LOUISIANA SCIENTIST

THE

NEWSLETTER

of the

LOUISIANA ACADEMY OF SCIENCES

Published by
THE LOUISIANA ACADEMY OF SCIENCES

15 June 2012

Louisiana Academy of Sciences
Abstracts of Presentations
2007 Annual Meeting

Southern University and A&M College
Baton Rouge, Louisiana
16 March 2007

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The following abstracts of oral and poster presentations represent those received by the Abstract Editor. Authors' affiliations are abbreviated as follows:

ACHRI	Arkansas Children's Hospital Research Institute
ARS	Agriculture Research Services, Little Rock, AR
AVMA-PLIT	American Veterinary Medical
BGSU	Bowling Green State University
BNL	Brookhaven National Laboratory, Upton, NY
BRCC	Baton Rouge Community College
CC	Centenary College
CIT	California Institute of Technology
CL	Corrigan Laboratory, Baton Rouge, LA
CTF	Cora Texas Manufacturing
CU	Clemson University
DNIRI	Delta Nutrition Intervention Research Initiative, Little Rock, AR
EU	Ege University, Turkey
FSU	Florida State University
GCSU	Georgia College and State University
GSU	Grambling State University
HU	Harvard University
HU-SCA	Harvard University-Smithsonian Center for Astrophysics
LDFW	Louisiana Department of Fish and Wildlife
LSU-A	Louisiana State University, Alexandria
LSU-BR	Louisiana State University, Baton Rouge
LSU-CC	Louisiana State University-Climate Center
LSU-E	Louisiana State University, Eunice
LSUHSC-NO	Louisiana State University Health Sciences Center, New Orleans
LSUHSC-S	Louisiana State University Health Sciences Center, Shreveport
LSU-S	Louisiana State University, Shreveport
LTU	Louisiana Tech University
LU-NO	Loyola University, New Orleans
McSU	McNeese State University
NCC	Northwest Community College, Southaven, MS
NGCSU	North Georgia College and State University
NiSU	Nicholls State University
NSU	Northwestern State University
OLHCC	Our Lady of Holy Cross College
SIUC	Southern Illinois University, Carbondale, IL
SLEH	St. Luke's Episcopal Hospital, Houston, TX
SLU	Southeastern Louisiana University
SPA	Southern Plains Area, Little Rock, AR
SU-BR	Southern University, Baton Rouge
SU-NO	Southern University, New Orleans
SUSLA	Southern University at Shreveport, LA
UC-I	University of California, Irvine

UE	University of Evansville
UFS	University of Free State, South Africa
UH	University of Houston
ULL	University of Louisiana, Lafayette
ULM	University of Louisiana, Monroe
UNO	University of New Orleans
UPR	University of Puerto Rico
USDA	U.S. Department of Agriculture
USFWS	U.S. Fish and Wildlife Service
USUHS	Uniformed Services University of the Health Sciences, Bethesda, MD
UT-A	University of Texas, Austin
UT-B	University of Texas, Brownsville
WAFB-TV	Baton Rouge Television Station
XU	Xavier University

Division of Agriculture, Forestry and Wildlife

Abdollahi, K.K. and Z.H. Ning. SU-BR. **Pre and post hurricane Katrina assessment for the urban forest structure of Gulfport Mississippi**.—Urban forest ecosystems of the Gulf Coastal areas are under severe threats from rapid urban sprawl, climate change, and extreme events. However, very few assessments have been conducted on the urban forest ecosystems in the Gulf Coastal region of the United States. The main objective of this collaborative research among Southern University, USDA-FS, NASA and the Gulf Coast Chamber of Commerce was to provide an urban forest assessment for the city of Gulfport Mississippi. Two sets of fifteen tiles each covering approximately 0.58 square miles were randomly selected from the 2001 and 2005 high resolution aerial photographs. A Principal Component Analysis (PCA) technique was performed on each set of the fifteen tiles to group like pixels into approximately 50 plus classes. A supervised classification technique was used to group the 50 plus classes into the following 7 classes of interest: healthy oak trees, declining oaks, other trees, grass, water, inert/shadow, and beach. The original imagery tiles, PCA classes and the supervised classification plots were georeferenced and formatted to for ESRI ArcView GIS. The results are presented in this paper.

Anderson, L.L. LSU-BR. **Assessment of *Thelypteris palustris*, *Asparagus sprengeri*, and *Lolium perenne* for their potential in the phytoremediation of arsenic-contaminated soils**.— Greenhouse studies were conducted to evaluate the potential of *Thelypteris palustris* (marsh fern), *Asparagus sprengeri* (asparagus fern), and *Lolium perenne* (perennial ryegrass) for use in the phytoremediation of arsenic contaminated soils. The results of the studies indicate that the marsh fern, the asparagus fern, and ryegrass all uptake arsenic. Bioaccumulation factors of all plants except ryegrass are greater than one, indicating that they are hyperaccumulators of arsenic. The bioaccumulation factors of marsh fern were found to be in the range of the bioaccumulation factors of the known hyperaccumulator, *Pteris vittata*. During arsenic exposure, plants exhibited arsenic toxicity in the form of necrosis or vascular system degradation. The marsh fern would be suitable for phytoremediation of areas contaminated with low arsenic concentrations because of its high bioaccumulation factors (>10). Ryegrass and asparagus fern may have potential applications in phytostabilization instead of phytoextraction because their bioaccumulation factors were <10.

Antoine, A. UNO. G. Eggleston. USDA. A. Monge. CTM. **Characteristics of technological sugar samples formed from sugarcane subjected to different climates**.—It is of great importance for the sugarcane industry to minimize expensive sugar losses. Losses can be minimized through understanding the effects of different environmental conditions on sugar samples. The characteristics of technological sugar samples across the boiler station can serve as good indicators of sugarcane deterioration. Extreme weather conditions play a vital part in the deterioration of cane because it creates an environment for the production of high levels of polysaccharide by bacteria, such as dextran from *Leuconostoc* bacteria, which aids in the loss of recoverable sucrose and causes processing problems in the factory. Such characteristics as crystal elongation, °Brix (%-dissolved solids), thermal conductivity and resistivity, and the amount of dextran (measured by an Antibody Rapid Dextran Test) can reveal minimal and maximal deterioration in sugar samples. This paper illustrates and discusses the characteristics of

various technological sugar samples from a Louisiana factory boiler station formed from sugarcane subjected to different environmental climates.

Carson, L.A. and Z.H. Ning. SU-BR. **Biodiversity in a changing environment**.—This paper discusses the various types of biodiversity and factors affecting biodiversity, such as climate change and wild fires. The paper also examines the benefits of promoting biodiversity from a social, economic, and environmental viewpoint. The paper explores some strategies that can be used to increase biodiversity and explore the issues that are unique to the Gulf Coast region.

Coldiron, L., A. Womack, B.M. Joubert and S.W. Gabrey. NSU. **Intestinal flora of *Alligator mississippiensis* in Louisiana.**—*Alligator mississippiensis* is of importance to the ecosystem and economy of Louisiana and the entire Gulf Coast. Due to the frequent contact of alligators and man, it is important to understand the intestinal flora of the alligators. All of these microbes circulate between the alligator gastrointestinal tract and the waterways used by man for recreation, food and commerce. It is important to understand which microbes represent the normal flora of wild-caught alligators so that appropriate measure can be taken to protect humans from infection with microbes such as *Salmonella* species acquired from alligator materials. A first step in determining the roles of such bacteria in wildlife populations and in individual animals is identification of the microbes. The focus of this report is the documentation of the bacterial intestinal flora of wild-caught alligators and farm-raised alligators. Intestine sections were collected from 32 alligators captured in September of 2004 and from 31 alligators sacrificed on a farm in January of 2006. Information regarding the sex, length, and diet of each alligator was recorded along with the bacterial genera. Bacterial genera isolated from these farm-raised alligators are discussed and compared with those isolated from wild-caught alligators.

Ferchaud, V.A., Y. Qi and J.I. McNitt. SU-BR. **Comparative wood anatomy of selected southern broadleaf trees using cryo-microtechnique and microscope imaging systems**.— There is little information available on systematic comparison of wood anatomy of major southern broadleaf trees. Such comparisons require using the same method for trees of the same age and growing in the same environmental conditions. This study applied a new cryostat micro-imaging technique in comparative wood anatomy of ten southern broadleaf tree species including *Magnolia grandiflora* L., *Ulmus Americana* L., *Platanus occidentalis* L., *Quercus falcate var. pagodifolia*, *Quercus acutissima*, *Quercus shumardii*, *Quercus virginiana* Mill., *Quercus falcate* Michx., *Quercus nigra* L., and *Quercus phellos* L. All tree species used were located on Southern University's campus in Baton Rouge, Louisiana. Comparisons were made of wood texture, pith type, vessel arrangement, ray type, annual growth band width, and phloem rays. Southern magnolia and American sycamore had diffuse-porous wood and irregular shaped piths while American elm displayed ring-porous wood and circular-shaped pith. All the oak species have star-shaped pith and the wood is ring porous. By using this technique, anatomical characteristics of tree species in relation to growth and development can be studied in detail. This information will be useful to natural resource professionals, land-use planners, policy makers and private citizens in tree species selection, ecological management and natural resource education.

Gavion Jr., M.J. SU-BR. **A comparison of rates of photosynthesis of trees under stress and trees without stress**.—The study of chlorophyll fluorescence can tell the extent to which

Photosystem II (PSII), which is a multi-subunit complex embedded in the thylakoid membrane of higher plants, algae and cyanobacteria, is using the energy absorbed by chlorophyll and the extent to which it is being damaged. Light energy absorbed by chlorophyll molecules in a leaf can undergo one of three fates: it can be used to drive photosynthesis (photo-chemistry), excess energy can be dissipated as heat, or it can be re-emitted as light—chlorophyll fluorescence. Fluorescence gives insights into the ability of a plant to tolerate environmental stresses and into the extent to which those stresses have damaged the photosynthetic apparatus. Trees in urban areas undergo a lot of stress. This research will attempt to explore the effects of stress on the process of photosynthesis in urban trees. This will be done by comparing the rates of photosynthesis between trees under stress and those without stress. The results of this research will provide important information about trees that thrive in stressful environments and therefore will be recommended for urban areas. Several species will be used in study.

Jariel, D.M., M.A. Mansfield and M.F. Vidrine. LSU-E. **Organic matter in remnant and restored Cajun prairies**.—Soil organic matter (OM) or humus contains humic and fulvic acids, and binds with iron (Fe), manganese (Mn), zinc (Zn) and copper (Cu). The decomposed tissues are converted into small molecules (monomers) that further undergo a series of humification (polymerization) processes forming large molecules of humic and fulvic acids. Two restored prairies at Louisiana State University at Eunice (LSUE) campus (burned and mowed every January) and city of Eunice (burned every January), and two remnant prairies (under 'natural' management practices) at Frey and Estherwood communities were used in this study. Soil samples from each prairie were taken in July 2005, November 2005 and March 2006. We hypothesized that OM, humic and fulvic acids, Fe, Mn, Zn and Cu from OM extracts were higher in remnant prairies than in restored prairies. Humic and fulvic acids were statistically similar in remnant and restored prairies. However, OM was significantly higher in remnant than in restored prairies. Iron and manganese were significantly higher in restored than in remnant prairies. This suggests that the annual management practices in restored prairies had faster rates of OM mineralization that generated greater Fe and Mn concentrations in the soil, compared with the 'natural' management practices in remnant prairies.

Johnson, R., B. Delany and C. Lemieux. McSU. **Observed effects in the West Bay management area of the black turpentine beetle on slash pine**.—The Louisiana timber industry relies on the availability of harvestable trees (Smith and Lee, 1972). Timber lost to natural causes reduces the landowner's earnings. In areas affected by Hurricanes Katrina and Rita, the black turpentine beetle (*Dendroctonus terebrans*) killed loblolly (*Pinus taeda*) and slash pine (*P. elliotti*) trees (Alquist, 2005). The beetle girdles the cambium layer of pines that are weakened by wind or drought (Alquist, 2005). This study estimated post-Hurricane Rita beetle damage on a 134-acre tract at 157 trees per acre on the West Bay WMA, Louisiana. Timber loss was estimated by identifying, mapping, and calculating the board footage of infested trees on 10 randomly selected plots. There were 59 infested trees that averaged 17.0 board feet per tree. The total loss estimate was 295 trees, which totaled to 5,009 board feet with a value of $1,750 (LSU AgCenter, 2006). The estimated timber loss was compared to the historical beetle losses is substantial but not alarming. Further research should be implemented to gather additional information on timber losses that resulted from the consequential infestation of the black turpentine beetle in hurricane affected timber stands.

Legiandenyi, T.N. and K.K. Abdollahi. SU-BR. **A comparison of carbon dioxide flux from urban tree forest soils**.—Recently there has been an increase in the "greenhouse gases", carbon dioxide (CO_2), methane (CH_4), and nitrous oxide (NO_2) in the Earth's atmosphere. CO_2 contributes 60% of global warming. Soil respiration contributes 20% of the total emission of CO_2 to the atmosphere. There is a need for scientists to focus their attention on soil as a major source and sink for atmospheric CO_2. In this study, the LI-8100 Automated Soil CO_2 Flux System was used to evaluate net soil CO_2 flux on randomly selected trees on Southern University tree farm. A comparison of carbon flux in urban tree soils with mulching, and that without mulching was done. Ambient soil temperature and moisture are the other variables that were measured. Soil CO_2 fluxes are a major component of the global carbon budget. As part of photosynthesis, plants absorb carbon dioxide from the atmosphere; store the carbon as sugar, starch and cellulose, while oxygen is released back into the atmosphere (Rustad et al., 2000). This research will provide substantial benchmark data for scientists to use in evaluating variations of soil CO_2 flux in an urban ecosystem.

Moreman, D. SU-BR. **Dead zone theory, a correlational illusion killed by its own data**.—A high correlation r between two quantities can hide the existence of a multi-part reality in which parts, the correlation of those quantities is zero or even opposite in sign to r. We illustrate the perils of this fact by examining a long assumed connection in an environmental science. It was natural to assume that the size S of the summertime "dead zone" on the continental shelf of Louisiana was controlled and predictable by the amount N of organic nitrogen coming down the Mississippi River in springtime. Using data published in 2003 in support of that assumption, which I call the Theory of Springtime Nitrogen, I show the theory to be probably false. The connection of S to N, to the extent that it exists at all, seems probably based on a two-part mechanism. Each part alone has a low correlation of S to N but in all the data together there is a correlation of S to N high enough to have led to a prevailing certainty. Correcting this wrong theory of nitrogen, if it is indeed wrong, might alter pressures on aspects of national agricultural policy.

Ning, Z.H. and K.K. Abdollahi. SU-BR. **Post hurricane damage assessment and restoration in New Orleans: From an urban forestry point of view**.—New Orleans, a city with a rich culture and history, suffered catastrophic damages from Hurricane Katrina, from loss of lives and destruction of property to city infrastructure collapse and environmental contaminations. Trees and urban forests are among the victims that are often overlooked. This paper emphasizes the importance of the urban forests in New Orleans, damage assessment, and restoration strategies. This paper also discusses opportunities for the urban forestry professionals to assist affected communities.

Orban, J.I. SUSLA. **Space biology: Quail embryos from space**.—Space biology: Quail embryos from space biology studies have been enhanced by advancement in aeronautic technology leading to the development experimental laboratory in the orbital space station. The effect of microgravity on avian embryogenesis is being studied by several teams of scientists around the world. Among the host of life support systems being studied in space station laboratory is the Japanese quail. It is being studied for development as a biological space bird for research and possible food supplement during prolonged missions in space. Calcium, which is

required for bone formation and other physiological functions, has been a major problem for space crew involved in space research exploration. The problem is often related to negative calcium balance resulting in bone loss. In birds, the newly hatched chick derives 80-82% of its calcium from the eggshell during incubation. However, it was questionable whether quail embryos incubated in space under microgravity will assimilate calcium from the eggshell in a similar way as quail embryos incubated on earth. The objective of the study being reported was to evaluate calcium assimilation from the eggshell by quail embryos incubated in space under microgravity and compare results with quail embryos incubated on earth. Forty-eight fertile Japanese quail eggs were incubated in space and forty-eight quail eggs were incubated on earth at the same time period for 16 days. Eggshells from both groups were evaluated for calcium content to assess calcium assimilation. Results of the study showed that calcium assimilation from eggshell by quail embryos incubated in space was impaired by 12.6% when compared to quail embryos incubated on earth. However, nearly 60% of the embryos incubated in space developed to expected stage of embryonic development. The project was supported by NASA (NAG 2-1001).

Poole, A.G. SU-BR. S.M. Shane and M.T. Kearney. LSU-BR. D.A. McConnell. AVMA-PLIT. **Occupational hazards in large animal practices**.—Based on combined data from the Bureau of Labor Statistics, the National Council on Compensation Insurance, and private companies, researchers estimate that job-related injuries and illnesses cost the Nation over $171 billion annually in 1992. This value exceeds the losses associated with Alzheimer's disease ($67 billion), or AIDS ($30 billion) and at least as much as cardiovascular disease ($164 billion) or cancer ($170 billion). Before interventional strategies can be implemented, additional information is needed. The goals of this study were to determine the prevalence of accidents within the categories of practice and ascertain specific injuries within employment categories found in practice categories. Food animal and equine animal practices reported needle puncture injuries as the most common followed by kicking and crushing injuries; slips, trips and falls. Veterinarians experienced the majority of total incidents followed by lay assistants, owners of animals and helpers. Supported by the AVMA PLIT.

Preuett, J.A. and F.L. Namwamba. SU-BR. **Rural-urban interface GIS study of the city of Central, Louisiana**.—The city of Central, Louisiana is currently undergoing historical changes with the development of Louisiana's newest city and creation of a new school district officially starting July 1, 2007. The study of the area examines change in forested areas, recreational land, agricultural areas, and analyzes urban forest land changes in the context of the rich, limited history of the Central area. This research study explores the history, current and future development changes, and implications of urban forests within the context of a rural-urban interface within the city of Central. The methodology was implemented by the building of a GIS database, coupled with spatial analysis. Through this project, a comprehensive understanding of the concept of urban planning was revealed, incorporating urban recreational area, hydrology, land use changes, and possible future projections as integral components of an urban green infrastructure.

Schaffer, C., F. Namwamba and D. Collins. SU-BR. **GIS application in tree health assessment in post-Katrina urban areas**.—Hurricanes impact tree ecology in urban and

suburban areas. This occurrence affects the habitats of wildlife and it creates problems globally. Recent disasters have strongly affected urban tree health in Louisiana urban areas. GIS applications in plant pathology focus mainly on agricultural practices in rural areas. This study is innovative in examining the application of GIS, GPS, remote sensing and other spatial technologies to carry out plant pathology studies in post-hurricane urban and suburban tree stands. The goal is to use spatial analysis to focus on areas of high risk so that traditional and contemporary strategies for disease management can be most effectively applied. Some tree damage may have resulted from direct effects by air and water pollution but the most interesting is plant disease. GIS and GPS are useful for individual tree cataloguing and spatial analysis of tree stands. GPS technologies allow scientists to detail tree damage in databases, evaluate patterns, and suggest mitigation strategies. Results from this study will be useful for future applications relating to plant bio-security. This research document will provide examples, and chart a way forward for future applications of spatial technologies in post-hurricane plant pathology studies.

Wallace, J. SU-BR. **The adverse affects of urban sprawl on the wildlife habitat of the squirrel**.—Land use choices strongly affect human and animal health. More or less direct effects on air and water pollution are well recognized, but other less direct but important impacts have only recently begun to reach public attention. "Urban sprawl" is defined as development of low-population-density settlements around high-density cities, either by emigration from the core cities or by influx of new residents from elsewhere. Urban sprawl can simply be defined as the unplanned, uncontrolled spreading of urban development into areas neighboring the border of a city. Urban development is an ongoing event many industries participate in, though, not realizing the impact building infrastructures' have on the environment. Not only does this occurrence affect the habitats of wildlife, it also creates problems globally. Higher energy use is required because of the increasing demands for transportation due to population increase and heating and cooling systems in homes. This research is an attempt to determine whether or not the building of infrastructures cause more squirrel related accidents and how well they adapt to urbanized areas.

Zaunbrecher, D.J., M.E. Merchant, T.S. Shields, and F.M. LeMeiux. McSU. **The effect of American alligator (*Alligator mississippiensis*) serum on growth performance of broilers**.— Antibiotic use in the food animal industry is a major concern for producers and consumers. Therapeutic and sub-therapeutic use of antibiotics in animal feed is a common practice in feeding farm animals. Sub-therapeutic use in farm production animal diets has been a common practice since 1946 when the addition of sub-therapeutic levels of antimicrobials was found to enhance growth in poultry (Moore et al., 1946). Today, consumers are concerned of the potential of bacteria resistance to these antibiotics. If a cost efficient antimicrobial substitute for these traditional antibiotics can be found producers and consumers will benefit. Alligator serum has exhibited antimicrobial properties in vitro (Merchant et al., 2003, 2004, 2005). Compton et al. (2006) fed weanling pigs diets supplemented with 0.5% alligator serum (AS). Pigs fed diets containing (AS) had increased ($P < 0.05$) ADG and ADFI from d 0-7 post weaning. The poultry industry faces the same issues as the swine industry in relation to antibiotic usage. The objective of the project is to feed broiler chicks, alligator serum to assess its effectiveness on growth and efficiency during the growing phase compared to traditional antibiotics.

Division of Biological Sciences

Botany Section

Bodri, M. NGCSU. L.A. Chance. NSU. **Pitcher plant bog research and restoration in west-central Louisiana**.—A project to halt the degradation and rapid decline of pitcher plant bogs in west-central Louisiana was begun in 2005. The primary objective of this study was to determine if bog restoration can be achieved by erosion control, species propagation, and reintroduction of acid bog species aimed at preserving high quality bog plant habitat. Five sites with varying topography chosen in the Kisatchie National Forest in Natchitoches Parish were impacted by recreational traffic, fire lanes, and herbicide from private property, understory encroachment and past timber cutting activity. Hay from donor bogs was spread over bare ground and sandy fill dirt placed in deep ATV and skidder ruts for erosion correction. Bog species obtained from high quality donor bogs were grown in a greenhouse and then transplanted onto bare areas. Different erosion controls were implemented on the varying terrain to test soil retention. Preliminary data indicate all restoration sites have high quality potential. Although re-vegetation is occurring, attempts failed to close some bogs to vehicular traffic allowing them to recover naturally. More study is needed to develop better management techniques to preserve this unique, small Louisiana wetland.

Sasek, T.W. and D.E. Bell. ULM. **Mass seed production of native Louisiana wildflowers for roadside beautification and conservation**.—A seed bank of native Louisiana wildflower species is being developed through funding from the Louisiana Department of Transportation and Development supported by the Federal Highway Administration. Three universities – Southeastern Louisiana University, the University of Louisiana at Lafayette, and the University of Louisiana at Monroe – are responsible for identifying species in their regions suitable for beautification of roadsides, scenic byways, and welcome centers. Wild collected seeds are being collected for seed increase plots and subsequent mass production. In north Louisiana, ULM has identified about 40 candidate species desirable for beautification projects and potentially suitable for mass production. This includes a variety of annuals and perennials appropriate for mass planting and in various combinations for extended blooming displays. In 2006, we determined germination rates and stratification requirements of wild collected seeds. Results from a small test plot were used to design a 1-hectare seed increase plot planned for 2007. This includes the costs and benefits of using weed barrier and drip irrigation to increase seed yield.

Environmental Sciences Section

Anderson, L.L. LSU-BR. **Phytoremediation of arsenic contaminated soils**.—Greenhouse studies were conducted to evaluate the potential of *Thelypteris palustris* (marsh fern), *Asparagus sprengeri* (asparagus fern), and *Lolium perenne* (perennial ryegrass) for use in the phytoremediation of arsenic contaminated soils. The results of the studies indicate that the marsh fern, the asparagus fern, and ryegrass all uptake arsenic. Bioaccumulation factors of all plants except ryegrass are greater than one, indicating that they are hyperaccumulators of arsenic. The bioaccumulation factors of marsh fern were found to be in the range of the bioaccumulation

factors of the known hyperaccumulator, *Pteris vittata*. During arsenic exposure, plants exhibited arsenic toxicity in the form of necrosis or vascular system degradation. The marsh fern would be suitable for phytoremediation of areas contaminated with low arsenic concentrations because of its high bioaccumulation factors (>10). Ryegrass and asparagus fern may have potential applications in phytostabilization instead of phytoextraction because their bioaccumulation factors were <10.

Cibilic, M. and K.E.B. Law. OLHCC. **Similar levels of biodiversity are shown in soil-dwelling invertebrates between habitats flooded during Hurricane Katrina and unaffected habitats**.—During Hurricane Katrina on August 29, 2005, strong winds and heavy rainfall moved over the city of New Orleans, Louisiana. The greatest damage was done the next day when several floodwalls on drainage canals broke and poured water from Lake Pontchartrain into the city. This study was conducted to compare levels of biodiversity between two different habitats within New Orleans after the storm: Our Lady of Holy Cross College (OLHCC), which had no flooding, and New Orleans City Park, which had significant flooding. Soil samples were collected from both habitats with repeated measures and invertebrates extracted by using the Berlese funnel technique. The Shannon-Wiener index was used to estimate species diversity. Rank-Abundance curves were applied to compare species richness and species evenness in both communities. The results of the Shannon-Wiener indices demonstrate non-significant differences (student t-test p>0.05) between the two habitats. Rank-Abundance curves show similar levels of species richness and evenness between the two habitats. The low levels of biodiversity that were expected by many after Hurricane Katrina in areas that sustained high levels of flooding have not been supported through this study. These data illustrate the need for further investigation into how disturbance can affect biodiversity. Supported by Our Lady of Holy Cross College.

Comeaux, J.L. McSU. **Distribution of *Cicindela dorsalis venusta* on Louisiana beaches**.—*Cicindela dorsalis venusta* (Coleoptera: Cicindelidae)is an obligate inhabitant of marine beaches of the western Gulf of Mexico. Larvae reside in burrows in the upper intertidal zone, while adults are active on moist sand near the surf line. Adults are very mobile opportunistic predators, while larvae are ambush predators that seize prey passing within reach of their burrows. Normal distributions appear to be related to both salinity and substrate granularity. The presence of this organism is indicative of a pristine beach ecosystem. Historical data from museum voucher specimens indicated the presence of five disjunct populations in Cameron, Jefferson, Plaquemines, Orleans, and St. Bernard Parishes. Satellite imagery was used to identify additional potential habitats, and all known and potential habitats were surveyed for extant populations. Several new populations were discovered in Terrebonne and Lafourche Parishes. A seven-year study indicates that all populations are apparently declining in both size and range. A variety of causes are implicated, all of which result in habitat degradation. These causes include vehicular activity, coastal erosion, and shoreline development. Recent hurricane activity seems to have accelerated these declines, and current investigations to quantify their effects are underway.

Crockett, A. and Z.H. Ning. SU-BR. **Global warming and climate change**.—Global warming can occur from a variety of causes, both natural and human induced. The term "global warming" often refers to the warming that can occur as a result of increased emissions of greenhouse gases from human activities. These gases, in the form of carbon dioxide (CO_2), methane (CH_4), nitrous

oxide (N_2O), and fluorinated gases, trap heat inside our atmosphere. There are many elements that are sensitive to the effects of climate change and global warming. Our health, agriculture, ecosystems, and coastal areas are all climate-sensitive elements. Coastal zones are especially vulnerable to climate change and variation. This paper discusses key areas of concern such as sea level rise, land loss, changes in frequency of storms and flooding, responses to sea level rise and implications for water resources. This paper also explores the strategies to reduce the effects of climate change and global warming on the environment.

Grymes, J. LSU-CC/WAFB-TV. **Hurricane activity and the Bayou State: Assessing the historical record**.—Recent increases in tropical activity, highlighted by the 2005's tropical catastrophes of Katrina and Rita, prompt an obvious question: "Are these extreme events evidence of a 'new norm' of tropical threats to Louisiana?" In terms of landfalls in the Bayou State, 2001-2005 proves to be among the most active five-year periods in recorded history. In addition, several recent scientific investigations suggest that hurricane activity in the Atlantic basin is being enhanced by man-induced global warming, adding to the complexity of a clear answer. However, many have underestimated the long-term, historical frequency of landfall threats for Louisiana, especially compared against other states. This presentation reviews the long-term historical record of tropical weather activity in the Atlantic, the Gulf of Mexico and Louisiana, and addresses the recent debate regarding explanations for the above-normal run of tropical weather since the mid 1990s.

Ingram, T.E. SU-BR. **The effects of eutrophication using crayfish waste as a soil amendment for production of vegetable crops**.—Louisiana leads the nation in producing crayfish, crab, and shrimp. However, none of Louisiana's industrial plants currently transform the millions of pounds of aquatic waste into useful products. Only 15% of the crayfish waste meal is consumed, while the rest is dumped in bayous, rivers, ponds and swamps, resulting in adverse effects to the environment. A study was conducted to evaluate crayfish waste meal as a soil amendment to grow vegetable crops. The study was conducted in a greenhouse setting in one gallon pots with 1:1 soil and sugarcane bags. Mustard greens were planted and were harvested after 70 days. The experimental design was a randomized complete block design with composting days 0, 15, 30, and 45, respectively, as the main treatments and crayfish waste meal levels (0, 36, 72, 107, 143 mt/ha) as sub-treatments and four replications. Leachates from pots were collected for chemical analysis (pH, nitrogen, phosphorus and heavy metals). Germination was almost 100% in all plots except in those treatments that were of 0 composting days. The composted treatments, especially in the 30 and 45 composting days with 107 and 143 mt/ha of crayfish waste levels, germination was excellent and the highest yields were obtained. Therefore, the application of crayfish waste meal should be limited to 72 mt/ha with a 15 day composting period before planting vegetable crops. Crayfish waste meal not only added nutrients to the soil but it also raised the soil pH. Field studies to replicate this greenhouse study are in progress.

Kinney, C., T. Sylvester, M. Paulissen, M. Merchant and G. Ramelow. McSU. **Preliminary analysis of metals in the tissues of Mediterranean geckos from southwestern Louisiana**.— The Mediterranean gecko is an invasive, ubiquitous species in the southern United States. Because these reptiles often inhabit industrialized areas, we measured the concentrations of eight metals in gecko tissues collected in Calcasieu Parish (which is heavily industrialized), and in

Beauregard Parish (which is rural). Geckos were measured and weighed to estimate body condition, and then a section of each lizard's tail was collected for analysis. Tissues were analyzed for Pb, Cu, Zn, Cd, Cr, Fe, Mn, and Ni content using inductively coupled plasma. There were no significant correlations between metals concentrations and gecko body condition. However, females from a site in Westlake had significantly greater concentrations of Zn, Fe, and Cu than did females from a site in Moss Bluff about 10 km away (both in Calcasieu Parish); there were no significant differences between males from these two sites. Females at each site had higher concentrations of all eight metals than males from the site (except for Zn at Moss Bluff), with the differences reaching the levels of statistical significance for Cu, Cd, Cr, and Ni at the Westlake site. These results suggest that there are sex-based differences in metal accumulation in this species.

Mitchell, M., F. Ohene and A. Reed. GSU. **Photochemical oxidation of pyrene in water: Aqueous solutions of oxygenated solvent and micellar solutions**.—Kinetics and transient absorption spectra of pyrene(BaP) have been studied in water, oxygenated solvent (H_2O_2) and in Dodecyltrimethylammonium bromide (DTAB) micellar solutions by ultraviolet (UV) irradiation. High Performance Liquid Chromatography (HPLC) was used to determine transient photolysis products of the initial photochemical oxidation. The transient species, 1-hydroxypyrene, initially formed, was found to undergo further photochemical oxidation to produce 1,6- and 1,8-pyrenequinones. Photolysis rate constants were determined by direct measurements of the UV absorption at 334.5 nm. Pyrene photolysis quantum yields decreased by a factor of approximately two in the micellar media relative to the quantum yields determined in water. The enhanced effect of hydrogen peroxide, H_2O_2, on the photolysis rate is proposed to catalyze enhanced photolytic formation of reactive hydroxyl radicals that attack the pyrene nucleus.

Munoz, H., D. Moreman, S. Bai and N. Gwee. SU-BR. **A generalized hypoxia model for the Gulf Coast of Mexico**.—This work presents a generalized solution for the hypoxia model for the Gulf Coast of Mexico, which depends on time variable and extends a steady state solution provided by the mathematical model. The effects of nutrient loading from the Mississippi River basin on hypoxia in the northern Gulf of Mexico have been examined by using a novel application of a dissolved oxygen model for a river with a steady state solution. Our model is based on the Streeter-Phelps model, which is extensively used to simulate oxygen concentrations in rivers and estuaries, and its non-steady state solutions are studied in the classical theory of evolution equations on a Banach space.

O'Neal, P., J.M. Wakeman and G.J. Michalak. LTU. **Acute toxicity of nanoparticles to aquatic organisms**.—In recent years, there has been a dramatic increase in the use of nanoparticles (materials less than 100 nm in diameter) for industrial and medical purposes. Certain nanoparticles are resistant to degradation, tending to accumulate in aquatic environments where they can remain suspended in the water column for long periods. Some of these nanoparticles are able to penetrate cells and tissues and cause biochemical damage to aquatic organisms. We used EPA-approved biomonitoring protocols to determine the toxicity of various nanoparticles to aquatic organisms. The nanoparticles selected for this preliminary study included silica, gold, zinc, copper, and titanium. Acute toxicity tests were conducted using water fleas (*Daphnia pulex*) and larval fathead minnows (*Pimephales promelas*) to determine the 48-

hour LC_{50} for each type of nanoparticle. The results of these biomonitoring tests showed that silica and gold nanoparticles were only slightly toxic, while copper and titanium nanoparticles were highly toxic to the test organisms. Titanium showed the highest toxicity, with an LC_{50} of about 0.01 ppm for fathead minnows and an LC_{50} of 0.001 ppm for *Daphnia pulex*. These results were verified by sending a sample of the titanium nanoparticle solution to an official EPA-approved testing laboratory for confirmation testing.

Onor, I.O. and M.S. Kambhapati. SU-NO. **Ecophysiological effects of nitrogen on soybeans**. ―The goal of this research is to find optimal nitrogen requirement for the growth of soybean. Specific objectives for this experiment are to observe the plants for: a) The growth rate, b) Morphological deformities, and c) Chlorophyll concentration in the leaves. Plants were grown in Biotronette® Environmental chambers at 27°C and the photoperiod was set to 10L:14D under three soil nitrogen amendments: low, medium, and high concentration of modified Hoagland nutrient solution. Growth rate, morphological deformities and leaf chlorophyll were taken periodically. Plants grown in low and medium nutrient treatment had the highest growth rate (1.2±0.0995cm/day) in comparison with plants grown in control and high nutrient treatment plants (1.1±0.1565cm/day). Leaf necrosis was severe in the high nutrient conditions compared to medium treatment, low treatment and control plants, possibly because of the high osmotic pressure of the concentration of nitrogen in the medium. The chlorophyll concentration of the plants declined in general after the second addition of the nutrients, but the low treatment plants had the highest total chlorophyll concentration (315.8±26.9µg/mL/gFW), while the medium had the least total chlorophyll concentration (298±20.6µg/mL/gFW). The low nutrient amendments had the optimal effect on plant growth. The low nutrient amendments had no necrosis. Supported by NSF.

Razvan, C.C. LSU-BR. **Study of pollutant dispersion in urban environment**.―Computational simulations can aid in understanding the complex flows of environmental interests such as the pollutant/chemical dispersion in the urban cityscapes. Computational fluid dynamics (CFD) represents study of fluid mechanics with the use of computer models and simulations. In this study, the simulations of the complex flows involved are created using an open-source parallel CFD framework (the Cactus CFD toolkit). The Cactus CFD toolkit is an open-source problem solving environment for a variety of interdisciplinary fluid dynamics applications. Specific contributions of this research study have been the implementation of Marker and Cell (MAC) method for the governing equations, transport of passive scalars like the pollutant concentration and the use case definitions for the pollution dispersion problems. Canonical flows such as jets-in-cross flow (JICF) and flow past obstacles form the physical as well as modeling building-blocks for our application. JICF from elevated sources is used as the model for pollutant release. Flow past an arrangement of obstacles is used as the model for the urban cityscape. Results from these simulations will be presented to elucidate the complex flow physics relevant to the respective problems. Pollutant dispersion in the urban canyon encapsulates all of these complexities as well as their interplay.

Rockett, C.A. and M.S. Kambhampati. SU-NO. **Water quality of Pontchartrain beach and Bonnabel boat launch sites of south shore lake Pontchartrain**.―The purpose of this research is to determine the water quality and identify coliform bacteria of (Pontchartrain Beach and

Bonnabel Boat Launch) sites of Lake Pontchartrain. Specific objective was to determine if indicator coliforms are present in numbers that are harmful to humans. Our hypothesis was that coliform bacteria are present in the lake, but not in numbers that are harmful to humans. Ten samples were collected 200m apart from each site and analyzed for chemical factors using a LaMotte Water Kit. The samples at the Bonnabel site were collected a day after rainfall. The nitrogen and phosphate levels were greater by 0.1 ppm at the Bonnabel site than at Pontchartrain Beach. The bacterial tests were performed using Nutrient agar and EMB agar plates to determine the morphology of the bacteria. Bonnabel, with greater levels of pollution and rainfall, showed evidence of *E. coli* in 6 of the ten samples. Pontchartrain Beach site showed *E. coli* in 1 of the 10 samples. The presence of *E. coli* was determined by the green metallic sheen and nucleated colonies that were present on the EMB plates. We conclude that water quality is poor and should not be used for any recreational use. Supported by NSF.

Stemley, L., H. St. Cyr and M.S. Kambhampati. SU-NO. T. Green. BNL. **Environmental health studies on Peconic River headwaters: Water chemistry**.—The purpose of this research was to collect scientific data on water from the remediated and natural sites of the Peconic River (PR) headwater complex at Brookhaven National Laboratory and to compare results with available earlier findings. The specific objectives were to: (a) compile and analyze abiotic factor data statistically, and (b) to identify the interrelationships between abiotic factors. We hypothesized that samples would be acidic with excessive turbidity, nutrient poor, and free of contaminants. We collected 54 surface water samples at 150m intervals, randomly from 7 sites (LH1-7). Experimental sites were plotted using eXplorist-200 Global Positioning System and ArcInfo Geographic Information Systems. Field data were obtained on DO, temperature; pH, turbidity, and conductivity using Yellow Spring Instruments, Inc. (YSI) probe. Filtered samples (pH<2) were used to estimate metal content using Inductively Coupled Plasma Spectrometer. Water was acidic (4.61±0.10 to 5.87±0.04 at LH2 and LH5, respectively) and low in DO (1.49±0.17 to 5.67±0.70 mg/L at LH3 and LH1, respectively). Samples had traces of nitrate and ammonia nitrogen, and sulfates. Alkalinity ranged from 10.5±5.65 mg/L at LH2 to 83.13±3.26 mg/L at LH7. In conclusion, water of PR natural sites has higher concentrations of metals (Al, Fe, Pb) than the remediated sites. Supported by BNL.

Thayer, T.P. and K.E.B. Law. OLHCC. **The effects of flooding from Hurricane Katrina on plant species abundance and biodiversity as an indicator of ecological functioning**.— Hurricane Katrina caused a significant amount of damage to the southeastern region of Louisiana. Shortly after Hurricane Katrina passed, floodwater consumed Orleans Parish. This floodwater, which contained toxic components, may have affected ecosystem functioning. The objective of this research is to examine the effects of flooding on plant species biodiversity and abundance. Two habitats were selected in the New Orleans area: City Park, which was flooded by Hurricane Katrina, and Our Lady of Holy Cross College, which was not flooded by Hurricane Katrina. The quadrant sampling method was used to acquire data from both locations about levels of biodiversity. Both areas were examined and samples collected to determine the ecological impact of the natural disturbance. The Shannon-Weiner Index was calculated for both areas to compare the level of biodiversity in each habitat. A student's t-test performed on the calculated Shannon-Wiener indices shows a non-significant difference (p>0.05) in biodiversity between the two communities. These two communities were also similar in measures of plant

species evenness and richness. Further research is needed to investigate any subtle differences in ecological functioning between hurricane affected habitats and unaffected habitats. Supported by Our Lady of Holy Cross College.

Yankowski, S.A. and F.X. Phillips. McSU. **A combined study of the precipitation and tidal stage compared to the solids in Contraband Bayou, Lake Charles, Louisiana**.—This baseline study was conducted to determine the "solids" concentrations in a portion of Contraband Bayou, Lake Charles, Louisiana. Relationships among the waters' conductivity, salinity, temperature, and average rainfall were determined. The tidal stage was also considered to determine the tides' effects on the water column solids in the bayou. Nineteen discrete samples were taken throughout a 17 week sampling period October 2006 through January 2007. Both surface water samples and bottom water samples were taken from a designated sampling point of the bayou as it runs through the McNeese State University campus. Each sample was analyzed for the concentrations of settle-able solids, total solids, as well as suspended solids.

Microbiology Section

Ghislain, N., A. Corbin, J. Doucet and R. Nathaniel. NiSU. **Characterization of methicillin resistant *Staphylococcus aureus* isolated in south Louisiana**.—*Staphylococcus aureus* causes skin and wound infections that can become blood-borne. The bacteria are found in over 90% of the healthy population in the U.S. Antibiotic therapy is difficult because multi-drug resistant strains have arisen over the last few decades. Methicillin resistant *S. aureus* (MRSA) is now a major public health concern in both hospitals (HA-MRSA) and the community (CA-MRSA). HA-MRSA and CA-MRSA strains differ both genetically and in their susceptibility to different antibiotics. To assess the incidence of HA-MRSA and CA-MRSA within the population, nasal swabs from volunteers in selected south Louisiana parishes were cultured for *S. aureus* on mannitol salt agar. Coagulase and catalase positive strains were tested for resistance to oxacillin. MRSA strains were analyzed for the presence of pvl (Panton-Valentine leucocidin), SCCmec (Staphylococcal chromosomal cassette) and mecA (penicillin binding protein-2A) genes by PCR. Of 294 volunteer nose swabs, 220 individuals harbored *Staphylococcus* spp. Two of 69 *S. aureus* isolates were resistant to oxacillin. PCR results confirm the presence of both HA- and CA-MRSA isolates within this study group. The differentiation of HA-MRSA versus CA-MRSA has public health implications.

Ghislain, N., D. Anderson, C. Delatte, A.H. Hoffmann III, A. Corbin and R. Nathaniel. NiSU. **In search of multi-drug resistant *Salmonella typhimurium* in south Louisiana**.— Nontyphoidal *Salmonella* infections (NTS) such as *Salmonella typhimurium* have increased over the last couple of decades and are now one of the leading bacterial zoonotic infections of the industrialized world. An estimated 1.4 million cases of salmonellosis are reported annually in the United States alone, with approximately 550 deaths. The DT104 multi-drug resistance gene cluster has been reported to be located on a 43 kbp region termed the *Salmonella* genomic island 1 (SGI1). Confirmed *Salmonella typhimurium* strains obtained over the course of a year from a large regional hospital in south Louisiana were tested for susceptibility to ampicillin, chloramphenicol, streptomycin, sulfmethoxazole and tetracycline (ACSSuT). Polymerase chain

reactions were performed on 34 clinical strains to evaluate the presence of floR (florphenicol resistance), thdF-S001 (SGI1 marker) and S044-int2 (SGI1 marker) as well as *S. typhimurium* specific genes. The PCR results indicate the absence of classical DT104 genetic elements within isolates from this region.

Harris, L.D. and S.K. Sullivan. LSU-A. **Identification of microbial antagonism in Attine colonies**.—Colonies of Attine (leaf-cutter) ants maintain fungal gardens for sustenance. Though the ants continually bring new plant material into the colony to supply the garden with nutrients, the garden is largely a monoculture of the ant's associated fungal species and is essentially free of competing microbial growth. A bacterial associate of the ants is thought to inhibit the growth of competing species. In this study we have isolated a bacterium from the ants that inhibits the growth of several members of the genus *Bacillus*. We report studies seeking to quantify and identify the mechanism(s) of the inhibition.

Jones, J.M. and W.H. Dees. McSU. J.L. Giddings. USUHS. **Evaluation of the surface-binding capacity of antibodies specific for conserved loops of *Neisseria gonorrhoeae* opacity proteins**.—*Neisseria gonorrhoeae* expresses 8-10 different antigenically distinct opacity (Opa) proteins, which form four surface-exposed loops. Two of these loops, the semivariable (SV) loop and the highly conserved fourth loop (4L), are potential vaccine targets due to limited sequence variability among different Opa proteins. We investigated the surface-binding capacity of antibodies specific for the SV and 4L loops. The antibodies, which were generated against linear peptides that correspond to each loop, were evaluated for the capacity to bind the surface of *N. gonorrhoeae* using indirect fluorescent antibody (IFA) staining and an immunoblot technique that utilizes whole bacteria. Antibody JG1L (semi-variable loop specific) bound to gonococci that expressed one of three different Opa proteins, but not to gonococci that expressed the other five Opa proteins produced by this strain. Antibody AB4L (conserved loop specific) did not bind to the surface of any gonococci. Both antibodies recognized all Opa proteins when tested against outer membranes fractionated on an SDS-polyacrylamide gel under denaturing conditions. Our studies indicate the highly conserved 4L loop may not be a good target for a vaccine; further development of antibodies against the SV loop, however, is still warranted.

Joubert, K.J. and J. Al-Dujaili. LSU-E. **A study of the inhibitory effects of the essential oil components of herbs on the growth of *Listeria monocytogenes***.—Studies show that the essential oil fraction in herbs can inhibit the growth of bacteria. With the rising request for all natural food products, it has become important to have a better understanding of the capability of herbs in preserving food. Since the late 19th century, scientific experiments have documented the antimicrobial properties of some herbs and their components. The antimicrobial compounds in herbs are found mostly in their essential oil fraction. Five different species of Cajun prairie herbs collected in Eunice, Louisiana, were used in this study. This study investigates the effects of the essential oil of these herbs on the growth of *Listeria monocytogenes*, a bacterium typically found in salad bars causing the foodborne disease called listeriosis. This task was carried out using the Agar Diffusion Method and a viable plate count. The essential oil components were also analyzed using gas chromatographic methods. It was found that all of the five herbs showed inhibitory effects on the growth of *L. monocytogenes*; however, *Nothoscardium bivalve* (false garlic) showed the highest inhibitory effects. The inclusion of essential oils to control food borne

pathogens in foods that are normally consumed raw may be one practical application of these finds.

Moran, D., D. Freeman and J. Akin. NSU. **A FETAX analysis of the effects of atrazine on development of *Xenopus* tadpoles**.—Atrazine is a common herbicide widely applied in US agriculture. We investigated the potential teratogenic effects of atrazine on tadpole development in *Xenopus*. Using FETAX, we found that atrazine exposure did produce deformities at concentrations that are lower than commercial formulations used in agriculture. Nonetheless, these findings suggest that amphibian populations may be affected by agricultural runoff.

Rutherford, R., L. Fleury, M. Merchant and M. Paulissen. McSU. **Effects of bacterial lipopolysaccharide on thermoregulation in the green anole (*Anolis carolinensis*)**.—Fever is a nonspecific host defense mechanism that comprises part of the innate immune response. This innate immune function is thought to be an important adaptive immunological response to infection because of its conservation across a broad diversity of phyla. It is interesting that ectotherms can mount a febrile response, considering that their internal body temperatures are, to some extent, at the mercy of the environmental temperatures in which they live. Anole lizards (*Anolis carolinensis*) were maintained in thermal gradients (22-45°C) with a 12 hr diurnal cycle. Anoles injected with bacterial LPS, pyrogen-free saline, or left untreated, and their body temperatures were measured using internal cloacal thermal probes. All lizards showed decreased temperatures during the scotophase and higher temperatures during the photophase. Anoles injected with LPS exhibited a hypothermic response relative to untreated animals and those injected with sterile saline. The response typically varied from 2.5-3.9^{o}C lower than control lizards. The hypothermic response was initiated 12-24 hrs after LPS injection, and continued for 2-3 days after treatment.

Samkutty, P.J. and L. Johnson. SU-BR. W.T. Doerrler. LSU-BR. **Protein trafficking to the outer membrane of an *E. coli* mutant defective in lipid export**.—The analysis of outer membrane protein trafficking in an *E. coli* mutant defective in lipid transport was the focal point of this study. Following biosynthesis in the cytoplasm, proteins destined for the *E. coli* outer membrane (OM) are transported across the inner membrane (IM) by the Sec machinery. Once in the periplasm, they are folded into their correct three dimensional structures by a number of molecular chaperones. This folding has been reported to require lipopolysaccharide (LPS) for a number of OM proteins, including OmpA. Here, we present data on the folding of OmpA in a temperature-sensitive mutant of MsbA that is defective for export of LPS and phospholipids to the OM under nonpermissive conditions. W3110 (wildtype) and WD2 (MsbA mutant) were grown at both permissive (30ºC) and nonpermissive (44ºC) temperatures and analyzed for levels of unfolded OmpA using western blotting and immunoprecipitation. We found that there is no detectable increase in unfolded OmpA in MsbA mutant WD2 during growth under nonpermissive conditions.

Sanders, P., J. Dronette, J. Berken and M. Merchant. McSU. **Iron withholding as an innate immune mechanism in the American alligator (*Alligator mississippiensis*)**.—Pathogenic microbes require Fe and Zn for growth and proliferation. Higher vertebrates respond to infection with increased expression of proteins that sequester serum iron away from bacteria, and thus host

plasma Fe levels decrease during the initial phases of infection. This study was conducted to determine if alligators exhibit similar mechanisms to protect against microbial proliferation. Injection of alligators with bacterial LPS resulted in a time-dependent decrease in plasma Fe, as determined by ICP-AES. Fe levels decreased by 5.9%, 10.6% and 18.6% relative to untreated controls at 3, 6 and 12 hrs post-injection, respectively, and remained decreased at 48 hrs. Alligators injected with saline did not exhibit significant changes in Fe concentrations at any time point observed. Serum Zn and Cu remained unchanged relative to controls. To insure that the decreases in plasma Fe were not due to the repeated blood collections during the course of the kinetic study, another experiment was conducted in which plasma metals were measured at 24 hr post-injection. Fe was reduced by 30.2% while Zn and Cu did not exhibit appreciable changes. These results show that alligators exhibit low plasma Fe levels during an inflammatory response.

Talbert, C. and M. Sulkes. GSU. **Molecular beam studies of organosilicon species**.—The focus of this study was to employ rod oblation and laser spectroscopy to extract and ionize an organosilicon intermediate of silicon dinitride. A high voltage source was used to initiate the formation of reactive intermediates. The intermediate entities were placed in a vacuum system and high pressure diffusion pumps were used to move the ionized intermediates over a set distance. Using the time of flight properties we identified the parent ion peak and determined the parent ion mass. The mass values were correlated to species identification. This specific method of ion mass identification is known as mass spectroscopy.

Watkins, J.M., A.L. Corbin, R. Nathaniel, R. Boopathy, Q.C. Fontenot, N. J. Rau and M.C. Ledet. NiSU. **Evaluation of suppression of targeted pathogenic *Vibrio* species with use of probiotics in experimental pond aquaculture of *Litopenaeus vannamei*.**—The Vibrionacea are significant indigenous pathogens in marine and estuarine waters and in aquaculture systems. Shrimp vibriosis pathogens *Vibrio harveyi* (*carchariae*), *V. campbellii*, *V. parahaemolyticus*, and *V. alginolyticus* were targeted for suppression with *Bacillus*-based probiotics (F-1, F-2, and W) in 4 outdoor lined ponds for experimental *Litopenaeus vannamei* aquaculture. Ponds were stocked at two densities (51 and $84/m^3$) with one pond in each density being treated with probiotics. Samples from all ponds were tested monthly. TCBS was used for isolation of all *Vibrio* species. *Vibrio harveyi* agar (VHA) was evaluated for the identification of *V. harveyi* and *V. campbellii*, and *Vibrio CHROMagar®* (VCA) for the identification of *V. parahaemolyticus*. Selected presumptive isolates were confirmed with the BIOLOG system. *V. alginolyticus*, *V. harveyi* (carchariae) and *V. campbellii* were isolated from the source water and shrimp before stocking. Mortalities began to occur in all ponds about 5 weeks after stocking. Water from all 4 ponds and some shrimp contained *V. parahaemolyticus*. *Vibrio alginolyticus* was isolated from the low density treated pond. Water samples from all 4 ponds showed large numbers of *V. harveyi*. Overall, use of the selected probiotics did not prevent vibriosis in the treated ponds of this experimental aquaculture system.

Molecular and Biomedical Biology Section

Haque, D. UH. F.A. Jurnak. UC-I. M. Doskoya. EU. **Solubilization of *Toxoplasma gondii* GRA1 protein under the influence of cationic and anionic buffers**.—*Toxoplasma gondii*, a protozoan parasite, contains dense granule proteins (GRA) are important in protein trafficking. The protein GRA1 works as a calcium-binding protein, and it targets the parasitophorous vacuole network during invasion of the host cell (22, 23, Liendo, cesbron). The goal of the project is to find the optimal buffer and concentration parameters in order to crystallize the GRA1 protein. Upon centrifugation of the transformed *Escherichia coli* Rosetta pLysS cells, the supernatant was treated with extraction solvents of varying ionic strengths. The salts under evaluation included a cation (potassium) series (K^+X^-) and an anion (chlorine) series (Y^+Cl^-), where X (Cl, I, SCN, NO3) and Y (Na, NH4, K) varied according to size. The solubility profile was analyzed by sodium dodecyl sulfate polyacrylamide gel electrophoresis and ultraviolet spectroscopy. In both the cation series and anion series, most buffers followed the Kosmotrope-Chaotrope theory. There were only two instances in which our results did not match the expected solubility profile. Our attempt of plotting the salting-in and salting-out curve for the buffers was unsuccessful. This was because the buffers were too concentrated. For future work, a broader range of concentrations for the buffers will be used.

Jackson, R. and B. Lewis. SU-BR. **Retinol decreases Akt activity in retinoic acid-resistant colon cancer cells**.—Retinol (ROL), the dietary form of vitamin A, is a fat-soluble vitamin important in development, vision and bone growth. Retinol belongs to the family of chemical compounds known as retinoids. Akt, also known as protein kinase B (PKB), is an important molecule in mammalian cellular signaling and belongs to the serine/threonine specific protein kinase family. Akt is involved in cellular signaling pathways. It inhibits apoptosis, thus promoting cell survival, and increases metastasis. This study analyzed the effect of retinol on Akt activity. Human colon cancer cells from the Retinoic Acid (RA)- resistant lines HCT-116 and SW620 were treated with 1 and 10µM ROL. Cells were collected 1, 2, 24 and 48 hours after treatment. Proteins were electrophoresed using sodium dodecyl sulfate polyacrylamide gel electrophoresis (SDS PAGE). Phospho-Akt levels in the treated cells were compared with that in the control cells in order to determine if ROL affected [ELK1] [ELK1] Akt activity. Total Akt levels were used to show that ROL did not affect Akt protein levels. The data indicated that ROL decreased Akt activity in RA-resistant human colon cancer cells. ROL also decreased growth and invasion of these cells, potentially by affecting Akt activity. This project was supported by a Ronald E. McNair Grant from the U.S. Department of Education.

Kennedy, J. and C.J. Brame. CC. L.C. Robinson. LSUHSC-S. **Amino acid context of palmitoylated cysteine determines yeast casein kinase 2 localization**.—Yeast casein kinase 2 (Yck2) is one of a pair of redundant plasma membrane-associated kinases that are essential for cell division. The carboxyl terminus of Yck2 contains two terminal cysteine residues that are post-translationally palmitoylated, anchoring Yck2 in the plasma membrane. Previous experiments have demonstrated that mutation of each of the two cysteines results in different localization. The purpose determined by 1) the distance of the cysteine residue from the carboxyl terminus or 2) the distance of the cysteine residue from the recognition site. Three mutations were generated to test these hypotheses: deletion of the terminal cysteine (dC) and conversion of

each cysteine to a serine (SC and CS). We were able to visualize the localization of Yck2 using fluorescence microscopy. We saw that the dC mutant and CS mutant both exhibited plasma membrane and other membrane association. The SC mutant, however, exhibited soluble protein fluorescence. We concluded, therefore, that Yck2 localization was determined by the distance of the cysteine from the recognition site.

Mathis, K.W. and P.E. Molina. LSUHSC-NO. **Alcohol intoxication impairs counter-regulatory responses during hemorrhagic shock**.—Intoxicating alcohol levels are present in more than half of trauma victims entering emergency departments across the U.S. Alcohol-intoxicated injured patients have increased morbidity and only a 50% chance of survival. Our studies focus on the impact of acute alcohol intoxication (AAI) on cardiovascular, neuroendocrine, and immune responses to trauma and hemorrhagic shock (HS). Using a conscious rodent model of binge-like alcohol abuse preceding HS, we have demonstrated that AAI impairs hemodynamic counter-regulation during HS. This impaired hemodynamic response is associated with attenuated neuroendocrine activation. While this alone could account for the impaired hemodynamic response, alternative mechanisms include blunted vasculature responsiveness and/or decreased circulating blood volume. Current studies are investigating whether enhancing sympathetic activation prior to HS improves hemodynamic counter-regulation. Intracerebroventricular (ICV) choline, a precursor of acetylcholine, administered to AAI animals prior to HS resulted in only transient sympathetic activation. Subsequent studies will focus on prolonging the pressor effects of choline. Taken together, our studies will provide insight into mechanisms involved in hemodynamic instability during HS and assist in the development of better therapies to reduce morbidity and mortality in AAI-injured patients. Supported by DOD-PR-054196 and NIAAA-AA7577.

Park, E.R., E.M. McKinnon and A.D. Catling. LSUHSC-NO. **A novel mechanism for MAP Kinase activation with implications for prostate cancer**.—The Mitogen-Activated Protein Kinase (MAPK) pathway regulates many cellular processes, including proliferation, migration and invasion. Activation of the pathway normally proceeds through sequential activation of the small GTPase Ras, and the kinases Raf and MEK. MAP kinase is activated in response to growth factors and during cellular adhesion, presumably through the same mechanism. Many cancers display elevated activation of this pathway as a result of oncogenic mutations in the upstream activators, Ras and Raf. However, Ras and Raf mutations are rare in prostate cancer, despite aberrant activation of MAP kinase during progression to androgen independence and metastasis. Our laboratory has identified a novel mechanism for MAP kinase activation that does not require Raf (and presumably Ras) signaling, but instead results from signaling through adhesion-regulated proteins. We speculate that this mechanism may contribute to neoplastic transformation and progression in diseases lacking Ras and Raf mutations, and may provide a new therapeutic avenue for metastatic or hormone-refractory prostate cancer. Supported by DOD-PCRP Predoctoral Fellowship W81XWH-05-1-0591 (to E.R.P.), NIH P20 RR18766 (project PI A.D.C.) and RO1 GM068111 (to A.D.C).

Stewart, R., M. Froom, M. McKown, R. Gingles, A. Ludu and N.R. Hutchings. LSU-S. **A model for understanding swimming behavior in African Trypanosomes**.—The African trypanosome, *Trypanosoma brucei*, utilizes a single flagellum to swim along a three-dimensional

helical path. The flagellum has a specialized architecture and is attached along the length of the cell body, which creates novel biophysical considerations for understanding trypanosome motility. In previous studies, we have examined the bend shape and flagellar dynamics of tethered cells and have modeled the differential geometry of flagellar axoneme deformations (Ludu and Hutchings, 2007), which provided valuable insights into the nature of trypanosome flagellar bend dynamics. However, these studies were insufficient to connect the bend dynamics with swimming behaviors. In the current study, we are utilizing quantitative video microscopy and mathematical modeling to develop an equation to explain swimming velocity based on cell shape and easily measured dynamic characteristics. This equation overcomes the need to measure individual flagellar bends in free-swimming cells in order to relate flagellar dynamics to velocity. Rather, our current model includes parameters into which that information is generalized. The resulting equation represents the first steps in allowing us to develop a more intricate and complete model that connects the molecular and sub-cellular dynamics with the overall swimming behavior in the cell.

Tommasi, J. and W. Dees. McSU. K. Dougherty and A. Mortazavi. SLEH. **Carotid ultrasound imaging vs. carotid angiography**.—A comparison between carotid ultrasound imaging and carotid angiography was made. The carotid ultrasound imaging is a noninvasive procedure while carotid angiography is an invasive procedure. The procedures, risks, and recovery of each are reviewed and presented.

Tommasi, J. and W. Dees. McSU. K. Dougherty and A. Mortazavi. SLEH. **Quantification of carotid stenosis by Doppler ultrasonography**.—A comparison was made between Duplex Ultrasound Imaging (DUS) and Digital Subtraction Angiography (DSA) to determine a reliable method for diagnosing carotid artery stenosis. We reviewed carotid artery stenosis using DUS and its correlation to DSA in 70 patients. Of the 70 cases reviewed, 35 (50%) of the patients' ultrasounds did not correlate to their DSA. Since the percentage of discrepancies was high, our studies indicate that DSA should be the standard for diagnosis. Additional studies are underway to confirm our findings.

Zoology Section

Bourgeois, J.G. and C.A. Kersten. McSU. M.K. Reeves and K.A. Trust. USFWS. **A study of the gender of wood frogs (*Rana sylvatica*) in developed vs. remote areas of the Kenai National Wildlife Refuge in south central Alaska**.—High numbers of wood frogs with morphological abnormalities have been found on the Kenai National Wildlife Refuge by the U.S. Fish and Wildlife Service. Abnormal frogs have been found at both developed (<1 km from a road) and remote (>1 km from a road and in designated wilderness) breeding sites. We hypothesized that; abnormalities in the reproductive system would be present as well. Whole gonads from 138 frogs were collected from 8 developed and 4 remote breeding sites in 2006 and shipped to our facility. Seven micron sections were made and stained with hematoxylin and eosin. Light microscopy was used to determine gender. Logistic regression was used to test whether the following variables were significant predictors of intersex frogs: distance to the nearest road, frog size, frog developmental stage, or presence of other physical abnormalities. Of

138 frogs collected from 12 breeding sites in 2006, 30 were female, 73 male, and 35 were intersex. Intersex frogs were found at all 12 breeding sites. The presence of intersex frogs was not correlated with any of the variables. In conclusion, although 25% of wood frogs sampled from the Kenai National Wildlife Refuge in 2006 were hermaphrodites, causes remain unknown.

Chapman, C.E. and W.H. Dees. McSU. **Distribution of mite and tick species in Louisiana**.— A review of recent literature on the distribution of mite species, specifically mites causing trombiculosis, and ixodid tick species in Louisiana was conducted. Information on mites was sparse. General references note *Eutrombicula alfreddugesi* and *E. splendens* occur in states along the Gulf Coast. Ixodid tick species reported in Louisiana include *Amblyomma americanum*, *A. maculatum*, *Dermacentor variabilis*, *Haemaphysalis leporispalustris*, *Ixodes cookei*, *I. dentatus* and *I. scapularis*. *Ixodes scapularis* is distributed throughout most of Louisiana. Information on the other tick species is based on small, local collections. The literature review was expanded to include the border states of Arkansas, Mississippi and Texas. Several tick species not reported in Louisiana occur in Mississippi and Texas. Information on ticks in these areas will be presented.

Guillory, E. and S.R. Robichaux. LSU-E. J.H. Spring and B.R. Niland. ULL. **Evidence for the functional significance of aquaporins in the Malpighian tubules of the house cricket, *Acheta domesticus*.**—Insects are vulnerable to water loss and ionic imbalances because of their small size and high surface-area to volume ratio. The chief excretory and osmoregulatory organs of terrestrial insects are the Malpighian tubules (Mts). Histologically, the Mts are representative of a simple transporting epithelium; one cell layer thick with both apical and basolateral modifications to increase surface area for enhanced fluid transport. Fluid transport activity of the Mts is hormonally regulated. The morphology of the Mts and the driving force behind fluid movement have been investigated, however, the mechanisms for hormonally-stimulated fluid movement across the cell membrane remain unclear. Using the Mts of the house cricket (*Acheta domesticus*), we investigated the possible involvement of water transport proteins (aquaporins) embedded in the plasma membrane. Using immunocytochemistry, we recently demonstrated the localization of a Drosophila DRIP-like aquaporin in the Mts of *A. domesticus* and showed that its distribution was hormonally regulated. Preliminary data indicate that unstimulated fluid secretion in the house cricket is inhibited by the addition of mercuric chloride, a known inhibitor of many aquaporins. The impact of mercury reagents on the endocrine stimulation of fluid secretion will also be discussed.

Hinton, J.G., H.A. Meyer, and B.F. Caraway. McSU. **Tardigrades of the Texan Big Thicket**. —An All Taxa Biological Inventory (ATBI) is being conducted in the Great Smokey Mountains National Park (GSMNP). A similar project in the Big Thicket National Preserve (BTNP) will be performed to find additional species of limnoterrestrial (mossses, lichens, leaf litter and soil, freshwater vegetation, and sediments) tardigrades. Prior to this study 19 species are known in Texas as compared to the 73 species in the GSMNP. Tardigrade diversity is expected to be considerably less in the BTNP due to the lack of altitudinal and substrate variations.

Klucznik, D.J. and J. Akin. NSU.—**Symbiosis between algae and *Ambystoma* salamanders in a Louisiana vernal pool**.—The egg masses of *Ambystoma* salamanders in a Louisiana vernal pool were examined for the presence of a symbiotic alga. Some egg masses of *Ambystoma*

maculatum were found to have algae. We isolated egg masses with algae and without algae at similar developmental stages and monitored their development in situ. We found that egg masses with algae developed faster and hatched sooner than egg masses without algae. Our results support the notion that the symbiotic relationship between the algae and the salamanders is a form of mutualism.

Land, J.D., C.E. Chapman, H.A. Meyer and W.H. Dees. McSU. **Mosquito bionomics in a southwest Louisiana marsh: Nocturnal periodicity**.―A nocturnal periodicity study of mosquitoes during new moon phases in the Sabine National Wildlife Refuge in southwestern Louisiana is underway. Mosquitoes are collected before, during and after sunset and sunrise, and at other intervals throughout the night using modified Centers for Disease Control mosquito light trap with a rotating collector placed 1.5m above ground. This trap is placed in an area with little to no competing light and where no pesticide applications are conducted. Studies were initiated in July 2006. To date, *Aedes sollicitans* was the most commonly collected species throughout each collecting period. *Aedes sollicitans* was the most common species around sunset; *Anopheles crucians* around sunrise.

Land, J.D., C.E. Chapman, H.A. Meyer and W.H. Dees. McSU. **Mosquito bionomics in a southwest Louisiana marsh: Vertical distribution**.―A vertical distribution study of mosquitoes in the Sabine National Wildlife Refuge in southwestern Louisiana is underway. This study provides information on nuisance mosquitoes and disease vector ecology. In September 2006, mosquitoes were collected using Centers for Disease Control mosquito light traps placed overnight at 1.5m, 3.5m and 5.5m above ground. Traps were placed in areas with little to no competing light and where no pesticide applications are conducted. Meteorological conditions were recorded. *Anopheles crucians* was the most common species at 1.5m and 3.5m. *Culex salinarius* was the most common species at 5.5m. Information from this study will broaden our understanding of mosquito population dynamics in southwest Louisiana.

Merchant, M. and S. Williams. McSU. P. Troasclair III and R.M. Elsey. LDFW. **Febrile response to infection in the American alligator (*Alligator mississippiensis*)**.―Temperature probes were inserted into the stomachs of juvenile American alligators (*Alligator mississippiensis*) maintained outdoors at ambient fluctuating temperatures. Internal body temperatures (Tb) were measured every 15 min for two days, and then the alligators were injected with bacterial lipopolysaccharide (LPS), pyrogen-free saline, or left untreated. Alligators injected intraperitoneally with LPS exhibited maximum Tbs $2.6 \pm 1.1^{o}C$ and $3.5 \pm 1.2 \ ^{o}C$ higher than untreated control animals on days one and two after treatment, respectively. Tbs for these animals fell to within control ranges by day three post-injection. Similarly, mean preferred body temperatures (MPBTs) were significantly higher for LPS-injected alligators on days one ($4.2 \pm 1.8^{o}C$) and two ($3.5 \pm 1.6^{o}C$) after treatment. Intraperitoneal injection of heat-killed *Aeromonas hydrophila*, a gram-negative bacterium known to infect crocodilians, resulted in a fever while injection of *Staphylococcus aureus* (gram positive) did not elicit a febrile response. Injection of LPS in alligators maintained indoors in a constant temperature environment resulted in no increase in internal Tb. These results indicate that alligators did not exhibit a febrile response in the absence of a thermal gradient, and suggest that febrile responses observed are probably behavioral in nature.

Moreman, D. SU-BR. **Dolphin sonar: A possible neural mechanism consistent with reception through the jaw**.—Wave-base sonar imaging is a matter of comparison of times of arrival of signals. The coding of times of arrival in the brain can be achieved via lengths of axons. Relevant mathematics of wave-based imaging seems to require a multitude of receptors. This is consistent with the widely believed hypothesis that sound used for echolocation in dolphins is received via the lower jaw. Distinct signals can be kept distinct via connections to the brain, which bypasses the cochlea. It seems possible that touch receptors, sensitive to vibrations, evolved enhanced sensitivity and also connections to a three-dimensional, modeling part of the brain.

Ogunkoya, Y.O. SU-BR. **Water, do you drink enough?**—Water – Cradle of Life, is the most vital chemical substance for all living things including human beings to survive. Clean, potable water is essential for the survival and continued existence of human life on planet earth. The internal and external environment of a cell is "fluidy"/watery. Each body cell can only function in this controlled fluidy, watery environment. Water is the most abundant and important compound, constituting more than 70% of body weight. Water serves many vital functions and most of the chemical reactions in living organisms take place in this watery environment. The importance of water in life is attributable to its properties. This presentation discusses the need for humans to drink enough water every day.

Stoute, D.C., J. P. Doucet and R. Self II. NiSU/LSU-HSC. I. Arkhipova. HU. **Retroelements from the genome of the lovebug, *Plecia nearctica***.—The black marsh fly, *Plecia nearctica*, better known as the lovebug, is an invasive species and a common nuisance to the southeastern U.S. While the larvae of the fly exhibit a beneficial function in reducing decidua adults, which are normally found in mating pairs and at high densities along highways in spring and fall, are a nuisance to drivers and vehicles. Common population control strategies undertaken by several southeastern states have not proven successful. In an effort to mine its genome as a means of developing new control strategies, we sought to establish genetic markers from the lovebug that could potentially serve as population and chromosomal identifiers. Specifically, we undertook an amplification-based strategy to clone retroelements of the Penelope-Like Element (PLE) family, an ancient family recently demonstrated in the genomes of other arthropods and in particular *Drosophila* spp. We have cloned multiple loci showing significant homology to conserved domains of the unique PLE reverse transcriptase. These results (1) suggest that the *P. nearctica* genome has undergone modification by retroelement amplification and (2) provide a number of markers useful in further genomic studies. Supported by the Nicholls Research Council.

Sylvester, T.S. and C.A. Kersten. McSU. **Histological analysis of regenerated gonadal tissue following surgical ablation in goldfish**.—The phenomenon of tissue regeneration has intrigued humankind since ancient times. In the hope that someday we may be capable of regenerating tissue, organs, and even whole limbs in humans, scientists have studied regeneration in many animals. Fish make an excellent model due to the many structures capable of regeneration. We prepared slides for histological analysis of harvested gonadal tissue from male and female goldfish (*Carrasius auratus*) subjected to complete vs. incomplete gonadectomy and compared tissue harvested six months and twelve months following gonadectomy. Our hypothesis was that there would be no difference in the regenerating capabilities between males and females and that

it would require a year for the gonads to fully regenerate and produce gametes. It was further supposed that fully gonadectomized fish would require more time to regenerate tissue than partially gonadectomized fish. The time needed for regeneration of gonadal tissue was less than previously supposed. Males produced gametes, which were further developed than females. We observed anomalies such as tumors, fat bodies and increased interstitial tissue. Most anomalies were noted in the gonadal tissue harvested twelve months following gonadectomy.

Vidrine, M. F., S.R. Hazelton-Robichaux and M. Bastian-Stanford. LSU-E. D. D. Edwards. UE. Z. Lötter. UFS. **African mussel-mites (Acari: Unionicolidae: *Unionicola*): Hosts and distributions**.—*Unionicola*, a group of water mites with more than 100 species of mites infesting freshwater mollusks on all continents except Antarctica, were first reported as parasites of freshwater mussels (Unionoida: Etherioidea and Unionoidea) in Africa in 2002. In sub-Saharan Africa, five mite species in four subgenera in the genus *Unionicola* are known: 1) *Mutelicola* Gledhill and Vidrine (2002) (2 species) from *Aspatharia pfeifferiana* (Barnardi 1860) (Etherioidea: Mutelacea: Iridinidae) in Nigeria and Botswana, 2) *Chambardicola* Vidrine, Borsari, and Bastian-Stanford (2005) from *Chambardia wissmanni* (von Martens 1883) (Etherioidea: Mutelacea: Iridinidae) in the Central African Republic, 3) *Iridinicola* Vidrine, Lötter, Van As, Bastian-Stanford, and Hazelton-Robichaux (2006) from *A. pfeifferiana* and *Mutela zambesiensis* Mandhal-Barth 1988 (Etherioidea: Mutelacea: Iridinidae) in Botswana, and 4) *Coelaturicola* Vidrine, Lötter, Van As, Bogan and Bastian-Stanford (2007) from *Coelatura kunenensis* Mousson 1887 (Unionoida: Unionoidea: Unionacea: Unionidae) from Botswana and in *Chambardia nyassaensis* (Lea 1864) in East Africa. In the last half-decade, the sub-Saharan African region has revealed 5 species of mites in 5 species (4 genera) of mussels in two suborders of mussels, Etherioidea and Unionoidea. These mites provide evidence of the evolutionary and biogeographic history of both mites and mussels of Africa.

Division of Physical Sciences

Chemistry Section

Carson, L. and S. Burton. SU-BR. A.W. Maverick. LSU-BR. **The preparation and characterization of 3,5-diacetyl-2,6-heptanedione**.—Two aldol condensation products may be formed when 2,4-pentanedione (acetyl acetone) is condensed with formalin (37% formaldehyde). In this reaction, when a 2:1 molar ratio of acetyl acetone and formalin are respectively combined, 3,5-diacetyl-2,6-heptanedione, $C_{11}H_{16}O_4$, (I) is exclusively formed, and when a 2:2 molar ratio of acetyl acetone and formalin are combined, the exclusive product is 3,5,5-triacetyl-2-methylpyran-2-ol, $C_{12}H_{18}O_5$, (II). The 3,5-diacetyl-2,6-heptane has been envisioned for its potential to serve as a linker in the preparation of molecular solids and coordination polymers.

Dantin, A. and J.S. Temple. SLU. **Expression and purification of a yeast glutaminyl cyclase**.—N-terminal pyroglutamate formation from glutaminyl-containing precursors is an essential posttranslational process for many bioactive peptides. Although this reaction may proceed spontaneously, the efficiency is greatly enhanced by the enzyme glutaminyl cyclase (QC). This study examines substrate preference in order to characterize a proposed yeast glutaminyl cyclase enzyme (yQC). This process was initiated by cloning the gene for yQC into a plasmid for storage and over expression. The resulting recombinant plasmid was expressed in an *E. coli* system and purified via a cobalt affinity column. The enzyme activity was determined using a coupled assay with α-ketogluterate and NADH in a five component system. The current characterization experiments determine kinetic constants, such as Km, Vmax and Kcat, for various glutaminyl containing substrates then compare them with previously published kinetic constants for the human enzyme. Although the function remains unclear, the results presented here suggest that yQC catalyzes the same reaction as hQC enzyme.

Delaney, M.S. and S. Wedemeyer. McSU. **Measurement of concentrations of aqueous solutions of gallic acid, pyrogallol, and tannic acid and their metal complexes via FT-NIR spectroscopy**.—Fourier Transform near Infrared Spectroscopy (FT-NIR) was applied to the problem of determining the concentrations of aqueous solutions of gallic acid, pyrogallol, and tannic acid and their metal complexes. Previous studies had shown that both UV-vis and FTIR were not appropriate for these types of analyses. The most useful area of the FT-NIR spectrum for these analyses will be discussed. The most applicable types of analyses were metal complexes of the gallic acid and pyrogallol.

Fontenot, K., W. Gray and S. Naragoni. SU-BR. **Characterization of the estrogenic and phytoestrogenic activity of the Jamaican kola nut extracts**.—Kola Nut, also known as Obi or Bizzy Nut to the ETTU people of Jamaica, is the "cure-all" ingredient in bush/herbal tea. This herbal medicine may influence biological processes, many of which are directly or indirectly modulated by hormones. Anecdotal evidence suggests that Bizzy Nut may be effective in relieving menstrual cramps, functioning as a birth control medicine, aiding in the control of diabetes, and serving as a weight loss agent. Bizzy Nut also is used in removing certain toxins from the body. Currently, we are studying natural products that contain hormonal activity, particularly those compounds that contain phytoestrogenic activity. Since Bizzy Nut is claimed

to be an effective birth control substance, we hypothesized that this nut may contain anti-estrogenic activity. The purpose of this study was to characterize the putative phytoestrogenic compounds found in Bizzy Nut. As an initial step five different extracts (Extract I-hexane, Extract II-ether, Extract III-acetone, Extract IV-methanol and Extract V-water) of Bizzy Nut were sequentially generated using solid-liquid phase extraction. A preliminary screening of the Bizzy Nut extracts revealed that the greatest estrogenic activity was confined to the most polar extracts, Extracts III, IV and V. In assessing the phytoestrogenic potential of these extracts, the extractable compounds were characterized by thin layer (TLC) and GC-MS chromatography and evaluated in three bioassays. TLC results demonstrated that the three least polar solvents (hexane, non-polar; ether, non-polar, and acetone, slightly polar) extracted the greatest number of different compounds. However, only the acetone extract produced a significant cytotoxic response in MCF-7 breast cancer cells. On the other hand, all extracts were able to induce the expression of the estrogen-regulated Ps2 gene in MCF-7 cells. Results indicated that Bizzy Nut extracts may contain classical estrogenic compounds. This project was supported by a Ronald E. McNair Grant from the U.S. Department of Education.

Gordon, S.W. and T.J. Ilgen. SLU. **Development of biosensor for determination of dopamine**.—Dopamine (DA) is a neurotransmitter released by neurons in our brain. Many diseases, such as Parkinson's disease, are believed to be caused by a deficiency of dopamine. The ability to monitor DA released in the brain region would provide critical information to understand the role of DA in brain system. There are many available techniques, however, electrochemical sensors can be fabricated to extremely small dimensions and thus are ideal for placement directly into biological systems. Ascorbic acid generally interferes with the detection of dopamine. Nafion, a perfluorinated ion exchange polymer, has the ability to block the transport of anionic species to the electrode surface. Nafion coated electrodes have been designed to detect dopamine in the neutral solution. The Nafion film formed by dip coating method is estimated about 2 to 3 microns measured by a scanning electron microscope. Cyclic voltammetry (CV) is currently employed to detect dopamine and to investigate the stability of Nafion film. On the Nafion coated electrode, the electrochemical signal of dopamine is enhanced about ten times. A calibration curve of dopamine on the Nafion coated electrode will be presented and the ascorbic acid's effect on Nafion coated electrode will be discussed.

Hamilton, M.W., M.M. Merchant, P. Rode and J. Sneddon. McSU. **Determination of heavy metals in seafood and waters from Bayou d'Inde**.—The results of an ongoing study on selected heavy metals from water and seafood, in particular blue crabs, in Bayou d'Inde will be presented. A sample preparation method was developed involving microwave digestion and will be described in detail. Once the samples were in solution, determination for chromium, lead, cadmium and zinc was performed using inductively coupled plasma-optical emission spectrometry.

Hardy, R., S. Williams and M. Merchant. McSU. **Production of superoxide ions by leukocytes of the American alligator (*Alligator mississippiensis*)**.—Alligators are territorial animals that exhibit interspecies aggression that results in serious injuries. However, despite the facts that these animals live in marsh environments that harbor a wide variety of potentially infectious microbes, these wounds heal rapidly and generally without infection. Leukocytes in higher

eukaryotes, such as mammals, migrate to the site of an infection and produce superoxide ions to help fight infection. This study was conducted to determine if alligator leukocytes were capable of superoxide production. We used WST-1, a tetrazolium salt which can be reduced to a water-soluble formazan compound with high molar absorptive at 438 nm, to probe the production of superoxide by alligator leukocytes. Incubation of alligator whole blood with WST-1 resulted in a time- and concentration-dependent increase in absorbance of the plasma at 438 nm. The reduction of WST-1 was inhibited in a concentration-dependent manner by superoxide dismutase, an enzyme that catalyzes the reduction of superoxide to peroxide, confirming that the reduction of WST-1 was due to the presence of superoxide.

Harris, S. and M. Doughty. SLU. **Inhibition of nucleic acid polymerases: template-competitive transcriptase inhibitors**.—Enzyme inhibitors are often used to develop medications to treat viral and bacterial diseases. Our goal is nucleotide inhibitors which can inhibit viral nucleic acid polymerases as target drug candidates. The results presented here demonstrate the effectiveness of three inhibitors synthesized from 2-thioetheno dAMP: 1) 2-S(2,4-dichlorophenacyl)etheno-dAMP, 2) 2-S(4-chlorophenacyl)etheno-dAMP and 3) 2-S-phenacyl-etheno-dAMP. The target compounds were synthesized, purified by ethanol precipitation and chromatography, and then converted to triphosphates or aminoethyl phosphoramides, followed by DEAE and HPLC purification. The effectiveness of the inhibitors is determined in a five component assay system using a tris buffer, pH 8.5. The assays are initiated with enzyme, allowed to react for 30 minutes, and quenched with EDTA. The substrate inhibition is determined as the inhibition of ^{3}H·TTP incorporation into poly(A)·oligo(dT10) substrate, and calculated by non-linear regression as IC_{50} and K_i. The inhibitory efficiency and mechanisms will be presented.

Lane, G.M. SU-BR. **Safe standoff collection of hazardous chemicals using existing modified line-throwing devices**.—Research at Southern University is currently directed towards providing a quick, safe, and accurate stand-off methodology for obtaining hazardous chemicals from distances exceeding one hundred yards for subsequent analyses by portable chemical sensors. Current methodology requires that chemical samples obtained from within a suspected "Hot Zone" must be acquired manually, putting emergency responders at risk while being exposed to hazardous materials. Not only is this technique hazardous to users, it requires valuable time walking into areas suspected of containing unknown levels of hazardous chemicals carrying chemical sensors. Considerable funds have been expended by the US military to provide stand-off detection of hazardous chemicals under numerous programs. The Joint Services Lightweight Standoff Chemical Agent Detector (JSLSCAD) was a passive infrared (IR) detection system to detect chemical warfare agents by monitoring the ambient background IR radiation. However, this program was abandoned in 2004, and would not have provided concentration data. Emergency responders will be able to propel kinetically a chemical sampling line into an area containing hazardous chemicals. Once the sampling line is delivered, the end of the line can be connected to vacuum pumps to quickly draw chemicals toward portable chemical sensors. This technique is independent of any type of chemical sensor.

Lin, T. and M.B. Doughty. SLU. **Design and synthesis of template competitive reverse transcriptase inhibitors**.—Many viral diseases threaten people's health and there are too few

vaccines or viral inhibitors to fight against these viruses. One example is the HIV retrovirus. HIV encodes the enzyme reverse transcriptase (RT) that converts single-stranded RNA genome of the retrovirus into double-stranded DNA before the cell begins viral replication. The goal of our research is to produce nucleotide inhibitors that can directly inhibit the activity of RT and prevent viral replication. In general, synthesis of the inhibitors begins with conversion of dAMP into etheno-dAMP. After hydrolysis of etheno-dAMP, a thio group is installed into the 2 position on the ring, forming 2-thioetheno-dAMP. Three inhibitor base molecules derived from this template include: 1) 2-S-(3,4-dichlorobenzyl)-etheno-dAMP, 2) 2-S-(4-chlorobenzyl)-etheno-dAMP, and 3) 2-S-benzyl-etheno-dAMP. These monophosphates are modified into triphosphates or phosphoramides, followed by chromatography and HPLC purification. The results of enzyme assays performed to test the inhibition of HIV RT will be presented.

Masuram, S., M. Delane and J. Sneddon. McSU. **Determination of selected hydrocarbons in contaminated soils by gas chromatography-mass spectrometry**.—Recently we have embarked on a project which involves the extraction of selected hydrocarbons in contaminated soils for subsequent determination using gas chromatography-mass spectrometry. Initial studies involve working up a method in the laboratory using spiked soil samples, typically at the 100 ng level. The work involves polyaromatic aromatic hydrocarbons and is being extended to chloro-hydrocarbons.

Mattheus, A., J.S. Temple and M.B. Doughty. SLU. **Characterization of West Nile virus RNA dependent RNA polymerase**.—West Nile virus (WNV) is a member of the flavivirus family that causes infection via viral transfer typically from mosquitoes. The WNV genome encodes ten viral proteins, one of which codes for the NS5 protein which is an RNA dependent RNA polymerase (RdRp). This RdRp is hypothesized to uniquely replicate the RNA genome of WNV during cell replication within a host cell. To investigate the kinetic properties of the RdRp, the NS5 gene was first cloned and then expressed with a C-terminal poly-histidine tail in *E. coli* and partially purified as a 100kDa protein using a cobalt affinity column. Enzymatic activities of the protein have been analyzed using a five part assay that incorporates radioactive ribonucleotides. The results presented here suggest that the WNV RdRp is time dependent, non-primer directed and prefers polyribonucleotide templates to oligoribonucleotide templates. Furthermore, initiation is greatly enhanced by the incorporation of an initial purine ribonucleotide.

Matthews, S. GSU. P. Kohli. SIUC. **Investigation of the sensitivity of biosensing capabilities of pentacosadioynoic acid (PCDA) based liposomes**.—The focus of our research project was to investigate the potential biosensing capabilities of 10,12 pentacosadioynoic acid (PCDA) based liposomes, and to evaluate their properties as chemical biosensors. Experimentally, in situ studies were conducted by polymerizing the liposomes for various periods of time, applying different levels of (heat) stress, then measuring the optical and colorimetric changes that occurred. We demonstrate that liposomes with longer polymerization time have a higher resistance to (heat) stress, and thus undergo a colorimetric change at a higher stress level. We also examine and test optimum conditions for liposome synthesis by comparing the reaction rate and optical absorbance of the liposomes in an (air) environment and in an (inert-argon) environment.

Movellan, J., R.S. Srivastava and A.A. Gallo. ULL. **Studies in the copper-catalyzed aziridination of alkenes**.—This study consists of copper (I, II) catalyzed aziridination reactions of alkenes using two different N-fragment donors. One method used N-tosylimino-phenyliodinane ($C_6H_5I=NTs$) and the second method used p-toluene sulfonamide with iodine as the N-fragment donor. Four different copper salts in either the +1 or +2 state were employed as catalysts. Preliminary results indicate that N-tosyliminophenyliodinane was the better N-fragment donor and that Cu(I) salts were better catalysts. Activated alkenes such as alpha-methyl styrene produced higher yields of aziridination than inactivated alkenes. Yields of 40% were realized in this initial study. Future studies will focus on different catalysts, the stereo selectivity of the reaction and improved yields.

Payne, R.J. and M.O. Fletcher-Claville. SU-BR. F.R. Fronczek. LSU-BR. **Synthesis and structural analyses of halomethyltrimethylammonium salts**.—Halomethyltrimethylammonium halide salts were synthesized by nucleophilic bimolecular substitution reactions (SN2) between trimethylamine gas and dihalomethane. The halomethyltrimethylammonium tetrafluoroborates and hex fluorophosphates were synthesized through a counter ion exchange reaction, using halomethyltrimethylammonium halide and silver tetrafluoroborate or silver hexafluorophosphate, respectively. The yields of the five synthesized salts were as follows: bromomethyltrimethylammonium bromide in 69.77% yield, bromomethyltrimethylammonium tetrafluoroborate in 12.40% yield, bromomethyltrimethylammonium hexafluorophosphate (new salt) in 31.43% yield, iodomethyltrimethylammonium iodide in 86.56% yield, and iodomethyltrimethylammonium tetrafluoroborate in 80.96% yield. All salts were characterized by proton NMR, carbon-13 NMR and FT-IR. Bromomethyltrimethylammonium bromide and bromomethyltrimethylammonium tetrafluoroborate were additionally characterized by HRMS and X–ray crystallography. X-ray crystallography showed that the bromines in the bromomethyl portions of the cations were directly anti to one of the methyl groups in the same cation.

Plaisance, R. and I. Benoit. McSU. **Initiation of a soil database for Lake Charles and its potential forensic applications**.—Duplicate soil samples were randomly collected from six sites in Lake Charles, LA. The samples were profiled using a multiple parameters including appearance, pH, density, spectrometric analyses (AA, ICP and FT-IR), wet chemistry, and microscopy. These properties were organized into an initial profile for each sample. They were then combined to a framework upon which a soil database for the area could be constructed for geological, environmental, and forensic applications.

Ramelow, U.S. and S. Pingili. McSU. **Synthesis of ethyleneglycoldimethacrylate-methylmethacrylate copolymers, determination of their reactivity ratios, and study of dopant and temperature effects on copolymer conversions**.—Ethyleneglycoldimethacrylate (EGDMA)/methylmethacrylate (MMA) copolymers were prepared by using photochemical methods (UV irradiation). The conductivity of EGDMA polymer was increased by using $LiClO_4$ as a dopant. The effect of temperature on the conductivity of the polymer was examined. It was established that, when MMA is copolymerized with a conductive polymer, polypyrrole (PPy), MMA improves its mechanical strength and physical properties. However, the effect of MMA on the conductivity of PPy was not studied. The aim of this study was: 1) to determine the effect of MMA percentage on copolymer conductivity, 2) to determine the reactivity ratios of the

monomers EGDMA and MMA in copolymerization reactions by using IR spectroscopy and to correlate a relationship between reactivity ratios and conductivity, 3) to determine if the MMA homopolymer and the EGDMA/MMA copolymers would give the same characteristic curve obtained for PEGDMA previously, where the conductivity first decreases with temperature then shows a sudden increase (showing a minimum), and 4) to determine if there is a shift in the minimum temperature related with monomer percentage.

Richert, J., J. Hagen and J. Sneddon. McSU. **Determination of heavy metals in crayfish by inductively coupled plasma-optical emission spectrometry**.—This paper will present results of a study of a crayfish pond area. Samples of crayfish were/are being collected. The study involves whole crayfish, tail meat, and male and female. The crayfish are dried, ground to a fine powder and microwave digested to be brought to solution. They are then determined for selected heavy metals such as chromium, lead, copper, and zinc using inductively coupled plasma-optical emission spectrometry.

Shaffer, J. and P.D. Voegel. SLU. **Evaluation of cobalt(II)phthalocyanine, cobalt(II)tetra-2,3-pyridinoporphyrazine, and cobalt(II)tetra-3,4-pyridinoporphyrazine for the formation of dioctyldisulfide by aerobic oxidation of octanethiol**.—Disulfides are organic compounds formed by the oxidation of a thiol under basic conditions. Aerobic oxidation is most common and employed in this work. The percentage of dioctyldisulfide formed by aerobic oxidation of octanethiol with three different catalysts with a range of hydroxide concentrations are measured by GC/MS. The catalysts are cobalt (II) tetra-2,3-pyridinoporphyrazine, cobalt(II)tetra-3,4-pyridinoporphyrazine, and the more commonly used cobalt phthalocyanine. Hydroxide concentrations range from 1-4 M in 1 M increments. Based on this research, pH does not appear to significantly affect amount of dioctyl disulfide formed during a 30 min reaction. During GC/MS analysis, the retention times for octanol (internal standard), octanethiol, and dioctyldisulfide are consistent regardless of conditions demonstrating that no significant side reactions occurred.

Talbert, C. and M. Sulkes. GSU. **Molecular beam studies of organ silicon species**.—The focus of this study was to employ rod oblation and laser spectroscopy to extract and ionize an organ silicon intermediate of silicon dinitride. A high voltage source was used to initiate the formation of reactive intermediates. The intermediate entities were placed in a vacuum system and high pressure diffusion pumps were used to move the ionized intermediates over a set distance. Using the time of flight properties we identified the parent ion peak and determined the parent ion mass. The mass values were correlated to species identification. This specific method of ion mass identification is known as mass spectroscopy.

Wicker, S.A. and E.H. Walker, Jr. SU-BR. **Non-isothermal kinetic studies of $LiCo_{0.76}Ni_{0.24}O_2$ prepared via the Michael-Addition directed hydrogelation of acrylates for materials synthesis (MADHAMS) method**.—Nanocrystalline $LiCo_{0.76}Ni_{0.24}O_2$ was synthesized using Michael-Addition Directed Hydrogelation of Acrylates for Materials Synthesis (MADHAMS) method developed by the Walker group that employs 3,3',3"-nitrilotripropionic acid (NTP) as the gelling agent. It is generated in a mixture of metal acrylates by the Michael addition of ammonia with the vinyl group of acrylic acid. This generates a hydrogel in which the metal ions

are distributed homogeneously throughout the hydrogen-bonded network of NTP. Subsequent pyrolysis converts the mixture to the desired ceramic oxide. The MADHAMS method offers an affordable and versatile alternative to other methods, which involve the use of expensive, air sensitive reagents, organic solvents, or require multi-step processes. This preparative method has several advantages such as homogeneity, excellent control of stoichiometry, ease of handling, lower heating times and temperatures, and the production of uniform particle size and distribution. The synthesis of the non-stoichiometric cathode material is achieved in as little as ten hours ($400^{o}C$) with uniform distribution of particles that are 25 nm in size. The Kissinger analysis of the shift of the transformation peaks as a function of heating rate is used in this study for the determination of non-isothermal kinetics as well as the interpretation of the crystallization parameters.

Wicker, S.A. and E.H. Walker, Jr. SU-BR. **Synthesis and non-isothermal kinetic studies of $LiCo_{0.76}Ni_{0.24}O_2$ utilizing the Michael-Addition directed hydrogelation of acrylates for materials synthesis (MADHAMS) method.**—With the expanding interest in ceramic oxides as catalysts and the development of nanocrystalline ceramic oxides, a great deal of research has been focused on the development of novel methods of preparation for these ceramic oxides. Interestingly, the properties of these nanocrystalline ceramic oxides have been found to be influenced by their method of preparation. Nanocrystalline non-stoichiometric ceramic oxide cathode $LiCo_{0.76}Ni_{0.24}O_2$ was synthesized using the Michael-Addition Directed Hydrogelation of Acrylates for Materials Synthesis (MADHAMS) method developed by the Walker group that employs 3,3',3"-nitrilotripropionic acid (NTP) as the gelling agent. The MADHAMS method offers an affordable and versatile alternative to other methods, which involve the use of expensive, air sensitive reagents, organic solvents, or require multi-step processes. This preparative method has several advantages such as homogeneity, excellent control of stoichiometry, ease of handling, lower heating times and temperatures, and the production of uniform particle size and distribution. The synthesis of the non-stoichiometric cathode material is achieved in as little as ten hours (400oC) with uniform distribution of particles that range from 7 to 25 nm in size. Non-isothermal crystallizations kinetic studies were performed using a differential scanning calorimetry to determine the Arrhenius activation energy, individual reaction rates, and reaction orders.

Computer Science Section

Asoodeh, M., R. Pandian and P. McDowell. SLU. **Environmental education using underwater robots.**—Machines in general and robots in particular, have a strong appeal to the learning dimension of children and youth. Underwater robotics plays an increasingly important role in the monitoring of aquatic environments. This project employs underwater robots and their Internet-based tele-operation to bring children close to the underwater environment, and educate them on the local freshwater environments, interior wetlands, marine habitats and organisms, and techniques for water quality monitoring. Environmental monitoring of rivers, lakes, and oceans has become a major economic, social, and academic concern. This is in large due to overuse by population growth and suburban sprawl. Educating the public in general, and the children and youth in particular, about the importance of our environment, and the need for environmental

monitoring and pollution control, can help them cultivate life-long environmental stewardship. The main educational priority of this project is to design, develop, and implement a model project to educate the public, especially school children, about environmental issues in their communities. The project uses robots, computers, programming, and Internet in environmental education of the public and school children. The project will mainly be done at the Lake Pontchartrain Basin Maritime Museum and Research Center in Madisonville.

Blakeney, M. ULL. **Rendering northern lights**.—In this paper we describe a technique used to simulate the Northern Lights. We were able to render the Aurora by using a physical model to simulate the starting positions of the energetic particles. A grid formed from the calculation of emission points was used to simulate the points that emit light. This approach is a mixture of Aurora Physics and Mathematical modeling. Physics is used to simulate the starting positions and a mathematical model is used for the path of the particles. The color of the light emitted by the particles is modeled based upon the height of the emission point. Finally, a Gaussian blur is applied using an image editing program to give the image a more natural look.

Chao, S. GSU. **The importance of flexibility for the online examination**.—Most of the third world countries have common examinations for all state universities. The exam is conducted at the same time at all examination centers. The problem is that it is very difficult to monitor the examinations by protecting the question papers from unauthorized persons and at the same time conduct the exam efficiently. It is more difficult to secure the exam papers in order to minimize cheating and theft. Another problem is that the examiner sometimes is threatened to allow students to take the exam paper outside of the exam hall, which is a serious issue since exam papers may fall into many hands leading to cancellation of the exam. Preparation for the exam and subsequent cancellation may lead to a panic situation in the society and naturally a political problem later. The present research is related to solving the problems associated with common examinations. The exam may be a quiz or a detailed exam. The exam can be conducted at the government or industry level. The candidates/students can prepare in regular classes or privately at home. The idea provides statistical data, e.g., average scores in the country, state, and school. The proposed idea of implementation minimizes cost, saves time and allows for future improvement with the help of statistical data. The parents or friends can see the results if the examinee allows them (with password) to view them. The same examination paper procedure can be used similar to GRE, ACT, MCAT, and lab class exams.

Chilumula, S. and D. Moreman. SU-BR. **Satellite imaging to be used to test an alternative theory of the Louisiana dead zone**.—We have coded preliminary software which can be used to semi-automate an analysis of satellite images of the northern Gulf of Mexico. This software finds where muddy plumes, fresh water from rivers and swamps, extend over salt water. We had earlier decided that the most popular theory of the size of the summertime zones of hypoxia in the Gulf was at best incomplete. We intend to seek evidence for a connection between those zones and the muddy plumes. The popular theory holds that size of the dead zones is due to 1) plants in the Gulf growing abundantly due to river-delivered organic nitrogen, and 2) oxygen being removed from the deeper water due to the rotting of dead, sunken plant material. We suspect that, additionally, the shading effect of a thin layer of muddy plume decreases oxygen production in the deeper water where oxygen concentrations are low. We seek a correlation

between plumes seen in satellite images and maps of the dead zone generated over the past 20 or so years.. If this correlation is strong then perhaps policy-decisions of the Federal EPA, predicated upon what we fear is a wrong theory of springtime nitrogen, ought to be adjusted.

Davidson, A. LSU-BR. **Native image compression using fragment shaders and frame buffer objects on a graphic processing unit**.—Image compression is used in a wide-spectrum of applications such as medical resonance imaging, CT scans, and pattern recognition. Due to the increased demands for high resolution (quality and size) digital images as well as current limitations in the network bandwidth and storage size, image compression becomes essential. Most applications dealing with image compression read a texture segment from a Graphics Processing Unit (GPU), compress it into a different file format, and then send it to be processed by the Central Processing Unit (CPU). When the image is required again, the CPU re-converts to its original format and uploads it back to the GPU. Recent trends show that GPUs can outperform CPUs for certain computations. Current CPU-compression techniques underutilize the considerable amount of compute power available to the GPU. Making use of this GPU compute power remains a challenge because current programming tools and paradigms are cumbersome and inflexible. We will demonstrate a method for using a GPU to natively compress images which utilizes the GPU visual pipeline. Using Cg, a fragment shader language, we will natively compress an image (or images) on the GPU, and then store it for easy access in a frame buffer object (FBO).

Ferguson, Jamie. SU-BR. A. Aday. FSU. V. Vasquez. UPR. **AIX healthchecker**.—The purpose of this research was to develop a competitive tool for the IBM Corporation that will check the validity of the health of an Advanced Interactive executive (AIX) system. An AIX system is a proprietary operating system developed by the IBM Corporation that is based on UNIX System V. It generates comprehensive reports listing potential system problems and issues. As a result, it subsequently recommends resolutions to those potential problems and allows the user to issue an automatic fix. Ultimately, this tool will utilize the lease amount of additional overhead necessary while still providing an efficient means of constantly monitoring the system to reduce downtime which is detrimental to the customer.

Fomenky, P. and W. Zharro. GSU. **E-commerce based hybrid recommendation system**.—The main focus of this paper is to implement a recommender system for online stores. To properly demonstrate the effectiveness of this research, a webpage will be used to sell a range of products. Users will be able to buy products from the store and subsequently rate these products. Based on the knowledge gained from the prior purchases the system recommends products to users. Purchases made will allow the system to discern what items to recommend based on the experience and patterns learned from similar customers. The system detects trends from the item types, the order in which items were purchased and when they were purchased. The hybrid innovation allows a superior performance than other already existing systems such as ACF (Automated Collaborative Filtering) and CBRPR (Case-Based Reasoning Plan Recognition). This project will use this hybrid technology to accomplish the task of recommending.

Gao, K., P. Li and Z. Pan. ULL. **The application of turbo code in optical fiber communications**.—It has been shown that dramatic performance improvement can be obtained

in high-speed and long-haul optical fiber communication systems by using forward error correction (FEC) codes to minimize the degradation effects within fiber links, such as fiber nonlinearities, dispersion, and signal-to-noise ratio. During the last few years, several FEC codes have been intensively developed. However, these methods can work only for moderate signal-to-noise ratio (SNR) level, i.e., the net coding gain are not sufficient high enough for the continuous severe distortion and dispersion in the fiber links, specially for overcoming the fiber's polarization-mode dispersion effect that could statistically occurs and last for relatively long time (a few milliseconds to seconds). In this paper, we propose a turbo coding method which can be easily applied to the optical communication system. The decoding complexity can be controlled by changing the interleaver of the turbo coding system. The simulation results show that our method can achieve at least 9 dB net coding gain. When the channel's bit error rate (BER) is 1e-2 due to the distortions and attenuations in fiber transmission link (equivalent SNR equals 6 dB), the output BER can be 1e-12 by using the proposed turbo coding techniques.

Gwee, N. SU-BR. **Computers and counterpoint: Algorithmic music composition that really pleases**.—Given sufficient rules, it is fairly simple to design algorithms to produce technically correct music. What is an ongoing challenge is to produce music that is also natural sounding to human ears. We describe a procedure that combines artificial neural networks with genetic algorithms to produce 16th century counterpoint music that is both technically sound and aesthetically pleasing.

Gwee, N. SU-BR. P.P. Chen. LSU-BR. **The power of democracy: Improving the performance of heuristic optimization algorithms**.—We present a general procedure that effectively unites heuristic optimization algorithms to maximize their performance. This results in solutions that are often better than what each algorithm could produce individually. We illustrate our procedure on set covering problems, show improvements over previously published results, and obtain optimal solutions in many instances.

Gwee, N. SU-BR. S. Kundu. LSU-BR. **Optimal object-oriented class-hierarchy design: Theory and implementation**.—We present a method for designing optimal object-oriented class- hierarchies based on the concept of use-relationship among functions and variables. We then describe a software tool that implements this method. The tool's operations are based on the constructs of a design language for modeling the classes and a script language for manipulating the classes. We illustrate the tool with a small but non-trivial example.

Johnson, C., D. Lau, L. Hassebrook, A. Fatehpuria and V. G. Yalla. GSU. **Biometric identifiers**.—Biometrics plays a big part in personal identification today through the use of distinctive physical and behavioral characteristics called biometric identifiers. Biometric identifiers are a combination of physical and behavioral characteristics. Physical biometrics consist of the finger, iris, face, retinal, and hand scans, whereas, behavioral biometrics include the voice and hand writing. Here we used one of the physical characteristics of biometrics, the fingerprint. We collected fingerprints using the traditional 2-D rolled ink method compared to the novel 3-D finger scan method. After subject prints were collected they were entered into a database called File Maker Pro. The purpose of the database is to determine which method, 2-D

or 3-D, results in a better image quality. This database also will help us verify which method has clearer and more distinctive ridge and valley data.

Lewis, J., M. Xie, Z. Lei and G. Allen. LSU-BR. **Resource management in multicluster grid environment**.—As multicluster grid emerges as a major approach for people to pursue substantial computational capability improvement to support large-scale compute-intensive applications, it is becoming a challenging issue on how to efficiently manage application execution across the participating clusters, since the participating clusters are geographically distributed, heterogeneous, and self-administrative, and the network connection provided by the Internet is vulnerable in security and unpredictable in performance. The challenges include how to discover resource information, how to handle application workflow, how to allocate appropriate resources, how to make application execution reliable to endure certain system failure, etc. This paper outlines the latest progresses on resource management in multicluster grids as well as our contributions, including information service, workflow management, resource allocation, and execution management, etc. Information service provides basic functions for resource discovery and information management on both static and dynamic cluster information. Then, workflow management service defines, manages and executes application execution workflows on the grid, while resource allocation strategies efficiently assign jobs to clusters with various performances. Finally, execution management initiates, monitors, manages remote computations across the multicluster grids.

Li, P., K. Gao, J. Fuselier and Z. Pan. ULL. **Remote optical experiment for bit-error-rate and eye diagram measurement based on LabVIEW and internet**.—Online education has been growing for years due to the industrial need for training. Broadband access (to Internet) is beginning to have an effect on the content of such materials. However, most of the distance learning technologies are limited to provide lectures only. Moreover, to ease the restriction on lab area, cost on the investments of devices, and schedules of the experiments, it will be of benefit to create engaging laboratory practices using distance learning technologies which allow the student to obtain knowledge similar to that obtained in a hands–on environment. In this paper, we present a method for the development of optical fiber communications laboratory, and the implementation of the online remote laboratory through distance learning methods. We designed an optical experiment for measuring and displaying the bit error rate (BER) and eye diagram of a 10 Gbit/s optical fiber link using LabVIEW and GPIB interface. Moreover, we developed a method for remote experiment environment based on internet to access the distance equipments. This approach potentially can provide more effective laboratory scheduling than its traditional hands–on counterpart, and can utilize one institution's resources to serve students at multiple institutions for more cost efficient instruction. (Supported by NSF CCLI program.)

Lopez Jr., A.M. XU. **National three-year gender and ethnicity study of the computing disciplines**.—Spring 2007 is the last data collection period for a national, three-year gender and ethnicity study of the computing disciplines funded through grants to Xavier University of Louisiana. The Association for Computing Machinery and the Institute of Electrical and Electronics Engineers jointly described the major computing disciplines of Computer Engineering, Computer Science, Software Engineering, Information Systems, and Information Technology. Other Louisiana institutions providing data for the project are LSU and Southern

University. Texas Southern University, the institution of the conference's keynote speaker continues to be a higher education partner. There are 50 institutions of higher education from across the U.S. providing data, 23 are Historically Black Colleges and Universities. Undergraduates complete a web survey designed to investigate twelve variables appearing to impact recruiting and retention, especially of women and minorities, in the computing disciplines. It is hypothesized that Social Cognitive Career Theory variables would be most predictive in each of the computing disciplines of students' interests and goals across gender, ethnicity, and university type. The presentation will inform the state community of the published works available regarding this project as well as national and international presentations that have already taken place. Supported by: NSF, Microsoft, and Apogen Technologies.

Moreman, D. SU-BR. **Computer models that can be tweaked to predict what you expect - illustrated by a model of the Louisiana dead zone**.—Computer models are dangerous. I propose Parameter Box to represent one of the mechanisms by which modeling can go awry. Many a modeling parameter is known inexactly. Some parameters can be entirely overlooked. If a model has, known or unknown, a number n of parameters and these parameters are selected from ranges R1, R2, ..., Rn of possible values then the parameter box of the model is the Cartesian product R1 X R2 ... X Rn. This parameter box can be huge and allow two or more models to fit all known empirical facts but predict incompatible futures. I show a model published by Scavia et al. in 2003, designed to predict hypoxia in the Gulf of Mexico. Its authors seemed unaware that its parameters comprise a box of at least five dimensions. That box allows, under reasonable assumptions, more than 100,000 distinct models. In the published model, the number of parameters seems to exceed the number of empirical data. This would allow one to, unconsciously or by accident of fate, select for prediction the future one expects, while fitting the data. The authors, Scavia et al., express belief that since it fits their data, their computer model is "validated."

Neupane, M.R., I. Sanikommu and P. Derosa. LTU. **Efficient Monte Carlo simulation algorithm for electron beam dosimetry in electron beam radiotherapy**.—Radiation therapy has been one of the main therapeutic modalities for the treatment of cancer for more than 100 years. Electron beam radiotherapy is the type of radiotherapy technique in which high intensity electron beams are used to destroy superficial cancerous and malicious tissues by means of irradiation. Unfortunately, irradiation of surrounding healthy tissue cannot be avoided. In an attempt to minimize the damage to healthy tissue, nanoparticles have being considered to concentrate doses to tumors. MC simulations are well suited to study radiation interaction with matter but most available programs are not optimized to work at the nanoscale. The algorithm implemented in the computational code described here was designed for nanotechnology applications. It can estimate the doses (energy absorbed) delivered to tissue when nanoparticles are present. Optimum size of nanoparticles for more effective treatment could be predicted. The optimization steps of this code, implemented using Object Oriented programming language, are described here. Focus is placed on program speed and portability which would lead to fast and accurate simulation that can be ideal in real-time simulation of radiotherapy processes.

Pampana, M.S., R. Duff and D. Moreman. SU-BR. **An oil-platform based sonar network for imaging schools of fish**.—A sonar net might create real-time images on a daily basis of

commercially valuable schools of fish in the Gulf of Mexico. The sensors and ping-generators would be mounted largely on oil platforms. A paper in Science in February 2006 described a system which imaged schools of fish more than a mile long. It used a stationary sound source and a moving array of microphones. We suggest that having a multitude of arrays distributed over oil platforms will allow one to create images from stationary arrays of microphones. Potentially, the system could image schools fish in US coastal waters from Mexico to Florida to a distance seaward of 200 miles. We describe some of the fundamental mathematics of sonar-based imaging which might be used in a method appropriate to stationary arrays.

Reddy, Y.B. GSU. **Reinforcement learning model for dynamic spectrum allocation**.—Current wireless networks are characterized by a fixed spectrum policy. Presently, a small percentage of the spectrum (less than 60%) is efficiently used at any given time and place. However, spectrum is a scarce and highly valuable resource that must be utilized with extreme care. Therefore, new methodologies, algorithms, and techniques need to be developed for efficient utilization of the spectrum. The dynamic spectrum allocation (DSA) method is proposed to allocate spectrum efficiently and exploits the variations in load in various networks in allocating the spectrum. In the current research we discussed the role of cognitive radios and reinforcement learning technique for DSA.

Shields, T. and R. Thomas. GSU. **The "Roxy" on-line theatre**.—Create an online movie ticket purchasing application which allows the end user to select movies based on movie genre, show times, movie trailers, and movie descriptions. The site allows the user to register for a membership; which would make them eligible to receive benefits from the site. Benefits would include free concessions and free movie tickets. The site's database stores items such as movie information, user information, and customer history. Through the user interface, the end user will be able to access the most popularly viewed movies and top movie sales. Before the user is able to function within the site, s/he will be prompted to enter a login name and password. The site also will allow users to preview the site before becoming a member. Once the demo is complete, the user will be prompted to a membership form which will allow them to enter all contact information in order to become a member. The information collected will be stored into a database for easy retrieval by site administrators.

Tsuma, C.K., Y. Walta and V. Mbarika. SU-BR. **Global diffusion of the internet: The internet in Eritrea**.—Although the Internet is an engine for countries to join the Information Society, many developing nations, especially sub-Saharan Africa (SSA) lag behind much of the world in exploiting its full benefits. The SSA region is home to 34 of the 48 poorest nations of the world, of which Eritrea stands as one of the 5 poorest nations in SSA. Eritrea trails most SSA nations in harnessing the power of the Internet for its socio-economic development. In this study, we use the Global Diffusion of the Internet (GDI) framework to examine Internet diffusion in Eritrea along six different dimensions: Pervasiveness, Geographical Dispersion, Sectoral Absorption, Connectivity Infrastructure, Organizational Infrastructure, and Sophistication of Use. Launched in 1990, Internet use in Eritrea has grown steadily, though at a slower pace than other countries in Africa. Studying Eritrea's internet environment and its diffusion sheds light on some of the challenges facing other countries in sub-Saharan Africa. Distinctive challenges for Eritrea include shortage of foreign investment, expanding technical training, and low population

density. Currently there are approximately 70,000 users or 1.7 percent of the population. Under connectivity, the physical infrastructure available in Eritrea, as distinct from broader factors that determine internet access, will be the focus of our study. These factors include the number of internet hosts per capita; PCs per capita; telephone mainlines per capita; and mobile subscribers per capita. Applying the GDI framework will inform the current state of Internet diffusion in Eritrea and reveal areas of strengths and weaknesses that policy makers and researchers can use to improve Internet and related applications for socio-economic development of this (sometime) forgotten region of the World. We conclude our study with some future research implications.

Turner, A. and D. Moreman. SU-BR. **Hurricane sensors and oil platforms**.—Just a year and a half ago, one of the greatest storms in American history hit the Gulf Coast. With so many questions and concerns about how things could have been prevented, we came up with an idea that would track hurricanes far in advance to forecast possible evacuation dates and/or false alarms as deemed necessary. The idea and research is geared toward finding ways to place Hurricane sensors on oil platforms in the Gulf of Mexico. With this idea and research, we were looking at various materials with which to make the sensors, the technologies available that would make the sensor precise and accurate, and strategic platform locations where we could place the sensors. We have come up with some great ideas that I believe will be very interesting. Once all of the research is done and the sensors are ready for processing, we look to have it funded, placed, activated, and tracking hurricanes.

Vuppuluri, D., K. Logan, R. Jackson, N. Gwee and D. Moreman. SU-BR. **Possibly using oil platforms of the Gulf of Mexico to improve predictions of landfall of hurricanes**.—Some fraction of the nearly 4,000 oil platforms in the Gulf of Mexico, from Mexico to Florida, can be mounted with weather-sensors to communicate in a Hurricane Net. When a hurricane advances towards a large city, such as Houston, data from those sensors can be sent to a grid of powerful computers running distributed, hurricane-modeling software. The increase in data-resolution thus achieved, fed to an appropriate model, might possibly lead to a long-enough increased time of accurate warning to avoid wrongful evacuations of major cities as happened in 2005. It is widely believed that the United States is entering a decades-long semi-cycle of increased hurricane activity. We have been warned that hurricanes have hit the East Coast in the past, of a magnitude which, if equaled today, would cause costs comparable to those of Hurricane Katrina. It is unknown what confusion and distress might follow an order to evacuate a city on the East Coast. We consider expansion of the proposed Hurricane Net up the East Coast via existing tall structures such as cell-phone towers.

Earth Sciences Section

Feig, A.D. ULM. **Theory and method in geoscience education**.—Geoscience education is one of the newest sub-disciplines of geology. As such, few formal discussions of methodology and research categorization have take place. In general, the field can be categorized into four basic research types: 1) learner characterization; 2) innovations and best practices; 3) grounded theory/conceptual models; and 4) policy analysis. In this presentation, each of the four categories are defined and examples of each are provided. As a discipline, geoscience education has

significant overlap between "traditional" geoscience and educational research grounded in social science. As a group, geoscientists have little exposure to or training in the typical social science methods long employed by educational researchers. This presentation will discuss selected social science research methods and methodologies and explore their utility to geoscience education, as well as what kind of research questions can be addressed by their application.

Habib, M.A. ULL. **Assessment of radar rainfall information for flood prediction information**.—Recent advances in rainfall measuring using remote sensing techniques (such as weather radars and satellites), made it possible to provide rainfall information with high spatial and temporal resolution and areal coverage. Radar-rainfall information has significant potential for several hydrologic and environmental applications such as flash-flood prediction and urban drainage analysis. However, radar-rainfall estimates are subject to uncertainties caused by both instrumental effects and lack of unique relation between radar measurements and surface rainfall quantities. The main objective of this study is to analyze effect of these uncertainties on flood predictions. The study site is the Issac-Verot experimental watershed in Lafayette, Louisiana, which is under coverage by the NEXRAD radar site at Lake Charles. This study applies a hydrological model known as GSSHA (Gridded Surface Subsurface Hydrologic Analysis), which is a physically based distributed model developed under the US Army Research Office. The model will be driven by radar rainfall estimates and the resulting flood predictions will be assessed against predictions based on rainfall data from the dense rain gauge network of gauges in the watershed. Statistical as well as qualitative analysis will be performed to determine to what extent we can rely on the radar-rainfall information for flood prediction purposes.

Larson, B.F and E. Habib. ULL. **Analyzing rainfall uncertainty on salinity forecasting within the Barataria Bay Estuary**.—This study focuses on using NEXRAD (Next Generation Radar) radar-rainfall information to investigate the impact of rainfall spatial variability and limited sampling on salinity prediction in an estuarine system. The site of this study is the Barataria basin, which is a wetland-dominated estuarine ecosystem in southwest Louisiana. Salinity prediction was found to rely heavily upon accurately estimating basin rainfall, due to rainfall being the largest source of freshwater and the most variable component in the net supply of fresh water to the basin. Rain gauge density scenarios of limited rainfall samplings were simulated from the fully-distributed radar data and corresponding salinity predictions were assessed. Results indicated that a high degree of uncertainty existed in salinity prediction associated with the typical average U.S. rain gauge density (1.3 gauges/1000 km^2). By slightly increasing rain gauge density beyond the typical density, a significant amount of salinity prediction uncertainty could be reduced.

Stringer, G. ULM. D. Cicimurri. CU. D. Parmley. GCSU. **Bony fishes based on otoliths from the Eocene Clinchfield formation, central Georgia: Initial findings**.—In the Cenozoic deposits of the Gulf Coast and Caribbean, fish otoliths (ear stones) have proven to be invaluable in the identification of fossil actinopterygians (bony fishes). Preliminary investigations of the Clinchfield Formation (late Eocene; 34.2 to 36.0 million years old) from the Hardie Kaolin Mine northwest of Gordon, Wilkinson County, central Georgia, yielded skeletal remains representing only five taxa of actinopterygians. The number of actinopterygians is unusual considering that 30 chondrichthyan taxa (sharks, rays, and a holocephalian) have been identified from the site. To

better interpret actinopterygian diversity at the site, surface and bulk collecting techniques were utilized to obtain otoliths. Identification of the otoliths nearly tripled the number of teleosts known from the vertebrate assemblage. The fossil fish assemblage based on otoliths is dominated numerically and taxonomically by sciaenids (drums). The otoliths also indicate the presence of albulids (bonefishes), congrids (conger eels), ariids (sea catfishes), ophidiids (cusk-eels), and haemulids (grunts). The fish assemblage provides important data for the interpretation of the paleoecology and verifies a nearshore, marine environment as indicated by earlier studies on chondrichthyans and invertebrates. Research partially funded by ULM BellSouth Endowed Professorship.

Materials Science and Engineering Section

Bazille, L.J. SU-BR. **Characterization of etching techniques on SiC for high temperature micro-electo-mechanical systems applications**.—We present methods and results of etching technology relevant to high temperature micro-electro-mechanical systems (MEMS). The objective of the project is to examine the strengths and limitations of two etching methods of silicon carbide (SiC). The methods being investigated are Reactive Ion Etching (RIE) and Photo-Electro-Chemical Etching (PEC). RIE etching of SiC was done using select gas combinations. The gas ratios and etch rates were evaluated. Surface morphology characterization by atomic force microscopy (AFM) was also performed on samples using both methodologies.

Froom, M., R. Stewart, B. Salvatore, G. Boucher and N.R. Hutchings. LSU-S. **A novel production monitoring assay for real-time quantification of oil concentration in Caddo Pine Island stripper-wells**.—The Caddo Pine Island (CPI) oilfield of Northwest Louisiana has thousands of shallow oil wells that produce approximately 1 part oil for every 1000 parts saltwater. The average production of these wells ranges from one third to two barrels per day. Due to the small amounts of oil and the extremely large volumes of water that must be produced and disposed of daily, the existing production monitoring technology is insufficient for application in the CPI oilfield. The lack of accurate and affordable production monitoring technology forces the CPI operators to 'subjectively gauge' oil well performance on a gross time scale. To facilitate the CPI operators' ability to accurately monitor the production characteristics of individual wells, we have developed a novel spectrophotometric assay that quantifies oil concentrations in produced fluids as low as 1 part per 10,000, two orders of magnitude more sensitive than most commercial production monitoring devices. Our assay solvent-extracts a produced oil/water mixture followed by spectrophotometry calibrated to a standard curve equation based on Beer's Law. The results of both laboratory blind screens and field production monitoring trials suggest this assay is at least 98% accurate at predicting oil concentration and production rates.

Hampton, T. and Z. Ning. SU-BR. **Linkages between climate change and wild fire: Consequences on natural resources and society**.—My research is on the linkages between climate change and wild fire. I will be researching the connections between today's climate change and wild fire in comparison with the consequences on natural resources and society. The objective of this research is to evaluate and compare today's extreme climatic changes to the

production of wildfires in the United States and their effects on our natural resources and society. My methodology includes extensive research through various references (i.e. Internet, encyclopedias). Through this research, we hope to identify the problem and propose a solution or an alternative that may contribute to the decrease of this conflict.

Harris, J. A., J.A. Buchanan-Vega and N.V. Seetala. GSU. **Magnetic properties of FePt and FeRh mixed nanoparticles**.—FePt nanoparticles have been founded to be an ideal material for information storage. Its magnetic characteristics such as high coercivity are useful to retain the recorded information for a longer time. However, the problem is that it requires high magnetic fields to record the information. In order to overcome this problem, heat assisted magnetic recording (HAMR) in presence of FeRh granules was implemented in bi-layer thin film systems. We are trying to see the feasibility of using TAMR in FePt-FeRh mixed nanoparticles. Annealed FeRh behaves anti-ferromagnetic below 80^0C and ferromagnetic with low coercivity at higher temperatures. FePt (L10 phase) and FeRh nanoparticles were chemically synthesized in collaboration with MINT center, University of Alabama-Tuscaloosa. FeRh particles were salt annealed at 800^0C to obtain anti-ferromagnetic phase. The magnetic properties (saturation magnetization and coercivity) were studied individually for FePt and FeRh nanoparticles and after physically mixing the particles. A vibrating sample magnetometer (VSM) is used to obtain hysteresis curves in the temperature range 20 - 230^0C while heating and cooling cycles. The results indicate that there is strong interaction between FePt and FeRh nanoparticles and these nanoparticles systems would be efficient in HAMR.

Kolan, B. and P.A. Derosa. LTU. **Proton diffusion in porous materials, molecular dynamics study**.—Molecular Dynamics (MD) study of the diffusion of protons in bulk water and confined space (nanopores of different diameters) is presented. Bulk water simulation models include 1 proton with 1000 water molecules and 10 protons with 1000 water molecules at 1atm pressure. Calculated diffusion coefficients of proton in bulk water are $9.18 \times 10\text{-}5 cm^2$/sec for single proton models and $3.708 \times 10\text{-}5 cm^2$/sec for ten proton models. Although longer simulations are needed for better statistics, these results compare well to the experimentally measured diffusion coefficient in bulk water of $9.3 \times 10\text{-}5 cm^2$/s. Simulation models to study proton diffusion in nanopores include a nanopore built with silicon as its outer layer and hydroxyl groups as inner layer with a negatively charged slab placed at one end of the pore. Simulations were run in vacuum as well as in the presence of water. From the results, time taken for diffusion of protons in nanopores of 12, 21 and 26 nm in diameters and 32 nm in length are found to be 2.7, 3.2 and 2.0 ps, respectively, in vacuum and an average of 0.45 ps in presence of water and diffusion times decrease as the electric field increases.

Landry, J., M. Delandro and L. Lyles. SU-BR. **Geospatial assessment of coastal Louisiana land loss before August 2005 to determine whether human activity contributed to observed land loss after hurricanes Katrina and Rita**.—Our research thrust aims to determine whether human activity contributed to observed land loss after Hurricanes Katrina and Rita, using geospatial assessment of coastal Louisiana land loss before and after August 2005. The first step in our on-going research was to obtain a copy of the USGS report, which outlines the amount of land loss that resulted in the Louisiana Wetlands after Hurricanes Katrina and Rita. Using the USGS report, we will identify the areas in the Louisiana Wetlands that experienced land loss and

link each area with its Lat/Long coordinate points. Using the most recent DOQQs images, which were taken before August 2005, we will identify the areas in the DOQQ images that experienced land loss we identified previously. Use the Lat/Long coordinate points for each area so that the area that experienced land loss can be established in each appropriate DOQQ. Once this is completed we will import the appropriate DOQQ images into GIS. Then using the LSU GIS Atlas Data for "oil and gas wells" determine to what extent oil and gas production activities were developed in the areas that underwent significant land loss after Katrina and Rita.

Phillips, E. and E. Berrera. GSU. **Charred phenolic impregnated carbon ablator (PICA) characterization**.—This report presents the analysis of the physical properties of charred phenolic impregnated carbon ablator (PICA) in relation to its performance quality. PICA is a heat shield ablator used in thermal protection systems, which allows for atmospheric reentry. Developing and improving heat shields for man-flight missions has always been a concern of NASA, especially after the space shuttle Columbia incident in 2003. In this project, the interaction between charred PICA's components, carbon fibers and phenolic resin, were evaluated through the use of stereomicroscopy, optical microscopy, scanning electron microscopy, and BET (Brunauer-Emmett-Teller) surface area analysis. The manner by which the carbon fibers are distributed among the phenolic will provide a better understanding of its density, a significant quality studied in all thermal protection systems. As a result of the experiments, it is revealed that the charred PICA sample studied is classified as surface-densified PICA, which can improve its performance in ablation without significantly increasing its entire density. In the end, this study of charred PICA at microscopic levels will open up new doors to its improvement for future space missions. This research of charred PICA is supported by Dr. Enrique Barrera, the Rice AGEP Program, and the NASA Ames Research Center.

Sanders, M., B.M. Walker and D. Hubbard. GSU. **Thermal studies of polyimides made from 2,2'-bis(p-aminophenoxy)biphenyl and aromatic dianhydrides**.—Polyimides are known to exhibit high glass transition temperatures and have been used in various high temperature applications (e.g., as military engine components). The focus of this research investigation was to prepare polyimides from the reaction of bicyclo[2.2.2]oct-7-ene-2,3,5,6-tetracarboxylic dianhydride and 2,2'-bis(p-aminophenoxy)biphenyl; and to assess their potential use in high temperature applications. our research plan included the comparison of the thermal behavior of the polymer product to that of a known polyimide formed from 3,3',4,4'-benzophenone-tetracarboxylic dianhydride and para-phenylene diamine. The polyimide products were formed using condensation polymerization and subsequent removal of excess solvent by rotary evaporation and oven curing. The characterization techniques included the use of Fourier Transform Infrared Spectroscopy, Differential Scanning Calorimetry, Thermal Gravimetric analysis, and Thermal staging. This work is supported by NASA.

Sanikommu, I., M.R. Neupane and P. Derosa. LTU. **Modeling nanoparticle doped radiation detectors using Monte Carlo simulations**.—We describe here the simulations on the relative performance of different materials when interacted with beta/gamma radiation. The main application is the design and development of small, very-sensitive and low-cost radiation detectors, with excellent spatial resolution and particle discrimination. Radiation detection is one of the main concerns for homeland security. Every nuclear activity produces radiation that

characterizes it, thus the radiation detection can lead to the identification of a nuclear activity being developed. However for concealed detection, size is very important thus novel materials are needed. A synergistic interaction between simulations and experiments is the most appropriate approach for effective design of nanotechnology-based radiation detectors. In this novel detector nanoparticles are embedded on a scintillating resin and those nanoparticles convert the incoming radiation into electrons that will scintillate the resin. The advantage of using nanoparticles is it does not attenuate the electrons produced during the interaction. Moreover, as they are smaller than the photon's wavelength, they will be virtually transparent to the photons produced in the scintillator. MC-based simulations are used for this purpose, our results show that electron-electron and photon-electron conversion efficiency is better for tungsten than for lead which was originally thought as a better choice for photon-electron conversion.

Zachary, B. and T. Dobbins. GSU. **Nanoconstituents for blast and fragmentation protection systems**.—Carbon nanotube dispersed polymers will be developed for improving the level of protection for military personnel subjected to blast and fragmentation threats. Research will be reported on the covalent functionalization of carbon nanotubes with B4C, used for ballistic protection and as armor plates.

Mathematics and Statistics Section

Beslin, S.J. and D.J. Baney. NiSU. **Floor samples**.—The speakers exhibit various applications of the greatest integer function to trigonometry, algebra, and the sciences.

Chen, Y.L. and O. Chi. LSU-BR. Y.N. Chi. UT-B. **Understanding business students' perceptions to the community: Application of place attachment theory**.—Using data collected from an environmental attitudes and behavior survey of business students (N = 157), this study examined respondents' answers, on a five-point Likert-type scale, to 11 statements regarding the community to discern patterns in individuals' preferences and to identify groups exhibiting common patterns of responses. Using the principal component analysis, these statements were condensed into two dimensions, named place dependence and place identity, related to the nature and intent of the community. Empirical results based on the K-means cluster analysis identified four groups of respondents, favoring or disfavoring various place attachment dimensions. Results of the K-means cluster analysis were tested for accuracy using the multiple discriminant analysis. The Box's M was significant and the Wilk's Lambda scores indicated that the group means were significantly different. The canonical correlation results also indicated strong relationships between the discriminant score and cluster membership. A series of Chi-square tests were conducted to identify significant differences among the clusters associated with these place attachment statements. The results of this study provide insight into the understanding of business students about concerning with the community that can be used for local environmental education program purposes.

Craciun, I. LSU-BR. **Performance analysis of Krylov iterative solvers using Ritz values**.— Even in today's simulation and modeling, solvers usually take 60-80% of run-time and storage.

Solvers used in various software frameworks suffer from both suboptimal computational and storage complexity. Suboptimal complexities of solvers prevent such a software package from being a viable tool in realistic applications. We investigate the performance of two of the most commonly used Krylov subspace solvers: full orthoganization method (FOM) and generalized minimal residual (GMRES). One interesting fact known about these solvers is that the Ritz and the harmonic Ritz values are the roots of the polynomials defined by FOM and GMRES, respectively. FOM fails and GMRES stalls when the underlying system matrix produces a zero Ritz value and a harmonic Ritz value close to infinity, respectively. We analyze the performance of these solvers as well as try to fix the arising convergence complications in the framework of the Ritz values.

Cunningham, K.A. SU-BR. **A Plancherel formula for two completely solvable homogeneous spaces**.—R. Lipsman developed a method for constructing the Penney-Fujiwara Plancherel Formula for abelian symmetric spaces and for completely solvable homogeneous spaces. However, his program makes a crucial assumption that is not valid for all completely solvable homogeneous spaces. B. Currey showed that this crucial assumption can be removed for a certain class of homogeneous spaces and that the Penney-Fujiwara Plancherel Formula can be obtained. At present, it is not clear how to construct the Penney-Fujiwara formulas for all classes of completely solvable homogeneous spaces. The speaker will consider and discuss the decomposition of representations of two classes of completely solvable homogeneous spaces. In one class, the homogeneous space g is the associated Lie algebra of an extension of the split oscillator group. It is considered with its subspace h, the Lie algebra of a nonabelian subgroup of the extension. In the other class, the homogeneous space g is the same extension, and h is another like algebra of an abelian subgroup of the extension.

Eapi, B., S Mallampati, S Bai, N. Gwee, H. Munoz and D. Moreman. SU-BR. **Mathematical modeling of the Louisiana dead zone**.—We are improving upon a model, published in 2003, for predicting the size of the summertime hypoxic region on Louisiana's continental shelf. The 2003 model assumes steady state conditions. We have shown this assumption to involve a contradiction, and so, that the model is wrong. We remove the assumption by putting time back into the initial equations of that 2003 model. This results in a pair of partial differential equations which we are studying and expanding using classical numeric approaches.

Gable, M.C. and J. Omojola. SU-NO. **Numerical solution of the predator-prey non-linear differential equations**.—The predator-prey model is a system of differential equations that models the dynamics of the interaction between two biological species in which one is a prey and the other is a predator. In this research, we numerically solve the Lotka-Volterra equations; a pair of non-linear, first order differential equations which are used to model the predator-prey problem.

Javier, W.R. SU-BR. A.K. Gupta. BGSU. **Mutual information for the skew multivariate normal distribution**.—Mutual Information for a multivariate distribution is a measure of dependence among the components of a random vector having the given distribution; it is zero when the components are independent, otherwise it is always positive. This paper derives, the formula for Mutual Information for the Skew Multivariate Normal Distribution, as a function of

the parameters of the distribution: the determinant of the variance-covariance matrix and the skew parameter.

Lu, Min. SU-BR. **The effects of outliers and extreme values on reliability tests**.—It is the researcher's responsibility to evaluate the quality of quantitative measures. Reliability testing is one type of evaluation. This study focuses on finding the effects of outliers and extreme values on establishing reliability. The effects of outliers can influence the outcome of reliability testing. In utilizing data sets with outliers, all the results show that removal of the outliers has significant effects on these tests. The presence of outliers can make reliability illusive. Therefore, before doing reliability testing, the researcher should always be aware of the power of outliers and follow up with procedures to deal with them based on different situations.

Munoz, H. and E. Walker. SU-BR. **Verification of estimated kinetic parameters applying calculus**.—This work presents the application of numerical integration and derivation formulas and regression analysis in standard methods for estimating kinetic parameters by differential scanning calorimeter based on the Borchardt and Daniels Method. Derivatives and integrals of non-equally spaced data were used to estimate the kinetic parameters of activation energy, Arrhenius pre-exponential factor, and reaction order using the Borchardt and Daniels treatment of data obtained by differential scanning calorimetry.

Pierre, E. and H. Munoz. SU-BR. **Reliability optimization with interval arithmetic**.—This work presents an interval arithmetic algorithm to solve nonlinear integer programming problems in reliability. Real interval arithmetic is based on closed intervals of real numbers and the optimization techniques use interval arithmetic versions of standard optimization techniques, such as the Newton's method, Lagrange method, Gauss-Seidel method and branch and bound method to find efficiently the optimal system reliability (or system cost) under some constraints. The effect of interval arithmetic techniques is compared with other existing methods, which are very commonly used for both the redundancy allocation problems. The results show that this interval optimization algorithm can obtain rigorously the optimal solutions in most cases.

Robertson, C. and H. Munoz. SU-BR. **Numerical analysis in kinetic parameter estimation**.— This poster presentation will highlight the application of numerical analysis techniques in the estimating of kinetic parameters for different compounds. Large data were obtained by differential scanning calorimeter based on the Borchardt and Daniels Method, and then standard methods in regression analysis, as well as numerical integration and derivation formulas of non-equally spaced data were used to estimate the kinetic parameters of activation energy, Arrhenius pre-exponential factor, and reaction order using the Borchardt and Daniels treatment of data obtained by differential scanning calorimetry. Some examples will illustrate the presentation. Supported by NSF.

Simmons, H.A. NCC. **A visual method of dealing with exponents for non-traditional students**.—Both non-traditional students and non-science majors often react with aversion to learning or re-learning scientific notation. A visual approach to dealing with exponents has decreased negative reactions to this topic. When presenting addition and subtraction of exponential numbers, the following inscribing is used: $2.0 \times 10^3 \Rightarrow 2.0 \times 10^3 + 1.0 \times 10^2$

=Δ=> 0.1 x 10^3 = answer. The change symbol reminds the student which entry is being altered. For multiplication and division, a "10 to the whatever" platform is used: (9.3 x 10^2) (2)-(-5) --- = 3.0 x 10^--- = 3.0 x 10^+3 (3.1 x 10^-5) The use of a visual "platform" and parentheses also helps the student remember to properly compare signs of numbers. This visualization process has helped students with manipulation of exponents. Each successive generation seems more and more visually oriented, so any mechanism that expresses math and/or abstract concepts in visual models will benefit both student and professor.

Taylor, P.E., U.T. Eden and E.N. Brown. GSU. **Determining an optimal stimulation threshold for an auditory midbrain implant**.—The performance of the cochlear implant, a prosthetic device that is currently used to treat many cases of hearing loss, may be affected by tumors and also movement. Previous studies have proposed that the inferior colliculus central nucleus (ICC) would be a better site for an auditory prosthesis. Here, the brain would be directly stimulated leading to a better restoration of hearing abilities and an increase in performance. Determining the optimal stimulation magnitude is important in the design of such a prosthetic. We propose that point process neural models can determine statistically significant auditory thresholds, using appreciably less spiking activity than previous methods. By applying the theory of Poisson processes and generalized linear models (GLM), we developed a better model for threshold detection that suggests that smaller stimulation intensities lead to significant spiking in primary auditory cortex (A1). Now that designs have been made for an ICC implant, the need for the stimulation threshold is actively approaching. Our results provide insight on how to develop a more sensitive auditory prosthesis that can be used to restore hearing to its natural level.

Physics Section

Doomes, E.E. and E.H. Walker. SU-BR. **XAS of manganese-doped oxides**.—This experimental work is preliminary and exploratory in nature. Lanthanum oxide and strontium oxide nanoparticles have applications in fuel cell materials. A large amount of empirical data has been assembled on these systems, but the mechanisms that govern their operation remain poorly understood. We present details of the low-temperature synthesis and x-ray absorption characterization of manganese-doped lanthanum oxide nanoparticles and manganese-doped strontium oxide nanoparticles in powdered form as well as gels. Initial assessments of the relationships between preparation method, particle size distribution, and chemical properties are presented. X-ray absorption spectra were recorded at the Double Crystal Monochromator beamline at the J. Bennett Johnston Center for Microstructures and Devices. X-ray spectra were obtained at the manganese K-edge and lanthanum LIII-edge in fluorescence mode as well as in transmission. The incident beam intensity and transmitted beam intensity were measured using an ion-chambers filled with air. Samples and the detector were placed in the standard 45° geometry for fluorescence measurements. A liquid nitrogen cooled Canberra 13-element Germanium detector was used to record the fluorescence data.

Franklin, L., H. Jin, G. L. Zhao and D. Bagayoko. SU-BR. **Predictions of the electronic structure and related properties of zinc-blende calcium hexaboride (CaB_6)**.—We present theoretical predictions of the electronic structure and related properties of calcium hexaboride

(CaB_6) in zinc-blende structure. Our nonrelativistic calculations employed the local density functional approximation (LDA) and the linear combination of atomic orbital's (LCAO) formalism that implemented the Bagayoko, Zhao, and Williams (BZW) method. The BZW procedure avoids a recently identified spurious effect which has been instrumental in successfully reproducing or predicting the band gaps of numerous semiconductors. This effect, inherent to the use of basis sets in variation calculations, has plagued ab-initio calculations of electronic properties of semiconductors since their inception. This work was funded in part by the Department of the Navy, Office of Naval Research (ONR, Grant Nos. N00014-05-1-0009 and N00014-4-1-0587), NASA (Award Nos. NCC 2-1344, NAG 5-10253, and NNG 05G146G), and the National Science Foundation (Award No. HRD 0503362).

Jin, H., G.L. Zhao and D. Bagayoko. SU-BR. **Electronic structure and related properties of rutile TiO_2.**—We report results of our ab initio, self-consistent calculations of the electronic structure of rutile TiO_2. Our non-relativistic calculations employed a local density approximation (LDA) potential and the Bagayoko, Zhao, and Williams (BZW) implementation method of the linear combination of atomic orbitals (LCAO). Our preliminary, calculated band gap of 2.66 eV is in a much better agreement with the experimental value of 3.0 eV than previous LDA findings that underestimate it by 30 to 50% or more. We discuss the calculated densities of states. The d and p orbitals of Ti and O atoms in the solid were found to be fairly hybridized. This work was funded in part by the Department of the Navy, Office of Naval Research (ONR, Grant No. N00014-05-1-0009), NASA (Award Nos. NCC 2-1344 and NAG 5-10253), and by the National Science Foundation (Award No. HRD 0503362), though the Louis Stokes Louisiana Alliance for Minority Participation (LS-LAMP).

McGuire, S.C. SU-BR. **Merging physics research and pre-service science teacher preparation**.—In this talk we provide an overview of our program of pre-service enhancements to the introductory physics course sequence that forms part of the K-12 science education curriculum at Southern University. This initiative is part of the ongoing collaboration in physics and science education between Southern University and A&M College (SUBR) and the Laser Interferometer Gravitational-wave Observatory (LIGO). Examples of course enhancements based upon classical LIGO science concepts will be presented and discussed. Supported by NSF Grants No. PHY-0101177 and PHY-0355471.

Stevens, C.S. SU-BR. E. D. Black. CIT. **Effect of ring dampers on thermal noise in LIGO TNI**.—While the current generation of LIGO detectors is operating, a large community is actively developing advanced detectors that will greatly improve on the range and sensitivity of existing detectors. In order to build these advanced detectors, significant technical challenges must be overcome; two of which involve thermal noise and parametric oscillations. Ring dampers made of copper are expected to decrease parametric instabilities in the cavity by lessening the vibrational mode Q's of the mirror. Thermal noise of the mirrors, which is a significant part of the noise budget, may increase due to the placement of these copper rings. The ring dampers are tested on an output mirror of one of the optical cavities in the Thermal Noise Interferometer (TNI). Initial results show that the rings are reducing the Q's but cause broad peaks in the displacement noise near 1.2 kHz.

Yang, S., G.L. Zhao, D. Bagayoko, J. Tang and Z.J. Wang. SU-BR. **Ab initio calculations of the electronic structures of controlled doping of C60 semiconductors**.—Controlled doping of C60 based nano-semiconductors presents an effective method of tuning the electronic properties of these materials for future electronics applications such as high efficient thermoelectric material design. We report our studies on ab initio density functional calculations of the electronic structures of several selected n- and p-type doped C60 semiconductors. We utilized a super-cell approach that includes 240 carbon atoms and a doping atom in the calculations. We performed a series of ab initio density functional computations to study the systematically changes of the electronic properties of doped C60 semiconductors, at the doping level of 1:60 and 1:240. We found that aluminum and boron doped, face-centered cubic (FCC) C60 solids have the electronic structures of n-type semiconductor. Nitrogen doped FCC C60 solid has an electronic structure similar to those of a p-type semiconductor, with shallow impurity energy levels near the top of the valence bands of the host material. On the other hand, phosphorus doped FCC C60 solid exhibits electronic properties of an n-type semiconductor, with the impurity energy levels near the bottom of the conduction bands of C60 solid semiconductor.

Young, C.H., K.E. Young and V. Popo. NiSU. T.Y. Bourke. HU-SCA. N.J. Evans. UT-A. **The protostars of Lynds' Dark Nebula 1221**.—In the past several years, our knowledge of star formation has exploded because of new observations from the Spitzer Space Telescope. We present observations of Lynds' Dark Nebula 1221, an isolated star-forming core that is forming, at least, three low-mass stars. The observations span 3.6 to 70 micrometers, and we show data from Earth-based, (sub)millimeter telescopes as well. The new infrared observations reveal two new protostars, which were previously unknown, outflow cavities, and a possibly displaced protostar. In addition, by modeling the transfer of radiation through the dark nebula, we can estimate many of the physical parameters describing this star-forming system. We show that two of the protostars, while coeval and forming in very similar environments, are distinctly different. One of these protostars is possibly forming a substellar object. This work is supported by a LaSPACE Research Enhancement Award.

Division of Science Education

Higher Education Section

Doucet, J.P. NiSU. **Exploring the linear geography of eukaryotic genes: A non-tech bioinformatics strategy**.—The National Center for Biotechnological Information (NCBI) maintains enormous worldwide databases of genetic sequences, complete with feature annotation and established sequence-searching tools. Searching these databases and studying gene features has proven an effective strategy in teaching classroom students about real (not symbolic) eukaryotic gene structure. Annotation complexity and file length in the age of whole genome sequencing, however, has rendered searching, reading, and understanding nucleotide sequence files daunting, even to the professional investigator. I have developed a series of word-processor based files of invented nucleotide sequence into which a number of eukaryotic gene landmarks (promoter, exonic, repetitive, polyadenylation sequences) can be cut and pasted at appropriate relative distances. Students search these single-page files manually to predict the complete structure of an embedded gene, simulating what script-editing software accomplishes noninstructively online. These exercises (i) are manageable within the time-frame of a single laboratory session, (ii) eliminate time normally spent scrolling for gene features during computer-based bioinformatics exercises, (iii) can be undertaken more easily by groups of students than similar exercises from a computer screen, (iv) concentrate on the lesson and not computer navigation and (v) have proven effective in teaching students gene structure.

Doucet, J.P. NiSU. B.J.B. Keats. LSU-HSC. **Genetics and Louisiana families: A comprehensive web-based instructional and professional resource**.—For the past two centuries, Louisiana has served as the sanctuary of multiple immigrant groups. These groups thrived in insular settlements and established strong cultural ties based on extended families and their geographical vicinity. Remnants of such settlements present clinically as rare, heritable diseases. In a state with a large and medically underserved rural population, it is imperative to educate families about genetics, heritable disease, transmission risks, and avenues of treatment. For these reasons, we have created the definitive instructional resource for genetics in Louisiana, the online reference titled Genetics and Louisiana Families. We have previously reported features of the inaugural edition of the website, and here we focus on improved and new features. The reference contains articles written by the foremost experts on genetics disorders among Louisiana families, together with other useful information. The informativeness of these articles is suitable for use by patients, health care providers, and educators. The site is available without subscription or registration and will be continually updated. Supported by HRSA Office of Rural Health Policy Grant No. 2D04RH00136-03.

Omojola, J.O. SU-NO. **My professor is smart but cannot teach**.—The number one complaint of many college students is that their professors cannot teach. This cry is especially very rampant in mathematics and the sciences. Somehow, these students also know that their college professors know their material very well. Consequently, there is a gap between the college professors' academic mastery and the ability to communicate the information to students in a way they can understand. This presentation will address some of the issues at stake and make recommendations towards improvement in communication skills of college professors.

Pugh, A., J. Washington, M. Beutner and M. Johnston. ULM. **The effects of peer teaching on science achievement of elementary preservice education majors**.—With new requirements from NCATE, it was necessary to determine the extent of basic science knowledge learned by elementary preservice candidates. For the fall 2006 semester, 21 professional block students were required to give a pre and posttest for the peer lessons they taught in class. The four areas assessed were: 1) magnetism, 2) animal/plant life, 3) solar system, and 4) human body. The group administered the pretest, taught the lesson, and then administered the posttest approximately 45 minutes later. Each group was then required to aggregate the data for determining gains of knowledge. Results indicated percentage gains made for each group.

Plaisance, D.V. SU-BR. **A study of mathematics anxiety in preservice elementary teachers after completion of a problem solving and number sense mathematics course**.—Five preservice elementary teachers, who had completed a mathematics content course in problem solving and number sense within a year, participated in individual interviews to determine their views about mathematics and their mathematics anxiety. Participants self-reported their level of mathematics anxiety before and after the course. Interviews were conducted with five students who reported a reduction of mathematics anxiety. All participants stated that their feelings about mathematics changed in a positive way during the semester enrolled in the course. In general, students believed their feelings changed because they had a better understanding of mathematics as the course progressed. Most participants indicated that the mathematics content course was different from previous college mathematics courses taken because it was hands-on and was more explanatory. In the continuing effort to produce knowledgeable and enthusiastic elementary mathematics teachers, it is imperative that university instructors of preservice teachers make themselves aware of what can be done to transform preservice elementary teachers who simply tolerate mathematics into in-service elementary teachers who are able to successfully transfer knowledge of and enthusiasm for mathematics.

Reese, T.L. SU-BR. **Using blackboard to facilitate homework**.—It is well known that doing homework improves students understanding of the material that is being taught and instructors assign homework with this knowledge in mind. However, it is not uncommon for a teacher to receive homework assignments that are exact copies of each other. This happened regularly in my physical science class when I assigned written homework. In an effort to overcome this problem I adapted the Blackboard testing system for homework assignments. The Blackboard testing system allows the instructor to create a quiz which the students take over the internet. In this method the students are given an assignment containing ten problems and are given ten days to work them out. A quiz is created on Blackboard containing five of those ten problems and five multiple choice and short answer questions from the notes. The students are given ten days to take this quiz before it goes off. After completing the quiz the students are given their grade and which answers were correct and which ones were wrong. The Blackboard system randomizes the questions and answers making it harder for the students to copy answers directly as indicated by three years of data.

Rusin, D. BRCC. **Peer-led team learning (PLTL)**.—The Peer-Led Team Learning (PLTL) model is an effective proven model for enhancing the learning of science at the undergraduate level. PLTL utilizes the workshop format to create an active and participatory learning

environment for students that takes them beyond the limitations of the traditional lecture mode of presenting concept. In weekly two hour Workshop sessions, under the leadership of peer leaders, students work together cooperatively through the struggles, frustrations, joys and satisfaction of problem solving. Students learn to take ownership of the class materials by using the language and ideas of science through focused discussions with their peers. Workshop leaders are students who have done well in the course previously and have been trained to be leaders. This model is extremely powerful because it benefits students and faculty alike. For students, it increases their enthusiasm for study and increases their success in the course. Peer Leaders grow and gain valuable experience from working with faculty and guiding others through a difficult course. This model allows community building between peer leaders, students and faculty and permits faculty to be creative and innovative in teaching because there is some release from the restraints of the traditional lecture mode of course delivery.

Stephens, K. and E. Zenon. BRCC. **Facilitating access for science student success (FASS2)**.—Facilitating Access for Science Student Success (FASS2) is a comprehensive project that will enhance the quality and scope of learning experiences for BRCC students pursuing degrees in the Associate of Science Program. The purpose of FASS2 is to develop and implement an innovative and collaborative student-centered learning environment that integrates both academic and student support systems into a holistic infrastructure to promote student learning, raise retention rates in critical science courses, increase persistence and completion of degree programs and promote student success. The FASS2 Programs include (1) Peer Led Team Learning (PLTL) Workshops in Chemistry, Biology, Physical Sciences and Mathematics, (2) Content Specific Learning Modules Incorporating Problem-Based Learning, (3) Non-traditional Instructional Delivery, (4) Peer and Faculty Mentoring Programs, and (5) Monitoring and Intervention Activities.

Stevenson, L.H., W. Dees, N. Kiritsis, E. Stevenson and E. Davison. McSU. **STEM education initiative at McNeese State University**.—McNeese State University is the lead institution in a multi-school initiative to enhance education in the science, technology, engineering, and mathematics (STEM) disciplines. The initiative is funded by two grants from the NSF: Com-STEM, Community- Based STEM Education Initiative, and E-STEM, Engagement in the Science, Technology, Engineering and Mathematics Disciplines. McNeese is partnered with Louisiana State University at Eunice and Lamar State College-Orange (Texas). The institutions organized a proactive, systemic approach to STEM education. All STEM majors with less than 90 credit hours are eligible to participate. The effort starts with recruiting at the high school and community college levels using a small number of one-semester scholarships. Students electing to participate are engaged in a plethora of relevant activities designed to enhance academic excellence and student success. Continuing financial support is dependent on performance in a competitive program based on grade performance while pursuing a full-time class schedule, interactions with other students and faculty, accessing mentoring and tutoring services, and other related activities. During the fall 2006 term, the second full semester of the program, 216 enrolled and of that number 56 received financial supports based on performance as determined by the Academic Excellence Reward Formula.

Washington, J., A. Pugh, M. Johnston and M. Beutner. ULM. **The effects of peer teaching on the mathematics achievement on preservice elementary education majors**.—Mathematics is integral in our lives. Elementary school teachers play significant roles in students' mathematical development. Just as elementary school teachers assess their students' growth in understanding mathematics, preservice teachers' mathematics growth is also assessed. The purpose of this study was to investigate the effects of peer teaching on the mathematics achievement of preservice elementary education majors, as determined by pretest and posttest scores. During the fall 2006, 21 students developed and administered pretests and posttests for the peer lessons that they taught in class. The four strands assessed were: (1) Algebra, (2) Geometry, (3) Measurement, and (4) Data Analysis and Probability. Then each group aggregated the data for determining gains of knowledge. Results indicated percentage gains made for each strand.

Wilkerson, D.E. and V.M. Mbarika. SU-BR. **Information technology in distance learning for resource poor nations: The case of the African virtual university in Kenya**.—Sub-Saharan Africa (SSA) lags behind the rest of the world in education. Less than 25 percent of qualified high school graduates in this region will not make it to the university because most countries within the region have less than three universities. This calls for academic research albeit strategies to address the education dilemma in SSA countries such as Kenya. In this study we investigate the case of a wide spread TeleEducation initiative in Kenya, the African Virtual University (AVU). The objectives of AVU are: 1) To use modern telecommunication technology (including satellite TV technology), 2) To demonstrate that such a project can be successfully implemented in various African countries, 3) To sustain itself after the discontinuation of donor funding, 4) To upgrade the quality of teaching in African countries in mathematics and science, 5) To demonstrate that diverse communities can easily adapt to modern technology, and 6) To increase participation of women in science and engineering. The first prototype service has been implemented within Kenyatta University in Kenya. In this paper, we also discuss AVU's challenges as well as strategies used to overcome these challenges. We conclude our study with implications for research and practice.

K-12 Education Section

Bagayoko, D. SU-BR. **Concept maps for mastering AP and introductory college physics – mechanics**.—We recall some recommendations of educational reform blueprints. We underscore a key lesson that was missed by reports of the Trends in International Mathematics and Science Study (TIMSS) to underline the need for applying "less is more" or "More in less" to the design of both curricula and lesson plans. We review the empowering procedure of cognitive or structured condensation for implementing "More in less." We discuss illustrative concept maps in Advanced Placement and introductory college physics, i.e., mechanics. By explicitly engaging the rational powers (thinking skills) in the construction of these maps, cognitive condensation promotes not only the reinforcement of "habits of mind" germane to the practice of science, but also ensures the transfer from short term to long term memory, a critical step in the development of "expertise." These illustrative concept maps are not only applicable to the teaching and learning of Advanced Placement mechanics courses at the pre-college level, but also to those of introductory college mechanics – for both calculus and non-calculus based courses. This work is

Robinson, D.I. SU-BR. **Informal learning in science and mathematics education through television based activities**.—The use of television as a medium to actively engage students in learning has been strongly supported by proponents of informal learning. What could be more motivational than turning students into super sleuths to learn scientific principles and mathematical applications? Stakeholders will learn about activities that can be used in math/science classes based upon popular television shows such as Crime Scene Investigations (CSI), Numb3rs, and Survivor. These activities will help improve critical thinking by reinforcing skills of observation, experimentation, and logical thinking in math/science real world applications.

Sangaré, S., K. Konaté, U.B. Mali and D. Bagayoko. SU-BR. **Modeling and analysis of average air temperature of the GLOBE program and applications to teaching and learning science**.—Global Learning and Observations to Benefit the Environment (www.globe.gov) is an international, environmental and earth science education and research program that involves more than 10,000 schools in over 100 countries. Students in these schools, under the supervision of trained teachers, regularly collect atmospheric, hydrology, soil, and biometric data that are reported in a large, web-driven database. We present modeling results of the average daily air temperature data at several schools around the world. Using the software product GraphPad, we performed four-parameter fits of the average daily air temperatures at the selected schools to the function $T(OC) = Asin(?t+?) + B$, where A, ?, ?, and B are the four parameters and T is the temperature. Our analysis shows that the GLOBE data not only reproduce well-known facts of physical geography, but also identify peculiar phenomena like El Niño! We discuss applications of this work in promoting "the practice of science" by pre-college and college students alike. Acknowledgment: This work is funded in part by NASA (Award No. NNG 05G146G), through Iowa State University (ISU), and by the National Science Foundation (Award No. HRD 0503362), through the Louis Stokes Louisiana Alliance for Minority Participation (www.ls-lamp.org).

Thompson, J. H. and C.C. Crockett. SU-BR. **Supporting the Louisiana comprehensive curriculum with educational multimedia.**—This presentation will discuss modalities for using the Multimedia Resource for Learning and Online Teaching (MERLOT) digital repository to support the Louisiana comprehensive curriculum (LCC). Modalities include the creation of interactive concept map linking the thematic units of the LCC to relevant resources selected from the repository and the use of social software such as weblogs (blogs) and Wikipedia to facilitate interaction and the creation of a Community of Practices.

Division of Social Sciences

Ali, S. B. and L.B. Lewis. LU-NO. N.P. Couch. LSU-BR. **Differences in creativity and symbolic thinking among Catholics, Protestants, and Muslims**.—Greeley (2000) cites evidence that people's subjective ratings of creativity vary across religious traditions. Specifically, he found that Roman Catholics judged themselves more creative than Protestants and attributed the differences to the higher presence of symbolism in the Catholic tradition. The present research further evaluates this claim by adding objective measures of creativity and symbolic cognition along with subjective self-ratings in a sample of Catholics (n=30), Protestants (n=14), and Muslims (n=14) . To further expand Greeley's work, we included Muslims to evaluate the effects of another highly symbolic but separate religious tradition on creativity and symbolic thinking. On the objective tasks, results showed that Catholics (63%) and Muslims (60%) were more likely to perceive a human face in an ambiguous picture than Protestants (43%). On a symbolic coding task, Catholics were both faster and more accurate than Muslims or Protestants. Furthermore, in a complex pattern completion task, Catholics (30%) and Muslims (28%) were more likely to successfully complete three out of five items than were Protestants (7%). Subjectively, Catholics (57%) were more likely to report sophistication in art, music, and literature than Protestants (42%) or Muslims (21%). These results suggest that there is a link between religious background and performance on symbolic and creative tasks.

Armah IV, N. and W. Arp. SU-BR. **The state of black collegiate America: A pilot study on black college students at Southern University and Louisiana State University**.—The purpose of this exploratory study was to examine the socio-economic differences between African American students attending Southern University and A&M College at Baton Rouge (an Historically Black College and University, HBCU) and those attending Louisiana State University in Baton Rouge (a predominantly white institution, PWI) and the students' perceptions of their academic abilities and quality of their educational experiences. Research suggests that students attending predominately white higher education institutions have a false perception of their academic abilities and believe that they have superior social status when compared to students attending HBCUs (Fleming, 1999). To examine students' perceptions of self-status, the study surveyed 100 African American students attending SUBR and 100 students attending LSU. Regression analysis using Pearson Product Moment Correlation coefficient was conducted to determine the relationship between the perceived quality of the educational experiences of students attending the HBCU, the PWI and family income. Preliminary results indicated a weak association between income and perceived status. African American students with higher income were more likely to believe that the educational experiences and career preparation provided at PWIs were superior to the quality of education provided by HBCUs. This project was supported by a Ronald E. McNair Grant from the U.S. Department of Education.

Brown, T. and R. Rackley. SU-BR. **The relationship between HIV/AIDS knowledge, misperception of HIV/AIDS transmission and risk behaviors among African American college athletes**.—The purpose of this study was to examine how lack of knowledge within the African American collegiate athletic community may lead to misconceptions about HIV/AIDS, which contribute to risky sexual behaviors and increased the risk for contracting HIV/AIDS. In

the U.S., African Americans compose only 13% of the U.S. population (Rathus, 2006). However, African Americans make up approximately 41.8% of people living with HIV/AIDS. It was hypothesized that athletes have the misconception that they are not susceptible to contracting sexually transmitted diseases to include HIV/AIDS because of perceived susceptibility. An exploratory study of African American athletes revealed that those with high levels of HIV knowledge regarding AIDS transmission engage in more risky behaviors and use condoms when having sexual intercourse. African American college athletes with more HIV misperception regarding AIDS transmission engage in less risky behaviors when checking their sexual partner history before sexual intercourse. Males and upper class African American college athletes were more at risk of using alcohol and drugs. Upper class and African American college athletes in committed relationships consuming ecstasy pills before engaging in sexual intercourse, and African American college athletes with high HIV knowledge had high levels of misconception of HIV transmission. This project was supported by a Ronald E. McNair Grant from the U.S. Department of Education.

Christian, O.G. SU-BR. **The social and political ecology of Louisiana: 1900-1930**.—The objectives of this study were: (1) to define, measure and locate aspects of the state's socio-ecological context, and (2) to measure statistically the effects of socio-ecological context on parish level voting behavior in the state of Louisiana sixty-four parishes. The period under investigation covers 1900-1930. The technique of factor analysis was applied to seven variables common to the periods in question and four dimensions emerged for each of the four decades. Two dimensions were common to all time periods. These were: (1) Educational Deprivation and (2) Rural-Native. The other dimensions not common across the four-decade modes were labeled: (3) Black Population, (4) Population Change, and (5) Farms. The total percent of variance explained by each application of the technique was rather high, ranging from 81.1 percent to 83.9 percent. The technique multiple regression analysis determined the contribution that the separate decade factorial dimensions made to an explanation of parish voting behavior in Louisiana. The multiple regression analysis determined the contribution that the separate decade factorial dimensions made to an explanation of parish voting behavior in Louisiana. The multiple regression analysis was applied to fifteen gubernatorial elections and it was found that a significant amount of the variance was explained. The 1920 data set showed explained variances ranging from 44.7 percent to 50.8 percent. Both the 1900 set of elections and the 1930 set had only one significant R^2; the 1910 set had none. The strongest independent predictors for these elections were (1) Population Change, (2) Educational Deprivation, (3) Black Population, (4) Farms, (5) Rural-Native. The strongest of all of the predictors was Education Deprivation, which was the best predictor four times in the 1920 data set. The research of this study has depicted a social-ecological environment of the State of Louisiana, which is fairly stable over the period under investigation. The test of the relationship between the ecological environment and voting behavior has shown the utility of such an approach to understanding the variation in Louisiana's voting behavior.

Corrigan, G.E. CL. **A stable etiological classification of autopsy death in Baton Rouge**.—The author demonstrates a relatively stable classification in the autopsy study of public death. It demonstrates an unchanging manner of death permitting predictions of future events and conditions. Other populations demonstrate similar characteristics. The utility of the classification

in classifying social groups is discussed and analyzed. Related scientific papers on natural selection and mortality laws are presented.

DeCou, D.D. SU-BR. **An evaluation of racial and social class as predictors of standardized test scores**.―Research suggests that a relationship exists between race, SES, and standardized test scores (Hedges and Nowell 1999). While studies have examined these factors regarding other standardized tests such as the ACT and SAT (Dreger and Miller 1960), little research has been conducted assessing the relationship between income and performance on the LSAT. This research examined whether racial and social classes are predictors of test scores, and evaluated the differences between Blacks and Whites. The research hypothesized the existence of a positive relationship between race, class, and LSAT scores. It also hypothesized that no differences would be found between the relative performance on the LSAT of high income Blacks and Whites. The study collected data from students enrolled at the S.U. Law Center. No significant differences were found between the performance of high income Whites and Blacks on the LSAT. The correlation analysis revealed no significant differences between racial class and LSAT scores (r (73) = .002, p = .984) and no differences between racial class and LSAT scores (r (72) =.168, p=.159). This project was supported by a Ronald McNair Grant from the U.S. Department of Education.

Duncan, E., R. Perine and H. Perry. SU-BR. **An analytical evaluation of parental involvement and its subsequent impact on the sexual behavior of their offspring**.―The purpose of this research was to identify factors associated with risky sexual behaviors in African American college students enrolled at a major African American university in the South. The study examined the relationship between family structure and likelihood of students engaging in risky sexual behavior. Understanding of these factors may aid in the development of interventions targeting HIV/AIDS on college campuses. Research suggests a relationship between parental involvement and sexual behavior. While the correlation between sexual behavior and family structure has proven to be confounding, this research assessed the relationship between student evaluation of the level of parental involvement and parenting practices and their self-report level of risky sexual behaviors. The research hypothesized a negative correlation between high levels of risky sexual behavior and perceived level of parental involvement. Data for this survey were collected by surveying 70 students attending Southern University and A&M College during the summer of 2006. Items used from this scale required yes/no answers (0=no and 1=yes). The total score could range from 0 (low RSB) to 7 (high RSB). Family Process Questions was used to measure parental involvement. It is a 4 item, 3-point Likert scale (0=Never to 3=we talk about it a lot). Total score could range from 0 (low parental involvement) to 12 (high parental involvement). No significant differences were found between students' perception of parental involvement and risky sexual behavior. Additional research is needed using a more valid and reliable measure of parental involvement. Sexual attitudes toward condom use was used to measure risky sexual behavior. This project was supported by a Ronald E. McNair Grant from the U.S. Department of Education.

Ellis, J. and T. Sheets. LTU. **The relationship between a dual-task assessment, general cognitive ability and personality**.―While research has generally supported the relationship between cognitive abilities and job performance, very little research has investigated the role of

increasing cognitive load within this relationship. Le Pine et al. (1999) found that an unexpected change in a task with heavy cognitive load was significantly related general cognitive abilities as well as other personality factors (e.g., openness and the six subfactors of conscientiousness). The purpose of this study is to examine the relationships between cognitive ability, dual-task performance and the personality factors of openness and conscientiousness. Cognitive ability will be measured using the Raven Standard Progressive Matrices test. The dual-task assessment will consist of using two computer tasks that run simultaneously. The first is primarily a vigilance task that requires the subject to track a moving dot in a frame on the screen and prevent it from hitting the bottom of the frame. The second task is a Stroop-type task which will require the subject to respond when a target word/color appears. The personality factors of conscientiousness and openness will be measured using the International Personality Item Pool (IPIP). Scores from all measures will be correlated and examined for interaction effects.

Igiede, A.I. SU-BR. **Reevaluating sciences: Isn't sociology a superior science**?—Since the middle of the 19th century, social sciences and natural sciences have been competing for preeminence. While both camps continue to gain recognition for their pragmatic and ideological contributions to modern societies, the active paradigms of their nature has polarized rather than uniting them. As Thomas Kuhn pointed out, the paradigm whose supporters control the most important journals in a field will likely gain preeminence; paradigms whose adherents lack access to prestigious outlets will be diminished in importance. The most important question currently in the literature is why has "Hard Science" been used to describe natural sciences and "Soft Science" to describe social sciences. In this forum, I intend to re-evaluate the relationship between natural and social sciences by demonstrating that each has a scientific aim to pursue objective, empirical research and ascertain knowledge. In addition, just because people wear long coats with chemical spray on them does not make them more scientific.

Jacobs, K. and J. Freeman. SU-BR. **The impact of political empowerment on municipal employment and sociopolitical attitudes.**—The purpose of this research is to identify the impact of political empowerment on municipal employment and sociopolitical attitudes in the city of Houston, Texas. Research suggests there is a positive relationship between black political empowerment and policy outcomes for African Americans. This research builds on this extant research by examining the relationship between African American empowerment, municipal employment for African Americans, and sociopolitical attitudes by race in Houston. The impact of black political empowerment on African American municipal employment and sociopolitical attitudes is examined during three mayoral administrations over a 14-year period from 1991 to 2005.The research study hypothesizes that black political empowerment (operationalized as having an African American mayor) is positively associated with increased municipal employment for African Americans and blacks having more trust in government, feeling more efficacious about government, and exhibiting greater levels of political knowledge as opposed to when the mayor is not African American. The data that will be examined for this research consists of voter turnout by race, municipal employment and by occupational categories broken down by race and gender. Data on the sociopolitical attitudes of political trust, political efficacy, and political knowledge will be obtained from surveys of mayoral approval and political attitudes conducted by political scientists at the University of Houston. This project was supported by a Ronald E. McNair Grant from the U.S. Department of Education.

Jefferson, E. and O.G. Christian. SU-BR. **An exploratory study of the effects of hurricane Katrina on selected families in a rural Louisiana community**.—This exploratory study investigates the impact that Hurricane Katrina had on rural adults who were care-givers to evacuees from Orleans Parish. This investigation revealed that adult care-givers experienced difficulty in coping with the depression, anxiety, grief, guilt, and loss of the evacuees from New Orleans, Louisiana. Personal interviews were conducted in Iberville Parish, Louisiana.

John-Baptiste, M. and R. Rackley. SU-BR. **The relationship between African self-consciousness, self-esteem and African American college students' use of the "N" word**.—The purpose of the study was to examine the relationship between African Self-Consciousness (ASC), self-esteem and use of the "N" word among 60 African American College students enrolled in an African/Black Psychology class at Southern University and A&M College (SUBR). The research hypothesized that African American college students' use of the "N" word would decrease after enrollment in an African/Black Psychology class. Pre- and post-test scores were compared. When comparing students, data analysis revealed a significant difference between students objecting to using the "N" word and scores on the ASC scale. Students with higher ASC scores were more likely to object to use of the "N" word. A repeated measure design also showed a significant interaction difference for students with high levels of ASC and their perception of the "N" word. After completing the class, students with high ASC perceived the "N" word as both a term of endearment and an insult. Students with low ASC perceived the "N" word a term of endearment. No differences were found between students' level of self-esteem and negative perception of the "N" word. In addition, there were no significant differences between gender and perception of the "N" word. This project was supported by a Ronald E. McNair Grant from the U.S. Department of Education.

Lawrence, A.J. SU-BR. **The theory of the glass plate: A revisitation of a DuBoisian concept**. —Although W.E.B. DuBois' The Philadelphia Negro: A Social Study (1899) and The Souls of Black Folk (1903) are among the most recognized classics in American sociology; the Glass Plate Theory is rarely mentioned. The author presents the theory consistent with, and harmonious to the presentation by Dr. DuBois himself. The focus is on inter-group relations dynamics and post reconstruction America. Explication of the theory reveals DuBois' observation of the complex social process, and the prevailing ideologies in the American social system. Special attention is given to United States Supreme Court cases germane to the issue of race and caste. A critical instrument utilized by the writer was Dubois' idea of Double Consciousness, propounded in 1877. This work traces the apparent modification of that concept. Additionally, the paper reveals the implication of the present study for general race relations as well as the general influence of DuBois on the contemporary social science theory.

Liou, H.M. and H. Albert. SU-BR. Y.N. Chi. UT-B. **Understanding psychological distress symptoms of Baton Rouge Chinese residents: A preliminary analysis**.—Little empirical data is available regarding Chinese residents' psychological wellbeing and adjustments to the new living environment in the United States. Especially, the mental health field of Chinese residents has received little attention from researchers. The purpose of this study was to understand the psychological distress symptoms of current Chinese residents in Baton Rouge, Louisiana, measured on a Likert-type scale based on the five-question Mental Health Inventories (MHI-5)

and the Hospital Anxiety and Depression Scale (HADS). They were chosen because these two self-administered questionnaires can be used to screen for psychological distress symptoms. Empirical results showed that respondents held positive mental health situations based on the mean MHI-5, HAD-A and HAD-D scores. Empirical results also found that there were no significant gender and age effects on the psychological distress symptoms. Results of this study may provide insight into the understandings of Chinese residents' psychological distress issues that can be used to frame scenarios for Asian Americans' mental health treatment purpose.

McGee, B.B, V. Richardson, A. Thornton and C. Johnson. SU-BR. J.M. Gossett, K. Kim, K. Bardell and P.M. Simpson. ACHRI. M.L. Bogle. DNIRI, USDA-ARS, SPA. **Attitudes and beliefs affect frequency of eating out in the lower Mississippi Delta**.―Attitudes and beliefs reflecting cultural values can have a positive or negative influence on eating behaviors. Eating out may negatively affect diet quality. In a representative sample of the lower Mississippi Delta (LMD) consisting of 1601 African Americans (AA) and Caucasian (C) adults, the aim was to show that the frequency of eating out was lower in those that had a better attitude to diet in addition to cultural and socioeconomic differences. A comparison was made of those who thought it was important to practice five healthy eating guidelines to those who did not think it was important. The study found that those who thought it was important to eat plenty of fruits and vegetables ($P<0.001$), consume adequate fiber ($P<0.005$) and eat 2 servings of dairy daily ($P<0.05$) eat out less often. Using regression modeling with frequency as the outcome, religiosity, income, education, gender, food security, knowledge, and age as independents, it was shown that all but religiosity, food security and education were significant. Being younger, white or male or having a lower income or better attitude resulted in eating out less. Previous findings showed that diet is poorer in those with lower income and education, and in food insecure households. This suggests that it is not just how often people eat out but where they eat out. Sensitivity to the beliefs and attitudes is important when planning effective nutrition interventions. Supported by USDA, ARS Project # 6251-53000-003-00D.

Ngnitedem, M.A. and V.W. Mbarika. SU-BR. **Global diffusion of the Internet: The Internet in Rwanda**.―We use the Global Diffusion of the Internet (GDI) framework to examine Internet diffusion in Rwanda along six dimensions: Pervasiveness, Geographical Dispersion, Sectoral Absorption, Connectivity Infrastructure, Organizational Infrastructure, and Sophistication of Use. Internet was launched in Rwanda in 1996 with the help of the USAID Leland initiative. Until 2001 Rwanda had only one Internet Service Provider (ISP) offering Internet services through dial-up, which causes Internet diffusion to grow at a very low rate. In 2001, following the award of two more ISP licenses to private-owned companies, growth picked up some speed. However, it was not until 2004 when the privatization of Rwandatel* to an American company brought in heavy investments and higher technology that a significant Internet penetration growth actually started. All in all, we found that Internet growth in Rwanda is hampered by three factors namely the shortage of qualified and experienced human resources to support the growth, the lower level of private sector involvement, and the lack of persistent and consistent regulation in the telecommunication sector to ensure reliable, affordable and consistent services. In the meantime we found the existence of three major factors that point to a promising future for Internet diffusion in Rwanda namely the elevation of Internet to the national strategic level, a strong and higher political will and a strong support from multilateral and unilateral donors.

*Rwandatel is the Rwanda national telecommunications company that owns and operates telecommunications infrastructure in Rwanda.

Norwood, W. and J. Freeman. SU-BR. **A content analysis of Black Americans and their exclusion from the superhero genre**.—The purpose of this research was to characterize the depiction of African Americans in comic book literature through an historical assessment of African Americans in this genre. Utilizing content and historical analysis, the study assessed the progression of African Americans in comic books from obscurity to their roles in mainstream comic book media. The study also examined the relationship between the treatment of Blacks in America from 1930 to 1960 and their portrayal in comic books during the same period. The evolution of Blacks in comics was tracked by utilizing data from www.blacksuperhero.com to find a listing of Black superheroes from the two biggest comic producers, Marvel and DC comics. Each character was listed as Black heroes with his/her own title, shared title, or a part of a majority Black or Black lead group. Frequency of each category was summarized by year. Each decade was examined by historical events influencing the portrayal of African Americans in the larger society. The research suggested that Blacks were excluded from early comic book literature. Further, the omission of Blacks in early comic books was a reflection of the American societal perception of Blacks. As Blacks became more visible in American culture, Black characters began to appear more in comic books. This project was supported by a Ronald E. McNair Grant from the U.S. Department of Education.

Nwokolo, B.N. GSU. **The role of investment strategies and e-commerce in poorly accessible regions of Nigeria as tools for economic uplift**.—The direct and indirect or spatial impacts of transportation and concomitant investments in poorly accessible regions need to be evaluated in order to more realistically prioritize developmental funds in less developed regions. The case of the rural parts of Nigeria in West Africa is examined. In the study, the methodology of System Dynamics after (J.W. Forrester of MIT) and the technique of simulation are used to evaluate the overall impacts of transportation in an agricultural region of that developing nation, Nigeria. Benefits from production instead of traffic volume are quantitatively evaluated in the benefit/cost ratio, whereas population shifts in terms of rural in-or-out migration over time is assessed as the primary spatial impact using simulation technique. The approach used in this study is designed to show whether the impacts from the investment strategies are strongly based on the marginal costs of transportation, per se, or more on the removal of "hindrance" to the expansion of production and productivity and the reversal of urban migration. A number of investment strategies in roads, drainage, irrigation, mechanization, and fertilizer will be investigated and analyzed in order to determine their most favorable socio-economic characteristics in terms of population level, regional income per capita, out migration and unemployment. Educational packages in digital divide on e-commerce technology are developed and introduced.

Seymour, N. and R. Rackley. SU-BR. **The relationship between fatherlessness, self-esteem, and promiscuity**.—The purpose of this research was to examine the relationship between fatherlessness and promiscuity amongst African- American college women. This research provided an exploratory study on the effect that fatherlessness has on African American women's view on sexual risk taking. This study shows that there is an inverse relationship between women who do not have relationships with their fathers and promiscuity. The study was

conducted on 52 African- American college females between the ages of 18-32 at Southern University in Baton Rouge, LA. The results showed that women growing up in single parent or other parent households were more likely than those growing up in two parent homes to engage in promiscuous behavior. The findings also showed that those living in other households with low self-esteem are more likely to engage in promiscuous behaviors. The findings also showed that those living in other households with low self-esteem are more likely to engage in promiscuous behaviors. The findings suggested that women who spent a less percentage of time growing up with fathers were more likely to engage in promiscuous behaviors. The findings also showed that those that had lower perceived father involvement were more likely to have a negative outlook on father's day. This project was supported by a Ronald E. McNair Grant from the U.S. Department of Education.

Thornton, A., G.S. Johnson, B. McGee, V. Richardson and C. Johnson. SU-BR. J.M. Gossett. ACHRI. **Socio-economic and structural correlates of health perception, knowledge and practices among low income families with children in the lower Mississippi Delta**.—The lower Mississippi Delta is an economically depressed area. The study compared household characteristics, awareness of the relationship between diet and disease, and eating practices in low and high income households with children in the lower Mississippi Delta counties/parishes in Arkansas, Louisiana and Mississippi. The study found high income respondents were more likely than low income respondents to be aware of diet-disease relationships and low income respondents with children were less likely to report following specific dietary recommendations. Supported by USDA, ARS Project # 6251-53000-003-00D.

Yehya, R.M. SU-BR. **Objectivity in social sciences: The social construction of knowledge**.— Whereas in physical sciences findings can be expressed with a high level of certainty, social-science findings are stated in probabilistic terms and absolute scientific objectivity is an out-of-reach ideal. The social results are influenced by the methods and perspective used, including one's values, beliefs, and ideology. This paper critically examines the social construction of knowledge, sheds lights on the biases and limitations involved, and offers suggestions for their reduction.

Yehya, R.M., S. Addison, S. Armstrong, D. Keithly and A. Samuels. SU-BR. **Definition and realization of quality education: A panel discussion**.—This panel discussion offer various views on the definition and realization of quality education.

Acknowledgement