is commonly used to determine impulse response of concert halls. Here we present the use of the MLS method to determine impulse response (pulse response) in a new application area, electromagnetic induction (EMI) landmine detection. In this paper we introduce the theory of EMI landmine detection for low-metal-content landmines based on pulse-response measurement and describe the use of MLS sequences to measure the pulse response of an EMI landmine detection system. As part of this research, an experimental EMI landmine detection system was designed and built. In this paper, measured pulse-responses for the experimental system are presented and compared with theoretical results. The comparison shows that the MLS measurement method applied to EMI landmine detection is both accurate and repeatable.

1:50 IMAGE PROCESSING AND TARGET IDENTIFICATION USING GRAPHICAL PROCESSING UNITS

Matthew Inman*, Chye Hwa Loo, and Atef Z. Elsherbeni, University of Mississippi, University, MS 38677

Image processing and target identification are two related areas in which major research is currently being performed to increase the accuracy and utility of such systems. With new algorithms that are being developed for target tracking and identification the computational needs to perform them grow exponentially. It will be shown that graphical processing units (GPUs) that are commonly found in all modern computers can provide vastly increased power for processing images with these new techniques. With the proper programming and application

of these graphical processing units, speed increases of orders of magnitude can be reached for some techniques. Both the application of common and custom image processing algorithms and increases in processing speed will be presented.

2:10 REAL-TIME DISTORTION INVARIANT OBJECT CLASSIFICATION WITH SDF BASED FJTC

Chye Hwa Loo* and Atef Z. Elsherbeni, University of Mississippi, University, MS 38677

The task of object classification is complicated by variations in the three-dimensional (3D) object, which translate into distortions in 2-D images. Distortions due to scale variations, illumination, background clutter, occlusion, and in-plane and out of plane rotation hinder successful recognition. The pattern matching for invariance classification requires a large amount of data and computation time. Proposed here is an efficient distortion invariant object classification algorithm for real-time fringe-adjusted joint transform correlator (FJTC) based automatic target recognition (ATR) system. The proposed classification technique employed the synthetic discriminant function (SDF) in the generation of distortion invariant correlation filter sets. The optoelectronic FJTC is then used to provide correlation of the filter sets and input under a proper arrangement. This classification method is simple and fast and hence is relevant to be in use by real-time ATR systems. A description of the optoelectronic system and the entire process is presented. In addition, simulation results are provided to prove the effectiveness of the proposed system in the classification of objects invariant to scale as well as in-plane and out-of-plane rotations.

2:30 Break

Wireless Propagation

2:40 PERFORMANCE OF DUAL-BRANCH MAXIMAL RATIO COMBINING DIVERSITY OVER NON-IDENTICAL CORRELATED WEIBULL FADING CHANNELS USING PADÉ APPROXIMATION

Mahmoud Ismail* and Mustafa M. Matalgah, University of Mississippi, University, MS 38677

In this study, we evaluate the performance of the dual-branch maximal ratio combining (MRC) diversity scheme in non-identical correlated Weibull fading channels with arbitrary parameters. We first use Padé approximation (PA) to find closed-form rational expressions for the moment generating function (MGF) of the output signal-to-noise ratio (SNR) of the MRC receiver. Different performance measures such as the outage probability and the average symbol error rate (SER) for different linear modulations such as 8-phase shift keying (PSK) and 16-quadrature amplitude modulation (QAM) are then presented using the well-known MGF approach. Furthermore, the effect of input SNRs unbalancing, the severity of fading and the degree of correlation, between diversity branches, on the system perfor-

mance are also studied. Our analytical results are validated by comparing them to computer simulations and we show that the PA technique is indeed a convenient tool for such performance evaluation studies.

3:00 OUTAGE PROBABILITY ANALYSIS IN A COOPERATIVE UAVS NETWORK OVER RAYLEIGH AND NAKAGAMI-M FADING CHANNELS

Ibrahim Abualhaol* and Mustafa M. Matalgah, University of Mississippi, University, MS 38677

In this work, the outage probability in a network of cooperative unmanned airborne vehicles (UAVs) is studied analytically. A master-slave topology with one ground control unit (GCU) is assumed where the GCU communicates directly with a master UAV. The master-slave and master-GCU links should satisfy a certain minimum data rate, which is related to the application to which the UAVs are assigned, to be considered in service. The outage probability of the system is defined as the probability that either the rate of transmission over any of the links goes below the predefined minimum value for this link, or the GCU-master link is not able to transmit the collected data from all UAVs besides the minimum rate related to the master UAV itself. The outage probability is considered over Rayleigh and Nakagami-m fading channels. The resultant expression for the outage probability can be used to provide guidelines for system designers to minimize the outage probability of the cooperative UAVs network. In the same time, it could be used to maximize the system throughput with the constraint of not exceeding a certain outage probability limit.

3:20 Divisional Poster Session

A NOVEL TECHNIQUE FOR STUDYING PHASE TRANSITIONS IN GRANULAR MATERIALS

Francis Tuluri, Jackson State University, Jackson, MS 39217

Granular materials composed of discrete particles exhibit a great variety of patterns and phases reflecting complexity of interactions between contiguous particles. A quick survey of the literature on the study of granular materials is mostly focused on symmetrical objects like spheres and cylinders. In the present work, a simple experimental model of vibrated granular materials is explored for the study of phase transitions occurrence by spontaneous symmetry breaking. The model considers two dimensional systems of asymmetric cylindrical objects. A simple physical mechanism of the phase transitions observed is accounted for in terms of symmetry breaking.

FRIDAY MORNING

Meeting Room 4

Future of Energy Resources

8:30 HOW IS THE U.S. INDUSTRY DOING QUALITY-WISE?

S. Kant Vajpayee, University of Southern Mississippi, Hattiesburg MS 39406

The American Society for Quality (ASQ) keeps track of the quality performance of the major sectors of U.S. industry. It has developed a yardstick, called Quality Index, to do this. Each quarter of the year it publishes its findings, based on a prominent economic indicator, called American Customer Satisfaction Index (ACSI). Established in 1994, ACSI is a measure of the quality of goods and services in the US market. The ACSI monitors trends in customer satisfaction. The Ross Business School at the University of Michigan, the ASQ, and the international consulting firm CFI Group work together as partners in conducting the study. More than 200 companies in 41 industries participate in the study. The results are reported on a scale of zero to 100. Eight economic sectors are covered; namely, Manufacturing Durables, Manufacturing/Non-durables, Transportation/Communications/Utilities, Retail, E-Commerce/E-Business, Finance/Insurance, Services, Public Administration/Government (local, state, and federal). More than 65,000 consumers are interviewed annually. Since the baseline study in 1994, a typical sample has amassed more than half-a-million respondents. Cell phone service providers are the lowest-rated industry, though their manufacturing counterparts—Nokia, Motorola, and Samsung—have a much higher perceived quality rating. Airlines are the second worst. Fast-food chains remain among the lowest-rated industries, though pizza chains do a great job in meeting customer expectations. Refer to www.asq.org for more information.

8:50 NUCLEAR FISSION ENERGY - THE ENERGY OF CHOICE

Amin Haque, Alcorn State University, Alcorn State, MS 39096

As the world becomes more industrialized, the demand for energy is increasing. Currently the energy sources available in the world are: fossil fuels, uranium (nuclear fuel), hydroelectric, wind, and solar. People are concerned about environmental quality, global warming, and acid rain caused by various air pollutants released from combustion of fossil fuels -- the major source used in the world to produce electricity. Burning of fossil fuels requires expensive air pollution controls and extensive transportation systems. Nuclear fission produces virtually no air pollution, and the amount of waste produced is the least. Uranium is abundant and the overall cost of producing electricity is relatively small. One kilogram of natural uranium produces as much energy as 38.5 tons of coal. According to 2003 MIT published report, the generation cost for nuclear energy is 4.2 c/kWh, the same as coal without any carbon cost. According to 2004 report from the University of Chicago, the power costs of future nuclear, coal, and gas-fired power generation in the USA. range from 4.3 to 5.0 c/kWh, 3.5 - 4.1 c/kWh and 3.5 - 4.5 c/kWh, respectively. In the U.S. for 2001 the cost was 3.73

c/kWh for nuclear, 3.27 c/kWh for coal, and 5.87 c/kWh for gas. Nuclear energy plants are now safer because of the use of advanced technology and higher standards. New technologies and improved knowledge have made it possible to produce much safer light water nuclear plants.

9:10 NUCLEAR FUSION ENERGY - THE ENERGY OF THE FUTURE

Amin Haque, Alcorn State University, Alcorn State, MS 39096

A fusion reaction occurs at very high temperatures (10-15 million degrees Celsius) when the fuels are in a plasma state. The stars are natural fusion energy generators. In the labs, the fusion of deuterium and tritium is more promising. About 17.6 million electron volt of energy per cycle are released. Deuterium is plentifully available from seawater, and tritium can be obtained by the breeding from lithium. One kilogram of fusion fuel would produce the same amount of energy as 10 million kg of fossil fuel. Since plasmas are very good electrical conductors, magnetic fields are used to confine and isolate them from the container walls. To produce self-sustaining fusion, part of the energy released is used to heat new reactant nuclei. Several methods are used to heat the plasma. The fusion energy is safer, and the likelihood of an accident is much smaller. Fusion reactions produce no atmospheric pollution, and low radiation levels. Commercially available fusion reactors are not expected for at least the next 35 years. In June 2005, it was announced that the first experimental fusion reactor designed to achieve sustained fusion reactions, the International Thermonuclear Experimental Reactor, will be built in Cadarache in Southern France at a cost of 10 billion dollars. This will be the first earthbound star. The technical requirements to achieve this goal are immense and a great challenge to the nuclear scientists. If they succeed, the rewards will be tremendous.

9:30 VIOLENT CELESTIAL EXPLOSIONS AND GAMMA RAY BURSTS

Amin Haque, Alcorn State University, Alcorn State, MS 39096

Gamma-Ray Bursts (GRBs) are the most powerful explosions and the brightest source of cosmic gamma-ray photons in the observable Universe, lasting anywhere from a few milliseconds to several minutes. They are brighter than a typical supernova and about a million trillion times as bright as the sun. GRBs are detected roughly once per day from random directions. Satellite measurements show that GRBs are isotropically distributed. Recent observations, and theoretical work link GRBs to supernovae in distant galaxies, billions of light-years (bly) away. This means that some GRBs actually originated while the universe was only a few billion years old. Although such stars died long ago, only now is the light from their explosive deaths reaching us. The relativistic fireball shock model show that these explosions appear very energetic because much of their energy is blasted outward in two narrow jets in opposite directions. This can result from either the merger of a double neutron stars which

lead to short bursts (< 10 s) GRBs or by the collapse of the fast-rotating core of a massive star which leads to long GRB bursts (> 10 s) and could be associated with a supernova-like phenomenon. The Swift Gamma-Ray Burst observatory, recently launched by NASA, is expected to zero in on two GRBs a week as far away as 15 bly, representing the very first generation of stars, for a total of more than 200 during the planned two-year mission.

9:50 Break

Invited Speaker

10:00 WASTE WISE: COMPUTER WASTE

Pao-Chiang Yuan, Jackson State University, Jackson, MS 39217

Start from October 2001 until now, Jackson State University collaborates with Hinds County, Public Work Department received grant from State of Mississippi, and Department of Environmental Quality established computer recycling and training program. In the past years, 2388 Central Processing Units, 2864 monitors, 609 printers and more were collected. The program also refurbished 465 computer sets return back to the community; another 206 pallets of unwanted materials were shipped to the recyclers. The program received total 7 awards from Keep Jackson Beautiful, Mississippi Recycle Coalition and was chosen by United States Environmental Protection Agency (USEPA), Waste Wise program partner of the year. According to the institute for local Self-Reliance approximately 80 percent of obsolete electronics are being stored or warehoused somewhere before they will disposal of. Since the last three decades, computer industries are booming. Now, Personal Computer has become a necessity for our way of life. Everyone is focused on cyber technology. Cyber Technology is the theme for this new millennium: How many industries? Attention is given to the other end: when the Personal Computer (PC) has reached the end-of-its useful life. What do we do with them? In 2005, the National Safety Council projects more than 63 million personal computers to be retired according o a recent study. This paper discusses possible alternate methods, to solve the problems, and most importantly it makes the people aware of what kind of problems we are facing.

FRIDAY AFTERNOON

Meeting Room 4

Physical Phenomena and Experiments

1:00 THERMOACOUSTICS OF SMALL DEVICES

Carl Jensen, University of Mississippi, University, MS 38677

Small thermoacoustic devices are being built and modeled by our research group for applications such as micro-chip cooling and waste heat power generation. Due to their high

frequency of operation, however, the optimal pore size for the stack material is very small making construction of conventional parallel plate stacks impossible. We are investigating the use of random packing of fibrous materials instead. The thermoacoustic properties of these random stack materials are being investigated using techniques common for sound absorbing materials. The extension of these techniques to thermoacoustics as well as the challenges in modeling a small thermoacoustic device will be discussed.

1:20 THREE DIFFERENT METHODS TO ACCOUNT FOR LOST VAPOR FROM LARGE USTS DURING THE SUMMER MONTHS IN THE SOUTHERN STATES

Leili Pirouzan and Sam Gordji*, University of Mississippi, University, MS 38677

The vapor loss from fuel tanks can be a significant environmental problem. The problem can impact air quality and bias leak detection compliance methods for the measurement of product into the ground water. The loss becomes larger for the larger tanks during the summer months in the southern states such as ours, "Mississippi." First to consider is the deterministic method using equations obtained through the laws of physics to account for the lost vapor gasoline. This method since it is deterministic is without the doubt the best approach and should yield the best estimate if one can capture the values of each parameter in the mathematical model. The second method uses the probabilistic approach and uses the method of regression analysis. We are now soliciting data from some companies that have large USTs. The third method is through the use of the applications of the Time Series Analysis. To apply this method several programs (more that ten) were written in SAS and Fortran using IMSL applying the applications of Time Series Analysis to tank inventory data. Two very important results were obtained from these analyses. 1. That the tank inventory data is not an "orphan child" and belongs to a large family of data sets called "random walk", and therefore, it has all the properties of a random walk data set and everything that is already been proved about random walk may be safely applied to tank inventory data. 2. The most important results obtained is that according to the previous research done by others in other fields such as air line travel, etc. the present trend of gas losses may be extended to forecast the future losses.

1:50 TEMPERATURE GRADIENT MEASUREMENT IN A SHALLOW WATER ENVIRONMENT

Patrick D. Coln*, John David Heffington, James Bell, and James P. Chambers, University of Mississippi, University, MS 38677

A temperature probe containing eight strategically placed precision integrated circuit temperature sensors has been developed and used to better understand the temperature gradient that forms in shallow ponds during the heat of the day. The motivation for this effort comes from the development of

the Aquascanner Catfish SONAR to acoustically scan commercial sized catfish ponds. The unit is capable of providing detailed scans of catfish ponds. However, it is being run on large ponds in situ and as such the results are susceptible to variations from a variety of somewhat uncontrollable factors between experimental runs. In particular, sun loading acts to create vertical temperature gradients which cause refraction and act to bend sound rays toward the absorptive bottom. The temperature probe is designed to float to ensure constant relative depths with respect to the surface. Evaporation or precipitation may change the water depth during the measurement and either expose or submerge the upper probe. A total of eight sensors are spread out vertically at logarithmic intervals to measure the temperature gradient. Data is taken over multiple day cycles to observe diurnal heating with gradient formation during the day and a return to thermal equilibrium during the night. Measurements show that the temperature difference between the top and bottom of the water column, typically 36-48", can vary by 10 or more degrees during the strongest gradient.

2:10 WIND NOISE MEASUREMENTS OVER A FLAT PLATE

Jiao Yu*, Richard Raspet, and Jeremy Webster, University of Mississippi, University, MS 38677

Measurements by Kevin Dillion [MS thesis University of Mississippi, 2005] have shown that a thin layer of foam covering a flush mounted microphone attenuates wind noise as well as a spherical windscreen. This indicates that a better understanding of the interaction of turbulence with the shear boundary layer near a flat plane could lead to flush mounted systems with superior wind noise reduction. The experiments described here were performed to measure various properties of this interaction. Wind velocity profiles were measured in a wind tunnel close to hard and foam covered surfaces both with and without turbulence present. Measurements of velocity correlations with height were also taken, using two hot-wire anemometers placed near the surface. The implications of these measurements for predicting pressure fluctuations in flush mounted microphones will be briefly described.

2:30 Awards and Divisional Business Meeting

PSYCHOLOGY AND SOCIAL SCIENCE

Chair: Sheree Watson, University of Southern
Mississippi

Vice-chair: David Swanson, University of Mississippi

THURSDAY MORNING

Meeting Room 3

8:15 HOW DO INTERRACIAL COUPLES STRATEGIZE AGAINST THE COMPLEXITIES OF RACISM?

Reginald Riggins^{1*} and Kerry Ann Rockquemore^{2,1}, Jackson State University, Jackson, MS 39217 and ²University of Illinois at Chicago, Chicago, IL 60603

Prejudice is a major fear of members of interracial relationships. Strangers, family and friends hold prejudice views of interethnic relationships. Hill and Volker (2000) describe three strategies interracial couples use to deal with prejudice: blocking, transferring, and generating. This article investigates what strategies interracial couples use when faced with racism from family and friends. To gain further insight on these strategies I analyzed a data set of twenty-four in-depth interviews of individuals in Black-White relationships. Several themes emerge as to where (setting) strategies are used and why some are used more than others. The results show that the framework of Hill and Volker (2000) does hold up with a larger sample. The three strategies do exist but are used selectively depending on the setting (family, friends, or strangers).

8:30 CELL PHONE USAGE AND DEPENDENCY IN UNDERGRADUATES

Reid Jones*, Robert N. Johnson, Tonya Anderson, Heather Peacock, Delta State University, Cleveland, MS 38733

Upperclassmen (N=123) completed surveys developed to measure cell phone usage and cell phone dependency (CPD). CPD survey items were derived from the diagnostic criteria for substance dependency in the DSM-IV-TR. Surveys also requested information on demographics and personality traits. Almost all students (98%) owned cell phones, averaging 11.69 calls sent, 12.65 calls received, and 85.40 minutes of usage per day. The nine item CPD Survey had good reliability (Chronbach alpha = .78). Concurrent validity was demonstrated by correlation ($r=.85$; $p<.01$) with an established survey, the Mobile Phone Problem Use Survey. Further evidence for the validity of the CPD Survey was demonstrated by significant ($p<.05$) associations with all five items where subjects reported their volume of cell phone usage (r ranging from .24 to .37). The brief CPD Survey was also demonstrated to have significant associations with personality traits, patterns of usage, and grade point average.

8:45 PATTERNS OF CELL PHONE USAGE IN UNDERGRADUATES

Tonya Anderson*, Heather Peacock, Robert Johnson, and Reid Jones, Delta State University, Cleveland, MS 38733

Time of day and day of week when students reported using their cell phones had some interesting relationships with volume of calls and grade point average (GPA). Self report surveys indicated that students who used cell phones more during the week than on weekends were more likely to use the phones in the afternoon than at other times ($r=.32$; $p<.05$). Further, students using cell phones more on weekends than on weekdays were more likely to send and receive calls at night ($r=.41$; $p<.01$). Those students who sent and received calls the highest proportion of calls during the mornings on weekdays were also the ones who sent ($r=.28$; $p<.05$) and received ($r=.28$; $p<.05$) the highest volume of calls each day. Finally, the heavy "morning users" also had the lowest GPA ($r=-.25$; $p<.05$). These patterns of use suggest that students who restrict their cell phone use somewhat during morning (classroom) hours were less likely to suffer negative impacts on GPA.

9:00 PERSONALITY VARIABLES AND CELL PHONE USE IN UNDERGRADUATES

Robert N. Johnson*, Tonya Anderson, Heather Peacock, and Reid Jones, Delta State University, Cleveland, MS 38733.

The recent introduction of cell phones in world culture has resulted in both positive and negative consequences. Poorer communities in developing countries can use them to communicate their health, welfare, and safety needs. On the other hand, cell phone usage can be a distraction, resulting in increased accidents. Cell phones are even outlawed in some states. The research question considered here is how personality traits of cell phone users might influence patterns of cell phone use. Self report surveys were completed by students who received extra credit in courses. Introversion was found to be negatively associated with the volume of calls sent to fellow classmates, $r(116) = -.29$, $p < .05$; volume of calls received from fellow classmates was negatively correlated with an "uncaring" personality trait, $r(117) = -.23$, $p < .05$; volume of calls was significantly associated with a new measure of "cell phone dependency", $r(117) = .37$, $p < .05$. Although research indicated that cell phone users who interact more with classmates are more extraverted and conscientious, some may become excessively dependent on cell phones.

9:15 A WAKE UP CALL FOR CELL PHONE USERS: CELL PHONES AND UNDERGRADUATE GPA

Heather Peacock*, Robert Johnson, Tonya Anderson, and Reid Jones, Delta State University, Cleveland, MS 38733

This study investigated how some behaviors of undergraduates may change after they first acquire a cell phone.

Volunteers received extra credit for filling out surveys concerning demographics, grade point average (GPA), and cell phone use. The primary research questions focused on possible associations between self-reported years of cell phone use and other self-reported behaviors. The longer students had used cell phones, the higher their GPA ($r = .24$; $p < .05$). The longer subjects had owned cell phones, the more likely they were to make calls in the afternoon ($r = .21$; $p < .05$) and the less likely they were to make calls at night ($r = -.19$; $p < .05$). Years of cell phone use were not associated with volume of calls sent or received ($r = .10$; $p > .05$). However, GPA was negatively associated with volume of calls sent ($r = -.22$; $p < .05$) and received ($r = -.30$; $p < .05$). While some positive associations were discovered, it was clear that excessive cell phone use can be detrimental to undergraduate grades, particularly for new owners.

9:30 THE COLOR COMPLEX: RELATIONSHIPS BETWEEN SELF-RATED SKIN TONE AND SELF-ESTEEM IN AFRICAN-AMERICANS

Frederick A. Smith^{1*}, Karen Christoff² and Shaila Khan¹,¹Tougaloo College, Tougaloo, MS 39174 and ²Mississippi State University, Mississippi State, MS 39762

The purpose of this study was to test how self-rated skin tone related to self-esteem in African-Americans. It was hypothesized that light-skinned African-Americans would have higher self-esteem. By using the Rosenberg Self-Esteem Scale and additional questions pertaining to gender and desirability of various skin tones, it was determined that there was a trend level significant difference between scores for those rating themselves as having various skin tones ($p = .073$). For the 34 students surveyed, the majority rated themselves as light brown in color. 0% (0) said they were very dark, 21% (7) said they were very light, 56% (19) said they were light brown, and 24% (8) said they were dark brown. Individuals that identified themselves as light brown had the highest mean self-esteem scale scores, followed by individuals that identified themselves as dark brown. Individuals that identified themselves, as very light had the lowest self-esteem scale scores. In addition, subjects who were content with their skin tone had higher self-esteem scale scores than those who wanted to change their skin tone. However, this difference was not significant.

9:45 INCIDENCE OF DOMESTIC VIOLENCE AMONG STUDENTS AT THE UNIVERSITY OF SOUTHERN MISSISSIPPI: AN INITIAL REPORT OF FINDINGS

Ann Marie Kinnell, University of Southern Mississippi, Hattiesburg, MS 39406

There are relatively few studies that examine the current experiences of college students with domestic violence. In a recent review of the literature on domestic violence and college students, most studies either focused on the effect of childhood abuse on current academic outcomes or used vignettes

to analyze students perceptions of types of behavior as either domestic violence or not. However, as a faculty member I have had several students who have been affected by domestic violence. I am not the only instructor who has had this experience. Yet, despite anecdotal data from our students detailing personal stories of violence, there has been no formal study done to determine the actual number of students affected by domestic violence or how this violence has impacted their academic careers. The purpose of this project was to determine 1) the extent to which students attending USM's Hattiesburg campus are affected by domestic violence, 2) the specific nature of this violence, and 3) the effect of this violence on their academic careers. A survey of 436 undergraduates and graduates was carried out in April 2005. In addition, interviews with students are being collected to create a more detailed understanding of the student's experiences with domestic violence. This paper will discuss the initial results of this study.

10:00 Break

10:15 THE EFFECT OF PARENTING STYLES ON INTIMATE RELATIONSHIP

Yolanda M. Grady* and Shaila Khan, Tougaloo College, Tougaloo, MS 39174

It has been demonstrated that the characteristic of three parenting styles such as authoritative, authoritarian and permissive show similar parental behavior connected with secure, avoidant and ambivalent attachment style. 92% of students with authoritative parenting style were found also to be securely attached. Research showed that quality of adult interpersonal relationship depends on childhood attachment style and that parental style reflects the same influence as attachment style. Based on this it seems likely that parenting styles should also act as a predictor for relationship outcome. Previous research showed that compared to authoritarian or permissive parents undergraduate students who were securely attached to their parents scored significantly higher on tests of personal intimacy and beliefs in others abilities to be intimate (Jennifer & Donna, 2001). The present study examines the relationship between parenting styles and the effects on intimate relationships among African American College students. The study also explored the extent of trust in a relationship. The sample for the present study consisted of 80 African American College students. The participants were surveyed on their parent's warmth/responsiveness, coldness/rejection, and ambivalence/ inconsistency as they were being brought up. The participants were also surveyed on their current feelings of romantic love in intimate relationships as secure, avoidant, or ambivalent to determine their feelings that were true of their relationship. They were also given a trust scale to see the correlation between trust and intimate relationship. It is hypothesized that 1) warm/responsive parenting style will lead to secure intimate relationships in adults; 2) cold/rejecting parenting style will lead to avoidant intimate relationships in

adults; 3) an ambivalent/inconstant parenting style will lead to an anxious/ ambivalent intimate relationship in adults and 4) there will be a high correlation between trust and intimate relationship. The result showed that parenting style does act as a predictor for relationship outcome.

10:30 USE OF RADIOGRAPHS OF PATIENTS WITH ARTHRITIS AND PAIN QUESTIONNAIRE RESULTS IN THE IDENTIFICATION OF FORENSIC CASES

Krista Burleigh, University of Southern Mississippi, Hattiesburg, MS 39406

This research is to investigate a correlation between the extent of arthritis of an individual and the type of impact it has on his/her life, specifically the amount of pain and the limitations of movement, along with an examination of the x-rays taken during medical visits. This information can become potentially important in forensic studies for identification. Arthritis is the most common physical ailment, usually associated with age and physical activities or trauma, and frequently attacks the vertebral column, especially the cervical and lumbar vertebrae. Similar to the identification of individuals by dental records, if an individual got medical attention and x-rays after complaining of arthritic pain (and often had observable symptoms, like a limp), this can be used to identify them in death. Non-invasive surveys and x-rays of patients (around 50 individuals per race and sex, 200 total, with ages ranging from mid 20s to early 80s) obtained from doctors (chiropractors) are examined for the extent of arthritis in the back (the most common site affected). The questionnaire results are tailored to concern the type of pain and other ways the arthritis disables the patients' lifestyles, correlated with the x-ray results using SPSS. By allowing for a more detailed description of their behavior, this information can aid in the identification of unknown persons in forensic settings. Initial results confirm that the amount of pain an individual claims to suffer from is associated with the degree of arthritis observed in the radiographs.

10:45 HEALTH STATUS AND SOCIAL STRATIFICATION AT MANGUM (22CB584)

Tiffany Hensley, University of Southern Mississippi, Hattiesburg, MS 39406

"A human burial contains more anthropological information per cubic meter of deposit than any other type of archaeological feature." (Peebles 1977: 124) Given this, twenty-four burials from the Mangum site (22Cb584) in Claiborne County, Mississippi, were used to explore the lifeways of the ancient inhabitants of the site. The Mangum site is a Plaquemine necropolis that likely dates to approximately A.D. 1400 or A.D. 1500. The individuals buried at Mangum were part of a chiefdom and, as such, should show evidence of social stratification. The burials at the site were thus examined for a variety of health variables using data provided by Penton (1995) including age at

death, stature, anemia, infection, dental pathology, trauma, and arthritis. These variables were in turn correlated with a number of mortuary variables indicating status including age, sex, body preparation and treatment, grave form, grave location, and grave furnishings. Overall, the site was quite homogeneous with few distinctive patterns emerging. The results are discussed in light of health variables and burial programs at other sites in the region.

11:00 PATTERNS OF HEALTH AMONG CHILDREN IN NINETEENTH CENTURY NATCHEZ

Ashley Siedell, University of Southern Mississippi, Hattiesburg, MS 39406

Childhood health patterns are one of the best indicators of a society's adaptational success. As such, this paper will examine morbidity and mortality patterns of young children in later nineteenth century Natchez, especially as they differ by race. Distinctions can reflect not only potential differences in access to food and medical resources, but also a variety of other factors ranging from belief systems about the causes of disease to genetic differences in immunity. The sample for this study was taken from the sexton's records of the Natchez City Cemetery (Shumway n.d.). Some 4000 juveniles, both black and white, between ages 0 and 15 who died between 1850 and 1900 were selected. Sex was available for only a small subsample of these individuals, and thus did not play a large part in the analysis. All data were evaluated using Excel. Overall, many expected health patterns emerged. The most common causes of death among the neonates were tetanus/lockjaw and respiratory illnesses. Mortality was higher among African-American children than in their Caucasian counterparts. Among young children, digestive diseases were most prominent in both ancestral groups. Some infectious disease differences did emerge, however. Blacks were seen to be more susceptible to tuberculosis and "teething" whereas whites were found to succumb to epidemic diseases, especially yellow fever, at a far higher rate. All of these findings are discussed in light of historical events occurring at the time, including the effects of the Civil War and Reconstruction.

11:15 COMPARATIVE ANALYSIS OF THE RELATIONSHIPS OF AGE, GENDER, AND CAUSE OF CAUCASIAN DEATHS IN LATE NINETEENTH CENTURY VICKSBURG AND NATCHEZ, MISSISSIPPI

Harold W. Webster, Jr., University of Southern Mississippi, Hattiesburg, MS 39406

This paper explores the possible effects on mortality of differing political, social, and economic views and the underlying issues in two, post-Reconstruction era, Mississippi towns. Vicksburg and Natchez were geographically, demographically, and economically similar river towns, but had dissimilar attitudes towards the war. Using records from the Vicksburg Fisher Funeral Home (Ragland 1985) and the Natchez City Cemetery Sexton's Records (Shumway n.d.), comparative data was derived

concerning the longevity and causes of death for over seven-hundred and sixty Caucasian adults, of both genders, who were deceased at age thirty and above between 1880 and 1884. The two sets of data were analyzed using Microsoft Excel. Where no age or cause of death was reported, the individual was not included in the final sample. For comparative purposes, groups were analyzed by gender, age-at-death, and cause of death. (pulmonary, age related, cardio, infectious disease). Overall, there was less homogeneity than expected between the two towns. Longevity was around fifty-one years of age in both towns and infectious disease was the single most common cause of death for both sexes. Males were much more likely to die of respiratory causes than were females in both cities as well. The hypothesis that the cultural and economic differences between both towns may have been a factor in the causes of death was born out by the fact that Vicksburg had a mortality profile that was measurably different from the mortality profile of Natchez and that sociological causes of death were more prevalent in Vicksburg.

11:30 POPULATION AGING AND THE MEASUREMENT OF DEPENDENCY: THE CASE OF GERMANY

David Swanson, University of Mississippi, University, MS 38677

Many industrialized countries have concerns about aging (and declining) populations and the level of future financial and other support required of the working-age population for the elderly. Concern over this is particularly acute in Germany. However, there are those who argue that these concerns are blown out of proportion. One line of argument is that the burden of caring for a larger elderly population could be offset by reduced spending on the young because of their declining numbers. I use Germany as a case study in examining this debate and analyze changes in the old-age, youth, and total dependency ratios as shown by official population projections for the period 1998-2080. The findings suggest that acute concern about aging in Germany is warranted. As inquiries continue to be made into the ability of Germany and other countries to support their elderly populations, I suggest that the both the youth dependency ratio and the total dependency ratio be used in conjunction with the elderly dependency ratio to guide policy decisions.

THURSDAY AFTERNOON

Meeting Room 3

1:15 Symposium on Hurricane Katrina

THE PSYCHOLOGY & SOCIAL SCIENCE INVITED SYMPOSIUM ON HURRICANE KATRINA

David Swanson, University of Mississippi, University, MS

38677

It has been nearly six months since Hurricane Katrina came ashore in Mississippi and the levies failed in New Orleans. Katrina was one storm, but it manifested itself in very different ways. Consequently, it will take a multi-faceted approach to study its effects, many of which are likely to be traced decades into the future. In this symposium, we will look at Katrina from several aspects relevant to the Division of Psychology and Social Science. The first considers locating and analyzing data to help understand the extent and magnitude of the damage while the second considers the effects on people and activities directly affected by Katrina. The third aspect looks at the future - what can be done to ameliorate the effects of future disasters?

DISASTER PREPAREDNESS PLANS FOR ANIMAL FACILITIES

Sheree Watson* and Matthew McManus, University of Southern Mississippi, Hattiesburg, MS 39406

In the aftermath of Hurricane Katrina, the need for continual assessment and revision of disaster preparedness plans for laboratories that maintain live animals became apparent. Whereas these plans have generally provided for the animals' well-being for several days, the extent of damage after Katrina revealed the need for a more extensive, long-term plan. Moreover, the optimal plan would be one that can be implemented quickly and would involve cooperation among several institutions. Potential models for disaster preparedness plans for animal facilities will be discussed. Feedback from session participants will be incorporated with the aim of developing a template for a statewide disaster preparedness plan.

2:30 Break

Regular Session Resumes

2:45 ASL AND SCHIZOPHRENIC LANGUAGE: MISDIAGNOSIS AND NEEDED MODIFICATIONS TO THE DIAGNOSIS CRITERION OF DEAF SCHIZOPHRENICS FROM A BIO-PSYCHOSOCIAL PERSPECTIVE

Jennifer Chustz, University of Southern Mississippi, Hattiesburg, MS 39406

Research shows that there are significant differences in the diagnosis standards, hospitalization histories, and treatment effectiveness of deaf schizophrenics when compared to hearing schizophrenics. The research literature states that as a whole, deaf schizophrenics are hospitalized for longer periods than hearing schizophrenics. The lack of understanding of American Sign Language structure and the impact of deafness on behavior further contribute to misdiagnosis trends among those responsible for diagnosis. The lack of homogeneity among the deaf population contributes to misdiagnosis as well. My work will attempt to address the need to familiarize those who are responsi-

ble for the treatment of the deaf mentally ill and suggest needed changes in the field of psychology that is responsible for the treatment of deaf mentally ill patients. I will examine the biopsychosocial impact of deafness, the standard assessment procedures currently used among psychologists, the problems with psychological testing instruments, and current diagnosis criterion for schizophrenia. I will also analyze the language process of schizophrenia and how deafness affects this symptom's manifestation. Finally, I will offer research results that support my proposal for future research needs and the modifications for the treatment of deaf mentally ill patients.

3:00 EFFECTS OF L-TRYPTOPHAN ON FOOD INTAKE IN BUSHBABIES ARE SEX SPECIFIC

Sheree Watson*, Matthew McManus, Kelly Manning, Charmese Broach, and David Hanbury, University of Southern Mississippi, Hattiesburg, MS 39406

L-tryptophan is the amino acid precursor to the neurotransmitter serotonin. L-tryptophan administration may be associated with increases in both central and peripheral serotonin levels. Thus, administration of l-tryptophan may be associated with behavior changes similar to those observed with increased serotonin levels. Serotonin systems may have an inhibitory role in feeding behaviors and reductions in food intake have been reported following l-tryptophan administration in rodent models. However, the effects of l-tryptophan on feeding behavior in nonhuman primates has not been well characterized. The present experiment reports sex-specific decreases in food intake in a prosimian primate, Garnett's bushbaby, following oral administration of l-tryptophan. Twenty male and 12 female bushbabies received oral administrations of l-tryptophan daily for 6 weeks as part of a larger study examining self-injurious behavior. The bushbabies received ad libitum monkey chow once daily, which was weighed prior to feeding. Remaining food was collected and weighed approximately four hours later. The differences between amount of food given and amount recovered was recorded as "intake". Food intake for the two weeks prior to the onset of the study served as the baseline measure. Post l-tryptophan values were the average food intake during weeks five and six of the study. Food intake of male and female bushbabies did not differ at baseline. Repeated measures analysis of variance revealed a time by sex interaction in that post l-tryptophan food intake values decreased significantly from baseline for female, but not male, bushbabies ($p=.019$). These results are consistent with reports of reductions in feeding behavior in rodent models. However, they further suggest that, in prosimian primates, the reduction in food intake may be more pronounced in females than in males.

3:15 GENDER DIFFERENCES IN ATTITUDES TOWARD CARE AND USE OF ANIMALS

David Hanbury, Amanda Necaie, Emily Helms, Ty Stafford, and Sheree Watson*, University of Southern Mississippi,

Hattiesburg, MS 39406

Studies of veterinary students have shown gender differences in attitudes toward the use of euthanasia in veterinary situations. Similar gender differences may be reflected in other areas of animal care and use, including zoo management. To investigate these differences, we examined the extent to which college undergraduate students (N=376) endorsed statements related to euthanasia, anthropomorphism, and attachment to animals in zoo settings. Males were more likely than females to agree with statements endorsing special attachments to animals (e.g., "Wild animals can make good pets") and anthropomorphism (e.g., "Animals respond positively to kindness"). Females were more likely to disagree with statements endorsing euthanasia, especially for animal management (e.g., "Sometimes common animals must be removed to make room for endangered or rare animals"). The overall pattern of responding suggests that men and women may hold differing views of the human-animal bond, with men taking a more pragmatic viewpoint and women romanticizing the human-animal relationship.

3:30 WEIGHT CONCERN AND BODY IMAGE AMONG SOUTHERN AFRICAN AMERICAN FEMALES

Pamela Smith* and Safiya R. Omari, Jackson State University, Jackson, MS 39217

Although weight concern and thinness pressures have been identified as primary concerns for White and Latino women when compared to Black women, a few studies have found otherwise. The purpose of this study was to explore the potential cultural and psychosocial correlates of obesity in Black females in Mississippi. There were three hypotheses: 1) There would be a positive relationship between cultural values and body mass index (BMI); 2) There would be a positive relationship between BMI and depression; and 3) There would be a negative relationship between BMI and self-esteem in this sample. The researcher is interested in whether the relationships identified would be supported by a quantitative study of weight concern among African American women. A sample of 80 Black female undergraduates, ages 18 and older was recruited from social science classes at a HBCU. Participants completed a questionnaire packet containing measures of acculturation, body image, depression and self-esteem. Demographic information such as age, marital status, employment and education, and self-report information related to height and weight was also obtained. Hypotheses 2 and 3 were supported: $r(70) = .28, p = .017$, $r(71) = -.27, p = .023$ respectively. Hypothesis 1 was not supported. This sample reported, on the average, an ideal appearance that was significantly lower than their current appearance, however, their levels of body satisfaction were not significantly related to acculturation.

3:45 Divisional Business Meeting

6:00 Divisional Poster Session – Exhibit Hall B

RACIAL DISPARITIES IN TOBACCO USE AND SOCIAL INFLUENCES IN A RURAL SOUTHERN MIDDLE SCHOOL

Jessica Muilenburg* and William D. Johnson, University of Mississippi Medical Center, Jackson, MS 39216

Purpose: The purpose of this study was to investigate racial differences of tobacco use and social exposure to tobacco products in a sample of middle school students. **Methods:** Questionnaires were administered in January of 2005 to 281 students in a Mississippi Delta area middle school. **Results:** The participants were 51.0 percent female and 56.6 percent African American. Unadjusted odds ratios (OR) revealed that Caucasian students were statistically more likely than were African American students to (1) ever have tried smoking, (2) ever have been a daily smoker, (3) have smoked in the past 30 days, (4) live with someone who smokes, (5) have seen a parent or guardian smoke, and (6) have friends who smoke. In contrast, African Americans were more likely to report "no one is allowed to smoke" in their home. Caucasian females had the highest rates of smoking, as well as the highest exposure to social smoking behaviors. **Conclusions:** This study not only showed that Caucasians were indeed smoking more, but that African American adolescents do not have the same exposure to social smoking, particularly African American females. Of particular interest was why the differences eventually dissipate and smoking rates are virtually the same in adulthood. A greater understanding of the impact of exposure to tobacco use on an adolescent's own tobacco use is vital to prevention efforts, especially in regard to racial differences. Future research on youth tobacco prevention should focus on sociocultural and racial differences in the development of tobacco use in adolescents.

EFFECTS OF EARLY FOOD RESTRICTION ON SUBSEQUENT WEIGHT GAIN

Andrew Thaw*, Amberly Ethridge, Christine Faust, Mimi Grissom, Shelly Jo Johnson, Madeleine Leake, Betsy Powell, and Joseph Wehby, Jr., Millsaps College, Jackson, MS 39210

Human studies have supported a protective role of excess fat storage in times of stress and deprivation. Thus, persons exposed to limited nutrition might expect to compensate by storing excess fat when food is plentiful. From an evolutionary perspective this makes sense. However, research in this area has focused on adults only. Different mechanisms may develop during sensitive periods prior to adulthood. In other words, there may be a developmental period that sets the stage for later weight regulation depending on food availability. If one has limited food during this time they may develop more or less ability to store fat. To examine this hypothesis, 5 groups of newly weaned rats were allowed ad libitum access to food 24h/day. On successive weeks a single group was deprived of food for 48 hours. Food was then returned ad lib. Weights of each group were tracked and compared to the control group that had no food deprivation. Results indicate that the earlier food

deprivation occurs the more likely adult body weight will be reduced. These findings may have implications for dietary recommendations during early development to reduce the likelihood of adulthood obesity.

HEALTH AND ACTIVITY OF A PLAQUEMINE NECROPOLIS IN CLAIBORNE COUNTY, MISSISSIPPI

Miranda Page* and Daniel Zivin, University of Southern Mississippi; Hattiesburg, MS 39406

Osteometric data from the human remains recovered at the Mangum Site in Claiborne County, MS, a Plaquemine necropolis dating to approximately 1300 AD, were analyzed for patterns of stature and robusticity. The skeletal population represents a minimum of 68 individuals. Although many burials were fragmentary, cranial and post-cranial remains were sufficiently complete in over half the individuals to allow for analysis. The cranial dimensions, long bone lengths, and long bone transverse dimensions were recorded for each individual. Stature results show a mean male height of approximately 169.8 cm and a mean female height of 163.1 cm. The females at this site are a little on the tall side but all other findings are similar to those recorded at other Plaquemine sites. The childhood health expectancy at Mangum were likely similar to those of other Mississippian sites in the region. These indicators are reflective of a number of cultural variables, including diet and physical activity. Certain indices of the femur, however, are unusual, reflecting activity stresses. Possible explanations of these results will be discussed.

UNSTABLE SELF-ESTEEM AND PSYCHOLOGICAL DEFENSE

Lindsey Osterman* and Virgil Zeigler-Hill, University of Southern Mississippi, Hattiesburg, MS 39406

Defense mechanisms were initially believed to be a means by which the ego defended itself against unacceptable impulses (e.g., sexual and aggressive desires; Freud, 1915/1961). As a revision to Freud's earlier ideas, Fenichel (1945) proposed that the purpose of defense mechanisms is actually to protect self-esteem rather than shield the individual from their own impulses. This reformulation of the purpose of defense mechanisms is more consistent with the modern views of social and personality psychology. In a recent review of the literature, Baumeister, Dale, and Sommer (1998) found support for the idea that defense mechanisms protect self-esteem from threats related to the self-concept. The present study examined whether defense style was related to the stability of self-esteem (i.e., fluctuations in state self-esteem over time). More specifically, it was predicted that individuals with stable high self-esteem would report more mature defenses than individuals with either low or unstable self-esteem. Participants were 123 undergraduates who completed the Rosenberg Self-Esteem Scale (Rosenberg, 1965) and the Defense Styles Questionnaire-40 (DSQ-40; Andrews, Singh, & Bond, 1993) during a laboratory session. In addition,

participants completed a measure of state self-esteem twice per day for 14 days via the internet. The results of the present study found that individuals with stable high self-esteem reported the lowest levels of neurotic ($b = .21, p < .04$) and immature defenses ($b = .22, p < .01$). Discussion will focus on the implications of defense style for the protection of self-esteem.

TEENAGE RATES PREGNANCY AMONG DAUGHTERS WHOSE MOTHERS ARE INCARCERATED

Kristie Squire^{1*} and T. Chedgzsey Smith-McKeever², ¹Jackson State University, Jackson, MS 39217 and ²University of Illinois at Chicago, Chicago, IL 60607

Teenage pregnancy is a serious issue facing America. Approximately 1 out of 10 teenage girls between the ages of 15 and 19 become pregnant. Despite the decline in teenage pregnancy globally, the United States has the highest rate of teenage pregnancy than any other country. Research indicates that daughters of incarcerated mothers are at higher risk for teenage pregnancy. Investigations have shown that 60% of the daughters who were placed with caregivers, due to maternal incarceration, were or had been pregnant (American Correctional Association, 1993). It is important to examine teenage pregnancy among daughters of incarcerated mothers to see if girls whose mothers are incarcerated remain at risk for early pregnancy. In the present study, a secondary analysis of data collected in 2002 that asked woman about their perceptions of their daughter's social connection, participation in delinquent activities, and teenage pregnancy among the women's daughters was examined. One hundred-one women incarcerated at a Cook County Jail in Illinois were included in this study. Results showed 7.3% of the mothers reported that their daughters were teen mothers, compared to 92.7% who reported that their daughters were not teen mothers. Findings were not consistent with previous research that found girls of incarcerated mothers to be at high risk for teenage pregnancy. Findings suggest that daughters of incarcerated mothers may not be at high risk for teenage pregnancy.

PASSENGERS: DO THEY VALUE THEIR LIVES?

Jennifer Gillespie* and Dawn Bishop-McLin, Jackson State University, Jackson, MS 39217

The purposes of this study were to measure the actual rate of seat belt usage in urban African American populations in Jackson, MS, and to identify effective, replicable, and sustainable strategies for increasing seat belt restraint among this population. It was hypothesized that the observed female passengers of all ethnicities would have a higher rate of seat belt restraint compared to the observed male passenger group and that the passengers included in the observed younger group (16-25 yrs.) would have a lower rate of seat belt usage compared to the 25+ group. We conducted naturalistic observations at intersections located in predominantly African American census tracts; however, observations were also made at schools, clinics,

and Caucasian neighborhoods. The total number of observed vehicles was 4,071, and about 75% of these observed vehicles were drive without a front seat passenger. After data analysis was complete, results confirmed both of the hypotheses. Limitations for this study included 1) personal perception of the age and race of the observed passengers, and 2) automatic seat belts in certain manufactured vehicles. This is a three-year project funded by the National Highway & Traffic Safety Administration (NHTSA) and the National Conference of Black Mayors. Further studies will continue to observe seat belt usage in the city while implementing stronger marketing techniques as well as better enforcement of the law.

NARCISSISTIC SUBTYPES AND CONTINGENT SELF-ESTEEM

Eric Parker* and Virgil Zeigler-Hill, University of Southern Mississippi, Hattiesburg, MS 39406

Two subtypes of narcissistic personality are believed to exist (e.g., Akhtar & Thomson, 1982; Cooper, 1981, 1998; Kohut, 1971; Wink, 1996). The first is a grandiose subtype which is characterized by grandiosity, arrogance, a sense of entitlement, a willingness to exploit others, and envy of others. The second narcissistic subtype consists of vulnerable narcissists. Vulnerable narcissists harbor hidden grandiose expectations beneath a façade of modesty which results in anxiety, defensiveness, and oversensitivity. Both subtypes share certain characteristics such as arrogance and the disregard for the needs of others as well as being characterized by poor interpersonal relationships. The present study investigates the relationship between these narcissistic subtypes and contingent self-esteem. Individuals with contingent self-esteem base their feelings of self-worth on perceived success or failure in important domains (Crocker & Wolfe, 2001). For some individuals, self-esteem is based on physical attractiveness, for others, it may be based upon the approval they receive from others, or on whether they make good grades in college. We predicted that vulnerable narcissists will base more of their self-esteem on meeting external contingencies (e.g., others' approval and physical appearance) than grandiose narcissists. To examine our hypothesis, data were collected from 156 undergraduate participants. These participants completed measures of grandiose narcissism, vulnerable narcissism, self-esteem, and contingent self-esteem. The results of the present suggest that vulnerable narcissists are more likely than grandiose narcissists to base their feelings of self-worth on domains requiring validation by external sources. Discussion will focus on the implications of contingent self-esteem for vulnerable narcissists.

THE INFLUENCE OF GENDER ROLE IDENTITY AND GENDER RELATED TRAITS ON THE PERCEPTIONS OF SEVERITY IN SAME AND CROSS-SEX SEXUAL HARASSMENT

Annie Smith, Jackson State University, Jackson, MS 39217

When assessing situations of sexual harassment, gender-role identity held by the individual observing the harassment strongly influences the perception of both the perpetrator and victim as well as the perception of severity. The purpose of this study was to assess differences in the perception of same and cross-sex sexual harassment. Specifically, individuals classified as being high feminine, high masculine, and high dominant were compared to low feminine, low masculine, and low dominant individuals based upon their scores from the Bem Sex Role Inventory (BSRI)-Short Form. It was hypothesized that 1) individuals who score high on the femininity scale would perceive cross-sex sexual harassment more severe than individuals who score low on the femininity scale 2) individuals who score high on the masculinity scale would perceive same-sex sexual harassment more severe than individuals who score low on the masculinity scale and 3) individuals that are more dominant would perceive same-sex sexual harassment as more severe than individuals that are less dominant. Undergraduate students (N = 106) with a mean age of 22 were given the BSRI and viewed a video that depicted both same-sex and cross-sex sexual harassment scenarios. Using a 5-point likert scale, participants rated the severity of the scenarios. Analyses revealed that high feminine individuals significantly perceived female to male sexual harassment as more severe; however, the other hypotheses were not supported. This present study attempts to fill the gap of the lack of information comparing same and cross-sex sexual harassment.

EFFECTS OF MODAFINIL ON WORKING MEMORY

Monica Stevens* and John McCoy, University of Southern Mississippi, Hattiesburg, MS 39406

Modafinil is a relatively new wake-promoting drug traditionally used to treat narcolepsy. Recent studies have shown modafinil to induce cognitive benefits, particularly as related to memory. Of particular interest within these studies is evidence that modafinil is especially beneficial to human subjects who exhibit low performance on working memory tasks. To further investigate this finding, low-performing male Wistar rats were tested in a delayed non-matching to position (DNMTP) task utilizing a Morris water maze. The apparatus presents animals with one of two choices in order to locate the escape platform. Each trial consisted of two swims called the information swim (IS) where the rat was oriented with the platform location, and the choice swim (CS) in which the platform was found in the quadrant opposite the IS. There were ten trials per day for three days, and rats were administered intraperitoneal injections of 100 mg/kg of modafinil or a placebo thirty minutes prior to testing. Though rats given the drug showed an increase in performance accuracy on the first two days, there was a decline in performance on the third day. Rats given modafinil did not show a significant increase in performance accuracy over the control group overall, which may be attributable to the brevity of the testing period. Further research using low-performing

animals should be conducted in order to obtain more conclusive results.

INTEGRATING DATA ANALYSIS IN THE SOCIOLOGY CURRICULUM

James Hill* and Cliff Holley, University of Mississippi, University, MS 38677

The University of Mississippi's Integrating Data Analysis (IDA) project experimented with a different approach for improving quantitative literacy in lower division sociology classes by implementing census exercise modules into an online section of introductory sociology. Our stated goal for the project was to evaluate the cost and benefits of such an endeavor. In addition to measuring the extra instructional effort involved in the creation, installation, and grading of quantitative modules, we also measured the difference in learning outcomes between an experimental section and a control section. The university currently uses A New Global Environment for Learning (ANGEL) as its online teaching platform. During the fall 2005 semester, the department opened two sections of Sociology 101 to be taught online using the ANGEL program. Students were randomly placed into the two web-based sections designated Section 1 (the experimental group) and Section 2 (the control group). Section 1 was assigned five quantitative exercises during the semester, while Section 2 was taught in the "traditional" manner. Both sections were administered the same IDA assessment at the end of the semester.

SCIENCE EDUCATION

Chair: William J. Sumrall, University of Mississippi
Vice-chair: Todd Adam, J. L. Scott Marine Education Center

THURSDAY MORNING

Meeting Room 5

8:00 A REVIEW OF THE 2005 J.L. SCOTT MARINE EDUCATION CENTER AND AQUARIUM'S (MEC&A) GEAR-UP MISSISSIPPI ISLAND ECOLOGY CAMP

Sam Clardy * and Chris Snyder , Gulf Coast Research Laboratory's J.L. Scott Marine Education Center and Aquarium (MEC&A), Ocean Springs, MS 39566

The purpose of the J.L. Scott Marine Education Center and Aquarium's *Gear-Up Mississippi Island Ecology Camp* was to expose selected high school students to a variety of marine careers and environments. Participants lived on a remote

houseboat off of the Chandeleur Islands and spent the days and evenings collecting specimens, exploring a variety of coastal habitats, fishing, and documenting their experiences on a variety of media. PowerPoint presentations were developed by the participants and specimen collections were identified and labeled for them to share with their classmates. All involved with this program came back with a better awareness and understanding of marine environments which will help them with future career choices and decisions regarding these precious resources.

8:15 J.L. SCOTT MARINE EDUCATION CENTER AND AQUARIUM'S EDUCATIONAL PROGRAMS: POST-HURRICANE KATRINA

Shelia A. Brown* and Sharon H. Walker, Gulf Coast Research Laboratory's J.L. Scott Marine Education Center and Aquarium (MEC&A), Ocean Springs, MS 39566

The J.L. Scott Marine Education Center and Aquarium (MEC&A) was directly in the path of *Hurricane Katrina*. The facility, exhibits, and most of the contents were a total loss. An interim facility is now operating as the MEC&A at the Gulf Coast Research Laboratory (GCRL) in Ocean Springs, MS. The continuation of the Project Marine Discovery Program (PMD) Educational Series, the Centers for Ocean Sciences Education Excellence: Central Gulf of Mexico (COSEE:CGOM) Teacher/Scientist Summer Institutes, and teacher workshops will operate from the former Director's Residence, modular classrooms, and natural habitats surrounding the GCRL campus. Teachers can now register their students (K-12) for the high quality PMD formal and informal educational programs. Applications are being accepted for teacher institutes and workshop opportunities sponsored by the National Science Foundation (NSF), Mississippi's Department of Marine Resources (DMR), the Mississippi-Alabama Sea Grant Consortium (MASGC), and the National Oceanic and Atmospheric Administration's (NOAA) Office of Ocean Exploration.

8:30 WHAT HAPPENED TO MY BEACH?

Chris Snyder¹ and Tom Wissing²,¹Gulf Coast Research Laboratory's J.L. Scott Marine Education Center and Aquarium, MS, 39530, and ²Naval Oceanographic Office, Oceanographic Department, Data Division

The purpose of this project is to introduce middle school students to basic information on coastal morphology, shoreline erosion and accretion, barrier island movement trends, and long shore transport trends. The concepts will be built into an activity on shoreline dynamics and coastal processes. Students will determine the best method of monitoring shorelines and coastal shoreline dynamics. The activity will also increase their understanding of the responses of the shoreline to human interaction and natural sea-level changes. Students will use GPS technology and land surveying techniques to monitor shoreline changes. All data collected during the activity will be entered into an interactive database maintained at the J.L. Scott

Marine Education Center and Aquarium.

8:45 THE TOP 10 INVASIVE PLANTS OF THE MISSISSIPPI GULF COAST

Michael Carley, Gulf Coast Research Laboratory's J.L. Scott Marine Education Center and Aquarium (MEC&A), Ocean Springs, MS 39566

The purpose of this project is to educate the public about invasive plant species which have established populations *or* which are establishing populations in the Mississippi Gulf Coast region. Information from a variety of resources has been used to develop descriptive language delineating the location, native range, introduction history, species description, impacts, and status of the "Top 10" aquatic or wetland invasive species of the region. Through funds from the Coastal Impact Assistance Program (CIAP), the species information has been used to develop a photographic, full color educational pamphlet and poster to be reproduced and disseminated at areas of public access to coastal waterways.

9:00 Break

9:15 THE PRODUCTION OF TWO VIDEOS, *THE MICROSCOPE* AND *PLANTS AND ANIMAL CELLS*, FOR BIOLOGY STUDENTS OF MISSISSIPPI GULF COAST COMMUNITY COLLEGE

Christopher Livingston*, Julie Parker*, and Doug Mansfield, Mississippi Gulf Coast Community College, Gautier, MS 39533 and National Aeronautics and Space Administration, Stennis Space Center, MS 39522

The purpose of this project was to produce two educational videos for the Biology students at the Mississippi Gulf Coast Community College, Jackson County Campus. The videos were developed to replace older versions with more dynamic presentations of information. *The Microscope* and *Plant and Animal Cells* were the titles of the two new videos. After viewing the older versions of the videos for ideas on modification and improvement, research was gathered on the topics of study to develop new storyboards. All parts of the microscope and their functions, information on care and proper use of the microscope, cell parts, and their functions, and difference between plant and animal cells became significant components of the storyboards. Extensive editing allowed for the production of the final videos now used at the community college.

9:30 DEVELOPING A DATABASE OF TEACHER CONTACTS TO AIDE IN MARKETING EFFORTS FOR THE J.L. SCOTT MARINE EDUCATION CENTER AND AQUARIUM'S (MEC&A) PROJECT MARINE DISCOVERY (PMD) PROGRAMS

Deeneaus Polk¹* and Sam Clardy²,¹Mississippi Gulf Coast Community College, Gautier, MS 39533, National Aeronautics and Space Administration, Stennis Space Center, MS 39522, and

²Gulf Coast Research Laboratory's J.L. Scott Marine Education Center and Aquarium (MEC&A), Ocean Springs, MS 39566

The purpose of this project was to develop a database of teacher contact information from Mississippi, Alabama, Louisiana, and the Florida panhandle region which allowed the MEC&A to market their PMD programs more effectively and in an environmentally friendly manner. Extensive Internet searches were conducted and new contacts were established, with each state Department of Education, to aide in expanding the database. The database was utilized to market PMD programs for the spring semester of the 2005-2006 academic year which resulted in a significant increase in program reservations. The database is presently maintained by the MEC&A educational staff and will be utilized for future marketing endeavors.

9:45 CREATING A DIGITAL IMAGE AND VIDEO DATABASE FOR THE J.L. SCOTT MARINE EDUCATION CENTER AND AQUARIUM

Katelin Weimer¹* and Chris Snyder²,¹Mississippi Gulf Coast Community College, Gautier, MS 39533, National Aeronautics and Space Administration, Stennis Space Center, MS 39522, and ²Gulf Coast Research Laboratory's J.L. Scott Marine Education Center and Aquarium, Ocean Springs, MS 39566

This project was designed to create a database for storage and use of electronic images and digital video footage gathered by the J.L. Scott Marine Education Center and Aquarium. Scott Aquarium has collected over 1,000 new digital images in the past 12 months and is presently producing 100-300 new images per month. These images need to be stored in such a way that they could be easily accessed and are protected so that in the event of technological failure, the images are not lost. The database was designed to be searched by subject matter and date.

10:00 DEVELOPMENT OF A STATIC EDUCATIONAL SNAKE PHOTOGRAPHIC DISPLAY FOR J.L. SCOTT MARINE EDUCATION CENTER AND AQUARIUM'S INTERIM FACILITY

Melissa Britt¹*, Nicole Calvert¹*, Binnaz Bradley² and Michael Carley²,¹Mississippi Gulf Coast Community College, Gautier, MS 39533, National Aeronautics and Space Administration, Stennis Space Center, MS 39522 and ²Gulf Coast Research Laboratory's J.L. Scott Marine Education Center and Aquarium (MEC&A), Ocean Springs MS 39566

The purpose of the project was to design a static display and develop curricular materials to support the display for a new modular classroom of the J.L. Scott Marine Education Center and Aquarium's interim facility in Ocean Springs, MS. Using photographs of venomous and non-venomous snakes of Mississippi as the focal point, research on each species of snake was performed. Facts on biology, ecology, and natural history of the snakes were utilized to develop curricular materials for the

Project Marine Discovery Program Series. Review questions, vocabulary terms, puzzles and word searches were developed as evaluation instruments. Goals, learning objectives and benefits of the Snake Photo Display were designed as teaching tools to enhance content knowledge of students K-12. Curricular materials were aligned with *State and National Science Education Standards*.

10:15 Break

10:30 COSTUME DESIGNS FOR EDUCATIONAL PROGRAMS

Vanessa Key^{1*} and Shelia A. Brown²,¹Mississippi Gulf Coast Community College, Gautier, MS 39533, National Aeronautics and Space Administration, Stennis Space Center, MS 39522, and ²Gulf Coast Research Laboratory's J.L. Scott Marine Education Center and Aquarium (MEC&A) Ocean Springs MS 39566

Costumes were designed of marine and aquatic invasive and noninvasive species. The organisms chosen were species used in educational programs of the J.L. Scott Marine Education Center and Aquarium's Project Marine Discovery Program (PMD) Series. Emphasis in design was placed on anatomical and adaptation characteristics of each species. Two types of costumes were constructed, sturdy fabric designs for the PMD educators to use during instructional programs and paper templates for students to create their own costumes. Curricular materials were developed to support the educational goals associated with costumes as instructional tools. Learning objectives, descriptions of the organisms, their biology and adaptations were included in the lesson plans. The learning objectives were aligned with *State and National Science Education Standards*.

10:45 EXPOSURE OF AN ARTIST AND HIS WORK THROUGH FILM

Kyle B. Bellinger^{1*}, Patrick Shannon^{1*}, and Patricia Pinson²,¹Mississippi Gulf Coast Community College, Gautier, MS 39533, National Aeronautics and Space Administration, Stennis Space Center, MS 39522, and²Walter Anderson Museum of Art, Ocean Springs, MS 39564

The Walter Anderson Museum of Art (WAMA) has, in recent months, especially after Hurricane Katrina, experienced fewer visitors. For the purposes of public exposure and education, a film was made using slides of Walter Anderson's work and vignettes of an actor portraying the artist. The film was sent to local schools and colleges, as well as the Public Broadcast Station of Mississippi. A copy of the film was also kept by WAMA for presentations at the museum.

11:00 PRE-SERVICE TEACHERS' PERCEPTION OF THE PARTICULATE NATURE OF MATTER

Kelle Curry and William Sumrall*, University of Mississippi, University, MS 38677

The study consisted of approximately 180 undergraduate elementary teacher education candidates at the University of Mississippi. The instruments used in this study consisted of the Classroom Test of Scientific Reasoning (Lawson, 2002) and The Nature of Matter Inventory Rubric. The Nature of Matter Inventory Rubric was developed from a compilation of data gathered through a Nature of Matter Inventory that underwent a five category analysis. The researchers administered a pre-test to determine prior knowledge in relation to the particulate nature of matter and levels of scientific reasoning. Six teacher demonstration activities, i.e., three demonstrating Boyle's Law and three demonstrating Charles's Law were administered. A post-test determining if there were increases in levels of understanding the particulate nature of matter was conducted at the end of the study. Data analysis suggests that while levels of understanding improved after multiple demonstrations were conducted a significant relationship between Level of Scientific Reasoning and levels of understanding before or after the demonstrations did not exist.

11:15 MATH ACROSS THE SCIENCE, TECHNOLOGY AND SOCIAL STUDIES CURRICULUM

William Sumrall*, Kelle Curry, and LeAnn Carter, University of Mississippi, University, MS 38677

Eighteen teachers from critical needs area schools participated in a workshop June 1-28, 2005 at the University of Mississippi. The workshop consisted of a four week program where teachers received training from technology, science and math education professors in the optimal ways to integrate math, science, and social studies curricula. The teachers were involved daily in inquiry based math, science, technology and social studies projects. Instructors provided technological training involving computer spreadsheet/graphing applications and software (i.e., Inspiration) created concept maps. The participants were also required to attend two one-day workshops in the fall and spring. During the course of the year, each teacher participant is expected to integrate the training they acquired in the workshop into their classroom. Criteria specific lesson plans, pre/post concept maps and pre/post tests are project requirements for teacher participants. Data from 2004/2005 and preliminary data from 2005/2006 will be disseminated. This grant was funded by the Mississippi Institution of Higher Learning through the No Child Left Behind: Improving Teacher Quality Grant Professional Development Program-U.S. Department of Education.

11:30 Divisional Business Meeting

THURSDAY AFTERNOON

Meeting Room 5

1:30 OCEAN LITERACY: THE ESSENTIAL PRINCIPALS AND FUNDAMENTAL CONCEPTS OF OCEAN SCIENCES GUIDE

Shelia A. Brown* and Sharon H. Walker, Gulf Coast Research Laboratory's J.L. Scott Marine Education Center and Aquarium (MEC&A), Ocean Springs, MS 39566

Ocean literacy is the basic understanding of the ocean's impact on people and how they influence the ocean. Ocean-literate people understand principals and fundamental concepts about how the ocean functions, can communicate about the ocean in meaningful ways, and are able to make responsible and informed decisions about the ocean and its resources. A guide developed through a community-wide consensus-building process includes essential principals and concepts of ocean sciences. Over 100 members of the ocean sciences and education communities were involved with the production of the guide with major participants being the National Geographic Society's Ocean Life Initiative, the National Oceanic and Atmospheric Administration, the Centers of Ocean Sciences Education Excellence, and National Marine Educators Association. Although many concepts and principals of ocean sciences do not neatly fall within a particular discipline, the guide has aligned the principals and concepts to *National Science Education Standards* (NSES) for K-12.

1:45 LIVING DINOSAURS! THE RECLASSIFICATION OF BIRDS AS THEROPOD DINOSAURS AS AN OPPORTUNITY TO EXCITE STUDENTS AND EXPLAIN CLASSIFICATION THROUGH CLADISTICS.

John D. Davis, Mississippi Museum of Natural Science, Jackson MS 39202

Fascination with dinosaurs can be used to introduce students to cladistic methods of classification by demonstrating how all birds have been shown to be living theropod dinosaurs closely related to the "raptors" of popular fiction! 19th century suggestions that birds are closely related to dinosaurs were revived by John Ostrom's 1969 study of *Deinonychus*. More than 100 correspondences have been found for such dinosaurs and bird anatomy! An astonishing array of "feathered fossils" from the early Cretaceous Yixian Formation of China show that feathers appeared before flight in unequivocal dinosaurs and that all birds are dinosaurs. Feathered dinosaurs include the *Tyrannosaurs*! Exciting images are available for such "birdish" forms as the "feather tailed" *Caudipteryx zoui*, the "four winged" *Microraptor gui*, and the first beaked "bird," *Confuciusornis sanctus*. Intrigued students can be introduced to the taxonomic approach called cladistics, literally "the study of branching." This is the grouping of organisms by relative recency of common

ancestry. Branching diagrams are constructed using the features which seem most recently derived rather than those common to all members of larger groups. A group of organisms all descended from a common ancestor of the group forms a clade. It is a thrilling thought that predatory dinosaurs and the birds in your feeder are members of the same clade!

2:00 A METHOD TO ENHANCE THE ANALYTICAL WRITING SECTION ON THE GRADUATE RECORD EXAM

Carolyn Beck*, Susan Bourland, and Marilyn Ellzey, University of Southern Mississippi, Hattiesburg, MS 39406

In recent years the Graduate Record Exam has added a writing component to the general test. This section, called Analytical Writing, strives to supply graduate admissions committees with information about the writing ability of applicants for graduate school. Writing is a critical skill for graduate students at a time when writing skills are declining nationally. The purpose of this study was to determine if students preparing for the GRE could improve Analytical Writing scores. For the past 3 summers students in the McNair Scholars Program have been exposed to a variety of methods to enhance writing performance. The authors report on a method found to improve the scores of students through the use of a writing template developed over the three year period for each of the two types of essays required on the exam. Thorough teaching of the template method together with Kaplan Preparation Strategies has enabled students to increase writing scores so that the majority now perform above the national mean. Improvement was measured using both the online Score It Now! program (ETS) and actual writing scores from the GRE exam. We have determined that students can increase scores on the Analytical Writing section of the GRE.

2:15 ENCOURAGING SCIENTIFIC LITERACY THROUGH THE USE OF FORENSIC SCIENCE

Susan Bender^{1*}, Jammy Hemphill², Ben Lundy², Cindy Cook³, and R.W. Rockhold^{4,1}, Jim Hill High School, Jackson, MS 38204, ²Forest Hill High School, Jackson, MS 39212, ³Murrah High School, Jackson, MS 39202, and ⁴University of Mississippi Medical Center, Jackson, MS 39216

Students enrolled in honors and advanced science classes in the Jackson Public School District have been provided with forensic based novels purchased as a part of the Base Pair, Howard Hughes Medical Institute Grant and The University of Mississippi Medical Center. The novels include books by Richard Preston, Mary Manhein, Patricia Cornwell, Robin Cook, and Hugh Miller. There are four high schools currently participating in this literacy component, and 277 students have been provided books. Of the 277 students involved in the project, 95% or 263 students have completed all of the required assignments and portfolios that accompany the assigned books. This course and the infused novels and the activities that stem from

them provide an opportunity for teachers to capture the students enthusiasm generated from all of the popular crime scene dramas that now saturate the air waves. The lead teachers allow students an opportunity to experience the techniques used by scientists and law enforcement professionals and point some on the path to a successful career in science or criminal justice.

2:30 Break

2:45 INTRODUCTION OF THE POSITIVE ASPECTS OF MICROORGANISMS TO COLLEGE STUDENTS

Ashley Nicole Lee*, Mary Lux, and Margot Hall, University of Southern Mississippi, Hattiesburg, MS 39406

Our society tends to focus only on the pathogenic aspects of microorganisms. We sometimes forget about the many and diverse beneficial roles that microorganisms play in human health. A presentation was developed to emphasize the beneficial uses of microorganisms for several common clinical conditions. This is known as probiotic therapy. Probiotic therapy is the use of live microorganisms administered in adequate amounts to confer a beneficial health effect on the host. The inclusion of probiotics in microbiology courses is one of the many ways to balance the students' perceptions of the positive functions that microorganisms perform to promote human health. Students from 4 diverse classes were given a pretest to evaluate their knowledge of probiotics. The students who participated were enrolled in the following courses: 2 sections BIO 2924, a community college microbiology course with a majority of the students pursuing a health-related profession; 1 section of CHS 622, a graduate epidemiology course with a majority of students pursuing a MPH degree; 1 section of UNV 101, a general orientation course limited to first year university students. The total number of student participants was 54. The average score on the pretest was 44%. Following the probiotics presentation, the average score was 95%. Students from a variety of backgrounds demonstrated an enhanced knowledge of probiotics following presentation.

3:00 DO STUDENTS WHO EARN THE GRADE OF "A" IN A COMMUNITY COLLEGE MICROBIOLOGY COURSE HAVE DIFFERENT LEARNING STYLES FROM CLASSMATES WHO EARN LOWER GRADES?

Mary Lux, University of Southern Mississippi, Hattiesburg, MS 39406

In a limited study of community college students, differences in self-reported learning styles had little effect on the course outcome for students whom completed the microbiology course. The sixty-eight students who participated in the study were enrolled in Microbiology at the Forrest County Center of Pearl River Community College. The students completed a short survey, Learning Styles, developed by Colin Rose and available at www.chaminade.org/inspire.learnstl.htm. The test items were

designed to indicate a preference for learning style in three categories: visual, auditory, and kinesthetic/tactile. The high score for any category is 9. The mean scores for all students were visual, 4.18; auditory, 2.16; and kinesthetic/tactile, 2.68. The mean scores for students who earned a grade of A in the course ($n = 23$) were visual, 4.00; auditory, 2.26; and kinesthetic/tactile, 2.70. The mean scores for students who earned a grade of B or C in the course ($n = 42$) were visual, 4.24; auditory, 2.11; and kinesthetic/tactile, 2.88. The data suggest that 1) most successful students were visual learners, and 2) the visual learning style was not a differentiating factor among students who had an excellent, good, or average performance in the course.

3:15 MIDDLE SCHOOL SCIENCE TEACHERS' PERFORMANCE IN FIVE SCIENCE COURSES DESIGNED TO TEACH CONTENT

Meheri Fadavi*, and Abu Khan, Jackson State University, Jackson, MS 39217

Five science courses were offered to middle school science teachers from schools in central Mississippi. These courses were Physics & Astronomy, Geology, Biology, Meteorology and Chemistry. They were arranged through project MAST (Mississippi Academy of Science Teaching) at Jackson State University. Project MAST was funded by a grant from the Mississippi Department of Education (MDE). The content of these courses was designed with due attention to the requirements of middle school students' learning goals and objectives as defined by MDE. The strategy for delivering instruction was to teach the essentials of theory through activities. Materials used for these activities were chosen to be inexpensive and readily available. Modern technologies for measurements using sophisticated instrumentation were also introduced. The effectiveness of these courses was measured by comparing scores of a pre- and a post-test taken by the participants. Average pre-test scores in all subjects were less than 60%, with a minimum of 25% in Chemistry and a maximum of 59% in Biology. Comparisons were also made between pre- and post-test scores of all participants in all subjects taken together, for each subject separately, and for a subset of participants who have taken all of the topics offered. It was found that, on the average, participants' understanding of the content significantly improved ($p < .05$) after taking these courses. This was found to be the case for all courses taken together, for courses separately, and for participants who took all of the offered topics. Of special note is the fact that participants had difficulty with the mathematics necessary for success in the study of physics. The most improvement was observed in Geology, and the least in Physics & Astronomy.

3:30 TEACHER ENHANCEMENT PROGRAM, EMPHASIZING TECHNOLOGY INTEGRATION, FOR MIDDLE SCHOOL AND HIGH SCHOOL MATH

AND SCIENCE TEACHERS

Babu Patlolla^{1*}, Noland Boyd¹, Theophilus Danzy¹, Josephine Posey¹, Latronda Veals Gayton¹, Pamela Davis³, and Tracy Banks⁴, ¹Alcorn State University, Alcorn State, MS 39096, ²William Winans Middle School, Centerville, MS 39631, ³Alexander Junior High School, Brookhaven, MS 39601, and ⁴Warren Central Intermediate, Vicksburg, MS 39182

Alcorn State University hosted a four week workshop for twenty in service math and science teachers from the surrounding school districts from June 1-28, 2005. Another high school teacher was appointed as a 'Master teacher' to serve as a mentor instructor in the program. Activities included technology integration (using PDA, graphing calculator, and software), molecular biology techniques (DNA extraction, gel electrophoresis, and PCR), chemistry (atomic structure, measurements, and organic chemistry), and mathematics (algebra equations, conversions, and solving equations). Additionally participants took field trips to Gulf coast research lab and Aquarium in Biloxi, Natural Science Museum in Jackson and Mississippi Agricultural and Forestry Experimental Station at Crystal Springs. Two follow-up sessions will take place in the next academic year to discuss the implementation of the learned material at their local schools. Each participant was given a PDA, graphing calculator, 512 MB flash drive, and SD card to take back to their school and use in their teaching. Participants enjoyed the workshop and are excited to share their new knowledge with their colleagues and students. (This project was funded by Mississippi Institutions of Higher Learning through No Child Left Behind: Improving Teacher Quality Grant Professional Development Program # 2005-91E.)

3:45 MICROSOFT EXCEL SPREAD SHEET AS A GRADE BOOK

Mudlagiri Goli, Mississippi Valley State University, Itta Bena, MS 38941

The Grading is an essential part of teaching process. The teacher has no choice but has to do it. To accomplish that we need a recording mechanism that we call it as Grade Book. To get a better gauge on the student's performance, we put all the pertinent information in the grade book. For example, tests, quizzes, home works, assignments, class room participation, attendance to name few of those activities. There are two types of Grade Books that are still circulating on many campuses. The one is old style of hard copy of a book that the teacher can enter the information in and at the end of the semester he/she can manually tabulate all the information and give the grade. The other is computerized version, a spread sheet. It is very easy to use, not at all scary. The spread sheet reduces the tabulation time and minimizes the errors and is very slick and clean. If one has a banner system on the internet it is very easy to copy and paste the names of the students in the spread sheets too. Of course it is stored in the electronic form for many years to come. So it is very easy to search the past grade of a student if one demands for

it. This short talk is about versatility of Excel in tabulation and grading process.

ZOOLOGY AND ENTOMOLOGY

Chair: Elgenaid Hamadain, Jackson State University

Vice-chair: Julius Ikenga, Mississippi Valley State University

THURSDAY AFTERNOON

Meeting Room 7

1:00 FIRE ANT (SOLENOPSIS INVICTA) IMPACT ON DRAGONFLY EMERGENCE

Ryan E. Beatty* and Marty Harvill, Mississippi University for Women, Columbus, MS 39701

The impact of fire ants on terrestrial organisms such as birds, lizards, and other insects is well documented. However, there is little documentation of fire ant impact on aquatic and semi aquatic insects. In this study, six aluminum mesh containers (90 cm X 45 cm X 2.5 cm) were half submerged in a pond approximately 1 meter from the shoreline. Two containers were each connected to the shore with a piece of wood (2.5 cm X 2.5 cm X 150 cm). The second pair of containers, were also connected to shore with a piece of wood of equal size. Sucrose solution was applied to the wood and the container to serve as an attractant. The last two containers were not connected to the shore and served as controls. Thirty dragonfly larvae of various species were placed in each of the six containers. The study revealed that emerging dragonfly larvae in containers connected to the shore without an attractant had 50 % mortality, containers connected to the shore with an attractant had 80 % mortality, and the control containers had only 2 % mortality. Further research is needed to measure the impact of fire ants on other aquatic organisms.

1:20 EVALUATION OF ENTOPATHOGENIC FUNGUS, *BEAUVARIA BASSIANA*, AS A POSSIBLE BIOCONTROL AGENT OF TARNISH PLANT BUG, *LYGUS LINEOLARIS*

Ruby L. Mason^{1*}, Gerald Gipson², and Julius O. Ikenga¹, ¹Mississippi Valley State University, Itta Bena, MS 38941 and ²United States Department of Agriculture, Stoneville, MS 38776

Lygus lineolaris is a serious pest of cotton and other commercial crops. Declining crop yields, profits, and increasing resistance to pesticides necessitate exploring other pest control methods. This study evaluated the horizontal transmission of *Beauvaria bassiana*, to *L. lineolaris* and the relative pathogenic-

ity of two isolates (GHA and NI-1) of *B. bassiana* to *L. lineolaris*. Adults of *L. lineolaris* were exposed for one day, in groups of five, in capped, and cheesecloth-ventilated plastic cups containing either GHA or NI-1 and a sponge wetted with 10% honey water. Fungal isolates were introduced in the test cups using sporulated *L. lineolaris* cadavers. The control cups had no sporulated cadavers. Following the 24 hr. exposure to sporulated cadavers, all *L. lineolaris* were individually transferred, one per plastic cup described above. The LT 50 was 3.5 days for NI-1 and about 5 days for GHA. At day 10 post-exposure, mortality of *L. lineolaris* was 100% for NI-1, 95% for GHA, and 22% for the control. Bioassays of dead *L. lineolaris* revealed the presence of *B. bassiana* spores and varying degrees of sporulation. The NI-1 isolate was significantly more virulent than the GHA ($t=2.2622$, $cv=1.8331$, $df=9$). Further studies with other isolates of *B. bassiana* are recommended to determine the quickest and most virulent strain before undertaking a field application.

1:40 THE EFFECTS OF BODY MASS INDEX AND GENDER ON HORMONAL RESPONSES TO A SATIATING MEAL

Curtistine J. Deere^{1*}, Joan F. Carroll², Susan Franks², Julius O. Ikenga¹, Kathryn Kaiser², and James L. Caffrey²,¹Mississippi Valley State University, Itta Bena, MS 38941 and ²University of North Texas Health Science Center, Fort Worth, TX 76107

This pilot study was designed to elucidate the effects of body mass index (BMI) and gender on hormonal responses to a satiating meal. Two groups of female humans (obese and normal weight, NW) with known BMI and two groups of male humans (obese and NW) with known BMI were used in this study. Body mass of subjects and percent body fat were measured using bioelectrical impedance analysis. Fasting blood samples were collected and analyzed for plasma glucose, insulin, leptin, and ghrelin. Additional blood samples were also collected every 10 min for an hour following a satiating meal on a Slim fastTM. Plasma analysis was done using radioimmunoassay. Hormone and demographics data were respectively analyzed with a repeat measure ANOVA and a 2x2 ANOVA. P-values less than 0.05 were considered significant. Obese subjects showed a higher plasma leptin compared to NW subjects. Both gender ($p=0.05$) and BMI ($p=0.05$) had some influence on plasma leptin. A time X BMI effects on glucose ($p=0.015$) and insulin ($p=0.01$) were observed. No BMI or gender effects on ghrelin were observed. Overall, BMI rather than gender significantly influenced hormonal responses to a meal. Additional studies with young adults rather than middle-aged are recommended, as well as evaluating the effects of BMI and gender on gastrin, secretin, and cholecystokinin.

2:00 COMPARATIVE STUDY ON THE WATER QUALITY OF CHINA AND MISSISSIPPI, USA

Alex D. W. Acholonu, Michael Harris*, Tiffari Jenkins, Anthony Jones, and Ebony Jones, Alcorn State University, Alcorn State,

MS 39096

Water is used for many purposes hence, its quality deteriorates, causing serious concern in many nations including China and the USA. Water samples were collected from different locations in China, June 2005. They were tested with LaMotte water pollution detection kits. For China tap water samples, the parameters tested and the average readings were: alkalinity, 0.007 ppm; ammonia-nitrogen, 0 ppm; carbon dioxide, 13.7 ppm; chlorides, 49 ppm; chlorine, 0 ppm; copper, 0 ppm; dissolved oxygen, 201.3 ppm; fluoride, 0 ppm; hardness, 156 ppm; and iron, 0 ppm. For river water samples, the average readings were: alkalinity, 0 ppm; ammonia-nitrogen, 2.25 ppm; carbon dioxide, 24.9 ppm; chlorides, 45 ppm; chlorine, 0 ppm; copper, 0 ppm; dissolved oxygen, 156 ppm; fluoride, -0.15 ppm; hardness, 60 ppm; and iron, 0.485 ppm. For Mississippi tap water, the average readings were: alkalinity, 0 ppm; ammonia-nitrogen, 0.5 ppm; carbon dioxide, 21.5 ppm; chlorides, 9 ppm; chlorine, 0 ppm; copper, 0 ppm; dissolved oxygen, 150 ppm; fluoride, 0 ppm; hardness, 201.6 ppm; and iron, 0.125 ppm. For Mississippi River samples, the average readings were: alkalinity, 0 ppm; ammonia-nitrogen, 0 ppm; carbon dioxide, 5.5 ppm; chlorides, 60 ppm; chlorine, 0 ppm; copper, 0 ppm; dissolved oxygen, 135 ppm; fluoride, 0 ppm; hardness, 192 ppm; and iron, 0.375 ppm. Tap waters from China and from Alcorn State University in southwestern Mississippi satisfied the water quality standard with the exception of ammonia-nitrogen, dissolved oxygen, and hardness. Similarly, the river waters from China and the Mississippi River met the water quality standard for lotic bodies of water with the exception of ammonia-nitrogen, dissolved oxygen, and hardness, which exceeded the standard.

2:20 ANALYSIS AND DISCUSSION OF OUTBREAK OF LOVEBUGS, PLECIA NEARCTICA IN MISSISSIPPI: DID KATRINA AND RITA HAVE A ROLE

Elgenaid Hamadain* and R. Suseela Reddy, Jackson State University, Jackson, MS 39217

Plecia nearctica, the lovebug that motorists frequently encounter as a serious nuisance when traveling in southern states was first discovered by Hardy (1940) from Galveston, Texas. It was first described by Hardy (1940) from Galveston, Texas. These lovable little dipterans spend 5-7 months of their lives as larvae in the leaf litter. The adults emerge synchronously twice a year (April-May and September - October) and can form large swarms that cloud the air. They are invaders from Central America and have been working their way northward along the coast. They spread around the Gulf of Mexico through Texas and Louisiana to invade Florida and Mississippi. They are very widely distributed and they have been found in Costa Rica, Guatemala, Honduras, Mexico, and the southeastern U.S.A. in the states of Alabama, Florida, Georgia, Louisiana, Mississippi, South Carolina and Texas. This year, lovebugs have been reported unusually in high numbers. Jackson, MS, appears to

have been particularly hard hit. It may be that love bug numbers are higher than usual because of a wetter than average summer in many places. This year Hurricane Katrina and Rita dropped a large amount of rain across a vast area in the south which may have created a good environment for them and may have triggered a more synchronous than usual adult emergence. The insects are attracted to carbon dioxide and methane, thus car exhaust attracts them. They spread in large numbers and form swarms that can blur vision for drivers when they hit windshields. This presentation analyzes and discusses several environmental factors that may have contributed to the outbreak of lovebugs that took place in Mississippi, particularly in Jackson during October and November 2005.

2:40 Divisional Business Meeting

3:00 Divisional Poster Session – Exhibit Hall B

CARPENTER ANTS (FORMICIDAE: CAMPONOTUS) OF MISSISSIPPI

Joe A. MacGown, Richard L. Brown, and JoVonn Hill*, Mississippi State University, University, Mississippi State, MS 39762

Ants in the genus *Camponotus* are collectively known as carpenter ants because some species nest in wood and can be serious economic pests. Despite their large size and abundance, carpenter ants are difficult to identify, and their distributions in Mississippi have not been clearly delimited. The objectives of this study were to determine which species occur in the state, determine distributional patterns, and provide identification keys. From 2001 through 2005, the Mississippi Entomological Museum (MEM) conducted surveys of ants in Mississippi to provide baseline data on native species. Ants were collected by a variety of trapping and collecting methods, identified, and stored in the MEM. As a result of these surveys, 15 species of *Camponotus* in 5 subgenera are now known to occur in the state including *Camponotus americanus* (Mayr), *C. caryae* (Fitch), *C. castaneus* (Latreille), *C. chromaiodes* (Bolton), *C. decipiens* (Emery), *C. discolor* (Buckley), *C. floridanus* (Buckley), *C. impressus* (Roger), *C. mississippiensis* (Smith), *C. nearcticus* (Emery), *C. obliquus* (Smith), *C. pennsylvanicus* (DeGeer), *C. snellingi* (Bolton), *C. socius* (Roger), and *C. subbarbatus* (Emery, new state record). A list of Mississippi *Camponotus* species is being prepared with brief descriptions, information on biological and economic importance, distributional maps, identification keys, habitus photos, and diagnostic drawings.

Additional information is available on the MEM Formicidae of Alabama and Mississippi website at: <http://www.msstate.edu/org/mississippiantmuseum/Researchtaxapages/Formicidaehome.html>

A REVIEW OF SYMMOCINAE (LEPIDOPTERA: AUTOSTICHIDAE) IN NORTH AMERICA WITH THE DESCRIPTION OF A NEW SPECIES AND NEW GENUS

Sangmi Lee* and Richard L. Brown, Mississippi State University, Mississippi State, MS 39762

The moth subfamily Symmocinae (Gelechioidea: Autostichidae) includes 170 species in 42 genera, with greatest diversity in xeric areas of the Palearctic Region. Three species have been reported from North America: *Sceptea aequapulvella*, *Oegoconia quadripuncta*, and *Symmoca signatella*. A new genus and new species of Symmocinae are reported from Alabama, Kansas, Louisiana, and Mississippi. Fifty-one specimens (47 males, 4 females) have been collected in prairies, cedar glades, old fields, and a variety of dry forests. The new genus is defined by apomorphies of 1) metatibia with group of spines on dorsal basal surface, 2) metatibia with scales clustered in groups, 3) male antenna with truncate scales, and 4) male valva lacking saccular or costal projections, 5) metascutum transverse with width greater than length. The imago, wing venation, male and female genitalia and distribution of the new genus and new species are figured.

REDISCOVERY OF A LOST SPECIES, *ARGYRIA RUFISIGNELLA* (LEPIDOPTERA: CRAMBIDAE), IN BIBB COUNTY GLADES PRESERVE, ALABAMA

Edda Martinez* and Richard L. Brown, Mississippi State University, Mississippi State, MS 39762

Argyria Hübner (Lepidoptera: Crambidae) includes six species of moths in southeastern United States, however *A. rufisignella* (Zeller) is known from only four specimens collected in Texas and North Carolina more than 80 years ago. A series of specimens of *A. rufisignella* was recently collected at Bibb County Glades Preserve, Alabama, which has been termed a "Botanical Lost World" because of its unique flora. The first photograph of the adult and first description and illustrations of male and female genitalia of *A. rufisignella* are provided. An identification key is given for species of *Argyria* and the superficially similar *Urola nivalis* (Drury).

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