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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:

AFPMB	Armed Forces Pest Management Board, Washington, D.C.
BRCC	Baton Rouge Community College
CPMC	Calcasieu Parish Mosquito Control
CC	Centenary College
CU	Columbia University, New York
GCC	Gaylord Chemical Company, Slidell
GSU	Grambling State University
LSU-A	Louisiana State University, Alexandria
LSU-BR	Louisiana State University, Baton Rouge
LSU-E	Louisiana State University, Eunice
LSUHSC	Louisiana State University Health Sciences Center, New Orleans
LTU	Louisiana Tech University
LU-NO	Loyola University, New Orleans
McSU	McNeese State University
NiSU	Nicholls State University
NSU	Northwestern State University
RTV	Radio-Televizija Vojvodina, Serbia
SLCC	South Louisiana Community College
SLU	Southeastern Louisiana University
SU-BR	Southern University, Baton Rouge
TuMC	Tulane Medical Center
TU	Tulane University
UB	University of Buna, Cameroon, Africa
UF	University of Florida
UGBS	University of Ghana Business School, Ghana, Africa
ULL	University of Louisiana, Lafayette
ULM	University of Louisiana, Monroe
UMICH	University of Michigan
UPITT	University of Pittsburgh
USACE	United States Army Corp of Engineers
USDA/ARS	U.S. Department of Agriculture, Agricultural Research Service
USFS	U.S. Forest Service
USFWS	U.S. Fish and Wildlife Service
USP	University of São Paulo, Piracicaba, Brazil
USUHS	Uniformed Services University of the Health Sciences, Bethesda, Maryland
UTB	University of Texas, Brownsville

Division of Agriculture, Forestry, and Wildlife

Boudreaux, B.A. and A.R. Pierce. NiSU. **The effects of artificial perches on wintering raptors**.—Artificial perches may improve habitat quality for raptors in agricultural and grassland habitats, where the availability of perches may be limited. We used an experimental approach to quantify the effects of artificial perches on raptor populations and small mammal populations in an agricultural habitat in south Louisiana. Our study was conducted during the raptor wintering period from September 2008 to April 2009. We conducted raptor surveys and small mammal trapping before and after the installation of artificial perches to determine raptor and small mammal responses to artificial perches. Overall, artificial perches seemed to improve habitat quality, indicated by an increase from 77 to 153 detections of our target species. However, raptor species did respond differently as only three of the six target species had higher detections in the post-treatment period. Meanwhile, small mammal capture rate decreased from 9.17% to 3.75% in the post-treatment period. We conclude that artificial perches may be beneficial in perch limited habitats by increasing raptor visitation and possibly foraging efficiency, but the response may be species specific.

Buller, B.G., W.A. Storer, D.D. Kee, and F.M. Lemieux. McSU. **Production of forage soybeans in southwest Louisiana**.—An experiment was conducted to evaluate glyphosate resistant (Roundup Ready) forage soybeans in an effort to identify alternative high protein forage for beef cattle producers in Southwest Louisiana. To this end, glyphosate resistant forage soybeans were evaluated at different seeding rates and harvesting dates at the McNeese Fuller Farm, in Kinder, Louisiana. Soybeans were planted on May 10, 2009 yielding stand populations of 271,000, 345,940, and 444,780 plants per hectare. Harvesting was conducted at day 102 and day 130 relative to planting. Individual plant height, weight, stalk diameter, and CP were greater, while ADF and NDF were lower in the lowest population. Dry matter yield per hectare did not differ between populations. Starch and oil content increased between d 102 (R2) and 130 (R5) due to pod fill. This study aided in clarification of ideal seeding rate and harvesting date and established the potential for production of forage soybeans in Southwest Louisiana. Furthermore, reduced seeding rates may be necessary to maximize efficiency.

Comeaux, K., D. Kee, C. Richmond and S. Edwards. McSU. **Rattlesnake Master (*Eryngium yuccifolium*) individual seed size and total seed yield response to date of harvest**.—*Eryngium yuccifolium*, more commonly known as Rattlesnake Master, is a plant that is native to a large portion of Louisiana. However, with substantial habitat loss, the availability of high quality seeds for re-establishment is vital. Using transplants, a foundation block of Rattlesnake Master was established in the spring of 2008. Seed production, peak harvest, total seed yield, and individual seed size data were collected for two years. Seed heads were hand harvested as they ripened, then stored in labeled paper bags, dried, and then threshed by date. In 2008, seeds were harvested September through December with individual seed size greatest in mid September and then again in mid October. Optimal harvest period was October, with accumulated seed harvest comprising over 75% (weight to weight) of the total annual harvest. In 2009, seed was harvested August through November with individual seed size greatest in mid-September. Optimal harvest period was in the last half of September, with accumulated seed harvest accounting for 61% of the total annual harvest. With the limited information available about Rattlesnake Master's

reproductive characteristics, the information gathered from this study will aid in the development to make commercially available.

Delabbio, J.L. and S.W. Gabrey. NSU. **An intensive study of the gender ratio in harvested red swamp crayfish (*Procambarus clarkii*)**.—Red swamp crayfish were harvested for six consecutive months from 12 ponds at the Aquaculture Research Center of Northwestern State University. Each pond was 1/4 acre surface area and pyramid traps baited with commercial pellets were used to harvest 2-3 times per week. On each harvest day, collected crayfish were mechanically graded into six size categories. The sex of each crayfish in each size category was then determined by visual assessment. Data from six months of collection indicate a wide disparity between sex ratios observed in YOY (young of year) crayfish and those crayfish considered hold-over's from the previous year. In the early part of the crayfish harvest season, female crayfish dominated but by the end of the season, the sex ratio was 50:50. The low number of male crayfish observed in the early months of the harvest season suggests that there is high male mortality sometime during the summer and fall of the year.

Fennel, M.M., D.D. Kee, W. Storer, M.A. Idlett, and W.B. Brumbaugh. McSU. **"Big Fella" soybean silage response to seeding rate**.—Harvesting soybeans as a hay crop during a drought year is a common method of disaster management for farmers in Louisiana and Texas. However, scientists in the upper Midwest have seen better returns on investment if soybeans are harvested as silage. Seeding rate is one of the decision parameters that may affect silage yield and quality. A study examining the response of soybean silage production parameters to seeding rate of "Big Fella" soybeans was planted on the McNeese Farm in early May 2008. Data were collected in late August to mid October to determine yield and quality parameter responses to soybean seeding rate. Eight soybean plants from each plot were collected weekly. The plants were then separated, 3 plants for silage yield; 3 plants for growth stage, dry matter and stem diameter; and 2 plants to determine stem, pod and leaf composition. The study concluded with a final harvest on 14 October. Seeding rate did not significantly affect the last silage yield. Seeding rate did significantly affect plant population, stem diameter and dry matter composition of soybeans harvested last.

Fox, C., A. Ferrara, and Q. Fontenot. NiSU. C. Kersten. McSU. **Seasonal abundance, GSI, and gonad histology of yellow bass *Morone mississippiensis* in the Upper Barataria Estuary, Louisiana**.—Yellow bass abundance in the Upper Barataria Estuary (UBE) follows a seasonal migration pattern. This study provides one possible explanation for the migration of yellow bass throughout the upper estuary. Yellow bass were collected from Lac des Allemands and Bayou Chevreuil using gill nets from 15 November 2008 – 17 November 2009. Gonadosomatic Index (GSI) was calculated for each individual collected (N=1,064) throughout the year and gonad samples (N=200) were placed in 10% neutral buffered formalin for histological analysis. GSI decreased as temperature reached approximately 18-20°C, indicating spawning had occurred. Spawning activity was confirmed using histology to observe post-ovulatory follicles (POFs) in female gonads collected during the period of GSI decrease (17 Feb 09-11 May 09). Observation of POFs in females began on 04 Mar 2009 and continued through 12 May 2009. As of June 2009, gonads of both males and females were in the regression and regeneration stages. Results of this study indicate that in the UBE yellow bass spawn from early March through mid-May.

The results also suggest that the increase in yellow bass abundance in early spring is related to spawning activity.

Frugé, C.J., W. Storer, T. Shields, T. Bertrand, and F. Lemieux. McSU. **Effect of a commercial microbial inoculant (Promote®) on corn silage and animal performance**.—An experiment was conducted to evaluate the efficacy of a commercial microbial inoculant (Promote®) for corn silage and the subsequent effect on heifer performance. The three experimental treatments were: 1) no inoculant (control), 2) inoculant (100,000 CFU per gram of corn silage), and 3) inoculant (50,000 CFU per gram of corn silage). Promote® was applied to corn silage as a liquid suspension during the ensiling process in horizontal poly bags. Silage samples were collected at d 0, 7, 14, 21, and 61. Samples were analyzed (Analab, Fulton, IL) for chemical composition for each treatment. At d 61, ADF, NDF and pH was greater for Trt 3. A growth study with developing heifers (n=225; average initial wt 261 kg) was initiated at d135 post ensiling. Heifers were allotted in a complete randomized design (n=75) to each of the silage treatments. Heifers were weighed every 21d to obtain average daily gain. Heifers consuming diets treated with (Promote®) had increased average daily gain from d 0-21.

Gotte, G.N., D.M. Jariel, and M.F. Vidrine. LSU-E. **Cajun Prairie soils as reservoir of water, lead and arsenic**.—The disappearing Cajun Prairies of Louisiana are potential dumping grounds for waste materials that may release lead and arsenic into the soil. Two restored prairies (Louisiana State University at Eunice {LSUE} and the Cajun Prairie Restoration Project {CPRP} in Eunice) and two remnant prairies (Estherwood and Frey) were used to determine their capacities to retain water, lead and arsenic. Soil samples from three different depths were taken from each prairie. Eight grams of prepared soil were placed in the leaching funnel and 15 ml of distilled water was allowed to percolate through the soil for 22 hours. In separate experiments, 15 ml of lead treatment solutions and 15 ml of arsenic treatment solutions were leached through the soil for 22 hours. The CPRP soils showed equal percolation rates at all soil depths. However, the three prairies showed faster percolation rate at the surface than at the subsurface soils. The data suggest that the slower the percolation rate, the greater the retention of water, lead and arsenic in the soil. The four prairie soils are better reservoirs of lead than of arsenic, and their greater capacities to retain water, lead and arsenic were dependent on higher clay content of the soils.

Jandegian, C.M., F. Boone, W. Green, and G. Zumwalt. LTU. **Ozone sparging to prevent bovine toxicosis**.—The abundance of micro-organisms in water can cause harmful and deleterious effects on certain industrial equipment and products. In particular, cattle can suffer from toxicities released by the alga *Microcystis aeruginosa* and the disease mastitis spread by transference of bacteria, usually coliforms. Previous solutions, such as copper sulfate, produce negative side effects, which creates similar toxicity symptoms. Ozone sparging has the ability to destroy living cells without producing negative residuals. A 13,313 gallon metal watering trough, abandoned due to high organic contamination, was sparged with a 9 inch micro-porous diffusion stone for 5 hours at a max output of 27 grams ozone per hour. Data were collected for water quality and samples were drawn for bacterial consortium analysis. All water quality parameters increased dramatically and no colony-forming bacterial units remained after 300 minutes of treatment. Ozone sparging will remove bacteria, algae, fungi, and other potential

pathogens resulting in healthier livestock herds. While we previously illustrated that ozone depletes harmful concentrations of micro-organisms in the laboratory, it is now evident that its use can be successfully employed in real world agricultural applications.

Katzenmeyer, A.W. LTU. J.J. Hoover. USACE. **Schooling benefits of juvenile bighead carp**. **—**Bighead carp (*Hypophthalmichthys nobilis*) are invasive fish throughout the Mississippi River basin and now threaten the Great Lakes. Information on swimming performance of carp is necessary for predicting and controlling their dispersal but no data is available on their response to flow or on their swim speeds. We evaluated swimming performance of juvenile bighead carp in the laboratory using a Blazka swim tunnel. Bighead carp (36-69 mm total length) were tested individually and in groups of three and five fish at water velocities ranging from 20-80 cm/s. A total of 87 trials, with 183 fish, were performed. Individual fish showed positive rheotaxis in 89% of trials compared with 100% of groups tested. Maximum sustained swimming (i.e., > 200 min) for individual fish was 20 cm/s, but for groups was 40 cm/s. Maximum burst speed (i.e., < 30 sec) increased from 65 cm/s individually to 80 cm/s as a group. Schooling then provided hydrodynamic benefits for fish that resulted in improved rheotaxis, doubled sustained swim speeds, and a 23% increase in burst speed. Results demonstrate that schools of bighead carp can negotiate hydraulic barriers that are impassable by individual fish.

LaGrone, S., J.L. Delabbio, and M. Cochran. NSU. **Investigating carapace color in red swamp crayfish (*Procambarus clarkii*)**.**—**This study investigated whether environmental background color was the cause of morphological color change observed in wild-caught crayfish (*Procambarus clarkii*) held in aquaria. Wild juvenile *P. clarkii* were caught and placed in four different colored tank environments for a four month period. These tanks shared a common water source and had the same light environment. Crayfish were fed a ration of commercial fish feed. At three-week intervals, an OceanOptics colorimeter was used to assess the carapace color of each crayfish. Changes in carapace color were evident in all crayfish after four months in culture. However, this color change was not strongly co-correlated to background color. The findings indicate that environmental background color may be one, but is not the only factor influencing carapace color in these crayfish.

Mangrum, M.O. NSU. **Improving tomato variety production by grafting**.**—**Grafting has historically been used as a method of plant variety improvement. In recent years, this practice has been incorporated into horticultural application involving vegetable green house cultivars. Tomatoes can be grafted yielding plants that have soil-borne disease and parasite resistance as well as superior tomato fruit production. The actual process is simple and can be used as a classroom teaching tool. It is also a means of experimental investigation for tomato quality attributes and yield comparisons. The process involves growing both rootstock plants selected for their genetic strengths and parasite resistances, and scion plants selected for the desired fruit characteristic sought after by the researcher. These plants are grown from seed in separate containers and then grafted after plants obtain a stem diameter above the cotyledon leaves of approximately two centimeters. After grafting, the plants are placed in an environment with low light and 100% humidity for four to six days to allow the graft to heal and the re-establishment of vascular flow. This process allows for a multitude of tomato variety crosses yielding stronger plants with improved vigor and production.

Owen, T.M. and A.R. Pierce. NiSU. **Colonial waterbird reproductive success on the Isles Dernieres**.—Louisiana's barrier islands are dynamic ecosystems and provide essential breeding habitat for colonial waterbirds. Unfortunately, the barrier islands are deteriorating due to natural and anthropogenic causes. As coastal restoration efforts work to counteract the degradation, information about the function of the islands as breeding bird habitat is necessary to connect management decisions and restoration efforts. This study quantifies the reproductive success of four nesting waterbird species to provide information on the productivity of each island of the Isles Dernieres Barrier Island Chain. During the 2009 breeding season, the purpose of our research was to determine nest success of Gull-billed Terns (*Gelochelidon nilotica*) and Black Skimmers (*Rynchops niger*), and to estimate chick survival for Royal Terns (*Thalasseus maximus*) and Sandwich Terns (*Thalasseus sandvicensis*) using mark-recapture methodology. The Mayfield method was used to calculate nest success dependent on a constant daily survival rate, and the open population Cormack-Jolly-Seber Model was used to calculate the daily survival rate of tern chicks. Reproductive success varies by species and island. Temporal differences will likely be a confounding factor, which will be examined in the subsequent year of study.

Perkins, A. and W.H. Green. LTU. **Radio frequency identification of beef cattle**.—A disease outbreak in food producing animals is a very real possibility because of the continual import and export of livestock and livestock products. The U.S. Department of Agriculture has initiated steps to help prevent or control such an outbreak by formation of the National Animal Identification System (NAIS) that would allow tracing of infected and/or exposed animals. The NAIS has adopted a Radio Frequency Identification Device (RFID) as a means of permanently identifying food producing animals as well as other species. The benefits of electronic animal identification (EID) by using the RFID tags are numerous, including the ability to monitor animal movement. The proposed NAIS EID system has met resistance from animal producers because of fears of invasion of privacy, costs, and national acceptance. This study serves as a model for the beef cattle industry by the implementation of the EID tags in the beef cattle at Louisiana Tech University. The retention, readability, feasibility and other factors are to be examined in the use of the EID tags in cattle that are used for research projects and offered at public auction from Louisiana Tech.

Raynor, E.J. and A.R. Pierce. NiSU. C. Leumas and F.C. Rohwer. LSU-BR. **Hurricane impacts on Louisiana's barrier island nesting waterbirds**.—Louisiana's barrier islands are integral breeding habitats for several species of waterbirds that are of state-wide conservation concern. However, this habitat is subject to degradation, especially from high-energy storms. Two strong hurricanes, Gustav and Ike, heavily affected the Isles Dernieres Barrier Islands Refuge (IDBIR), Terrebonne Parish, Louisiana in September 2008. To determine the effects of these hurricanes on breeding waterbirds we compared pre- and post-hurricane assessments of waterbird species composition and abundance on the IDBIR and we estimated apparent nest success of two ground-nesting waterbird species, Royal Tern (*Thalasseus maxima*) and Sandwich Tern (*Thalasseus sandvicensis*). There was little change in species composition but there was a 36% decline in the breeding waterbird population with approximately 44,000 breeding pairs in 2008 and 28,000 breeding pairs in 2009. Royal Tern and Sandwich Tern nest success did not differ between 2008 and 2009. Our results suggest that barrier islands continue

to provide critical breeding habitat for many species of waterbirds but that these habitats are extremely fragile. The successful conservation of many waterbird species will require the continued restoration of barrier islands to maintain these essential habitats from future hurricanes.

Savell, J.D., and E.K. Lyons. McSU. **Vegetation analysis and population status of white-tailed deer (*Odocoileus virginianus*) post Hurricane Ike on the Chenier Plains of Southwest Louisiana**.—In Louisiana, Chenier Plain coastal marshes and ridges provide habitat for native and migratory wildlife. The impact of hurricanes on chenier coastal marshes of Louisiana as it pertains to wildlife populations and vegetative structure are of interest due to increased hurricane frequency since 2005. We measured vegetation parameters on a private property in Cameron Parish to quantify species diversity, woody cover, herbaceous cover, and bare ground. Vegetation was sampled in all layers of occurrence (e.g., herbaceous layer, mid-story, and canopy cover) of the chenier ridges and surrounding marshes. During vegetation sampling we identified >100 species, several of which are preferred food sources for deer. White-tailed deer population parameters (e.g., abundance and density) were collected in the fall via camera census. If we can quantify post-hurricane population parameters and analyze vegetative succession, we can improve coastal deer management efforts and help sustain viable populations' post-traumatic weather events. Results for vegetative parameters and deer population status will be presented for the 2009 field season. Future research plans include assessing mesocarnivore abundance (i.e., potential predators of white-tailed deer), cool season vegetation sampling, and a fall 2010 white-tailed deer census.

Stumpf, C.F. and D. Allen. LSU-A. **Toxicity and repellency of novel formulations of 2-undecanone, organic fatty acids, and sodium lauryl sulfate against German cockroaches**.—Several novel chemical formulations were tested for their insecticidal and repellent activity against German cockroaches. Insecticides tested were: 2-Undecanone, BioUD8 and BioUD10 (fatty acids with 2-Undecanone), BioBlock (fatty acids with sodium lauryl sulfate), BioBlock with enzymes (BBE), DEET, and Raid, Raid Max, Hot Shot, and Ortho Home Defense Max (OHD) (the last four are synthetic pyrethroids). Direct applications onto dorsal surfaces showed fast kill rates (seconds) for cockroaches treated with 2-Undecanone, Raid, Raid Max, or BioUD10, medium kill rates (minutes to hours) for BioBlock, BioUD8, or BBE, and slow kill rates (hours to days) for DEET, HotShot, or OHD. Tested formulations acted slightly faster on males than on females, and older adults were less impacted than younger ones. For the indirect treatments, different doses were applied to the bottom of polypropylene cups. Significant dose effects were found for 2-Undecanone and BioBlock, but not for BioUD8. 2-Undecanone killed cockroaches very fast in a short time period at higher doses, while BioBlock took longer to act. For the repellency experiments, half of the bottom of each cup was treated. BioUD8 and BioBlock were not significantly different from DEET, while 2-Undecanone lost its repellent activity fast at lower doses.

Stumpf, C.F. and B.T. Sullivan. LSU-A and USFS. **Acoustic communication of the southern pine beetle**.—The southern pine beetle (SPB), *Dendroctonus frontalis* Zimmermann, is the most economically damaging pest of pines in the southeastern United States, and has caused more than $2.5 billion in timber losses during the last 10 years. Studies during the 1970's

demonstrated that SPB use acoustic signals for short-range interspecific communication during the colonization of host trees, and at least four distinct types of 'chirps' were reported based on qualitative examination of oscillograms. We have initiated quantitative studies of oscillograms of SPB recordings to identify diagnostic characters of chirps and determine through robust statistical procedures the number of distinct chirp types and their behavioral functions. To this end, we have collected a large database of digital sound recordings of both male and female SPB infesting pine logs in the laboratory. We have developed a computer-aided procedure for rapidly analyzing digital oscillograms of SPB stridulation and objectively classifying SPB sounds.

Sullivan, B.T. USFS**. The smell of success (and excess): Pheromones of the southern pine beetle**.—The southern pine beetle (Coleoptera: Scolytidae) *Dendroctonus frontalis* Zimmermann is the most serious insect pest of pines in the southern United States largely due to its capacity to organize "mass attacks" on individual trees. Thousands of beetles penetrate the bark almost simultaneously, overwhelming the tree's constitutive resin defenses. This behavior permits colonization of hosts that would ordinarily be able to fend off attacks by smaller numbers of insects, and thus it vastly increases the availability of food and breeding material for the cooperators. Mass attacks are synchronized and targeted by means of chemical signals (pheromones) released by the attacking beetles. Recent studies of beetle responses to synthetic versions of these signals in the field have revealed previously unrecognized complexity and flexibility in beetle use of pheromones to tailor their behavior to specific environmental conditions.

Sylvester, T., J. Hoffman, and E. Lyons. McSU. **Diet and ectoparasites of the southern short-tailed shrew**.—The Short-tailed Shrews were, until recently, considered one species (*Blarina brevicauda*). Since *B. brevicauda* was separated into three different species, it has become obvious that the natural history of one of those species (*B. carolinensis*) is largely under-represented in the literature. Most of what is known about the diet and ectoparasites of the Southern Short-tailed Shrew has been derived from a small number of studies done outside of Louisiana. Since Southwest Louisiana has a variety of habitat types, there is an opportunity to investigate how this species diet may vary. Pitfall trap arrays along with Sherman traps were utilized for thirty days in three habitat types at Sam Houston Jones State Park beginning in December 2009. We captured six shrews during the winter trapping season. The stomach contents and ectoparasites of shrews will be identified, and organisms will be deposited as voucher specimens in the Vertebrate Museum of McNeese State University. Future research will consist of seasonal trapping and further stomach content and ectoparasite identification.

Varnell, R.B., J.L. Delabbio, C. Phifer, and M. Cochran. NSU. **The effectiveness of different methods for implanting passive integrated transponder (PIT) tags in red swamp crayfish (*Procambarus clarkii*)**.—The purpose of this study was to assess the effectiveness of different methods for implanting passive integrated transponder (PIT) tags into the ventral region of the tails of red swamp crawfish (*Procambarus clarkii*). Effectiveness of each method was assessed by tag retention and animal survival over a seven day holding period post-implant. Method variables included tag placement, tag orientation, implant tool and holding treatment of the animal after implanting of the PIT tag. Results of this study indicate that all methods were

effective for tag retention but there were statistically significant differences in survival among the different methods.

Division of Biological Sciences

Botany Section

Fotis, A.T. and J. Bhattacharjee. ULM. **Modeling delayed succession in a bottomland hardwood forest after twenty-one years of natural succession.—**Extensive research has focused on the ecology of old field succession, but few studies have concentrated on the natural succession of bottomlands. We examined a twenty-one year-old bottomland hardwood forest undergoing natural succession with another area planted with hardwood seedlings. The natural site is experiencing arrested succession and consists of an open field dominated by herbaceous vegetation with scattered trees. The herbaceous biomass and canopy cover varied greatly between sites. There was a strong negative correlation with herbaceous biomass and canopy cover. Based on these results, we developed a model that demonstrates that tree biomass is inversely related to herbaceous biomass and estimates when a closed canopy will form. This model predicts that at high levels of herbaceous biomass, such as during early succession, seedling growth and establishment will be delayed. Eventually, seedlings will become established, break through this layer and increase the canopy cover, killing herbaceous plants and facilitating seedling germination in close proximity. This will create a positive feedback of tree recruitment, and once a threshold of tree biomass is reached, the forest will switch to a closed canopy forest in a relatively short period of time.

Regmi, A. and M.D. Horton. McSU. **Quantitation of polysaccharide production of a benthic diatom *Navicula salinicola* (Bacillariophyceae) for coastal restoration.—**Diatoms secrete polysaccharides that have potential use for sediment stabilization. Southwest Louisiana coastlines constantly are subjected to flooding and erosion bringing devastating effects to the community. This study determined the polysaccharide production of an indigenous benthic diatom, *Navicula salinicola* for future utilization in coastal restoration. *Navicula salinicola* was maintained in axenic culture under controlled laboratory conditions at varying salinities, namely 18.2, 22, and 28 psu. Each treatment was prepared in five replicates. The average number of cells after eight days in culture in different conditions was counted using a hemacytometer. The polysaccharide secreted by cells within the culture period was quantitated concomitantly using phenol sulfuric assay and read at 485 nm wavelength with a spectrophotometer. The average concentration of carbohydrate secreted by cells grown in the control (22 psu) was ~3.4 pg/cell. At salinities 18.2 and 28 psu, the amount of carbohydrate decreased to ~0.7 pg/cell. This indicates that the amount of carbohydrate produced by *N. salinicola* is affected by salinity changes with highest production at 22 psu. This has very important implications for coastal management and restoration especially in estuarine areas like the Southwest Louisiana region.

Vidrine, M.F., T. Hillman, V. Fuselier, J.E. Cordes, D. Jariel, J. Al-Dujaili, and C.E. Vidrine. LSU-E. **Updates on the Cajun Prairie restoration projects.—**Disappearing remnant prairies along railroad rights-of-way are succumbing to woody vines and trees as a result of the lack of routine maintenance, especially fire. Two projects involving the reconstruction of prairie habitat in Eunice, Louisiana, area are the Cajun Prairie Restoration Project (CPR) of the Cajun Prairie Habitat Preservation Society and The Cajun Prairie Gardens (CPG) of the Vidrine family. The former project originated in 1988 and is in its 22nd growing season, and the latter project

originated in 1996 and is in its 14th growing season. The projects are very different in their methods of construction and maintenance. The CPR has recently had a parking lot, covered patio and a trail constructed for easy access to the ten acre park. The CPG have mowed grass trails. Both projects are annually burned in winter and are considered to be more than 90% restored with native vegetation. Two additional restoration projects in the Eunice area are discussed briefly: the LSU-E prairie and the Shallow Lake Prairie of Vernon Fuselier. Together nearly 300 species of native plants are present and established. Collectively, these prairie reconstructions provide both a glimpse into the past and a floristic introduction to the essentially extinguished Cajun Prairie.

Wakefield, J.M. and J. Bhattacharjee. ULM. **The effect of air pollution on morphological characteristics and chlorophyll content of lichens in northeast Louisiana**.—Over time, lichen thalli accumulate elements, such as, lead, zinc, sulfur, nitrogen, and radionuclides in their tissues; therefore, to evaluate and possibly avoid detrimental effects of these pollutants, there has been an emphasis in the use of lichens as bioindicators to monitor atmospheric quality in both urban and rural environments. We evaluated the impact of air pollution on lichen discs and twigs in and around the city of Monroe, Louisiana. In this study, lichens were transplanted from areas of known lower pollution concentrations to areas of potentially higher levels of air pollution and monitored over time. The lichens *Ramalina stenospora*, *Physcia sorediosa*, and *Parmotrema perforatum* were used as transplants. Over the course of the study, we measured percent bleaching, chlorophyll content, and morphological characteristics of the thalli. Air samples also were collected for volatile organic compounds at each site. Results indicate that percent bleaching, chlorophyll content, and morphological characteristics of the thalli differed significantly among sites. Our results indicate that lichen thalli characteristics and chlorophyll content can successfully be used as indicators of air quality.

Environmental Science Section

Apoya-Horton, M.D., J.L. Robinson, L. Marcantel, and B. Shrestha. McSU. **Sediment stabilization utilizing the benthic diatom *Achnanthes longipes* (Bacilliariophyceae)**.—The benthic diatom *Achnanthes longipes* and its extracellular polymers (EPS) were used to test its effect on stabilization of sediments. The EPS were differentiated into total carbohydrate, and ethanol- and hot water-soluble extracts. The cells and the extracts were inoculated separately into the following sediment types: sand, silt, clay, and a mixture of all three in definite proportions and left for 28 days of incubation. Three replicates of each treatment were subjected to pre-set agitation and the re-suspension of sediment particles was determined weekly by spectrophotometric analysis. Low absorbance values were noted in all sediments inoculated with cells, total carbohydrate, and hot water-soluble extracts, while a slight increase in the mixed sediment was observed in the ethanol-soluble extract that could be attributed to mechanical problems in the experimental set-up. The overall low absorbance values were indicative of reduced re-suspension of particles and therefore a manifestation of sediment stabilization. Cells mediated better adhesion in sediments as shown by the lower absorbance compared to those of extracted polymers. These results suggest that *A. longipes* is a potential sediment stabilizer that can be used for restoration measures in eroding coastlines as in the case of Southwest Louisiana.

Babineaux, R.G., F.D. Boone, and G.S. Zumwalt. LTU. **Effectiveness of polycyclic aromatic hydrocarbon (PAH) remediation techniques**.—Remediation of fuel contaminants may be accomplished by sparging ozone through the contaminant layer in either sub-surface or surface-water locales. While studies have shown that free-phase gasoline can be directly degraded via ozone sparging, the molecular phase (gas or dissolved O_3) that attacks the fuel is not fully understood. We have examined whether dissolved-phase or gas-phase ozone is necessary for free-product PAH remediation efforts. A glass aquarium was divided in half with a Plexiglas barrier extending from above the water's surface to 5 cm from the bottom of the tank, allowing dissolved O_3 to disperse freely. On both sides of the divider, equal volumes of gasoline were floated on the water's surface. In one half of the tank, ozone was sparged for 2.5 hours at a flow regime to maintain 1.5 mg/L dissolved O_3 throughout the tank, while only allowing gas bubbles to contact the contaminant layer on the sparged side. After 2.5 hours exposure, 71% of the contaminant layer was removed in the sparged side, while only 29% was removed in the side exposed to only dissolved ozone (most likely due to volatilization). Future studies will evaluate the effects of gas-phase O_3 at higher concentrations and longer treatment times.

Borrel, T.V., J. Thompson, D. McPherson, and J. Allen. LSU-A. **Nitrogen concentration in minor tributaries from Rapides Parish**.—In the Gulf of Mexico, dead zones preceded by exceptional algae blooms have a large negative impact on the waters to provide a reliable resource for Louisiana. Algae and aquatic plants within Louisiana waterways appear to be correlated with levels of fixed nitrogen. Nitrogen concentrations vary among waterways, resulting in different levels of impact upon plant life within the Mississippi Delta/Atchafalaya Delta region. The current study is designed to provide additional information on nitrogen distribution within various Louisiana waterways. This ongoing project involves measurement of fixed nitrogen forms. Fixed inorganic nitrogen exists in multiple ionic forms. Each of these ions may be easily measured with simple ion-selective electrodes, permitting direct quantification of nitrogen within various aquatic environments. Of these only the ammonium and nitrate measurements were performed. Levels of these fixed nitrogen ion concentration were determined by sampling at specific points within two minor Louisiana waterways. Using this approach, no difference in levels of fixed nitrogen could be demonstrated across these waterways and the concentrations were lower than expected. This result suggests that the minor waterways studied in this research of Rapides Parish do not contribute to rising concentrations demonstrated within the Gulf of Mexico.

Bourgeois, B., V. Rangan, and J. Owens. SU-BR. **Cytotoxicity and necrotic cell death in human bronchoalveolar A549 cells following exposure to fine particulate matter (PM2.5) collected in southeastern Louisiana**.—Fine particles less than 2.5μM in diameter are designated PM2.5. Inhalation of PM2.5 prompts a toxic response manifested by the release of cytokines. The cytotoxicity of PM2.5 on A549 human bronchoalveolar carcinoma cells was studied. Cell viability curves were generated in triplicate for three different batches of PM 2.5 suspensions. Batch 1 showed an IC_{50} of 238μg/ml; batch 2 showed an IC_{50} of 59μg/ml; and batch III showed an IC_{50} of 130μg/ml. Transition metals in PM2.5 particulates are believed to be the major cause of toxicity. Cytotoxicity was measured in the presence of deferoxamine mesylate, at concentrations of 0.75mM, 0.50mM, and 0.0375mM. Tests showed a reduction in PM2.5 cytotoxicity. This suggests deferoxamine mesylate provides protection to A549 cells and

that transition metals are indeed involved in mediating PM2.5 toxicity. The mechanism of cell death was studied by conducting experiments to differentiate apoptosis from necrosis. The three different PM 2.5 extracts tested showed 50±16%, 45±14%, 65±19%, and 70±20 %, 62±25%, 60± 19% cells undergoing necrosis by Annexin-V FITC/ propidium iodide and acridine orange/ethidium bromide dual staining, respectively.

Brumbaugh,W.B., D.D. Kee, K. Comeaux, and M.M. Fennel. McSU. **Soil pH, salinity and organic matter response to amelioration with waste livestock bedding**.**—**Studies have found a combination of table sugar (dextrose) and sawdust enhances the success of restoring native plants in disturbed prairie sites. However, little is known about the use of inexpensive waste materials such as livestock bedding to achieve this effect. Two studies were established on the McNeese State University farm examining the effect of five livestock bedding waste rates (0, 4, 8, 12 or 16 tons/acre) on three soil parameters (soil pH, soil salinity and organic matter content) using a randomized complete block design. Blocks ran perpendicular to slope with block 1 at the lower end of the slope. In mid-October, three core samples were taken from each plot, stored in labeled paper bags, weighed, dried, and then analyzed for soil pH, soil salinity and organic matter content. As expected, soil organic matter was not affected by bedding rate; however it was greater than anticipated (>3.2%). Bedding rate did not significantly affect soil pH or soil salinity. Position on the hill did affect soil pH; the lower slopes generally had lower soil pH (6.8) and the upper slope had higher soil pH (7.2).

Cook, R.N., F.D. Boone, and G.S. Zumwalt. LTU. **The utilization of ozone as a control method for *Hydrilla verticillata*.—***Hydrilla verticillata* is an invasive submersed plant that affects waterways around the world. This plant is difficult to control because many herbicides are ineffective and the ones that are generally provide only short term control. Research has shown that ozone is efficiently able to degrade organic matter. *Hydrilla* was placed in ozonated water to determine ozone's effectiveness as a control method for the aquatic species. Three bundles with three equal strands of *Hydrilla* each were placed in an 18.9 L (10-gallon) aquarium filled with reconstituted fresh water into which ozone gas was sparged through a microporous diffusion stone. A dissolved ozone concentration of 2.0 mg/L was maintained during the experiment to determine the minimum exposure time required to kill the plant or stunt re-growth of the treated strands. Chlorophyll degradation was measured by analyzing color intensity of digital plant images with Adobe Photoshop software. We concluded that 160 minutes of exposure at 2.0 mg/L concentration, while not enough to totally kill *Hydrilla*, was sufficient to heavily stunt growth for a period of two weeks. Future studies will assess control effectiveness at higher ozone concentrations or longer treatment durations.

Dixon, L.A. and E.M. Ceballos. SU-BR. **Does diepoxybutane (DEB) increase cancer stem cells (CSCs) and allow resistance to anti-tumor therapy?—**1,3-butadiene (BD) is an environmental pollutant and a volatile gas used in the production of rubber, plastics, insulation, acrylics, and other polymers. Its ubiquitous occurrence in environmental and industrial areas has been shown to increase the risks of respiratory illnesses. In addition, BD is a known mutagen and human carcinogen, and possesses multi-organ systems toxicity that includes bone marrow depletion, and spleen and thymus atrophy. After entering the body, BD is metabolized to its most toxic metabolite, diepoxybutane (DEB). Recent studies suggest that some environmental

pollutants may increase the stem cell population in several human cancers and that these cancer stem cells (CSCs) can acquire resistance to anticancer drug treatments. To elucidate the cellular and molecular mechanisms mediating the acquired resistance to carcinogens in cells, we investigated the effect of DEB on the prevalence of CSCs among the human prostate cancer cell line DU145. We observed that DEB (1μM) increases the incidence of CSCs within the DU145 cell population. By employing specific cell pathway inhibitors, we determined the role played by various cell survival pathways during the DEB-induced prevalence of cancer stem cells in DU145 cells.

Idlett, M.A., D.D. Kee, M.M. Fennel, and C. Li. McSU. **Remediation of salt affected soils and ship channel dredge material using gypsum and fly ash**.—Gypsum can be applied to a field and, with adequate irrigation, soil salinity will decrease. Fly ash, a byproduct of coal combustion, may have similar chemical characteristics to gypsum. This experiment was conducted to compare the effects of fly ash and gypsum applied to high salinity soils. Soils from two sources, a rice field and ship channel dredge material, were collected and evaluated. Pots were filled then saturated with 35% NaCl solution to assure adequate salt concentration. Ten treatments were applied to explore the effect of the different fly ash and/or gypsum concentrations on pH and salinity using a complete randomized design. Over four consecutive weeks, the pots were flooded with 4L of distilled water. Soil pH and salinity data were collected from each pot prior to initiation of study and after the completion of the study. Leaching the soil decreased salinity. In rice (clay) soils, soil salinity increased with the use of gypsum. Soil salinity also increased as the gypsum rate increased. Soil pH was significantly affected by treatment. Increased fly ash application increased the pH; gypsum had no significant effect on soil pH.

Katzenmeyer, A.W., G.S. Zumwalt, and F. Boone. LTU. **The application of ozone as an herbicide for the control of *Salvinia molesta***.—Giant salvinia (S*alvinia molesta*) is a floating aquatic fern that can double in biomass every 7-10 days. Current biological and chemical control methods have proven ineffective at controlling this invasive plant. Ozone has proven to be a cost effective oxidizing agent that can effectively raze giant salvinia. Two separate trials using dissolved ozone concentrations of 2.0 Mg/L and 8.0 Mg/L were conducted. Ozone was sparged through micro-porous diffusion stones beneath healthy giant salvinia plants floating on freshwater contained in laboratory beakers. Initial plant coverage on the waters' surface of each beaker for the 2.0 mg/L trial was approximately 100%. Plant coverage for each beaker at the beginning of the 8.0 mg/L trial was 75%. The plants were sparged for exposure times ranging from 1 to 120 minutes at their respective ozone treatment levels. The plants were placed beneath a light bank for 2 to 3 weeks following their treatment to assess their regrowth potential. After 120 minutes at 2.0 mg/L treatment, giant salvinia survived with 25% regrowth after 14 days. After 90 minutes, at 8.0 mg/L treatment, giant salvinia was completely necrotic with no regrowth after 21 days.

Li, C., D.D. Kee, and M.A. Idlett. McSU. **Vegetative response of white clover and lanceleaf coreopsis to soil desalination with fly ash**.—Louisiana is continually facing the problems brought by hurricanes. Many adverse effects can be attributed to hurricanes, especially the involvement of salt water. Gypsum, calcium sulfate dihydrate ($CaSO_4$:$2H_2O$), is commonly used

to desalinize soil. As a waste product from coal-fired power plants, fly ash may possess similar properties to gypsum, like high concentration of calcium oxide (CaO) and calcium sulfate ($CaSO_4$). However, the efficiency and potential harmful effects of fly ash as a soil amendment have not been completely tested. This study was designed to evaluate the vegetative response of white clover (*Trifolium repens* L.) and lanceleaf coreopsis (*Coreopsis lanceolata* L.) to the treatment of fly ash, gypsum, and fly ash/gypsum combinations. White clover as an introduced plant and lanceleaf coreopsis as a native plant would be used as biological indicators for efficiency and potential effects of fly ash in soil desalination. The results were generated after comparing the growth performance and salinity stress responding expression with two plants and control groups. In initial tests, pH in the rice field soil was significantly affected by the treatment of fly ash. The germination rate of coreopsis occurred at 2 tons of gypsum per acre.

McPherson, D., J. Thompson, T. Borrel, and J. Allen. LSU-A. **Comparison of chemical and physical properties of two ponds**.—The health of any body of water depends on many physical and chemical properties. During the fall of 2009, several of these properties (temperature, pH, dissolved oxygen, ammonia and nitrate concentrations) were monitored for two separate ponds next to the golf course on the LSUA campus to evaluate the general health of ponds and to compare these with other similar bodies of water. Temperature, pH and dissolved oxygen were tested 0.5 meters below the surface of the water by a YSI probe while the ammonia and nitrate concentrations were tested using appropriate ion-selective electrodes. Seasonal variations were seen for the temperature, pH and the level of dissolved oxygen. The concentrations of nitrate and ammonia were minimal. The results varied slightly for the two ponds.

Meche, A. and M. Merchant. McSU. L. Verdade. USP. **Heavy metal analysis of fish from the Piracicaba River in southern Brazil**.—A total of 202 fish, representing 16 species, were collected during 2008 (March-October) in the Tanquan region of the Piracicaba River using nets. Flesh samples were collected and analyzed, using inductively coupled plasma-optical emission spectroscopy, for Al, As, Cd, Co Cr, Cu, Mn, Mo, Ni, Pb, Se, Sn, Sr, and Zn. The results showed that the flesh of these fish all contained extremely high concentrations of Al and Sr, and moderately high concentrations of Cr, As, Zn, Ni, Mn and Pb. The metals were higher in these fish during the rainy season, with fish collected during the months of March and October being the highest. In addition, the accumulation of metals was species-dependent. Cascudos (*Hypostomus punctatus*) and piranhas (*Serrasalmus spilopleura*) exhibited high concentrations of almost all of the metals, while curimbata (*Prochilodus lineatus*) had moderate levels. A few species, including pacu (*Piaractus mesopotamicus*) and dourado (*Salminus maxillosus*), had very low concentrations of most metals. The results show that the Piracicaba River Basin is widely contaminated with high concentrations of many toxic heavy metals, and that human consumption of some fish species is a human health concern.

Nunna, S.K. and E. Zou. NiSU. **Assessing ethoxyresorufin-o-deethylase activity in *Uca pugilator* during the molting cycle**.—In this study, we investigated the fluctuation of ethoxyresorufin-O-deethylase (EROD) activity during the molting cycle of the fiddler crab, *Uca pugilator*. The activity of EROD represents the phase I detoxification of xenobiotic-metabolizing enzymes. EROD activity is inducible by organic pollutants in both vertebrates and crustaceans. As such, EROD has been suggested to have the potential to be used as a biomarker

for organic pollution in aquatic environments. However, some crustacean physiology is known to exhibit a cyclic characteristic because of the periodic shedding of the confining exoskeleton (molting). Our preliminary results revealed that much of EROD activity in the hepatopancreas of *Uca pugilator* exists in the non-microsomal fraction, which is different from vertebrates, whose EROD activity is mainly found in microsomes. Additionally, we found that there is no significant change in EROD activity during the molting cycle. The implications of our preliminary findings were two-fold. First, unlike vertebrates that express most EROD activity in the microsomal fraction, EROD biomarker activity in *Uca pugilator* is expressed in both microsomal and non-microsomal fractions. Second, the invariance in EROD activity during the molting cycle of *Uca pugilator* suggests that molt-staging is not necessary when using EROD as a biomarker for organic pollution.

Pyakurel, K. and M.D. Horton. McSU. **Diatom influence on the growth pattern of *Spartina alterniflora* under varying salinity for coastal restoration**.—*Spartina alterniflora* is an important wetland vegetation utilized extensively for erosion control, marsh stabilization and coastal restoration. This study is aimed to determine how a benthic diatom, *Navicula salinicola* influences the growth of *S. alterniflora* at salinities 0 and 14 psu. Young plants of *S. alterniflora* with relatively same height and number of shoots were grown in separate pots at five replicates each treated with: a) freshwater (control group), b) diatom cells, c) seawater (14 psu), and d) both diatom cells and seawater every 7 days of growth for four weeks. Results showed that plants treated with diatom cells and seawater produced the highest number of young shoots during the growth period. All plants decreased in height during the first week; however, plants grown in plain seawater and those mixed with diatoms started to increase in the succeeding weeks. A similar pattern was observed on the number of leaves produced. Chemical analysis showed that the presence of *N. salinicola* lowered the heavy metal concentration of the soil such as arsenic, cadmium, lead and zinc. Overall, this implies that pulse addition of *N. salinicola* in saline water enhances the growth of *S. alterniflora*, which is important in coastal restoration.

Ray, H.M., F.D. Boone, and G.S. Zumwalt. LTU. **Sparged ozone remediation of free-phase ethanol gasoline**.—Gasoline contamination from leaking underground storage tanks and surface water spills presents a costly and environmentally hazardous challenge. Remediation techniques in past years include dual-phase extraction and sub-surface air sparging. Containment rings and siphon systems typically are used in surface spill remediation. We have tested the efficiency of ozone sparging to remediate free-phase gasoline in both of these environments. A low concentration of ozone (1.5 mg/L) was sparged through 200 mL of 5% ethanol gasoline floating on top of sand saturated with fresh water. Gasoline degradation and released carbon dioxide were monitored. In the second model, 200 mL of gasoline was floated directly on 800 mL of fresh water and sparged with the same ozone concentration (1.5 mg/L) and flow rate. In both cases, 70% of the contaminant layer was remediated by 120 minutes of exposure, after which asymptotic behavior was achieved. Released CO_2 rose well above ambient levels in the early stages of treatment and then dropped as the contaminant layer further degraded. Future research will compare these data with sparged oxygen and atmospheric air. Studies also will be conducted to determine if the size of the sparge bubbles affect the rate of gasoline degradation.

Saterfiel, J.S. and G.S. Zumwalt. LTU. **Mobile dispersal unit and manifold for ozone remediation of giant salvinia**.—Invasive water plants are becoming a large problem throughout the southern United States. Ozone remediation of invasive plants is a process by which ozone is injected or released into areas with invasive submersed plants. The ozone is highly effective in oxidizing the plant but challenging to disperse because of the volatility with many materials. Giant salvinia will be captured and concentrated at the apex of a pair of drift fences. A schedule 80 PVC manifold with diffusion points in a semi-circle protruding pattern and a header run from an ozone generator will allow the ozone to be dispersed at a controlled rate. The large scale manifold shall be constructed in four zones, with points accordingly per zone. Each zone shall be controlled by separate ozone generators which will be located on a mobile barge. A small scale schedule 80 PVC grid manifold will be constructed and placed under the invasive plants. Ambient air sensors with automatic cut offs will be used to assure public safety. Testing of the manifold will include treating plants in an open area similar to the lake in 10 feet of water. Future plans also include designing and testing a small portable dispersant manifold.

Shields, S. and R. Boopathy. NiSU. **Use of energy cane in Louisiana for energy production**.—Energy cane, a high fiber variety of sugarcane, is a promising feedstock alternative for bio-ethanol. Pre-treatment of lignocellulosic biomass with alkaline or weak acid solutions is necessary for fermentative microbes to access the hemicellulose and cellulose. Energy cane variety L 79-1002 is a type II energy cane grown primarily for the higher fiber content. This study used a 1%, 2%, and 5% hydrogen peroxide solution each at a pH of 8, 11.5, and 13 with an 8 hour, 24 hour, or 48 hour soaking for alkaline pre-treatment. Acid hydrolysis pretreatments consisted of 0.8M, 1.4M, and 1.6M H_2SO_4 solutions with soaking for 24 hours. *Saccharomyces cerevisiae* strains 765 and 918, *Escherichia coli*, *Klebsiella oxytoca*, and *Zymomonas mobilis*, all from the American Type Culture Collection (ATCC), were used for fermentation. HPLC results showed a larger ethanol production in L 79-1002 pretreated with dilute acid solution (mean value of 795.5mg/L) than that pretreated with alkaline solutions (mean value 429mg/L). This study shows promise for the use of energy cane in bio-ethanol production, which is an excellent transportation fuel. Energy sugar cane can be grown in marginal land in Louisiana to meet the energy demand of our country.

Smart, J.D., F.D. Boone, and G.S. Zumwalt. LTU. **Evaluation of composition and effectiveness of an ozone-selective aquatic barrier for remediation applications**.—Remediating aquatic environmental issues presents a challenge due to the complexity of aquatic ecosystems. Sparged ozone has been shown to effectively remediate invasive plants, algal blooms, and fuel spills, however the toxic effects to non-target organisms is problematic. We designed several ozone-selective, semi-permeable membrane models and examined their durability and effectiveness at containing dissolved ozone to the immediate treatment area. These models were composed of coconut fiber and burlap, along with layers of charcoal or steel wool, and quilted with hemp twine to increase fiber compression and rigidity. Ten-gallon glass aquaria were divided in half with the membranes and ozone was sparged at 2.0 mg/L into one half of each tank for three hours. Dissolved ozone concentrations were analyzed on both sides of the membranes at 10 minute intervals. Dry weights were recorded for each membrane before and after treatment. Coconut fiber alone was 100% effective at blocking the migration of ozone through water and was reduced in mass by only 0.986% over the three-hour treatment period.

Adding steel wool yielded 95.91% effectiveness and exhibited a mass increase of 0.97% due to accumulated rust. Future designs will be tested to increase effectiveness and durability while decreasing both weight and cost.

Snowden, J.J. and E. Martinez-Ceballos. SU-BR. **Mechanism of DEB-induced cisplatin resistance on DU145 cells**.—Prostate cancer is a frequently diagnosed malignancy reported as the second leading cause of cancer or cancer-related deaths in U.S. males. Current methods of treatment include surgery, radiation therapy, and anti-cancer drug treatments. Although chemotherapy employing the drug Cisplatin is the cornerstone of many cancer treatments, including prostate cancer, the mechanism of this acquired resistance to cisplatin is not well understood. We hypothesize that exposure to environmental pollutants may be an important factor in the acquisition of drug resistance by cancer cells. To test this hypothesis, DU145, human prostate cancer cells were exposed to the environmental pollutant diepoxybutane (DEB) prior to cisplatin treatment. DEB is a known human carcinogen derived from butadiene, a chemical used in the manufacturing of many polymers and also found in automobile exhaust and cigarette smoke. Pre-treatment of DU145 cells with 0.5uM DEB previous to cisplatin treatment increased the expression of ERK1/2. Similarly, the expression of the anti-apoptotic regulator Bcl-XL was increased due to DEB pre-treatment followed by cisplatin exposure for 24 hrs. These results indicate that DEB treatment induces the resistance of DU145 cells to cisplatin treatment. Our findings shed additional light on the factors that promote cancer resistance to present chemotherapeutic treatments.

Sothirajah, J. SU-BR. **Life cycle assessment of feminine hygiene products**.—A cradle to grave life cycle assessment was conducted on two feminine hygiene products, the DivaCup (menstrual cup) and the Playtex Sports Regular Unscented tampons. SimaPro7 was used to analyze these two products using the Cumulative Energy Demand, Eco-Indicator 95 and Eco-Indicator 99 processes. The results indicated that the tampon due to its cotton content had consumed a larger amount of energy, had greater environmental impacts with emissions of pesticides, eutrophication and heavy metals and had impacts on human health, ecosystem quality and resources than the menstrual cup. Tampons came out unfavorably in these analyses because cotton production requires large applications of fertilizers and pesticides. Fertilizers and pesticides are produced using fossil fuels, containing heavy metals, which increased the energy demand. Fertilizer and pesticide runoffs pollute the soil and water and eutrophication occurs in bodies of water. Limitations of the current study and recommendations for future study are included.

Sothirajah, J. and M. Addo. SU-BR. **E-waste recycling and national safety standards**.—It is estimated that recycling companies in the developed world send 80 percent of e-waste to poor Asian and African countries. In the US, states have initiated their own standards for e-waste recycling. California's Electronic Waste Recycling Act of 2003 includes an e-waste recycling fee, requires the state to purchase environmentally friendly electronic equipment, and a reduction in hazardous substances in electronic products. Those substances are cadmium, lead, mercury, and hexavalent cadmium. The purpose of this study is to analyze the amount of hazardous substances (cadmium, lead, mercury and hexavalent chromium) that has been released into the atmosphere or deposited in underground wells in the US from 1988-2007. The results from this

study can be used as a catalyst to push the US, through its Environmental Protection Agency, to come up with national safety standards with regard to e-waste recycling and minimize the harmful effects of the toxic substances.

Microbiology Section

Bacon, C.M., T. R. Courtville, K. Leonard, A. L. Corbin, and R. Nathaniel. NiSU. **The family pet, a potential reservoir of *Staphylococcus aureus* in recurrent soft tissue infections in pediatric patients**.—The prevention of recurrent skin and soft tissue infections with *Staphylococcus aureus* is imperative in pediatric patients. The close relationship of pet owners and their pets was evaluated for the possibility of these pets serving as a reservoir for *S. aureus*. For a six month period, we evaluated family members and pets of pediatric patients with recurrent infections. Five patients met established criteria. For each case, culture material was submitted for the isolation of the pathogen and the external nares of all family members and pets were cultured. Following enrichment and isolation on non-selective media, all suspect staphylococcal isolates were tested for catalase and coagulase. All catalase and coagulase positive isolates were speciated using polymerases chain reaction (PCR) as *S. aureus*. PCR for the PVL gene was completed on all confirmed *S. aureus*. Isolates were then tested for susceptibility patterns. Isolates from the same household with identical susceptibility patterns and demonstration of the PVL gene were then proven to be identical cones with pulse field gel electrophoresis (PFGE). The same cone of *S. aureus* was identified in wound exudates, pet, and a parent in one household indicating that the family pet may serve as a reservoir for *S. aureus*. Supported by: NiSU Research Council.

Boopathy, R. NiSU. **Treatment of wastewater from shrimp farm using sequencing batch reactor**.—A sequencing batch reactor (SBR) is a variation of the activated sludge biological treatment process. This process uses multiple steps in the same tank to take the place of multiple tanks in a conventional treatment system. The SBR accomplishes equalization, aeration, and clarification in a timed sequence in a single reactor basin. This is achieved in a simple tank, through sequencing stages, which includes fill, react, settle, decant, and idle. A laboratory scale SBR and a pilot scale SBR was successfully operated using shrimp aquaculture wastewater. The operation of SBR with shrimp sludge experienced carbon limitation to the system, which resulted in accumulation of nitrite and nitrate in the sludge. The addition of molasses at the beginning and in the middle of SBR operation enhanced the removal of ammonia, nitrate, and nitrite within 14 days of reactor operation. The operation details, nitrification, and denitrification reactions of the SBR operation will be discussed in detail in this presentation.

Broussard, Q., S. Gilbert, D. Demaris, O. Christian, and M. Merchant. McSU. **Antibacterial properties of *Datura* plant extracts**.—Solaneaceous plants have been the focus of intense scrutiny over the past decade due to the presence of biologically active alkaloids, steroidal glycosides, and flavanoids obtained from several members of the family. Members of the genus *Datura* are rich in tropane alkaloids and are widely distributed in tropical and subtropical regions. An antibacterial sitosterol derivative was described from a Nigerian collection of *D. metel*. The steroid was active against a range of pathogenic bacteria. Crude extracts were tested

for antibacterial activity in classical antibacterial zone of growth inhibition assays. All three of the extracts showed no activity against *Escherichia coli*, *Klebsiella oxytoca*, *Enterococcus faecalis*, *Salmonella typhi*, and *Shigella flexneri*, but exhibited moderate to strong activity against *Staphylococcus aureus* and *S. epidermidis*. Subsequent studies revealed that each of the extracts showed concentration- and time-dependent anti-*Staphylococcus* activity.

Comingore, C., A. DiCarlo, B. Semien, F. Boone, and G. Zumwalt. LTU. **Effects of dissolved-phase ozone concentrations on five common microbe genera**.—*Escherichia coli*, *Staphylococcus aureus*, *Staphylococcus epidermidis*, *Bacillus cereus*, *Klebsiella pneumoniae*, and *Proteus vulgaris* exhibit pathologically important antibiotic resistances requiring novel sterilization approaches. Prior research focused on ozone-derived hydroxyl radicals (-OH) and super oxides that cause membrane and cytoplasmic damage leading to microorganism inactivation. We have examined the effects of dissolved-phase ozone (0.5, 1, 2, and 4mg/L) on five common microbial genera. Each concentration of ozonated water was administered directly to the plated bacteria and the organisms were observed for cell deformation and lyses using phase contrast microscopy. Following treatment, the colonies were plated and incubated for 24 hours to assess re-growth capabilities. Although all organisms exhibited cell deformation, *B. cereus* exhibited minimal rebound at 0.5 mg/L and was eradicated at 4 mg/L. Further assays involved re-suspending a centrifuged pellet of each species in ozonated water for 30 minutes. Cell densities were generated for each species using standard plate counts and absorbance readings at 600nm before and after treatment. We observed a positive correlation between decreased cell density and increased cell deformation of each species following ozone exposure. Future studies will focus on cell densities and ozone concentrations to determine species-specific dosages for optimum sterilization.

Dodo, R. A., R. Thomas, and D. Jackson. ULM. **Aquatic environmental signals influence biofilm formation in Bayou DeSiard**.—Aquatic bacteria have the ability to attach to surfaces and/or each other. This sessile community is called a biofilm. Previous research has documented that environmental signals regulate the diversity and mass of bacterial biofilms. In this study, dialysis tubing containing filter-sterilized bayou water was placed in Bayou DeSiard to capture biofilm forming bacteria. The following bacteria were identified: *Pseudomonas vancouverensis*, *Brevundimonas vesicularis*, *Raoultella terrigena*, and *Paenibacillus chondroitinus*. These strains were then tested for their biofilm forming ability when grown in filter sterilized bayou water sampled from August 2007 to August 2008. The results were compared to biofilm growth of these strains on R2A laboratory media alone. Our results show that *Pseudomonas vancouverensis*, *Brevundimonas vesicularis*, and *Raoultella terrigena* had an overall decrease in biofilm production over the one year period and a statistically significant decrease in biofilm production from October to December of 2008. In contrast, *Paenibacillus chondroitinus* showed an overall increase in biofilm production over the one year period and a statistically significant increase from July to December of 2008. The data suggest that there are environmental signals present in Bayou DeSiard that can influence biofilm development. Supported by HHMI.

Lyons, J. and E. Elder. LSU-A. **Interactions between *Pseudomonas aeruginosa* and *Candida albicans* in biofilm formation**.—The goals for this project were to monitor interactions of

Pseudomonas aeruginosa and *Candida albicans* in biofilm formation. These two organisms were chosen because of their ability to form biofilms, the ease in distinguishing the colonies, and to include prokaryotic and eukaryotic organisms. Stainless steel disks were suspended in spectrophotometrically-calibrated inocula in a combination of nutrient broth and Sabouraud maltose broth. The growth chambers were incubated at 370°C and rotated at 135 rpm to provide optimum growth. Variables included the order in which the organisms are introduced, time between introduction of organisms, and total incubation time. The disks were scraped, and the scrapings and fluid were diluted and spread plated. The basic outcomes of the experiment showed that when incubated as monocultures both *P. aeruginosa* and *C. albicans* produce biofilms that increase consistently in cell density. When incubated together, *P. aeruginosa* has an antagonistic effect on the *C. albicans* starting around the six-hour time interval. Future research will expand the incubation time and incorporate measures that can be used to control biofilm formation.

Mine, S. and R. Boopathy. NiSU. **An alternative to antibiotics to control shrimp pathogen, *Vibrio harveyi* in shrimp aquaculture industry**.—Shrimp farming accounts for 40 percent of the world shrimp production. *Luminous vibriosis* is a shrimp disease that causes major economic losses in the shrimp industry as a result of massive shrimp kills due to infection. Some farms in the South Asia use antibiotics to control *Vibrio harveyi*, a responsible pathogen for *L. vibriosis*. However, the antibiotic-resistant strain was found recently in many shrimp farms, which makes it necessary to develop alternative pathogen control methods. Short-chain fatty acids are metabolic products of organisms, and they have been used as food preservatives for a long time. Organic acids are also commonly added to feeds in animal husbandry, but not in aquaculture. In this study, growth inhibitory effects of short-chain fatty acids, namely formic acid, acetic acid, propionic acid, and butyric acid, on *V. harveyi* were investigated with both solid (Muller-Hinton agar) and liquid (alkaline peptone water) media. Among four acids, formic acid showed the strongest inhibitory effect followed by acetic acid, propionic acid, and butyric acid under both solid and liquid media conditions. The minimum inhibitory concentration (MIC) of 0.035% formic acid suppressed growth in the liquid media. The further diluted concentration of formic acid, 0.0125%, also suppressed the growth when combined with 0.1% acetic acid. The major inhibitory mechanism seems to be the pH effect of organic acids. The laboratory study results are encouraging to formulate shrimp feed with organic acids to control *Vibrio* infection in shrimp aquaculture farms.

Robinson, J.M. and W.H. Dees. McSU. A.E. Jerse. USUHS. **Mutations in the mtrR locus in clinical partner isolates**.—*Neisseria gonorrhoeae* (Ng), like all Gram-negative bacteria, have an inner and outer membrane enclosing a thin layer of peptidoglycan. Spanning these membranes is an energy-dependent Mtr (multiple transferable resistance) efflux pump. Encoded by the mtrCDE operon, the efflux pump is able to expel antibiotics, detergents, and host-specific anti-microbial agents, including the hormone progesterone. Progesterone is a steroid hormone produced by ovaries during menstruation and pregnancy; therefore, we hypothesized isolates from the females will more often carry a mutation in mtrR, a gene that represses mtrCDE transcription, due to selective pressure compared to male partner strains. We investigated this potential gender difference for the mtrR derepression in *Neisseria gonorrhoeae* using clinical partner isolates. We determined the minimum inhibitory concentration (MIC) of three different

substrates of the pump - erythromycin, triton-X 100, and penicillin G - against the partner strains. Only 10 of 35 strains were suspected to have the mtr mutations: 4 partner groups with the mutation (n=8) and 2 partner groups having only one partner with the mutation (n=2). The MICs of the partner strains were similar; showing no selective pressure for mtrCDE mutation in isolates from the female partner strains.

Robinson, J.M. and W.H. Dees. McSU. A. Kunz and A.E. Jerse. USUHS. **Preliminary fitness comparisons of *Neisseria gonorrhoeae* with gyrA and parC mutations**.—*Neisseria gonorrhoeae* (Ng) has recently developed resistance to fluoroquinolone (ciprofloxacin). According to the Centers for Disease Control and Prevention, fluoroquinolones are no longer a viable treatment option for Ng. Since fluoroquinolones are an excellent antibiotic for Ng infections, there is a need to understand the reason behind the increase in fluoroquinolone resistance. Information on mutations affecting increased fitness of bacteria may provide insight into this resistance. We examined the effects of mutations in gyrA, which encodes for gyrase A, and parC, a P53-associated parkin-like cytoplasmic protein. Preliminary in vitro growth curves show that Ng with gyrA mutations conferred increased fitness compared to both control strains and Ng with combined gyrA and parC mutations. The future direction of this research includes co-infection studies using animal models.

Samuel, J. and R. Giorno. LTU. A. Driks. LUMC-IL. J. R. Maddock. UMICH. **Characterization of CotH in *Bacillus anthracis* spore germination**.—*Bacillus anthracis* spores are the etiologic agent of anthrax. We seek to understand the roles of two spore structures in spore germination: the exosporium (the outermost spore structure) and the coat (located beneath the exosporium). Proper outer-layer spore assembly depends on the presence of key proteins. In their absence, other exosporium and coat proteins fail to assemble. Using SDS-PAGE analysis of extractable spore proteins, we determined that the coat protein CotH directs the assembly of at least four spore associated proteins in *B. anthracis*. Additionally, CotH affects germination; in its absence, a greater percentage of cotH spores germinate than in wild type. To further our understanding of the coat and exosporium's role in germination, we would like to identify the proteins absent from cotH mutant spores. To this end, we employed a reverse genetic approach that suggests CotJC and SleL (YaaH) are two of the four CotH controlled proteins. CotJC's assembly-dependency on CotH is being determined by constructing a strain that expresses green fluorescent protein (GFP) fused to CotJC. If the GFP fusion protein is shown to be CotH dependent, the corresponding gene will be deleted in *B. anthracis*.

Spahn, M.L, F. Boone, G. Zumwalt. LTU. **Ozone lysis of the colonial green algae *Scenedesmus quadricauda*.—**Many algae species, when conditions allow for high concentrations, can cause harmful effects if ingested. Without constant application of harsh chemicals, algae are extremely difficult to eliminate from a contaminated water source. Dissolved phase ozone was previously found to inactivate algal populations in solution. However, the exact mechanism by which ozone inactivates algal cells has not been fully explored. Ozonated water was placed in a sample of *Scenedesmus*, so that the inactivation process could be documented with phase microscopy. The cellular response was observed at timed intervals after treatment. The bipolar phospholipid membrane that contains the chlorophyll degraded first, releasing chlorophyll into the cell. Shortly after, the nuclear

membrane broke down releasing its contents into the cell. The cellulose wall then began to expand and finally failed, releasing the cellular contents. We have concluded that dissolved phase ozone readily passes into the cell and degrades internal structures before cell lysis is achieved. Further documentation will focus on a single cell to illustrate the real-time process of cell lyses and potential ozone treatments of other algae genera as well.

Wise, S., A. Corbin, B. Ramachandran, and M. Kilgen. NiSU. **Sources of anthropogenic fecal coliform contamination in Bayou Lafourche, Louisiana**.—Bayou Lafourche, located in southern Louisiana, branches off the Mississippi River, flows for 110 miles and eventually empties into the Gulf of Mexico. Bayou Lafourche is the drinking water source (DWS) for 300,000 people in five parishes. However, it seasonally exceeds the total maximum daily load (TMDL) for fecal coliforms (FC) and dissolved oxygen imposed by the Environmental Protection Agency (EPA) in 2008. The Louisiana Department of Environmental Quality (LDEQ) must address the EPA TMDL on Bayou Lafourche which requires a total 45% reduction of anthropogenic FC in summer months to meet the designated use standards for DWS and primary and secondary contact recreation. The goal of this project was to identify and enumerate anthropogenic nonpoint source FC contamination from malfunctioning home package sewage systems in the Bayou Lafourche watershed. Rotating temporal and spatial sampling of 54 sampling sites within 9 sampling clusters occurred 3 weeks each month during the 4 seasons of the year. Samples collected were tested for FC concentration, optical brightener fluorescent values (OB), and % photo decay. These OB and % decay values were used as rough indicators of anthropogenic input revealing 11 problem areas.

Molecular and Biomedical Biology Section

Addae, A.C, and E. Martinez-Ceballos. SU-BR. **Effect of hydrogel encapsulation on the neuronal differentiation of wt versus Hoxa1 K.O. mouse ES cells**.—Embryonic stem (ES) cells are pluripotent cells that can differentiate into all three main germ layers: endoderm, mesoderm, and ectoderm. A number of methods have been developed to differentiate ES cells into specific cell types in culture. The methods that have been primarily employed in the directed differentiation of ES cells rely on the generation of three-dimensional ES cell aggregates called embryoid bodies (EBs). One inherent limitation of this procedure is the low efficiency of ES cell differentiation due to the formation of cavitated or cystic EB. This cavitation is produced by cell death at the EB core due to a decrease in diffusion of nutrients into the deeper cell layers of the embryoids. We hypothesize that an increase in both nutrient diffusion and cellular waste into and out the EBs, respectively, may result in a high efficiency of ES cell differentiation. To test this hypothesis, we have encapsulated the ES cells inalginate-based hydrogels and examined the efficiency of neuronal differentiation after microgravity culture for 8 days. Our results indicate that encapsulation of mES cells prior to cell aggregation resulted in a 2-fold increase in neuronal differentiation efficiency as compared to that obtained from normal EBs culture.

Amancha, K.P. and A. Hussain. ULM. S. Balkundi and Y.M. Lvov. LTU. **Sustained release of insulin from microparticles following pulmonary delivery**.—This study tests the hypothesis that layer-by-layer (LbL) nanoassembly of thin films on insulin particles provides sustained

release of the drug after pulmonary delivery. LbL-insulin microparticles were formulated using cationic and anionic polyelectrolytes. The microparticles were characterized for particle size, morphology and zeta potential. The pharmacokinetics and pharmacodynamics of drug microparticles were assessed by measuring serum glucose and insulin levels after intrapulmonary administration in rats. Bronchoalveolar lavage (BAL) and Evans blue (EB) extravasations were performed to investigate if the formulation particles caused any cellular or biochemical changes in the lungs. The mass median aerodynamic diameter (MMAD) of the insulin microparticles was 2.71 μm. Confocal images of the LbL-insulin revealed the uniform coating of polyelectrolytes around the insulin particles. Zeta potential measurements showed that there was charge reversal after each layering. Compared to pulmonary administered insulin solution, LbL-insulin formulation resulted in sustained serum insulin levels and concomitant decrease in serum glucose levels for a period of 12 h. The BAL and EB extravasation studies showed that the LbL-insulin formulation did not elicit any significant increase in marker enzyme activity compared to the control group. Sustained release of insulin could be achieved using LbL-nanoassembly around the insulin particles.

Breaux, M., J.C. Lasyone, L. Lemoine, S. Montgomery, S. Timmons, E. Deblanc, J. Abreu, and F.J. Lemoine. NSU. **Characterization of yeast chromosome fragile sites**.—A cell's ability to maintain intact chromosomes is essential for normal cellular growth and viability. However, certain chromosomal regions, known as chromosome fragile sites, are prone to breakage when cells are exposed to replication stresses. Once broken, these sites often are involved in translocations and other genome rearrangements which are characteristic of certain types of cancers. We have recently identified a chromosome fragile site in *Saccharomyces cerevisiae* and are using this information to develop a simple, tractable eukaryotic model of mammalian chromosome fragile sites. Currently, we are working to identify the physical and genetic regulators of double strand break formation at yeast chromosome fragile sites. The establishment of a yeast chromosome fragile site model system will allow for the advancement of genome stability regulation studies, which are critical to the appreciation of cellular transformation and cancer development.

Clark, C., M. El Sayed, R.D. Davis, J. Harmson, C.R. Gissendanner, and A.M. Findley. ULM. **Isolation and characterization of mycobacteriophages from soil samples in Northeast Louisiana**.—The University of Louisiana at Monroe was selected by HHMI's Science Education Alliance to join its National Genomics Research Initiative. Our first year of participation resulted in the isolation, ultrastructural and restriction enzyme analyses of 15 distinctive bacteriophages, and the annotation and genomic characterization of mycobacterium phage peaches (GenBank GQ303263.1). During fall 2009, a second group of freshman students isolated 21 bacteriophages via enrichment or direct plating. Isolates were subjected to spot-test analysis, phage purification plating, and an empirical testing protocol that led to 10-plate infection and harvesting of high-titer lysates (10^9-10^{10} pfu/ml). Lysates were processed for TEM with negative staining. Isolated DNA samples were digested with BamHI, ClaI, EcoRI, HaeIII, and HindIII endonucleases and fragments were separated with electrophoresis (0.8% agarose containing 0.5mg/mL EtBr). Restriction gels were compared with known mycobacteriophages to ascertain the novelty of phage isolates. Genomic DNA was evaluated for quality, molecular weight, and quantity using the guidelines provided by the Department of Energy-Joint Genomics

Institute and phages were selected for library construction and sequencing. Descriptions of plaque morphology, phage titer, ultrastructure, and restriction digestion profiles for these new isolates, as well as an overview of Mycobacterium phage Peaches, will be presented.

Du, T. and S. Bai. SU-BR. **Docking arachidonic acid to 8R-lipoxygenase using ICM**.—Due to the important roles of lipoxygenases (LOX) in the biosynthesis of leukotrienes derived from arachidonic acid (AA), an understanding of how substrate (AA) is recognized by the enzyme (LOX) appears to be imperative. The understanding can help design drug/inhibitors of LOX. In this research, internal coordinate mechanics (ICM) was used to dock substrate AA into a member of LOX family, 8R-LOX, with default parameters and initial side chain optimization and all hydrogen atoms optimized. The high resolution 1.85Å structure of 8R-LOX from *Plexaura homomalla* was used as the receptor. We have found possible docking pockets using icmpocketFinder for the 1.85Å wild type 8R-LOX. One target docking area also was defined manually. Various docking confirmations of AA were obtained with different docking parameter settings. The most reasonable docked ligand conformations with the lowest free energy will be retained. The ligand conformations and binding side residues is useful in modeling AA:LOX complex. ICM is thought to be an efficient method in ligand-protein docking.

Fontana, J.M., C.F. Pasluosta, E.D. Sellers, H. Tims, and A.W.L. Chiu. LTU. **Real-time signal classification, predictive model and vibrotactile feedback control for a 5-digit prosthetic hand**.—The low acceptability rate of prosthetic devices can be attributed to the high cost and cognitive burden associated with them. We hypothesized that a myo-controlled prosthetic hand, utilizing advanced signal processing and control algorithms, can replace the use of expensive, specialized actuators, and sensors. Our proposed device consists of four components: a five-digit robotic hand prototype, a myo-electric signal classifier, a predictive force and slippage controller, and a vibrotactile feedback module. Surface EMG signals are used to classify the user's intended grasping configurations. After the pre-shape is selected, the control strategy is activated to modulate the grasping force. This approach drastically reduces the psychological burden of the user. Experiments, involving activities of daily living (ADL) were used to test the strength, response time, and versatility of the control algorithm. The preliminary results indicated that the myo-electric signals from the user can be processed and relayed to the controller in less than 25ms and that the real-time model-based grasping control can accurately detect and adjust to the appropriate force before slippage occurs. Vibrotactile motors were also placed at appropriate locations on the user's skin to increase the user's sense of control in forming secure grasping configurations.

Gill, K.K., K.P. Amancha, and A. Hussain. ULM. **Pulmonary targeting of aerosolized polymeric micelles containing paclitaxel for treatment of lung cancer**.—Lung cancer is the leading cause of cancer deaths globally. Systemic delivery is rarely successful because only limited amount of chemotherapeutic agent targets lung tumor sites, even when administered at high doses. Therefore, accurate delivery at the tumor site is the most crucial step for increasing the survival of lung cancer patients. Pulmonary delivery utilizes the natural permeability of the lung to transfer molecules to the bloodstream and inhaled chemotherapy seems a logical approach to treat lung tumors. In a similar attempt, aerosol delivery of anticancer drug paclitaxel

was attempted following entrapment into polymer micelles using biocompatible polymer. Paclitaxel was loaded into polymer micelles using solvent evaporation method. Different ratios of paclitaxel to polymer were used to maximize the entrapment efficiency of the drug into the polymer. The entrapment efficiency was determined quantitatively by HPLC analysis. The average diameter and polydispersity index were measured by photon correlation spectroscopy. Cascade impactor studies were carried out for aerodynamic characterization which includes measurement of mass median aerodynamic diameter (MMAD) and geometric standard deviation (GSD). To evaluate the stability of micellar formulation, Zeta potential measurements were done. Furthermore, differential scanning calorimetry (DSC) studies were carried out to investigate if the drug was dispersed inside the polymer matrix or not. To confirm the results obtained from DSC studies, proton NMR spectra for blank micelles, formulation and the drug alone were obtained. For in vivo studies, HPLC method for determination of paclitaxel in rat plasma following pulmonary delivery is developed. Future studies include in vivo evaluation of efficacy and toxicity of polymeric micellar paclitaxel following pulmonary delivery.

Gupta, V., G.A. Patwardhan, Y.Y. Liu. ULM. X. Gu. LSU. B. Rowan and S.M. Jazwinski. TU. **The role of glycosphingolipids in the formation of cancer stem cells and drug resistance**. **—**Cancer stem cells (CSCs) involved in the formation of primary tumors, metastasis, and relapse, display resistance to cytotoxins. This protects CSCs from chemotherapy. Glucosylceramide synthase (GCS) is an enzyme catalyzing the first glycosylation in glycosphingolipids synthesis. In the present study, we have found that GCS modulates the formation and maintenance of breast cancer stem cells (BCSCs). GCS over-expression was interrelated to the increment of BCSCs and drug resistance in human breast cancer MCF-7 cell lines. In MCF-7/Dox (doxorubicin-resistant) cells, GCS protein and activity were increased compared to wild-type MCF-7 cells. Analyzed by flow cytometry and immunostaining, the BCSCs with CD44+/CD24-/ESA+ phenotype were increased in MCF-7/Dox and NCI/ADR-RES cell lines, as compared to MCF-7 cells. In BCSCs, GCS enzyme activity was 2-fold greater than other subsets sorted from MCF-7/Dox. Silencing GCS by using mixed-backbone oligonucleotide (MBO-asGCS) significantly decreased the numbers of BCSCs in MCF-7/Dox cells. When NCI/ADR-RES and its variants NCI//ADR-RE/GCS (GCS over-expressed), NCI/ADR-RE/asGCS (GCS-silenced) were inoculated in athymic nude mice, the aggressive tumors were found with NCI/ADR-RES and NCI//ADR-RE/GCS that were BCSCs enriched; however, no tumor was observed in mice injected with NCI-ADR-RE/asGCS cells. These results, demonstrate glycosphingolipids are involved in the regulation of BCSCs formation.

Lemoine, F.J., J. Abreu, M. Breaux, E. Deblanc, J.C. Lasyone, L. Lemon, S. Montgomery, and S. Timmons. NSU. **Identification of chromosome fragile sites in yeast**.**—**For proper growth, a cell must maintain intact, or unbroken, chromosomes. Fragile sites are chromosomal regions that are prone to breakage. Such breaks may result in genomic alterations that are frequently observed in many cancers. Therefore, a greater understanding of chromosome fragile site regulation has important implications in cancer biology. We have identified the first two fragile sites in the budding yeast *Saccharomyces cerevisiae*. This discovery demonstrates the potential use of budding yeast as a model system for studying chromosome fragile site structure and regulation. However, additional studies are needed to validate the usefulness of this model system. Therefore, we are currently developing new techniques that will aid in the identification

and characterization of additional yeast chromosome fragile sites in hopes of revealing commonalities in structure and function. Results from these studies will provide insight into the molecular mechanisms controlling chromosome fragile site stability in yeast and mammals.

Lyles, Kimberlee, S. Bai, E. Khosravi, and S. Yang. SU-BR. **Modeling a gK protein fragment with a POPE membrane**.—The study of molecular systems, particularly proteins, can be done in various ways. The current most accurate method is to simulate the system by using a molecular dynamics (MD) simulation at an atomic level. In MD simulation, the protein structure, and eventually the protein function, is depicted by its interatomic interaction within the atoms in the molecular system, such as a membrane. The gK protein, which is found in the Herpes Simplex Type 1 virus, is comprised of hundreds of amino acids. Its interaction with a membrane is very important to the spread of the virus. In this study, the first segment of the gK protein was composed and merged together with a bilipid membrane and the results of that merge will be discussed in the report. This research is being supported by LONI and LBRN.

Merchant, M. and V. Maccha. McSU. L. Darville and K. Murray. LSU-BR. **Isolation and characterization of mannose-binding, C-type lectin proteins in serum of the American alligator (*Alligator mississippiensis*)**.—Lectins are carbohydrate-binding proteins that play an important role in innate immunity by recognizing a wide range of common pathogen surface carbohydrates. C-type lectin proteins, a subset of lectins that require calcium for binding to target carbohydrate moieties, were isolated from serum of the American alligator (*Alligator mississippiensis*) using a mannan affinity column. The proteins were isolated by SDS-PAGE, and the total mass determined by MALDA-TOF. Results from these analyses showed that the protein was present in monomeric, dimeric, and tetrameric forms in vitro. The N-terminal sequence was determined by Edman degradation, and the complete sequence is currently being ascertained using nanospray MS/MS. The sequence of the alligator lectin protein will be aligned with mammalian and avian C-type lectins.

Merrifield, J.J. and R. Nathaniel. NiSU. **Rabbit red blood cell hemolysis assay to evaluate serum complement system of fish in southern Louisiana**.—Red blood cell hemolysis is a cheap and effective method of characterizing serum complement potency in various species. This study aims to evaluate hemolytic activity using rabbit red blood cells (RRBC), mediated by complement of several species of fish found in southern Louisiana. Concentration dependence was evaluated for channel catfish (*Ictalurus punctatus*), striped mullet (*Mugil cephalus*), alligator gar (*Atractosteus spatula*), and spotted gar (*Lepisosteus oculatus*), as well as temperature and time dependence for spotted gar serum complement. For concentration dependence, serum was diluted in phosphate-buffered saline and incubated with RRBCs at serum concentrations ranging from 0% to 25%. Spotted gar serum kinetic assays lasting one hour showed that maximum hemolytic activity can be measured in the first 2 minutes. Samples in the temperature study were acclimated overnight at various temperatures before being assayed. Hemolysis was concentration dependent for all serum analyzed. Spotted gar and mullet serum activity peaked near 7.5% concentration, while channel catfish activity peaked near 12.5% concentration. Spotted gar serum activity showed no temperature dependence between 5^{o}C and 35^{o}C. Hemolytic activity was destroyed by heating the serum to 100^{o}C. These results demonstrate that

serum from different fish species have immune modulators that can be evaluated using RRBC hemolysis.

Ogunkoya, Y.O. SU-BR. B.M. Nickel, V.L. Gayand, and S.A. Murray. UPITT. **The association of clathrin with cellular organelles demonstrated by quantum dot immuno-electron microscopy**.—An extensive body of research has been used to establish the importance of clathrin in the process of endocytosis. Clathrin-dependent endocytosis occurs at specialized anatomical structures called coated pits which detach from the plasma membrane to form cytoplasmic clathrin coated vesicles. With electron microscopy a bristle coat, composed of clathrin, has been demonstrated to surround coated pits and vesicles, but there is a need to evaluate the composition of the bristle coat surrounding other cellular organelles. In this study, quantum dot immune-electron microscopic techniques were used to analyze the association of clathrin and one of its adaptor proteins, AP-2, with cytoplasmic structures in a human adrenal cortical cell line. Clathrin was demonstrated to associate with the plasma membrane and a variety of vesicle types, including the classic clathrin coated vesicles, pentilaminar annular gap junction vesicles, multivesicular bodies, and other unidentified structures. In addition, clathrin associated with connexin 43 (Cx43) gap junction plaques where it preferentially localized to the cytoplasmic surface of the gap junction plaque membrane. The adaptor protein, AP-2 was associated with the plasma membrane, coated pits, and with vesicles near the cell membrane. The electron micrographs obtained with the quantum dot technology allows an accurate and specific localization of clathrin and its adaptor protein with cellular organelles.

Ogunkoya, Y.O. SU-BR. I. Sehgal and G. Kousoulas. LSU-BR. **Plaque assay overlay media: Agarose, liquid and methylcellulose**.—Plaque assay is one of the most important and basic protocols in virology used in titrating viral stock to determine the concentration of infectious virus particles per ml (PFU/ml). Plaque assay relies heavily on the discrete, circumscribed areas formed in the cell monolayer by the virus for counting. However, some viruses do not form plaques in cell monolayers. Plaque assay was performed on a strain of human coronavirus on human rectal tumor cells using three different types of media overlay: liquid maintenance medium without fetal bovine serum, low melting agarose that solidified after setting and viscous carboxymethylcellulose. Specimens were incubated for 9 days. Liquid and agarose overlaid samples showed diffuse viral infection with no plaque formation in the cell monolayer, while the viscous carboxymethylcellulose overlaid samples showed discrete, circumscribed localized plaque areas in the cell monolayer. Plaque assay under carboxymethylcellulose-containing overlay media is easier, faster and more sensitive than assays under agar and liquid overlays on this strain of coronavirus.

Palem, J.R., G.R. Bedadala, K.A. El Sayed, and S.V. Hsia. ULM. **The marine-derived alkaloid manzamine A as a novel HSV-1 inhibitor**.—Manzamine A is a marine-derived β-carboline alkaloid first reported by Higa and coworkers in 1986, from the Okinawan sponge genus *Haliclona*. Manzamines showed a diverse range of pharmacological activities including insecticidal, antibacterial, anti-inflammatory, anti-HIV1, in vivo activity against malaria, and anti-leishmaniasis effects. This study reports the putative inhibitory effect of manzamine A on HSV-1 infection. Our results indicated that manzamine A effectively inhibited viral replication and infection in several cell lines such as epithelium and fibroblasts. Of all these cells, a

significant inhibitory effect on viral infection was observed in SIRC, a corneal cell line at 1 μM. The existing anti-HSV-1 drug acyclovir was analyzed and showed a comparable activity at 50 μM. Plaque assays demonstrated that manzamine A reduced the release of infectious virus by 1011-fold. RT-PCR assays indicated that HSV-1 viron host shutoff (vhs) activity and ICP0 transcription was decreased by manzamine A treatment. Identification of symbiotic actinobacteria, *Micromonospora* sp., as a cost effective sustainable source along with these results bode well for the development of manzamines as potential leads to reduce viral infection in corneal cells and to prevent HSV-1-induced eye infections such as keratitis.

Patwardhan G.A., V. Gupta, S. Hsia, and Y.Y. Liu. ULM. M. Jazwinski. TuMC. **Abolition of ceramide glycosylation reinstates functional p53 through ceramide regulated alternative splicing of p53 in p53 mutant drug-resistant cancer cells**.—p53 mutation, detected in more than 50% of tumors, prevents apoptosis and promotes cancer progression. Restoration of p53 to increase the expression of wild-type p53 and to eliminate mutant expression can substantially increase the efficacy of chemotherapy and stop malignant progression. We, for the first time, report that disruption of ceramide glycosylation restores p53 dependent-apoptosis in p53 mutant drug-resistant cancer cells. A loss of 21 base-pairs in the mRNA of exon-5 can result in the accumulation of mutant p53 and cells insensitiveness to induced-apoptosis in human NCI/ADR-RE ovarian cancer cells. We found that treatment of mixed-backbone oligonucleotide against human glucosylceramide synthase increased the levels of wild-type p53 mRNA and protein in a dose-dependent manner. Silencing of GCS using MBO-asGCS (1mg/kg) restored wild-type p53 expression and substantially sensitizes NCI/ADR-RE tumors to doxorubicin-induced apoptosis in vivo, as compared to control treatments. Increasing endogenous ceramide promoted wild-type p53 expression at the levels of mRNA, protein, and phosphorylation; decreasing ceramide repressed wild-type p53 expression. The present study indicates that cancer cells marked with mutant p53 phenotype are capable of expressing functional p53. Ceramide glycosylation is one molecular mechanism that shifts expression to the wild-type form of p53 at alternative splicing of post-transcription processing.

Quadri, S., D.W. Jackson, M.J. Reitzell, and K.E. Jackson. ULM. **Inhibition of endogenous carbon monoxide production promotes antidiuresis**.—Heme oxygenase (HO) catalyzes the degradation of heme to form iron, biliverdin, and carbon monoxide (CO). The vascular actions of CO include direct vasodilatation and indirect vasoconstriction through NOS inhibition. This study was performed to examine the effects of inhibition of endogenous CO production alone or combined with NOS inhibition. Chromium mesoporphyrin (CrMP, 45μmol/Kg, IP), a photostable HO inhibitor, was given to control rats and L-NAME (50mg/Kg, q 12hr, 4 days) treated hypertensive rats. In control animals, CrMP decreased CO levels, urine volume, and sodium and potassium excretion, but had no effect on mean arterial pressure (MAP), renal blood flow (RBF), plasma rennin activity (PRA), or glomerular filtration rate (GFR). In L-NAME treated hypertensive rats, CrMP decreased endogenous CO, and had no effect on MAP, RBF, or GFR; but decreased water, sodium, and potassium excretion in a similar manner to control animals. An increase in PRA was observed in L-NAME treated rats but not in control rats, indicating that this effect is associated with an absent NO system. The results suggest that endogenously formed CO promotes water, sodium, and potassium excretion by a direct tubular action that is independent of renal hemodynamic or the NO system. Supported by NHLBI.

Ramasahayam, S. and S.A. Meyer. ULM. **Effects of subchronic exposure of munition RDX environmental degradation product MNX.—**Hexahydro-1-nitroso-3,5-dinitro-1,3,5-triazine (MNX) is an environmental degradation product of munitions compound hexahydro-1,3,5-trinitro-1,3,5- triazine (RDX). Human occupational and accidental exposures to RDX and acute oral exposures in rats resulted in seizures. Earlier studies in our lab have reported hematotoxicity associated with acute exposure to MNX, but little is known about sub-chronic exposures of MNX. The main objective of the present study was to determine the hematotoxic effects of sub-chronic exposure to MNX in female Sprague Dawley rats. Rats were gavaged once daily for 4 or 6 weeks at a dose of 0 and 47 mg/kg/d MNX and sacrificed 24 h after the last dose. Toxicological endpoints measured included clinical observations, body weights, hematology, clinical chemistry, and histopathology. The major toxicological effects observed were granulocytosis and thrombocytosis in blood. Bone pathology exhibited increased megakaryocytes, but fibrosis was not evident as determined by Grocott methenamine silver stain for reticulin fibers. Clinical chemistry parameters like serum Na, K, Cl, glucose, and creatinine changes in the absence of loss in body weight gain and serum proteins are consistent with gastrointestinal toxicity. Proliferation of megakaryocytes in bone marrow and thrombocytosis after sub-chronic MNX exposures are likely to be related mechanistically to our earlier observation of MNX hematotoxicity. Support by US DoD.

Reis, L.G. and P.S. Sit. LTU. **Modification of hydrogel scaffolds to modulate the responses of corneal epithelial cells.—**In this study, we present the results of fabricating novel methacrylate-containing hydrogel scaffolds to be used as corneal replacement and augmentation, and testing of the responses of human corneal epithelial cells on the hydrogel scaffolds. The hydrogel scaffold is based on polyallylamine (PAH), glycidyl methacrylate (GMA), and polyethyleneglycol (PEG). Hydrogels with different compositions of PAH, GMA, and PEG were fabricated and tested for the materials' properties as well as the responses following the deposition of corneal epithelial cells. Material properties of the hydrogels were examined including morphology, viscoelastic properties, pore size, physical stability, swelling ratio, and surface wettability. Proteins including collagen, fibronectin, and bovine serum albumin (BSA) were incorporated into some of the hydrogels. Human corneal epithelial cells, in either serum-free or serum-rich medium, were allowed to deposit onto the hydrogels, after which their responses were examined. Tissue culture polystyrene (TCPS) served as a control. Cell adhesion occurred only when proteins were present in either the hydrogels or serum-rich medium. Moreover, cells adhered and spread on TCPS but not on soft hydrogels in the presence of proteins. The results suggest that both the presence of proteins and substrate stiffness are important factors that affect the responses of corneal epithelial cells.

Wilson, C., B. Morehead, and C.R. Gissendanner. ULM. **Using temporal RNAi to determine the function of the gene nhr-6 during differentiation of the spermatheca in *C. elegans*.—**The nhr-6 gene encodes the *C. elegans* homolog of the NR4A nuclear receptor transcription factor. It has been proposed that nhr-6 has a dualistic role in regulating cell proliferation and cell differentiation during development of the spermatheca, a somatic gonad organ involved in ovulation and fertilization. The purpose of this study is to test the dualistic function hypothesis using temporal RNA interference with gene function (RNAi). In this experiment, animals are subjected to bacteria –mediated RNAi at different time points during spermatheca development.

The goal is to knock-out nhr-6 during differentiation of the organ, post-proliferation. The prediction for a cell differentiation function would be a spermatheca morphogenesis-defective phenotype not associated with a cell proliferation defect. We have developed an enhanced RNAi assay using transgene rescue of an nhr-6 mutant with a GFP-tagged NHR-6 protein. This assay allows for both robust RNAi and monitoring of NHR-6 protein expression to verify RNAi efficacy. The effect of the temporal RNAi will be scored by brood size analysis and microscopic analysis of organ morphogenesis. This will allow us to identify the phenotypic effects of nhr-6 gene knockout in the differentiation phase of spermatheca development.

Zoology Section

Akin, J. NSU. **Demography of the southern red-backed salamander in an isolated Louisiana population**.—The red-backed salamander, *Plethodon serratus*, has a disjunct distribution across the southeastern United States. In Louisiana, the population is restricted to rock outcrops in the northwestern section of the state. This study makes a preliminary attempt to census the population density and size class distribution for this threatened species of salamander. In addition, habitat use and behavior for this species were noted.

Basiger, E.L. and R.L. Minton. ULM. **Status survey of the diversity and distribution of freshwater gastropods in the Mississippi Alluvial Plain and South Central Plains of Arkansas**.—Freshwater snail surveys help further knowledge regarding local biodiversity, current distributions, and extinctions of this highly imperiled group, as well as aid in successful conservation. This survey, focused on four hydrobiid snail species and headwater reaches, collected data documenting the diversity and distribution of freshwater gastropods from the Mississippi Alluvial Plain and the South Central Plains regions of Arkansas. Data were collected throughout the two regions of Arkansas encompassing all major river systems. Samples were collected during a two-month period in 2009 from a variety of lentic and lotic habitats. Species were identified in the field while voucher specimens were relaxed in menthol bath and fixed in 95% ethanol for later identification. Project information including methodology and results along with maps showing sample site locations and historical and current occurrences also will be presented. Survey information such as this will be valuable to future studies assessing the status of aquatic gastropods and water quality in Arkansas.

Battaglia, C. and R. Fiorillo. ULM. **Recruitment and seasonal dynamics of an undescribed microphallid metacercaria (Trematoda: Microphallidae) in its intermediate host, the grass shrimp *Palaemonetes kadiakensis*, in Black Bayou Lake, LA**.—We examined the seasonal dynamics of an undescribed microphallid metacercaria in its intermediate host, *Palaemonetes kadiakensis*. From August 2007– April 2008, we collected grass shrimp monthly from vegetated shallow areas of Black Bayou Lake in Ouachita Parish in Northeast Louisiana. Shrimp were found mostly associated with Brazilian waterweed, *Egeria densa*, and Coon's tail, *Ceratophyllum demersum*, near bald cypress, *Taxodium distichum*, stands. We recovered a total of 980 metacercariae from 237 *P. kadiakensis*. Metacercaria were recovered mostly from the cephalothorax, and only rarely in abdominal muscle. We found no sex effect on parasite abundance, but did note a significant positive relationship between host size and metacercariae

abundance for both sexes. Prevalence was relatively high throughout the sampling period and patterns of abundance and intensity suggest a Fall/Spring parasite recruitment period.

Coombs, A., D. Owens, and J Akin. NSU. **Effects of changing hydroperiod on larval recruitment in mole salamanders**.—Mole salamanders of the genus *Ambystoma* lay their eggs in seasonal bodies of shallow water called vernal pools. Both the time and the location of egg deposition typically vary within salamander populations. In this study, we examined egg deposition in two species of *Ambystoma* salamanders, *A. maculatum* and *A. talpoideum*, from multiple breeding pools that differed in hydroperiod. The hydroperiods ranged broadly from constantly flooded to periodically dry. We found that fluctuations in hydroperiod significantly affected hatching success and we suggest implications for future larval success.

Dees, W.H. and A.P. Figueroa. McSU. **An inexpensive mosquito rearing chamber for biological investigations**.—An inexpensive mosquito rearing chamber for laboratory and field investigations is described. The rearing chamber is made from plastics recycled from common house-hold products (e.g., peanut butter jars and room deodorizers). The cost for the rearing chamber is negligible. A demonstration of this device will be presented.

Dees, W.H. McSU. G.W. Schultz, R.G. Robbins, and D.W. Hill. AFPMB. **A teaching tool for identifying adult mosquitoes**.—A computer-based program on adult mosquito morphology and identification has been developed to complement laboratory education and training in medical entomology, pest management, and public health. This program addresses identification of adult mosquitoes to the species level. There are five major sections in the program: (1) tutorial in adult morphology, (2) student identification practice, (3) glossary of adult morphology, (4) adult mosquito drawings, and (5) a program map to aid users in moving about the tutorial. Twenty-eight mosquito genera and over 600 PDFs of adult mosquito drawings are presented. Common mosquito genera include (with number of mosquito drawings): Aedes (184), Anopheles (63), Coquillettidia (4), Culex (76), Culiseta (11), Haemagogus (3), Mansonia (3), Psorophora (12), Toxorhynchites (4), Uranotaenia (11), and Wyeomyia (4). A calculator and plastic ruler are recommended when using this program. A soundcard and Adobe Acrobat^{tm} are required to operate this program.

Figueroa, A.P., T.L. Sylvester, and W.H. Dees. McSU. J. Hightower. CPMC. **A preliminary investigation on endophilic and exophilic behavior of mosquitoes in a brackish marsh in southwest Louisiana**.—A preliminary field investigation was conducted in Cameron Parish, Louisiana, to determine endophilic and exophilic behavior of mosquitoes in a brackish marsh. CO_2-baited Centers for Disease Control light traps were employed inside and outside of a wooden shed. Two traps were employed on the outside of the shed – one on the side closest to the Intracoastal Waterway and the other on the opposite side near a marsh. A total of 15,196 mosquitoes were collected. The collection consisted of four genera and eight species. *Psorophora columbiae* and *Aedes sollicitans* were the most abundant species collected both inside (n=461 and n=196, respectively) and outside the shed (n=5,541 and n=5,661, respectively). *Culex salinarius* was collected the least (n=16) and only was collected outside the shed. More *Ae. sollicitans* were collected in the trap closest to the Intracoastal Waterway than in the trap near the marsh. The percent of each species collected inside the shed is as follows: 51%

Anopheles crucians, 26% *Ps. ciliata*, 25% *Cx. quinquefasciatus*, 17% *Ps. columbiae*, 8% *Cx. erraticus*, 7% *Ae. sollicitans*, and 7% *Cx. nigripalpus*. Data from this study will support future investigations into the host-feeding and resting behavior of mosquitoes in southwest Louisiana.

Hinton, J.G., H.A. Meyer, B. Peet, and G.A. Davis. McSU. **A preliminary report on tardigrades of the island of Dominica, West Indies**.—The first investigations of water bears in the West Indies were made in the mid-Twentieth Century, when DuBois-Reymond Marcus (1960) found five species on Curaçao and Los Testigos. Since then there have been few studies of tardigrades in the West Indies (herein defined to include the Bahamas, the Turks and Caicos Islands, and all the islands of the Caribbean Sea). Currently, seven papers report the presence of 11 genera and 26 species (including those identified only to genus or species complex) in the West Indies (DuBois-Reymond Marcus, 1960; Fox & Garcia-Moll, 1962; Beasley, 1981; Iharos, 1982; Schuster & Toftner, 1982; Kaczmarek & Michalczyk, 2002; Kaczmarek et al., 2007). These studies have been limited to Puerto Rico, Cuba and Hispaniola (Dominican Republic) in the Greater Antilles and Curaçao, Los Testigos, and St. Lucia in the Lesser Antilles. Most West Indian tardigrades have been collected from mosses and lichens. This is the first report of tardigrades on the island of Dominica. Tardigrades were found in samples of moss, lichen, and leaf litter. Specimens reported were found at sites including Archbold Tropical Research and Education Center, Syndicate Trail, Middleham Falls, Cabrits National Park, Morne Diabolotin Trail, and Freshwater Lake.

LaFleur, G., N. Broussard, and A. Ferrara. NiSU. H. Farris, LSUHSC. **The neurotoxic potency of gar oocyte extract peaks at spawning**.—A toxin in the oocytes of gar was first documented in 1850 when Brooks reported on a family suffering from vomiting, diarrhea, and the induction of a comatose state caused by their ingestion of cooked roe. We have been conducting experiments to further characterize this toxin. Using a crayfish paralysis assay we found that during oogenesis, the toxicity of the extract increases: at a gonado-somatic index (GSI) of 0.22 %, time to paralysis was 424.09±83.49 seconds while at a GSI of 1.39 %, time to paralysis was only 141.5±19.22 seconds. Furthermore, as larvae grew, their toxicity was reduced. We found 0% survival after boiling the extract for 0, 30, and 60 seconds, but 100% after boiling for 10 minutes. By injecting animals from different phyla that share the aquatic habitat with gar, we found that crustaceans were the only aquatic animal found to be affected. Our results suggest that the gar neurotoxin increases in potency during oogenesis until spawning, after which its activity decreases with larval age. This work was supported by NIH COBRE Grant P20RR16816 in collaboration with LSUHSC Neuroscience Center.

Louque, I.J. and W.H. Dees. McSU. S.A. Allan. USDA/ARS. **Do trap covers make a difference? A preliminary investigation on the effect of silver metal covers versus black plastic covers on mosquito light trap collections**.—During the 1980's, entomological supply companies began marketing Centers for Disease Control mosquito light traps equipped with black plastic covers. Prior to this time, silver metal covers were used. Preliminary tests were conducted to determine if this change in the make of the cover affected both the number and species of mosquitoes collected. To date, more mosquitoes were collected in traps with silver covers (n=40; mean=13) than in traps with black covers (n=32; mean=10). More females also were collected in traps with silver covers (n=36; mean=12) than in traps with black covers

(n=27; mean=9). In addition, more mosquitoes were collected in traps with silver covers (n=23; mean=11) than black covers (n=14; mean=7) when temperatures were less than 15ºC. However, more genera and species of female mosquitoes were collected in traps with black covers (n=5 and n=8, respectively) than in traps with silver covers (n=2 and n=5, respectively). Due to the few tests conducted, we plan to continue our studies to compare the number and species of mosquitoes collected in light traps with silver metal and black plastic covers.

Merchant, M., C. McAdon, S. Mead, J. McFatter, and R. Griffith. McSU, and K. Vliet. UF. **Comparison of serum phospholipase A2 activities of all known living crocodylian species**. **—**Serum samples from all 23 extant crocodilian species were tested for phospholipase A2 (PLA2) activity against nine different bacterial species. The data were used to generate a PLA2 activity profile for each crocodilian species, and the data were used to compare the activities of the three main lineages (Alligatoridea, Crocodylideae, and Gavalideae), the seven different genera, and to compare all of the 23 individual species. The data revealed that the three lineages of crocodylians (Alligatoridea, Crocodyloidea, and Gavaloidea) exhibited PLA2 activities toward 12 species of bacteria that were statistically distinguishable. In addition, the PLA2 activities of crocodylians in a specific genus tended to be more similar to other members in their genus than to members of other crocodilian genera. These data suggest that crocodilian lineages can be distinguished by their immunological enzymatic activities.

Merchant, M., P. Sanders, and M, Hamilton. McSU. P. Walther and J. Moon. USFWS. **Pb ingestion by mottled ducks (*Anas fulvigula masculosa*).—**We assessed the Pb content of mottled duck wing bones and gizzards using tissues collected during the 2006-2007 hunting season from McFaddin NWR and Anahuac NWR, both on the upper Texas Gulf Coast. We analyzed a total of 237 duck wing bones, resulting in mean Pb levels of 15.0±27.8 ppm. Females were higher than males ($p<0.05$) at both sites, and adult Pb levels were higher than juveniles ($p>0.05$). The mean Pb level of wings collected at Anahuac (18.7 ppm) was higher than that at McFaddin (11.0 ppm). In addition, wings collected from Anahuac had a more frequent occurrence of high Pb (above 30 ppm) than McFaddin. Pb pellets found in mottled duck gizzards collected from these areas confirmed the presence of ingested pellets. Mottled ducks ingest legally dispensed Pb shot used for dove hunting activities in agricultural habitats adjacent to areas in which Pb shot is illegal. The management implication for continued use of Pb shot in these areas is the persistent ingestion of Pb by waterfowl, including the mottled duck. The management suggestion is for the implementation of broader zones of Pb ban in areas which mottled ducks feed.

Meyer, H.A. and J.G. Hinton. McSU. ***Minibiotus jonesorum*, a new species of water bear (Phylum Tardigrada) from Michigan**.**—**Samples of moss, lichen, liverworts, and leaf litter collected in the Lower and Upper Peninsulas of Michigan contained 28 species of water bear (Phylum Tardigrada). One species, *Minibiotus jonesorum*, is new to science. This new species is characterized by having ten transverse bands of polygonal pores which increase in size from anterior to posterior, three macroplacoids which increase in size from anterior to posterior, and by lacking a microplacoid or leg granulation. A few of the many species of *Minibiotus* are cosmopolitan, but most are known only from one site. *Minibiotus jonesorum* lies between these two extremes. We have also collected it in material from Georgia and British Columbia,

suggesting that it is widely distributed in North America. The species is named in honor of Stephen, Kathleen, Daniel, and Shiloh-Rose Jones, who helped collect samples in Michigan.

Meyer, H.A., J.G. Hinton, and B. Peet. McSU. **Water bears of Bermuda**.—Water bears (Phylum Tardigrada) are minute animals, closely related to arthropods, which are found in leaf litter, soil, lichens, mosses, liverworts, freshwater, and marine sediments. We found six species of terrestrial tardigrade in moss and lichen samples collected on Bermuda, an island in the North Atlantic. These species included: *Echiniscus cavagnaroi*, *Milnesium tardigradum*, *Macrobiotus harmsworthi*, *Macrobiotus hufelandi*, *Minibiotus* cf. *intermedius*, and an unidentifiable member of family Hypsibiidae. All species except *E. cavagnaroi* are cosmopolitan in distribution. *Echiniscus cavagnaroi* from Bermuda differ from specimens collected from the Galápagos Islands and the American Gulf Coast states in having slightly shorter cirrus A and, in about half the individuals, a serrated lateral spine E.

Minton, R.L., E.L. Basiger, and C.B. Nolan. ULM. **Land snail diversity at Black Bayou Lake National Wildlife Refuge**.—Compared to states whose malacofauna has been intensively examined, Louisiana's terrestrial snail fauna remains relatively understudied. In an effort to better understand the land snail fauna in northeastern Louisiana, we conducted a survey of land snails at Black Bayou Lake National Wildlife Refuge in Ouachita Parish. This area was chosen as representative of the native fauna and diversity of this region because it contains patches of relatively undisturbed forest along with reclaimed and replanted land. Collections were made at 62 sites on the refuge during September 2009, and 0.5 man-hours were spent collecting at each site. We collected 18 species representing nine land snail families. When combined with species collected previously on the refuge and those listed as occurring in the parish, the estimated diversity at the refuge is 31 species in 13 families. This represents a more than two-fold increase in the known diversity in the parish. Modern assessments of land snail populations such as ours provide baseline data for tracking population fluctuations and declines and can reveal biotic and abiotic interactions that may be influencing snail community structure for further examination.

Nolan, C.B. and R.L. Minton. ULM. **Bioclimatic modeling of Eastern U.S. land snail diversity**.—A recent trend in conservation biology is the management of habitats rather than species-specific strategies. In order to identify habitats most suitable for conservation, several considerations must be evaluated: the identification of biodiversity "hotspots"; the significance of environmental variables that influence habitat types; and the presence of threatened and endangered species. North American land snails represent a taxonomic group that would likely benefit from this conservation approach. The aim of the present study is to elucidate Eastern U.S. land snail species richness and to quantify the individual contributions of environmental variables that significantly influence observed patterns of diversity. Species occurrence records were obtained from the collections of five museums of natural history (n=113,317) and species richness was estimated using various algorithms. Data for seven environmental variables (derived from five BIOCLIM parameters) and urbanized areas were then correlated against richness estimates. We report land snail richness "hotspots" for all Eastern states as well as the individual and combined contributions of abiotic variables across environmental and habitat

gradients. Areas with high richness values that also occur along environmental gradients are likely to benefit the most from a habitat-based conservation strategy.

Osborn, R. and N. Treusch. NSU. **Foraging patterns of *Tenebrio molitor* (Coleoptera: Tenebrionidae)**.—Feeding patterns of larval and adults of *Tenebrio molitor* were investigated. Larvae showed increased feeding rates in more complex microhabitats and showed a preference for potatoes over lettuce. Adults preferred spinach to oats in a separate feeding experiment. The indirect impact of a predator on larval foraging was investigated using tarantulas visible to mealworm larvae. Larvae showed avoidance behavior and consumed less food in the presence of the spider than in the absence. Results suggest that mealworms forage optimally to consume needed nutrients and to avoid perceived predators.

Osborn, R. and N. Treusch. NSU. **Foraging by birds in suburban areas**.—Optimal foraging of birds was investigated in Shreveport in 2009, and compared with data collected in South Africa in 1995. Both studies focused on determining diversity, richness, and evenness of avian species at different feeders. The feeders were located in wooded sites (attached to trees) versus open sites (not attached to trees). Bird species diversity was highest in feeders in trees in both cases, probably due to protection from avian predators. In the US study the quantity of food consumed also was recorded in wooded versus open sites.

Paul, J. and Z. Negatu. LSU-A. **Egg size, protein content, and hatching time of *Fundulus heteroclitus* eggs**.—This study was undertaken to determine average size, protein concentration, and hatching time of eggs of *Fundulus heteroclitus* maintained in the laboratory. Eggs were collected on five consecutive days from two groups of fish which were maintained in two ten-liter capacity aquaria under the same conditions. Egg sizes ranged from 1.7-2.1 mm and the average diameter was 1.96±0.06 mm. Diameter of eggs for group 1 was 1.98±0.07 mm and 1.98±0.05 mm for group 2. Cytoplasmic protein content ranged from 264.2-344.3 µg/egg. The average protein concentrations in µg per egg is 287.4± 56.6 (Group 1) and 311.9±71.3 (Group 2). Out of one hundred eggs incubated for hatching only 76 eggs formed well developed embryos. The number of days it took for the appearance of a beating heart, eyes, and embryo with gills was variable among the eggs. From day 14 to day 17 of fertilization 3, 1, 7, and 5 eggs hatched, respectively, for the four days. There was no statistical difference in egg size, protein concentration, and hatching time between eggs of the two groups of fish and between the eggs collected on different days.

Shrestha, B., C.A. Kersten, J.A. Hinton, and M.K. Hutton. McSU. **Efficacy of two methods for microchipping small fish**.—Fish research involves handling large number of individuals and identification becomes an issue. Problems can be addressed with microchipping, an effective method of inserting a uniquely coded microchip into the fish, which can be retrieved with a reader. Methods of microchip implantation have not been tested in small fish, particularly in *Carrasius auratus* (goldfish). Two methods of microchipping were evaluated to determine the more effective approach. Fifty fish were divided into two groups. Twenty-five fish of one group had the microchip inserted via surgery into the body cavity and the second group had it implanted via large bore needle injection into the flesh near the dorsal fin. The groups were observed for a month. All 25 fish with surgical implants retained the microchip. They were

detected and removed successfully. Eleven fish of the second group retained the chip while the remaining 14 lost it. These chips were lost in different intervals with the earliest being a week post injection. A Chi-Square analysis proved the efficacy of surgery over injections, and an odds ratio calculation concluded that the estimated odds of retaining the microchip is 58 times higher when it is surgically implanted instead of injected.

St. Romain, C. and J. Akin. NSU. **Hatching rate differences in egg masses of *Ambystoma maculatum* vary by egg type and water quality**.—The spotted salamander, *Ambystoma maculatum*, breeds conspicuously in vernal pools. A single female may produce up to 2-3 clutches of eggs bound in a gelatinous matrix usually attached to submerged vegetation. The composition of the matrix is either clear or milky white. In this study, we compared hatching success and developmental rates among egg masses that varied in matrix composition. In addition, we measured water quality, especially turbidity, from each deposition site and the effect of sediment on egg mass development. We found that differences between the composition of the matrix among egg masses were not purely qualitative but directly affected time to hatching and spoilage rates.

Vidrine, C.E. and S.R. Hazelton-Robichaux. LSU-E. **Anhydrobiosis in colonial rotifers of the Cajun Prairie ecosystem: a 2009 URSI project**.—Colonial rotifers (Phylum: Rotifera, Class: Monogononta, Order: Flosculariacea) are common inhabitants in rice fields of Louisiana. Anhydrobiosis is seen in many organisms, including water bears (Phylum: Tardigrada) and Bdelloid rotifers (Phylum: Rotifera, Class: Bdelloidea). Free-swimming colonial rotifers are yet to be studied in much detail as compared to water bears and Bdelloid rotifers. Diapause is the ability of the organism to produce offspring in a dormant and unhatched state. Hatching of the young will only occur when conditions are at their most favorable. These forms of dormancy are also known as cryptobiosis or quiescence. Do free-swimming colonial rotifers undergo anhydrobiosis? We hypothesized that they would be able to undergo anhydrobiosis like that of the bdelloid rotifers. If they are unable to do this then they undergo some other mechanism, possibly cryptobiosis. Our experiments failed to demonstrate that colonial rotifers go through anhydrobiosis. Therefore, we reject our hypothesis and must accept our alternate hypothesis that states that they would go through some other sort of mechanism such as cryptobiosis. Preliminary experiments with colonial rotifers and their eggs consistently failed to demonstrate clearly cryptobiosis.

Weidner, E. and M. Blackwell. LSU-BR. **Reflections on charter member, Ellinor Behre (1886-1982)**.—Behre was a charter member of the Louisiana Academy of Sciences. She established the first marine laboratory in Louisiana and was its director from 1923-1945. She was the first scientist to undertake an expedition to Central America accompanied only by a native guide. She established the first medical program at LSU. She was a founding member of the LSU Chapter of Sigma Xi. Her research focus was on chromatophores in the lower vertebrate groups in addition to crustacea. In her early career, she worked with Libby H. Hyman and Marine Biological Laboratory (Woods Hole, MA) director, Frank Lillie.

Williams, A. and D.W. Huey. LSU-A. **Does the crawfish (*Procambarus natchitoches*) avoid nitrite**?—Crawfish, as well as many other aquatic organisms, such as fish, produce ammonia as

a major nitrogenous waste product. Ammonia is converted to nitrite and nitrate by bacteria. Nitrite can become lethal at high concentrations. Bodansky (1951) showed that organisms that use hemoglobin, such as fish and salamanders, as a respiratory pigment are affected by nitrite because the nitrite oxidizes their hemoglobin into methemoglobin, which cannot bind oxygen. In crawfish the respiratory pigment is hemocyanin. Little research has been done to demonstrate the behavioral effects of nitrite on crawfish. The purpose of these experiments was to determine whether crawfish can detect nitrite in their environment, and observe how they respond when nitrite is present. Crawfish were placed in a two chambered container with one side containing aerated distilled water, the non-toxic solution, and the other 50mg/L nitrite solution. Crawfish were observed for behavioral changes. Results showed that the crawfish favored the toxic solution more than the non-toxic solution. Although crawfish may be physiologically impacted by toxic nitrite concentrations they may not respond by moving to a nitrite-free environment.

Division of Physical Sciences

Chemistry Section

Badam, S., C.J. Hardaway, and J. Sneddon. McSU. **Use of *Spartina alterniflora* for the phytovolatilzation of organics from contaminated soils**.—The use of *Spartina alterniflora*, smooth cordgrass, for the phytovolatilization of selected organics will be presented. The major organic pollutant studied is hexachlorobutadience (HCBD), a known contaminant of soil in Southwest Louisiana. Results using spiked, control, and contaminated soil will be discussed. The sample preparation of the soil using soxhlet extraction, and concentration using rotary evaporation prior to analysis with gas chromatography-mass spectrometry (GC-MS) will be discussed. Supported by NOAA.

Bailey, C., K.R. Christian, and O.E. Christian. McSU. **Anti-inflammatory and antioxidant activities of *Coccoloba uvifera* (seagrapes)**.—*Coccoloba uvifera* (seagrapes) is widely consumed in Florida and the Caribbean, where it is acclaimed to have antihypertensive and anti-asthmatic properties. The berries are eaten fresh or processed into jams, jellies, and preserves. The intense red color of the ripe fruits indicates the presence of potentially bioactive components that may include anthocyanins or other polyphenolics. Polyphenolics have been documented as excellent antioxidant and anti-inflammatory metabolites. Consuming foods rich in these metabolites have been linked to a reduced incidence of certain diseases such as cancer and arteriosclerosis. There is a direct link between anti-inflammatory response (inhibiting the cycloxygenase-2 (COX-2) enzyme) and deposition of plaque on artery walls (atherosclerosis). Additionally, inhibition of the COX-2 enzyme has been implicated in tumor suppression. The COX inhibitory potential and antioxidant capacity of the crude extracts were determined. The methanolic extract displayed marked selectivity inhibiting only the COX-2 enzyme. The hexane, ethyl acetate and methanol extracts showed significant inhibition of lipid peroxidase, 80%, 45% and 77%, respectively. The LCMS profiling of the methanolic extract has identified petunidin as one of the major anthocyanins. We herein discuss the biological activity and metabolite profile of seagrapes.

Burns, K.A, J. Pittman, and J. Fotie. SLU. **Synthesis of dihydroquinolines via a modified Skraup cyclization**.—Dihydroquinolines are mainly known for their antioxidant activity, although they also have been reported to possess anti-inflammatory, fungicidal, antiatherosclerotic, and hormone receptor modulator properties. We have recently discovered that this family of compounds also possesses a very strong trypanocidal activity. Dihydroquinolines have been synthesized via a variety of methods including Lewis acid-catalyzed cyclization, and Skraup cyclization reactions. However, due to the difficulties we encountered when synthesizing some dihydroquinoline derivatives for the purpose of structure activity relationship investigations, we decided to develop a new and easy method to access these family of compounds. In this paper, we are describing the development of a new modified Skraup cyclization reaction for easy synthesis of dihydroquinolines.

Cox, A.N. and S.E. Eklund. LTU. **Improvement of miniature biofuel cells using functionalized CNTs as electron transfer mediators**.—Films of carbon nanotubes (CNTs) and

enzymes, such as glucose oxidase (GOx), could prove useful in the development of miniature biofuel cells. The biofuel cells are based upon the different potentials experienced when the enzyme GOx is exposed to glucose. These potentials can be used as a source of energy for sensors and transmitters that are implanted and are powered in vivo. The miniature biofuel cells can be fabricated at a size of 1 mm^2 at very low cost. Improvements of the biofuel cells can be made by increasing the lifetime and power output of the fuel cells. These improvements may be achieved by the use of layer-by-layer deposition of CNTs and GOx to form a better film. The CNTs may then function as redox mediators. Presently, we are functionalizing CNTs with various groups and making LbL films with GOx to optimize the power output.

Dinser, J., M. Lanier, V. Wills, and D.D. Dolliver. SLU. A.S. McKim. GCC. **Synthesis of single geometric isomers of oxime ethers of unsymmetrical benzophenones by palladium-catalyzed cross coupling reactions**.—The Suzuki-Miyaura reaction is commonly used to couple boronic acids with vinyl or aryl halides using a palladium catalyst. The coupling of vinyl halides with boronic acids offers excellent E vs. Z stereocontrol of the resulting alkene. Similar studies involving imidoyl halides and examination of the resulting E vs. Z stereochemistry about the carbon-nitrogen bond has not been reported in the literature. This work discusses the first Suzuki-Miyaura coupling reactions using N-alkoxyimidoyl halides and pseudohalides. The efficacy of these reactions has been assessed to determine the most reactive coupling partners. Initially, low yields using the traditional boronic acids led to the use of more reactive trifluoroborate salts. N-alkoxyimidoyl iodides also were found to be more reactive than both N-alkoxyimidoyl bromides and N-alkoxyimodoyl tosylates. A series of reactions has been performed varying the substituents on the aromatic rings of both the trifluoroborate salts and the N-alkoxyimidoyl iodides. These reactions have been monitored by GC-MS and isolated yields also have been determined. The results of these reactions will be discussed.

Dormeka, J., J. Durand, and F. Ohene. GSU. **Fluorescence probing of micelles formed with cationic, anionic, and nonionic surfactants**.—Fluorescence quenching and vibronic band ratios of pyrene emission were used to quantify pyrene solubilization in dodecyl trimethyl ammonium bromide (DTAB), a series of polyoxyethylene nonyl phenyl (Igepal) and sodium dodecyl sulfate (SDS) surfactant solutions. A two-phase model (aqueous and micellar pseudophases) was employed to interpret pyrene fluorescence data in these surfactants to determine the partitioning of the pyrene between the aqueous and the micellar environments. The emission intensity of the fluorescent probe, pyrene, was used to estimate the critical micelle concentration (CMC) and the polarity of the hydrocarbon core of the micelles. The aggregation numbers Nagg also were determined by static fluorescence quenching of pyrene by cetylpyridinium bromide at a fixed concentration of surfactant. The comparison of the aggregation numbers and the kinetic data for Igepal surfactants with different chain length suggested that at concentrations close to the CMC, the surfactants from loose aggregates permeated with water molecules. In addition, the CMC values of the nonionic Igepal surfactants were markedly lower than the CMC values for the cationic and anionic surfactants studied.

Duddy, S. and S. Eklund. LTU. **Synthesis properties of soluble platinum nanoparticles protected by a nitrile self-assembly monolayer**.—Synthesis and catalytic properties and characterizations of organic soluble platinum nanoparticles protected clusters (MPCs) protected

by a thiol monolayer which goes through an ion exchange reaction with a nitrile group to form a nitrile protective self-assembly monolayer. The use of lithium triethylborohydride (LiTEBH) to form organic soluble thiol and tetrahydrofuran (THF) to form a soluble nitrile created an equal ratio of 1:1:1 of thiol/nitrile/platinum. After polarization from the ion exchange to show that the ratio of thiol/nitrile should not be an equal ratio, we denatured and crystallized the sample to purify it of any thiol monolayer connected to the platinum nanoparticles. Therefore, after purification, the platinum nanoparticles should only have a protective self-assembly nitrile monolayer, without any thiol monolayer residues.

Ferguson, A., C. Deere, and M.F. Claville. SU-BR. **Reactivity studies of distonic radical ions derived from oxidized met-ala-gly and its analogs**.—Distonic ions are reactive intermediates that contain both a radical and an ionic site within the same entity, but at different atomic sites. Although distonic radicals have been accepted as stable gas phase intermediates, very little is known about their reactivity once generated in biomolecules. Since these species have been generated in gamma irradiated amino acids, it is reasonable to expect that when certain foods are purified by this method, distonic radicals may be generated. Recognizing that conventional radicals have already been implicated as the cause of various carcinogenic ailments, the more reactive distonic radical is presumed to increase the incidence of disease. This paper reports the synthesis and characterization of met-ala-gly and its protected analogs, as well as the results of chemical oxidation studies on said substrates. Oxidants used in this study include peroxynitrite and hydrogen peroxide.

Flowers, P., A. Bordelon, J. Dinser, M. Lanier, J. Rhodes, A. Pandey, and D.D. Dolliver. SLU. A.S. McKim. GCC. **Synthesis of a new class of N-alkoxyimidoyl tosylates**.—This work describes the synthesis of a new class of N-alkoxyimidoyl tosylates. Various imidoyl hydroxamates were synthesized and used as the starting materials in generating these new imidoyl tosylate compounds in moderate to excellent yields. These compounds were made as part of a broader study involving palladium-catalyzed coupling of N-alkoxyimidoyl halides and pseudohalides with boron-containing coupling partners. Notably, this reaction results in only one geometric isomer. The contribution of these imidoyl tosylates to the aforementioned coupling reactions will be discussed.

Forester, R., S. Brown, and U. Siriwardane. LTU. N.V. Seetala. GSU. **Preparation and characterization of nanoparticle metal oxide (MgO, CaO, and ZnO) heterogeneous catalysts for biodiesel production**.—New ways to produce alternatives to petroleum diesel without minor changes in existing compression engines is important. Currently, biodiesel is produced using the homogenous acid/base catalyzed reactions. The common catalyst is usually sodium or potassium hydroxide which already has been mixed with the methanol and water. The extra water to dissolve bases increases fatty acid formation and requires additional washing steps creating environmental pollution. There is a demand for heterogeneous catalysts which will increase the transesterification rates and allow easy separation of catalyst, biodiesel, and glycerol from the reaction mixture. Placement of nanoparticulate metal-oxides in the pore structure of a mesoporous support will impart a lager surface area. The findings will allow us to develop an environmentally benign biodiesel production system by reducing enormous quantities of waste water. We have prepared novel nanoparticle metal oxide (MgO, CaO, and ZnO) catalysts

supported on mesoporous alumina using sol-gel methods. Catalysts were characterized using PXRD, BET surface area, FT-IR, DTA/TGA, AFM, and SEM (for surface morphology). Catalytic activities of the catalysts were investigated using a Parr batch reactor and GC-FID analysis (FAME) for methyl ester conversions.

Jarrell, T.M. and S.E. Eklund. LTU. **Improvement of miniature biofuel cells using functionalized carbon nanotubes as electron transfer mediators**.—The goal of the project is to utilize functionalized carbon nanotubes in conjunction with enzymes to produce biofuel cells that can function in oxygen and glucose rich environments, such as in human tissue. The cell would be powered by different potentials of wired enzymes, such as glucose oxidase and biluburin oxidase in the presence of glucose and oxygen. Using these enzymes, the cell could be powered while in vivo. The use of carbon nanotubes would decrease the size of the power cell for optimal implants to power biosensors to monitor human vitals and would increase the lifetime of the cell by using it as a redox mediator to these enzymes. Carbon nanotubes would replace the redox polymer currently used; therefore, decreasing the amount of energy lost and providing a larger potential. These characteristics are being explored through electrodeposition of carbon nanotubes and glucose oxidase films using single walled nanotubes that have been functionalized with –COOH or amine groups.

Jin. Y., M. Mitchell, and L. Green. SLU. **Purification of higher fullerenes and their photophysical properties study**.—Fullerenes' photophysical properties have been extensively studied. Because fullerenes are π-conjugated species, they are expected to have long-lived triplet excited states, which suggest several applications such as electron acceptors in molecular solar cell devices, singlet oxygen generators for photodynamic therapy (PDT), and optical limiting absorbers. As the third most ample fullerene after C60 and C70, C84 has 24 isomers according to the isolated pentagon rule. The wide range of triplet excited state lifetimes among three found C84 isomers D2 (IV), D2d (2), and Cs (a) have been compared, which illustrates that structurally similar isomers can exhibit significantly different photophysical properties. Isomeric resolution is needed to study the photophysics of higher fullerenes. An alternating-column system with two connected Cosmosil 5PYE (pyrenylethyl group bonded) columns is first used to separate C84 isomers in this project. It is an effective way to separate higher fullerenes because the HPLC (high performance liquid chromatography) retention time differences between isomers could be increased. In this project, C84 isomers have been separated and the photophysical properties of isomer D2d (I) is studied. The further goal is to continuously separate C84 isomeric constituents using alternating-column techniques and research other isomers' photophysical properties.

King, B., R.M. Uppu, and M.O. Claville. SU-BR. **Reactions of singlet oxygen with a furan-containing drug, furosemide: Attempts to generate a secondary ozonide**.—In an effort to synthesize a secondary ozonide with potential antimalarial activity from a reaction between furosemide and singlet oxygen, derivative product(s) were made that may be useful in determining the toxic metabolites that result from oxidation of furan-containing drugs in vivo. Typical experiments utilized furosemide (a diene, 5 mM) and singlet oxygen (a dienophile) that was generated by slowly bubbling molecular oxygen through the reaction mixture that contained Rose Bengal (0.1 mM) as a photosensitizer, in quartz cuvettes. Reaction mixtures were irradiated at 254 nm using six-sided positioned UVC bulbs in a LZC-EDU photoreactor

(Luzchem, Ottawa, ON, Canada) at room temperature for 15, 30, and 60 min intervals. Although proton NMR analyses of reaction mixtures that were irradiated for 15 and 30 min revealed the consumption of the furosemide, the growth of product signals were not consistent with the expected secondary ozonide product as predicted by ChemNMR H-1 estimation, a function of ChemDraw Ultra. Based on literature precedent, the desired Diels-Alder adduct, i.e. secondary ozonide may have reacted via one, or several reaction pathways to form a conjugated diene aldehyde. The formation of such an electrophilic intermediate(s) may prove to be toxic metabolites of furan-containing in vivo.

Koutilya, R.B. and S.E. Eklund. LTU. **Conductivity change in functionalized alumina membranes using room temperature ionic liquids**.—We are working on developing lithium-based batteries with improved conductivity and electrochemical stability for improved performance and safety. The traditional electrolyte is being replaced with a room temperature ionic liquid (RTIL) and a silane modified nanoporus alumina membrane (NAM) is being tested as a separator material for improved Li ion transport. Presently, we are working on modifying the NAM's with trichloro (octadecyl) silane and have characterized the surface with IR, Raman and SEM. However, the SEM shows that the surface coverage is non-uniform; therefore, we are currently working on a modified procedure for a more uniform coverage of the silane molecules in the nanopores. A test cell has also been developed for measuring the conductivity of the modified NAMs with RTILs. The conductivity of N-butyl-N-methylpyrrolidinium bis(trifluoromethylsulfonyl)imide (BMP TFSI) as the RTIL has been measured with unmodified alumina.

Kudale, T.V. and U. Siriwardane. LTU. N.V Seetala. GSU. **Fabrication of cellulose acetate membranes (CA) and their $CO/CO_2/H_2$ permeabilities**.—The development of effective separation membranes for separating $CO/CO_2/H_2$ gas mixtures produced during the water-gas-shift (WGS) reaction is important for the industrial production of hydrogen. Several types of polymeric membranes have been reported for gas separation applications. We have used polymeric membranes of cellulose acetate for CO_2 separation from $CO/CO_2/H_2$ mixture. Cellulose acetate (CA) with 25% tri-ethyl citrate (TEC) plasticizer was used to drip coat filter paper at different film thicknesses using different concentrations of CA/TEC in 10 mL acetone solution. The (CA+TEC)/acetone ratios are: 0.2 (thicker membrane), 0.133, 0.1, and 0.067 g/mL (thinner membrane). These membranes were examined by AFM for the surface topology. Relative permeabilities of $CO/CO_2/H_2$ gases were investigated using a stainless steel tester housing the membranes and $25\%H_2$:$25\%N_2$:25%CO:$25\%CO_2$ gas mixture in the inlet side and a GC analyzer at the outlet side. The AFM study indicates that the thicker films have more uniform coating with fewer pores compared to the thinner films. The CO_2 permeability decreased with the CA/TEC membrane thickness. It also can be inferred that there is increase in the CO permeability (i.e. CO enrichment in the product outlet). This supports the hypothesis that CA membranes entrap CO_2.

Liu, Y., W. Xu, A.A. Gallo, N. Tzeng, and R. Bajpai. ULL. **Dielectric property of the active site of B12-independent glycerol dehydratase: Inspiration from quantum mechanical calculations**.—Evaluation of dielectric properties in the active site of B12-independent glycerol dehydratase (GDH) was carried out quantum mechanically (QM), using quantum

mechanical/molecular mechanical (QM/MM) optimized substrate-protein geometry, which is based on a high-resolution crystal structure (PDB code: 1r9d). Ten pairs of interaction energies in the active site were computed using Møller-Plesset perturbation theory at the second order (MP2/6-311++G**) with varying dielectric constants. The discrepancy between the B3LYP Y339-glycerol interaction energy of 1.32 kcal/mol and MP2 energy of -2.39 kcal/mol necessitates the calculations of all interacting pairs at the MP2 level to account for the dispersion force. The MP2 calculation gives a correlation energy of -1.87 kcal/mol for S282-glycerol, close to the -1.88 kcal/mol by the quadratic configuration interaction method with triple excitation (QCISD(T)). Most of the calculated interaction energies tend to be larger as the dielectric constant decreases. The H-bond strength for E435-glycerol was predicted to be -11.79 kcal/mol, when the dielectric constant of the media was assigned to be 2.4. Given the H-bond strength range of 1-7 kcal/mol, our results suggest that the dielectric constant in the active site ranges from 4.9 to 47.7.

Machavaram, S.P.R., C.J. Hardaway, and J. Sneddon. McSU. **Determination of metals in oysters**.—The determination of metals in oysters from Southwest Louisiana over the 2009-2010 season will be presented. Topics to be presented include sample collection, sample preparation using microwave technology and subsequent determination using inductively coupled plasma-optical emission spectrometry (ICP-OES). Quality control/Quality assurance using standard reference material, NIST-SRM-1556b will be presented. Results will be compared with previous studies.

Mai, A., A.A. Gallo, W. Xu, N. Tzeng, and Y. Liu. ULL. **From Camptothecin to Topotecan: Insights from quantum mechanical calculations**.—Camptothecin is a natural product which exhibits a promising anticancer activity during earlier clinical trials. This compound was tested in clinical trials, but undesirable side effects prevented its further investigation. Chemists started to explore derivatives based on this parent compound, and finally a more receptive drug, Topotecan, was approved as a medication for the treatment of ovarian, cervical, and small cell lung cancer. This derivative differs from the parent Camptothecin in that it has two more functional groups attached, a hydroxyl and dialkyl amine at positions 9 and 10, respectively. Quantum mechanical calculations were performed to analyze the structural impact of these two substituents. Our analysis indicates that the introductions of these two polar groups alter the molecular properties. Additionally, the H-bond formed between the hydroxyl at position 9 and topoisomerase contributes stronger intermolecular interactions between the drug molecule and DNA topoisomerase. This work pinpointed the effect of functional groups on the behaviors of the drug molecule, and therefore aids in rational drug design of the natural product Camptothecin.

Phongphonkit, P. and P.S. Sit. LTU. **Release profile of fluorescein isothiocyanate from patterned polyethylene glycol hydrogel**.—Polyethylene glycol (PEG) has been used in many medical and pharmaceutical applications due to high level of biocompatible and resistance to protein adsorption. Many applications of hydrogel utilize a patterned array for protein adsorption, sensing, and drug delivery. Direct-write patterning technology is a new way for micro and nanoscale fluid delivery. In this work, fluorescein isothiocyanate (FITC) was used as a model molecule that was incorporated into polyethylene glycol solution. The solution mixture

was patterned on the surface of treated glass slide through direct-write method. Release profile of the FITC from the patterned hydrogel was compared to that from single-spot hydrogel. The initial release rate of FITC in the first hour from patterned surface was higher than that from single-spot hydrogel (67% vs. 47%, $p<0.05$). Additionally, FITC release reached approximately 75% of loaded amount from patterned hydrogel, which was significantly higher than that from single-spot hydrogel (66%, $p<0.05$). Since the release amount of FITC is directly proportional to the available surface area, the increase in FITC release can be attributed to the increase in the surface area of patterned hydrogel. The results suggest that surface area is an important factor for controlling the cumulative release of molecule in patterned surfaces.

Primeaux, B.C. and A.A. Gallo. ULL. C.H. Battle. TU. **Synthesis, characterization and reactions of 6-methyl-2-nitrosopyridine**.—The title compound 6-methyl-2-nitrosopyridine and an isomer, 4-methyl-2-nitrosopyridine, were synthesized and their dimerization studied by X-ray crystallography and variable temperature NMR spectroscopy. These syntheses were undertaken in order to design and study a Diels-Alder type cycloaddition between 6-methyl-2-nitrosopyridine and 1,3-cyclohexadiene. X-ray crystallography showed the 6-methyl-2-nitrosopyridine dimer was found to be Z in structure, with a 5.7˚ torsion between the oxygen's in the azo-dioxy bridge. Variable temperature NMR spectroscopy showed the enthalpy for the dimerization of 4-methyl-2-nitrosopyridine to be 63.48 kJ/mol, with a 50:50 monomer/dimer equilibrium between 15-20˚C, and the enthalpy for the dimerization of 6-methyl-2-nitrosopyridine to be 59.43 kJ/mol. The monomer/dimer ratios for 6-methyl-2-nitrosopyridine varied from a 50:50 mixture at 10˚C to a 67:33 mixture at 25˚C to a 75:25 mixture just after 35˚C, with the dimer concentration dropping off almost entirely relative to the monomer by 60˚C. The Diels-Alder reaction between 6-methyl-2-nitrosopyridine and 1,3-cyclohexadiene was carried out with excess 1,3-cyclohexadiene in benzene at 30˚C yielding an addict. Further work is now underway to generalize the addition reaction and to study any stereochemical parameters.

Ramelow, G.J. and S.R. Chowdary. McSU. **Assessment of heavy metal mobility and bioavailability of trapped metals in sediment cores from Bayou d'Inde, Louisiana**. —Sediment cores were collected from ten stations on Bayou d'Inde, a tributary of the Calcasieu River in southwest Louisiana. The stations are located from the mouth of the bayou to Cities Service Highway Bridge. Cores were collected by driving a 1-inch diameter PVC pipe into the bottom sediment, capping the tube, and then withdrawing the tube from the bottom. In the laboratory, each sediment core was sectioned into 3-cm segments. The sediments were cut in half; one-half was saved for future mercury analysis; the other one-half was dried in an oven for two days and then pulverized to a fine powder for subsequent trace metal analysis. Each dried and powdered sediment sample was subjected to a three-part BCR extraction procedure to determine the bioavailability of each metal studied and the chemical form of the metal in the sediment. All extracts were analyzed by inductively coupled plasma emission spectrometry.

Rhodus, J., A. Pandey, M. Lanier, J. Dinser, P. Flowers, A. Bordelon, and D.D. Dolliver. SLU. A.S. McKim. GCC. **Synthesis of N-alkoxyimidoyl iodides from N-alkoxyimidoyl tosylates**. —N-alkoxyimidoyl iodides are valuable starting materials for ongoing studies of palladium-catalyzed cross coupling reactions at the carbon-nitrogen double bond. Previously, the synthesis

of imidoyl iodides was accomplished through the reaction of imidoyl bromides with sodium iodide in sulfolane. However, a new procedure has been developed to synthesize imidoyl iodides from imidoyl tosylates. The results of this new synthetic route will be compared to the results obtained when using imidoyl bromides as the starting materials. This new synthetic route has been utilized to synthesize N-alkoxyimidoyl iodides with a variety of substituent's on the aromatic ring. The effect of the substituent on the results of these syntheses will be discussed.

Venkatesula, S., J. Hardaway, and J. Sneddon. McSU. **Phytoextraction of metals from contaminated soils using *Spartina alterniflora*.—**_Spartina alterniflora_ (smooth cordgrass) has been proposed for coastal restoration in Louisiana. In this study we have investigated the potential of this grass for the phytoextraction and removal of metal ions (inorganics) from potentially contaminated soils. Results of metal concentrations from spiked, controls and contaminated soil monitored over a five-month period as well as the plant and determined by inductively coupled plasma-optical emission spectrometry (ICP-OES) will be presented showing the high potential of this grass for removal of metal ions from contaminated soils. Supported by NOAA.

Vootla, S., C.J. Hardaway, and J. Sneddon. McSU. **Binding properties of crawfish exoskeleton for lead, cadmium, and lead removal from waters.—**Crawfish are frequently proposed as bioindicators of pollutants such as metals since their accumulation passively reflects the auxiliary metals levels in the potentially contaminated soil and land. Crawfish are a Southwest Louisiana icon and are often eaten boiled. The meat is removed for consumption and the shells discarded. This study investigates the binding properties of the shell for the removal of lead, cadmium, and chromium from waters. Factors such as pH, concentrations, and salt concentrations will be presented. Metal determination is determined using inductively coupled plasma-optical emission spectrometry (ICP-OES).

Wagle, R. and U.S. Ramelow. McSU. **Spectrofluorometric analysis and electrical conductivities of styrene and methyl methacrylate polymers.—**The luminescence properties of polymers have been found to be useful for their identification. The use of luminescence spectroscopy as an analytical technique for polymer identification involves the measurement of the fluorescence emission spectrum which is obtained by excitation of the polymer. For this purpose a spectrofluorometer was used. Fluorescence emission spectra for polystyrene and polymethyl methacrylate samples were taken at room temperature at excitation wavelengths of 290 nm and 292 nm, respectively. Polymethyl methacrylate matrix prepared with different bichromophoric compounds and the intensity of the fluorescence emission was related to the polymer chain length. Intensities of fluorescence emission of both polymers were correlated with their molecular weights. Conductivity as a function of molecular weight was established for each polymer. The plots of conductivity vs. molecular weight can be used as a calibration curve. From the plot of emission intensity vs. polymer molecular weight, the molecular weight of an unknown polymeric sample can be determined. The most efficient irradiation time was determined from the conductivity vs. irradiation time plots. The effect of temperature on the conductivity of the polymeric samples was determined.

Williams, T. and A. Wallace. SU-BR. **Reactivity of distonic species derived from oxidized methionine**.—When amino acids are subjected to high energy irradiation, they will form highly reactive distonic ions. Since gamma irradiation is currently being touted as a choice method for purifying foods, it is necessary to determine if distonic ions will derive from gamma-irradiated foods, and if formed, their subsequent reactivity. Compared to other amino acids, methionine is quite unique once irradiated. It is hypothesized that by performing single electron oxidation on methionine-containing compounds chemically, distonic ions will be generated. It is further hypothesized that upon generation, they will subsequently exhibit reactivity that will afford different isolable metabolites, depending on the environment of generation. To test this hypothesis, protected methionine analogs were synthesized and then subjected to various oxidation methods within different environments. The results of this study are presented herein.

Wills, V., A. Bordelon, J. Dinser, M. Lanier, J. Rhodes, A. Pandey, and D.D. Dolliver. SLU. A.S. McKim. GCC. **Synthesis of a new class of N-alkoxyimidoyl sulfonylimidazoles**.—A new class of imidazoyl sulfonates have been synthesized and classified. Various imidoyl hydroxamates were synthesized and used as the starting materials in generating these new imidazoyl sulfonate compounds. These compounds were made as part of a broader study involving palladium-catalyzed coupling of N-alkoxyimidoyl halides and pseudohalides with boron-containing coupling partners. The contribution of these imidazoyl sulfonates to these coupling reactions will be discussed.

Computer Science Section

Boateng, R., V. Mbarika, and S.R. Isabalija. SU-BR. J. Craig. LSU-BR. P. Panford. UGBS. N.Y. Kwadade. CU. **Green information technology practices in firms in a developing economy – The Case of Ghana**.—Rising energy prices and changes in the global climate have put green issues on the strategic planning of corporate executives. The purpose of this paper is to investigate the green information technology (GIT) practices among IT professionals in firms in a developing economy, Ghana. The paper develops a framework which examines GIT practices from three perspectives: sourcing, servicing and operations, and end-of-life management practice. Data were collected through interviews with IT professionals from 17 firms across 6 industries. The interviewees were questioned on their awareness of Green IT and strategies being used in their firms. The findings suggest that there is very little awareness and no strategic perspective of green IT practices in firms interviewed. The basic forms of practicing GIT which include refilling of printer toners, hibernating idle computers, telecommuting, and remote conferencing are fairly absent at the firm-level. Furthermore, there are no specific government policies and enforceable laws on the end-of-life management of IT equipments and on electronic equipments in general. This paper provides the future directions for research and practice to guide the firms and policy makers with regards to green IT. These directions are opportune given the wider "green movement" and "climate change" awareness worldwide.

Cordova, J. ULM. **Experimental discrete structures in computer science education**.—In this paper, we discuss the use of experiments to motivate and reinforce the study of various topics in the field of discrete mathematics. Experiments are used to verify hypotheses based on students'

solutions to problems of moderate complexity. Examples are presented from the areas of summations, probability, and relations. For each experiment, a procedure is outlined to test the experimental hypotheses. As is usually the case in other sciences, experiments can be used to complement the theoretical study of discrete mathematical structures in computer science. The paper concludes with observations regarding their uses in a classroom setting and possible avenues for future research.

Durand, J., S. Kafley, and Y.B. Reddy. GSU. **Detecting and identifying selective forwarding attack nodes in wireless sensor networks**.—Sensor networks consist of homogeneous or heterogeneous sensors with self organizing, low cost, and low power wireless nodes to perform a specific task over a designated area. The area of coverage depends upon the density and communication range of the sensors. We consider the coverage area of each sensor as a circle and its communication range as the radius of the circle. We assume the sensors are placed smartly in a sensitive area, but randomly in areas like forests and dangerous places like biological and chemical areas. The function of these sensors is to collect and transfer the data to the base station directly or through other sensors. The main challenge is collecting the data. Once data are collected, they will be analyzed for decision making. In this research, we designed a simulated environment with nodes placed randomly in a field and observed the disconnected nodes and nodes that drop the packets randomly. We designed algorithm-H to detect the disconnected nodes and algorithm-F for packet dropping nodes. The packet dropping nodes were detected using two methods called forward search and binary search. The results show that the binary search detects the random dropping nodes much faster than forward search. The ratio of search time with number of nodes is as follows: Number of nodes Binary Forward 20 2 1 50 4 1 100 10 1. The research work was supported by DEPSCoR grant No. N00014-08-1-0856. The authors wish to express appreciation to Dr. S. S. Iyengar, LSU Baton Rouge, for his support.

Nchise, A.C., R. Boateng, V. Mbarika, and S.R. Isabalija. SU-BR. N.A.D. Boateng and F. Ewusie-Moses. UGBS. **Using information technology to manage medical records in a university hospital**.—This paper aims at investigating how information technology (IT) is used to manage medical records in a university hospital in a resource-poor environment. The paper uses interviews, observations, and interaction with healthcare professionals and patients in University Hospital in Ghana to develop a case study. The findings suggest that IT implementation had been planned in three phases in the university hospital: beginning from 2007 and ending in 2012. Benefits reaped from the first phase of implementation include the timely preparation of bills for patients and the improvement in the record keeping on consultations and in the management of drugs inventory. However, the IT implementation process has been slow due to the lack of autonomy in decision-making or the bureaucracy from the university administration; the behavioral or attitudinal change from the introduction of IT; and the absence of an effective backup system for power supply. This study is one of the first IT and healthcare studies in sub-Saharan Africa to examine the use of information technology in a university hospital or a hospital which primarily serves a university community. It concludes with recommendations on addressing the current challenges in the implementation process.

Salam, M.A. SU-BR. **Cochannel interference reduction for CDMA cellular networks**.—Code division multiple access (CDMA) wireless communication systems have grown very

remarkably since the first commercial mobile cellular telecommunications service was launched. The most considerable interference for the CDMA system is cochannel interference (CCI). Cochannel interference is caused between two cells transmitting on the same frequency within a network. CCI limits the quality and capacity (number of users) of wireless networks. There are many techniques that are used to reduce the CCI. Our approach is based on the microzoning cellular architecture with directional antenna. This research presents an enhanced architecture for the code division multiple access wireless communication systems. Cochannel interference for the proposed CDMA architecture is compared and analyzed with existing architectures. An analytic expression for the proposed method is derived. The performance of the proposed architecture is evaluated by means of computer simulation. The result shows that the proposed method with highly directional antennas provides better signal-to-noise (S/N) ratio than the existing cochannel interference reduction methods. A significant reduction of cochannel interference is achieved compared to sectoring and omnidirectional architectures. The proposed architecture also accommodates more number of users while maintaining an adequate S/N ratio.

Salam, M.A. and S.A. Mohammed. SU-BR. **Protocol enhancement for wireless sensor networks in space environment**.—Space agencies, industry, and research institutions are very much interested about the applications of wireless sensor networks (WSN) in space environments. One of the paramount importances to NASA is to monitor the physiological condition of the crew members during the long space missions. This will enable mitigating astronaut health and performance risks. Other applications of WSN in space environments include spacecraft diagnostics, self-repair, and interplanetary exploration monitoring. The existing protocols for wireless sensor networks are not designed for application in space environments. They need to be enhanced according to the environmental condition of space. WSNs are composed of a large number of sensor nodes deployed densely in close proximity where the phenomenon needs to be monitored. Each sensor node collects sensory data, performs some processing, and sends it back to the sink node. Wireless sensor networks need to cope with frequent topological changes such as nodes failing, nodes sleeping, and nodes blocking by environmental interference. The main goal of this research is to find a suitable routing protocol for mobile sensor nodes that will consume ultra low energy and will be applicable for a space environment.

Smith, H. and Y.B. Reddy. GSU. **Node clustering in wireless sensor networks**.—A wireless sensor network consists of a network of sensor nodes that gather data and then must be wirelessly transferred to a base station for processing. There are many problems that can be formulated from this simple concept. Such problems include clustering of the nodes and the connection of these node clusters. One of the prevailing clustering techniques involves the use of the K-Means clustering algorithm. The K-Means algorithm requires that the number of clusters be specified and that it uses minimum distance as a criterion for creating the clusters. The fact that K-means clustering uses distance as a criterion for clustering is particularly important because sensor nodes only have a particular range in which they can transmit data. The limitation for transmission in nodes is due to their size which causes this limitation and others such as power usage and data size. To efficiently implement the K-Means algorithm, the limitation for data transmission must be taken into account because it is a direct representation of distance in the algorithm. Given that K-Means does create K clusters, there is still another

problem to address. This problem involves deciding which node inside of the cluster should be declared as the cluster-head and how this decision should be made. The next problem encountered is determining how to connect the cluster-heads to the base station so that no cluster is left out. The K-means algorithm of proposed wireless sensor network was simulated using Python language. The simulations show that the nodes successfully connect reachable clusters to the base station; however, there are some nodes/clusters that could not be connected to the network, called sensor holes. This is a real world problem to be dealt with separately. We tested the transfer of data from nodes to cluster-heads and then to the base station. The data transfer from connected nodes was done successfully. These results are satisfying and provide a basis for future work which includes the study of attacks on the network since the connection has been made and also how to improve the technique discussed here to ensure its efficiency.

Earth Science Section

Goodman, K., R. Johnson, C. Vines, M. Garrett, L. Delaney, A. McDowell, M. Williams, and G.I. Duke. LSU-A. **Geochemical similarities among three alkalic igneous centers in Montana, Wyoming, and South Dakota**.—The alkalic igneous centers of the Judith Mountains, MT, Rattlesnake Hills, WY, and Black Hills, SD, included subalkalic magmatism which preceded alkalic magmatism. These centers are Paleocene to Eocene in age, with Judith Mountain activity occurring between ~69 and 62 Ma (K-Ar), Black Hills between >58 to ≤46 Ma, and Rattlesnake Hills at ~44 Ma (K/Ar). In the Judith Mountains, the subalkalic pulse includes a ~67-69 Ma rhyolite, followed by diorite, syenite, phonolite (~67-65 Ma), and a late alkali rhyolite (~62 Ma). The Black Hills subalkalic series (~58 Ma) preceded the alkalic (~55-54 and ~49-46 Ma), although some subalkalic rhyolitic magmatism continued to 52 Ma. Major and trace element geochemistry of the Judith Mountains, Rattlesnake Hills, and Black Hills show similarities. Fractional crystallization of parental magma(s) likely was an important process at all three centers, as evidenced by Harker diagrams. Thorium is highest in kimberlite and carbonatite, followed by phonolite. Previous isotopic work from the Black Hills and Rattlesnake Hills suggest a common mantle-derived parent, with a dominant lithospheric component in older subalkalic groups. Ongoing research includes obtaining 40Ar/39Ar ages and isotopic data from these and other igneous centers. Supported by LABoR RCS funds.

Pullin, J.T. and A.T. Case Hanks. ULM. **Analysis of rainbands in the Monroe Regional Area associated with Hurricane Gustav**.—This work presents an analysis of the effects of convective precipitation associated with Hurricane Gustav. Rainbands are defined and analyzed using radar data from the National Weather Service (NWS) from Shreveport, LA, and Jackson, MS. Upper air data also were obtained from the NWS and indicate the stability of the atmosphere during the time of passing. There were 6 rainbands at the start of 1 September 2008 and by 2 September 2008 at 0Z, they were organized into 2 coherent bands. The cross-section and 3-D analysis were completed using Integrated Data Viewer. The convective precipitation in the Monroe area associated with the hurricane was 9.29 inches over a 24 hour period from 2 September to 3 September 2008 which was the largest amount of the surrounding areas for that time period.

Shaw, J.A., R.T. Chevious, and N. Wallace. LTU. C. Akers. LSU-BR. **Renovation of the Louisiana Tech Observatory and undergraduate observations of variable stars**.—Louisiana Tech University was awarded a Louisiana Board of Regents grant in 2008-2009 to rebuild its observatory. The rebuilt observatory became active in late spring 2009 and is now being used by students to do V and R band photometry of Delta Scuti stars. Delta Scuti variables have short periods making them good targets for undergraduate projects and are of scientific interest due to their multiple modes of oscillation that give information about the interior structure of the star. Observations of RR Lyra and SZ Her were made in the summer by a visiting student to establish best practices for data collection. Observations of the Delta Scuti stars SZ Lyn and RR Gem on the AAVSO watch list are now ongoing. Plans are being made to further automate the collection of photometric data and enable online access to the telescope.

Stringer, G.L. ULM. L. King. SLCC. **New fossil centropomid fish (snook) from the late Eocene Yazoo Clay of northeast Louisiana**.—The Yazoo Clay exposures near Copenhagen, Caldwell Parish, Louisiana, have one of the most diversified marine vertebrate fossil assemblages in the Paleogene Period (23 million to 65.5 million years ago) in the Gulf Coast. Reported fossil vertebrates, which include sharks, bony fishes, reptiles, birds, and mammals, number over 80 taxa. The teleostean fauna is the most diversified with 43 taxa based on otoliths and at least 12 skeletal-based taxa. Although over 10,000 otolith specimens have been recovered and analyzed, additional species continue to be found. Most recently, otoliths representing what appear to be a new species of *Centropomus* have been discovered. Specimens match otoliths from *Centropomus undecimalis*, the common snook, found presently in the Gulf of Mexico. However, the pronounced ontogenetic changes in *C. undecimalis* hindered identification since smaller juvenile otoliths are quite different from larger adult otoliths. Analysis of a growth series of recent *C. undecimalis* indicates significant changes in the height/length ratio, convexity, and sulcal shape. The Yazoo Clay specimens display the characteristics of the larger adult *C. undecimalis* but probably represent a new extinct species. Additional fossil specimens are required to confirm the identification. The Florida Fish and Wildlife Conservation Commission provided otoliths for this study.

Materials Science and Engineering Section

Acharya, L.N. and P. Derosa. LTU. **Study of geometrical structure and electronic properties of MEH-PPV**.—Electro-optically active polymer, MEH-PPV, has a unique absorption bands in the visible region, and it has a promising future in light emitting diodes and solar cells. In this work, a study of the dielectric effects of chloroform and toluene in the geometrical structure MEH-PPV, calculation of HLGs and excitation energy, frequency analysis, and the effects in the HLGs due to the formation of a pair of dimers of MEH-PPV is presented. HLG and excitation energy extrapolation for infinite chain length of MEH-PPV are also calculated. All these calculations were performed to study the geometrical structure of MEH-PPV in toluene and chloroform, to examine the optical and electronic properties of MEH-PPV and to see the effects on molecular and optical properties when dimers of MEH-PPV are paired. Most of the calculations were performed using DFT (B3PW91) method with 6-31 G* basis set whereas TD-DFT (B3PW91) method was used to calculate absorption energy. After the structures were

generated using Arguslab and Gaussview, different solution models of MEH-PPV with toluene and chloroform were created using PCM method, and finally all the computations were performed using Gaussian03.

Anderson, H.A. and D.P. O'Neal. LTU. **Physician-free nanoparticle-based drug delivery for space related applications**.—We demonstrate proof-of-concept for a biodegradable, remotely-detectable gelatin nanoparticle incorporating established layer-by-layer approaches and self-assembled monolayers capable of delivering a therapeutically relevant concentration of polyphenols to the blood stream or tumor masses. The nanoparticle manufacturing process was adjusted to accommodate small sample sizes which were loaded with variable concentrations of fluorescent dye. Layer-by-layer coating techniques were used to add polyelectrolyte and polyethylene glycol coatings to the surface of the particles to optimize circulation times. Customized in-house monitoring techniques were used to measure the in vivo circulation in real time. Using these monitoring techniques, reproducible circulation times will be developed and modified by modification of the nanoparticle layers. Supported by LASPACE/NASA.

Burks, G.R., and N.V. Seetala. GSU. **Positron lifetime studies of sintered B_4C pellets**.— Boron carbide (B_4C) is used as a body armor material due to its low weight and high impact strength. We studied the positron lifetime spectra (PLS) of two sets of B_4C samples: 1) 39,000 PSI compacted pellets annealed at 1,200°C for 10 hrs in Argon atmosphere and 2) B_4C powders sintered under 1,500 PSI at 1,750^{o}C for 5 hrs. The micro-porosity of these samples was studied using PLS. We prepared a new positron source and calibrated the PLS system with a pure silicon sample to estimate the source correction. ^{22}Na source is sandwiched between two identical B_4C samples under study and the lifetime spectrum was collected. The positron lifetime spectra for both sets of B_4C, compacted B_4C pellets, and in situ pressure-heat treated B_4C were resolved into three lifetime components using POSFIT computer program. The lifetime spectra clearly shows that the sample sintered at 1,750^{o}C for 5 hrs under 1,500 PSI pressure is less porous compared to the sample compacted at room temperature with 39,000 PSI and annealed at 1,200^{o}C for 10 hrs with mean lifetime values of 0.232 ns and 0.301 ns, respectively. Though the applied pressure is low, the in situ pressure-heat treatment at elevated temperatures provides better sintering.

Gotrala, K. and P.S. Sit. LTU. **Use of electrochemical impedance spectroscopy to continuously monitor fibroblasts seeded in chitosan scaffolds**.—In tissue engineering, while porous scaffolds are used to mimic the functions of natural tissue by providing structural support to the embedded cells, there exists a need to develop a protocol for the monitoring of cell responses. In this report, electrochemical impedance spectroscopy (EIS), a non-destructive method that involves the passage of current through porous materials, is used for continuous monitoring of embedded fibroblasts. EIS was run at a constant current of 0.1 mA between two titanium electrodes inserted into the chitosan scaffold that were 1 cm apart. A frequency sweep of 10^{6} to 10^{-3} Hz was applied. The same scaffold was then seeded with fibroblasts followed by EIS, which was repeated again after the fibroblast-seeded scaffolds were fixed using 4% paraformaldehyde. The data obtained from EIS led to the estimation of bulk resistance of the scaffolds, which was determined to be 10,600 ohms in a previous study. When the scaffolds are seeded with fibroblasts, the bulk resistance is expected to change, which can be attributed to the

capacitive effect of the cells. These results suggest that EIS can be used as a non-destructive characterization method for the continuous monitoring of the native and fibroblast-seeded form of chitosan scaffolds.

Hu, B., S. Yoshida, and A.J. Gaffney. SLU. **Stress and strain analysis of metal plates with holes under dynamic loads**.—For our long-term goal of understanding the response of metal connectors used for housing to hurricanes' wind load, we have conducted finite element analysis (FEA) to compute the stress and strain distributions in tensile-loaded aluminum and tin plates (20-25 mm wide, 0.1-10 mm thick, and 100 mm long) with two holes drilled along the tensile axis. In addition, we have conducted tensile experiments using an optical interferometer and analyzed the in-plane strain field. Comparison of the FEA and our experiments indicate that band-like interferometric fringe patterns representing strain concentration coincide with the region where the von-Mises yield criterion is satisfied, and that the specimen fractures at the hole that shows more concentrated plastic strain. Experimental results show that in the tin samples the fracture lines run through the holes perpendicularly to the tensile axis, while in the aluminum samples the fracture lines run about 45^{o} to the tensile axis. Results of the corresponding FEA are consistent with this observation, showing that the plastic strain patterns observed in the tin samples are much more horizontal than those in the aluminum samples. We have found optimum plate thickness, width, and hole locations for a given hole diameter.

Montoute, H.J., W. Augustin, and S.J. Lee. GSU. **Obstacle detector for the blind**.—Blind people may run into obstacles daily, causing harm to themselves. In this project, an infrared based proximity detector is designed by using an infrared transmitter and a receiver to detect objects. The transmitter section of this device consists of two 555 Timer based oscillators which produce a modulated signal with a 38 kHz carrier frequency and a 2 kHz audible frequency which is amplified by a Complimentary Darlington Pair current amplifier. This signal drives two infrared diodes to transmit a square wave. The receiver consists of an IR sensor module which only detects this modulated signal. When this wave is reflected by an object, the receiver detects and processes the signal. This signal is fed to a comparator which activates a relay via a bridge rectifier. When the relay is energized, it activates a voice processor which alerts the user through a headset. The designed obstacle detector was simulated using NI Multisim 10.1 and a prototype was constructed to demonstrate its functionalities and performance. The device was able to detect objects within one meter in the path of the user. The device can be further improved by utilizing a microcontroller to process multiple inputs from various sensors to improve sensitivity.

Olivard, S. and D. Mainardi. SLU. A. Kujomon. LTU. **In search of the adsorption sites of ammonia on the MDH enzyme**.—Methanol dehydrogenase (MDH) is an enzyme found in methylotrophic bacteria that catalyzes the oxidation of methanol to formaldehyde. The re-oxidation of MDH leads to electron transfer to Cytochrome cL. When the enzyme is isolated from the cell it is rendered inactive. Addition of ammonia in the range of 3 mM to 60 mM replenishes the enzymes' activity. In order to study the effect of ammonia as an MDH/cL activator, the complete system (MDH/cL) is optimized using molecular mechanics with the COMPASS forcefield to find the conformation of two structures with lowest potential energy. The binding energy of MDH and cL is found to be 4,791.95 kcal/mol. Binding energy of the system with one ammonia molecule resulted in 4,886.92 kcal/mol. Increasing the concentration

to two and three ammonia molecules, increases the binding energy to 4,971.75kcal/mol and 5,002.70kcal/mol respectively. The docking between the two macromolecules is also explored using the adsorption locator module, which carries out Monte Carlo calculations. A search for configurational space of the substrate-absorbate system while gradually decreasing the temperature also defines a binding energy. The binding energy of MDH and cL is maximum at an ammonia concentration of 35 mM (34,196.61 kcal/mol). A concentration of 70 mM decreased the binding energy by 53.64 kcal/mol and increasing the concentration of ammonia decreases the binding energy.

Richard, G.M., J.M. Johnnie, A.R. Smith, and R.A. Billings. GSU. **A fire alarm system design**. **—**Fire alarm systems have always been in high demand and will always be important since they alert people of nearby fires and improve safety in buildings. In this project, a fire alarm system is designed by utilizing digital and analog electronic devices. The fire alarm system is composed of a temperature sensing device, amplifiers, comparators, a potentiometer, a relay switch, and selected output alarm devices. When there is a fire, the temperature increase causes a voltage change across the temperature sensing device. That voltage is compared to a set voltage that corresponds with the set temperature in the comparator subcircuit. When the sensed temperature is higher than the set temperature, the relay switch is activated which triggers the alarm. The alarm consists of audio/visual devices. Both forms were chosen to cater to people who cannot hear and the people who cannot see. The circuit was first simulated using the NI Multisim 10 software and when proved functional it was then constructed on a circuit board to demonstrate its performance. This system is flexible and can be expanded and/or incorporated with other systems easily.

Mathematics & Statistics Section

Chi, O. LSU-BR. Y. N. Chi. UTB. **College business students' attitudes toward the environment**.**—**Environmental attitudes of college undergraduate students, especially business students, are critical factors influencing their motives to participate in natural resource management and conservation events and activities. The purposes of this study were to examine college business students' environmental attitudes and to identify groups exhibiting common patterns of responses using data collected from an environmental attitudes and behavior survey in 2007. Included in the questionnaire were 15 statements concerning the respondents' attitudes toward the environment measured on a five-point Likert-type New Ecological Paradigm scale. Principal components analysis revealed that these statements could be condensed into five attitudinal dimensions. Empirical results based on the K-means cluster analysis identified three groups of respondents. Results of the cluster analysis were tested for accuracy using multiple discriminant analysis. Results also showed that college business students' environmental attitudes had positive correlation with environmentally responsible behavior. Results of this study provided insight into the understandings of college business students' environmental attitudes that can be used to frame scenarios for environmental education program purposes.

Doucet, J. LSU-A. **Continuity and Uniform Continuity**.**—**We shall present a characterization of the conditions required for a metric space so that every continuous function is uniformly

continuous. We shall present a simpler proof than that found in the literature. It should be understandable by anyone who has had one semester in topology.

Soileau, Anthony. LSU-A. **Remarks on normal vectors**.—We shall demonstrate how to calculate normal vectors using the TI-83/84 calculators in the Cartesian plane.

Physics Section

Baker, S. and B.R. Ramachandran. LTU. P. Derosa, LTU/GSU. **Molecular modeling scheme to efficiently determine the selectivity of various calix-crown molecules with Cs, K, and Na ions**.—Nuclear energy is an attractive alternative fuel; however, the disposal of nuclear waste is an issue. A large quantity of inert waste, including radioisotopes with short half-life, is unnecessarily stored with the waste. One process proposed to reduce the amount of waste being stored is nano-filtration, this process requires complexation of a large molecule, calix-[n]-crowns, with the ion that needs to be separated. While nuclear waste contains many radioactive ions, only ^{137}Cs has a half-life long enough to require a long-term storage option. Experimental studies have already shown that certain calix-[n]-crown species are effective to bind with the ^{137}Cs. Further studies could lead to more effective species or applications, such as sensing. The calix-[n]-crown species have been optimized using hybrid DFT method B3PW91 with a LANLDZ2 basis set. The solvation and binding energies were calculated with the same method in water and CDCl3. With these energies a selectivity coefficient was determined for each calix-[n]-crown species. The molecular modeling scheme described here did not only show similar trends on selectivity to known experimental data, but also allowed us to predict selectivity on untested calix-[n]-crown species. The low cost to produce additional data also makes our method desirable.

Blanchard, G.T. SLU. **Coded-pulse radar multispectral Doppler shift detection using a modified Lomb periodogram**.—The Lomb periodogram method is a technique for spectral component detection in non-uniformly sampled time series data. This technique is an extension of Fourier spectral analysis that involves the least-squares fitting of sine and cosine functions to the unevenly sampled time series. We have extended the Lomb periodogram method to accommodate multiple targets, i.e. multispectral Doppler shift. We present the modified Lomb periodogram method and examples of the application of the method to data from the Kodiak Island, Alaska, high frequency radar, whose purpose is to observe the dynamics of the high-latitude ionosphere. We demonstrate that the modified Lomb periodogram method detects ionospheric dynamics that are masked by the integration time requirements of traditional spectral analysis.

Champagne, C. LTU. N. Seetala. GSU. T.A. Dobbins. LTU/GSU. **Catalyst induced defect formation and its effect on hydrogen mobility**.—Hydrogen storage is a key link in the progress toward alternative and clean energy technologies in the automotive sector. Proton exchange membrane (PEM) fuel cells intake hydrogen gas and deliver electricity with water as the only by-product. Generation of hydrogen to operate the fuel cell requires energy—thus, hydrogen itself may be considered a clean energy storage media. If PEM fuel cell technologies

are to be realized in automotive applications (for powering electric motors), safe methods to store hydrogen on-board in vehicles will be necessary. Long-range diffusion transport in $NaAlH_4$ will be a key factor in understanding H_2 desorption and uptake kinetics. In order to study lattice diffusion (by vacancy mobility), we will measure relative vacancy content among catalyzed (with $TiCl_3$) and non-catalyzed samples. Separately, we will measure the band structure of catalyzed and non-catalyzed systems to determine whether the Ti additions will cause a shift in Fermi energy within $NaAlH_4$. Speciation of the Ti added at 4000ppm, 400ppm, and 40ppm will be performed using X-ray absorption measurements.

Chevious, R. LTU. T.A. Dobbins. LTU/GSU. **Thermochemical modeling of the carbon dioxide capture problem**.—Global Warming is a pressing issue that is being addressed in the scientific community. The method to address this issue is capturing carbon dioxide, a greenhouse gas, which is a byproduct of industrial work. Since carbon dioxide is an acidic oxide, it allows for reactions with materials that have a deficiency of electrons. This research will focus on elemental metals ability to capture carbon dioxide. The metals are of interest because they have an incomplete outer shell which will covalently bond to carbon dioxide. A series of thermochemical calculations at temperatures between 100 and 600°C are being performed to find the best candidates.

Christov, C.I. ULL. **Nonlinear continuum mechanics of space and the foundations of electromagnetism**.—We prove that, when linearized, the governing equations of an incompressible elastic liquid yield Maxwell's equations as corollaries. Thus the electrodynamics can be fully explained if one assumes that it is the manifestation of the internal forces of an underlying elastic material which we term the metacontinuum. Through judicious distinction between the referential (Lagrange) and local (Euler) descriptions, the principle of material invariance (frame indifference) is established and shown to be a true covariance principle, unlike the Lorentz covariance, which is valid only for non-deforming frames in rectilinear relative motion. The new nonlinear formulation of the electrodynamics incorporates the Lorentz force as an integral part of Faraday's law. Respectively, the Ampere-Oersted and Biot-Savart laws are derived from the frame-indifferent modification of Maxwell's displacement current. The material invariance of the model entails Galilean invariance as a limiting case. We consider the particles and charges as localized nonlinear waves (solitons) of the metacontinuum. They do not move through, but rather propagate over the surface of the metacontinuum. From the soliton theory it is well established that a phase pattern is contracted in the direction of propagation by the Lorentz factor. Thus one does not need the Lorentz Transformation to explain the Lorentz contraction.

Ekuma, E.C., L. Franklin, G.L. Zhao, J.T. Wang, and D. Bagayoko. SU-BR. **Density functional theory description of electronic properties of wurtzite cadmium sulfide (w-CdS)**.—We present calculated, electronic and related properties of wurtzite cadmium sulfide (w-CdS). Our ab-initio, non-relativistic calculations employed a local density functional approximation (LDA) potential and the linear combination of atomic orbitals (LCAO). Following the Bagayoko, Zhao, and Williams (BZW) method, we solved self-consistently both the Kohn-Sham equation and the one giving the ground state density in terms of the wave functions of the occupied states. Our calculated, direct band gap of 2.47 eV, at the point, is in excellent agreement with the

experiment, as are the calculated density of states and the electron effective mass. In particular, our results reproduce the peaks in the conduction band density of states, within the experimental uncertainties. Acknowledgments: This work was funded in part by the Louisiana Optical Network Initiative (LONI, Award No. 2-10915), the Department of the Navy, Office of Naval Research (ONR, Award Nos. N00014-98-1-0748 and N00014-04-1-0587), and by Ebonyi State, Federal Republic of Nigeria, through its Superior Graduate Fellowship support for Mr. E.C. Ekuma.

Elumalai, D.N. and V.P Podduturi. LTU. P. Derosa. LTU/GSU. **A study of transport phenomena in nanostuctures**.—Nanotubes show exceptional properties that make them promising candidates for applications that require the transport of fluids through nanotubes. In order to implement potential applications, transport properties, and interactions such as adsorption and diffusion must be understood. Experimental studies with clay nanotubes predict a slow out-diffusion of drug molecules from the nanotube interiors, whereas carbon nanotubes exhibit an extremely fast out-diffusion of water molecules. This fascinating contrast is the inspiration for this research. In this work, we model the diffusion of particles in tubular nanostructures as a function of the interaction between particles and nanotube walls. The results allowed us to understand the reasons for the slow diffusion in clay nanotubes and to hypothesize the reasons for the fast diffusion of water in carbon nanotubes. To conduct this research, we employed Monte Carlo calculations, specifically, forced random-walk algorithms. In this study, we model a strong interaction by increasing the magnitude of the Van der Waal's energy parameter. Results suggest that the delay in diffusion is due to a strong molecule-wall interaction. Knowing that the surface of clay nanotubes bear charge, we believe that the slow diffusion is due to the columbic attraction between the diffusing particles and the nanotube walls.

Franklin, L., G.L. Zhao, and D. Bagayoko. SU-BR. **Density functional theory description of electronic properties of wurtzite zinc oxide (w-ZnO)**.—We report calculated, electronic properties of wurtzite zinc oxide (w-ZnO). Unlike many previous theoretical works, we solved self-consistently the two inherently coupled equations of density functional theory (DFT) following the Bagayoko, Zhao, and Williams (BZW) method. We employed a local density approximation (LDA) potential and the linear combination of atomic orbital (LCAO). Most of the calculated, electronic properties of w-ZnO are in excellent agreement with experiment, including our zero temperature band gap of 3.47 eV, and the electron effective mass. We discuss band structures and band gaps obtained from ab-initio, self-consistent calculations with basis sets other than the optimal one. They illustrate the inadequacy of single trial basis set calculations for semiconductors. The doubly self-consistent approach utilized in this work points to the ability of theory to predict accurately key properties of semiconductors, hence to inform and to guide the design and fabrication of semiconductor-based devices. Acknowledgments: This work was funded in part by the Louisiana Optical Network Initiative (LONI, Award No. 2-10915), the Department of the Navy, Office of Naval Research (ONR, Award Nos. N00014-98-1-0748 and N00014-04-1-0587), and by Ebonyi State, Federal Republic of Nigeria, through its Superior Graduate Fellowship support for Mr. E. C. Ekuma.

Gaffney, J., B. Hu, and S. Yoshida. SLU. **Study on stress distribution around holes in metal plates and transition to fracture**.—With strength analysis of metal connectors used for

buildings in mind, stress distribution around holes in tensile-loaded thin metal plates has been investigated. An optical interferometer sensitive to in-plane displacement of the specimen is set up in front of the tensile machine. Interferometric fringe patterns as a whole image of the specimen are formed on a real-time basis at a preset interval in the order of few seconds. Previously observed bright band-like fringe patterns representing stress concentration in similar specimens without holes are observed around the hole at a late stage of deformation. This band-like pattern is found to run at about 45 deg to the tensile axis through the hole. Sometimes two patterns appear simultaneously around the same hole, forming an "X" like shape. The appearance of the pattern greatly depends on the thickness of the specimen, the locations of the holes and the type of the metal. To a certain extent, the transition to fracture can be predicted from the shape of the pattern. Comparison with finite element analysis indicates that this pattern appears in the region where the von-Mises yield criterion is satisfied.

Ganapa, N. LTU. P. Derosa. LTU/GSU. **Polaron-free transport in conductive polymers using Monte Carlo simulations**.—Conductivity in polymers was a surprising discovery in the field of conduction. The discovery of these conductive polymers laid a bridge between two prominent fields of study: physics and chemistry. This special class of conductive polymers is designated as conjugated polymers. In the present study, disordered organic materials with hopping charge transport in a polaron-free regime is described using an analytical theory. For these systems, the conventional Miller-Abraham formalism is considered. This polaron-free model explains the electric field dependence of mobility assuming physically reasonable values of charge binding energies and transfer integrals. Monte Carlo technique is employed to simulate charge transport in polymers with realistic geometries. The calculation of mobility was of particular importance. In the process of calculating mobility, the hopping rates for the sites are calculated. The results obtained were compared with results from publications by other workers in the related field of study. Here, we present: i) implementation of a new algorithm for a polaron-free transport model which is an improvement over the existing model and ii) testing of the implemented model by reproducing existing proven results of realistic polymer systems. For this purpose, we use step-by-step code for simulating the mobility using the Monte Carlo technique.

Gentry, P.D. and D. Norwood. SLU. **Biodiesel examination**.—The SEAL (Student Entrepreneurs as Active Leaders) program allows students to do scientific research in conjunction with Louisiana industry while under the supervision of a faculty supervisor. Under this program, biodiesel samples were made by SEAL and some by Neil Corp using different methods and were analyzed using a differential scanning calorimeter (DSC) with Evaluation Software, to determine the extent of conversion of the original vegetable oil converted to biodiesel. SEAL plans to utilize the glass transition to determine the quantity of biodiesel.

Jones, P. ULM. **Canonical quantum gravity and the relavitistic infinite plane**.—One of the central problems in theoretical physics is the incompatibility of general relativity and quantum theory. The most popular approaches to this problem can be characterized as background dependent superstring theory and background independent loop quantum gravity. A complete solution for the relativistic infinite plane source was recently developed and could help to illuminate the importance of backgrounds in these two approaches as well as provide a mechanism for the inclusion of mass in canonical quantum gravity.

Shivane, D. LTU. P. Derosa. LTU/GSU. **Polaron transport in polymeric systems - A Monte Carlo based study**.—Electrically conducting polymers that act as electrical semiconductors, are referred to as conductive polymers. One of the mechanisms for conduction is polaron transport where polarons are charged quasiparticles that consist of a charge associated with lattice distortions that hops from one site to another in the polymer matrix. Polymer systems are characterized by disorder - energetical disorder, meaning that the interaction energy between charge and polymer is dispersed, and geometrical disorder, meaning distance between equivalent sites is not uniform. The main objective of the research presented here is to implement and use an algorithm to simulate polaron mobility in realistic polymer systems using the Monte Carlo method. This method mainly relies on the use of random numbers and probability theory to solve a problem. Polaron model describes a situation where a strong electron-phonon coupling characterizes the system, in other words, in a polaron model, energetic disorder is negligible when compared to the electron- lattice interaction. By using the Marcus formalism to determine hopping rates, we show that the model presented here, which incorporates a detailed and realistic description of the polymer matrix, can explain the observed magnitudes of temperature dependent of polaron mobilities assuming physically reasonable values for needed parameter.

Sziszak, C., M. Basnet, C. Schneider, and S. Yoshida. SLU. **Using finite element method to simulate temperature distribution of a heated tgg crystal**.—The long-term goals of this research are to use finite element analysis in an attempt to investigate the self-heating effects in various transmissive optics. As an example, we determined the temperature distribution in the terbium gallium garnet crystal used in a Faraday Isolator. Values such as boundary conditions, distance from heat source to crystal, and initial conditions were varied to determine what may have a significant impact on the temperature distribution or thermal expansion of the crystal. For example, by changing the boundary conditions at the surface of the crystal in the model, we are able to simulate the crystal being heated in a vacuum and compare the results to those taken from the crystal heated in an environment with an initially constant ambient temperature. Preliminary trials showed a significant difference; however, we are further investigating the results. As simulations are run, the results are graphed and analyzed and compared in an attempt to find any patterns or unexpected values.

Ukpai, W. LTU. T.A. Dobbins. LTU/GSU. **The study of the destabilized effect in $NaAlH_4$ using TiN**.—The possible use of hydrogen for vehicular applications will reduce our dependence on oil production. To bring about this emerging technology requires the full knowledge of (and control over) the H_2 desorption properties of sodium aluminum hydride. The new TiN destabilized $NaAlH_4$ hydrogen storage materials systems seem promising for gaining such control over H_2 desorption temperature. The possible destabilization reaction is:

$$NaAlH_4 + TiN \leftrightarrow Na + 1/2N_2 + TiAl + 2H_2$$

Samples prepared were $NaAlH_4$ with varying concentrations of TiN (specifically, 25mol%, 50mol%, and 75mol% concentrations). The destabilizer was introduced to the hydride powder system using high energy ball milling (SPEX 8000M mill in WC mill media). Formation of TiAl destabilized the $NaAlH_4$ system during high energy ball milling. After high energy milling, the hydrogen desorption reaction was lowered to 100-112°C (compared to 186°C for pure $NaAlH_4$), as determined using mass spectrometry (RGA Analog Scan) with 25 mol% concentration of TiN.

Division of Science Education

Higher Education Section

Ales, J.D. BRCC. C.S. Gregg, S.M. Pomarico, J.F. Siebenaller, and E.W. Wischusen. LSU-BR. **STAR (Scientific Teaching, Assessment and Resources) mini-institute: goals, methods, and preliminary results.—**The STAR mini-institute is a two and a half day workshop modeled on the National Academies Summer Institute on Undergraduate Education in Biology. STAR faculty from campuses across Louisiana participate in a workshop devoted to scientific teaching, assessment and alignment of learning goals with assessment and diversity of learning styles. One goal of the STAR is to train teams of biology faculty from higher education institutions across Louisiana. We are on the way to achieving this goal and have just completed the second full scale STAR mini-institute. Fifty-one faculty members from 14 different Louisiana 2- and 4-year institutions have participated in STAR during the first 2 years of the program. A second goal of STAR is to fuel reform of teaching, transitioning from a traditional lecture classroom to a teaching method that engages students in conceptual and analytical learning. Preliminary results on the progress toward achieving this goal will be presented. In addition, methods of scientific teaching using active learning will be demonstrated. The STAR mini-institute and the research associated with it are funded by an NSF CCLI grant.

Landor-Ngemi, J. SU-BR. **Student perceptions of an effective learning environment across the dimensions of synchronous, asynchronous and face-to-face learning.—**Prior to the implementation of computer technology in the classroom, the traditional classroom dynamic consisted of a chalkboard, a lectern, a teacher handout, and the occasional group assignments. However, as technology continues to evolve, so has the restructuring of the educational system. This study sought to expand the existing body of knowledge on distance learning and employed quantitative techniques (multiple linear regression, One-Way MANOVA, and Repeated-measures design) to investigate students' perceptions of the quality of courses delivered through synchronous and asynchronous instruction and compared their perceptions to face-to-face instruction. A sample comprised of undergraduate and graduate students from five regional universities was used to complete the study. Results from the study showed no statistically significant relationship among student demographics and technological skills. The researcher did find a statistically significant difference between students' rating of quality instruction when given a preference between synchronous online instruction with voice and asynchronous online instruction. Such findings reveal that when students are given a choice between synchronous online instruction with voice and asynchronous online instruction they tend to prefer an asynchronous online environment.

Namwamba, J. B. SU-BR. **Importance of learning science through formal settings.—**This position paper aims to make a strong case that formal setting for science learning is very necessary for science learning process in the 21st Century. Recent trends indicate that some education practitioners are suggesting that informal learning ought to be given more recognition than formal learning. The case for learning science by formal settings is made by deconstructing the advocacy for informal learning as an alternative to learning science in the formal setting. In

this paper, it is argued that whereas informal learning has a place, its main role should be as a strengthening tool but not as a replacement or alternative to learning in formal settings.

Namwamba, J. B. SU-BR. **The influence of music on mathematics test scores**.—In this research the effects of background music on mathematics test scores of college students and completion time were studied. Most research findings on relationships between mathematics and music have been based on comparison of test scores of students who had music instruction and those who did not. From these findings, some scientists argue that high scores in mathematics tests by students who had music instruction is caused by stimulation in the nervous system by music enabling them to develop superior visualization in space. Relatively less research has been done on the effect of background music on students' performance in mathematics examinations. This research addressed the following questions: Does the presence of background music enhance a student's motivation during a mathematics examination? Does the level of volume of background music have an effect on the total score in a mathematics exam? Does the level of volume of background music have an effect on time spent by students to complete a mathematics exam? To answer the above questions, students had to sit for equivalent mathematics examinations under the conditions of different music volume levels varying from zero to a safe maximum level and statistical analysis carried out on corresponding.

Pugh, A., J. Washington, and T. Sivakumaran. ULM. **Attitudes toward science in an elementary education professional block class**.—In the Department of Curriculum and Instruction for the area of Elementary Education, there are three distinct semesters for teaching classes in methods. The first two semesters focus on reading (1-2) and (3-5), classroom management, diversity, special education, and computer awareness. The third block is the Professional Block, the semester prior to student teaching, which includes the methods of science, social studies, and lower and upper mathematics. During this semester, the students attend class for approximately four weeks for learning methods in social studies and lower mathematics; then the students go to assigned schools with teachers for roughly four weeks of direct field experiences. At the conclusion of the four weeks, the students return to campus for additional methods in science and upper mathematics. For the remaining four weeks of the semester the students have an additional placement, grades three through five, with a different teacher for these two subjects. In order for the professors to determine the attitudes of these classes, an anonymous questionnaire is administered. The purpose of this paper is to ascertain the attitudes of these students for the methods class of science. Data were analyzed using percentages that indicated positive attitudes toward the science class.

Washington, J., A. Pugh, and T. Sivakumaran. ULM. **Attitudes toward mathematics in an elementary professional block class**.—In the Department of Curriculum and Instruction for the area of Elementary Education, there are three distinct semesters for teaching classes in methods. The first two semesters focus on reading (1-2) and (3-5), classroom management, diversity, special education, and computer awareness. The third block is the Professional Block, the semester prior to student teaching, which includes the methods of science, social studies, and lower and upper mathematics. During this semester, the students attend class for approximately four weeks for learning methods in social studies and lower mathematics; then the students go to assigned schools with teachers for roughly four weeks of direct field experiences. At the

conclusion of the four weeks, the students return to campus for additional methods in science and upper mathematics. For the remaining four weeks of the semester the students have an additional placement, grades three through five, with a different teacher for these two subjects. In order for the professors to determine the attitudes of these classes, an anonymous questionnaire is administered. The purpose of this paper is to ascertain the attitudes of these students for the methods class of mathematics. Data were analyzed using percentages that indicated positive attitudes toward the mathematics class.

Division of Sciences and Humanities

Alexander, R.A. NiSU. **Winner takes nothing: The illusory promises of general education in the sciences and humanities**.—In *The Structure of Scientific Revolutions*, Thomas Kuhn suggests that the Darwinian paradigm shift exploded the teleological framework of modern Western philosophy, revealing that, regardless of the complexity of the organisms we observed, organisms "were products of a process that moved steadily from primitive beginnings but toward no goal." Why, then, do we continue to hold on to a teleological framework with regard to our basic approaches to education, especially in general education courses in the sciences and humanities? We may attempt to complicate our students' understanding of basic modes of inquiry—the scientific method and the essay. These modes, after all, provide the potential for the kind of "spiraling" inquiry that characterizes discovery and innovation. Nonetheless, too many students leave these courses believing that these modes are essentially linear and conclusive. What can we do to enrich our students' comprehension and application of these modes of inquiry? May the time not be ripe for a paradigmatic shift in general education—one that shifts our efforts from skills-based instruction and assessment-driven outcomes to a focus on that which will engage students in ongoing inquiry regarding the amazing and astounding phenomena which we observe and of which we can conceive?

Baker, L.J. and L.B. Lewis. LU-NO. **Linguistic and visuospatial bases of gestural communication**.—Researchers have examined the role of gesture in signal presentation, but few have investigated factors that influence gestural interpretation. This study examined the relative salience of various types of gesture as well as the relationship of gestural coding to individual visual and linguistic ability. A number of gestures were acquired from social observation and then filmed in a laboratory setting in five to eight second clips. Fifty Loyola University undergraduates viewed each gesture without sound and were instructed to determine if a transcript matched or did not match the gesture within a three second period. Each participant completed tests of linguistic, visuospatial, and symbolic coding abilities. Individual differences in gestural interpretation suggest possible neural correlates in human gestural communication.

Bollinger, N.J. and J.P. Doucet. NiSU. **A survey of U.S. patents awarded to Louisiana reclamationist James Hill**.—Although James Hill was born in Ohio, he is better known as a Louisianian. Hill came to Louisiana with both knowledge of and frustration over problematic land drainage techniques used in the water-logged clays of his native state. At the end of the nineteenth century, he was awarded U.S. Patent 523,790 for the "Traction Ditching Machine," a steam-propelled apparatus that dug a continuous ditch with perfect grade line adapted for efficient laying of drain tiles. This machine revolutionized the field of agricultural drainage and allowed for large areas of marshy, wet land to be drained efficiently and economically. He continued to invent and patent machines and vehicles that facilitated land drainage, at least one of which was voluntarily surrendered to the U.S. government and applied to improving traction of U.S. Army tanks. In Louisiana, Hill lived in Lafourche Parish and is noted for draining the Lafourche prairie, which created thousands of acres of now habitable real estate and which now bear his nickname, "Butch Hill." This study will recover little known information regarding this important land reclamationist and will survey the innovative land vehicles and other inventions attributed to him.

Doucet, J.P., L.J. LeBlanc, and B.P. Breaux. NiSU. **Genetic influences in the Gabriel García Márquez novel, *One Hundred Years of Solitude*.—**South American author Gabriel García Márquez was awarded the 1982 Nobel Prize in Literature "for his novels and short stories, in which the fantastic and the realistic are combined in a richly composed world of imagination." He achieved international success with his 1967 novel *One Hundred Years of Solitude*, which has been translated into many languages and has sold millions of copies. Part of the "realistic" in *One Hundred Years of Solitude* is a plot line of lingering anxiety over segregation of a genetic mutation in a large, extended family in the isolated village of the novel's setting. Part of the "fantastic" of the novel is that the mutation manifests as a pig's tail. An in-depth study of the novel, together with the author's biography and influences, was undertaken to assess the biological accuracy of the genetic theme and to reveal related allusions and metaphors. The geographical and cultural isolation of the extended family, together with inevitable consanguinity associated with isolation, are consistent with autosomal recessive inheritance of the pig tail phenotype, and the fixity of mutation and inevitability of inheritance are reflected in allusion and metaphor throughout the novel.

Msangi, A.C. and Y.B. Reddy. GSU. **Trusting in Social Networks**.—Web-based social networking has grown since the introduction of Friendster in 2002. This growth has created potential for producing software that can be integrated into users' social network and preferences. The current research focuses on building trust and how that trust can be integrated into a recommending application. The process involved four steps. First, trust and possibilities of recommending peers based on trust ratings determined by that person's peers were defined. Second, an algorithm for rating trust relationships between users that are not directly connected in the network was developed. Third, the matching outcomes were strengthened by matching users based on their social and academic similarities. Finally, simulations were developed to determine the trust of relationships. In this research, the Index of Learning Style questionnaire and a modified version of Howard Gardner's original multiple intelligence inventory to determine academic similarities were used for social network preferences. Results from simulations suggest (1) that it is possible to define trust mathematically and (2) that using specified data sources needed to determine trust for a given user-selected purpose is possible using the average rating provided by the user's friends.

Ramsey, P.R. LTU. J. Stefanovic. RTV. **Media and scientific research: Studies of environmental history and biological diversity at audiovisual archives in the former Yugoslavia**.—Peoples of Southeast Europe face increasing unemployment and public debt, deteriorating environments from pollution and unrepaired war-damage, and declining biodiversity from encroachment on protected lands. To obtain baseline data on land use and biodiversity in/near national parks, studies of documentaries were undertaken at media archives in Vojvodina, a province in northern Serbia. Until NATO bombing, loss of personnel and aging equipment halted production, Radio-Television Vojvodina (Novi Sad) had recorded over 40 years of environmental history as well as biological and cultural diversity, across the former Yugoslavia. Moved shortly before the bombing of April 1999, RTV holdings (minus destroyed catalogues and scripts) included about 71,000 stories on 30,000 films in 6 languages, plus 8,600 audio tapes and 10,000 video canisters, stored in a museum basement without security and climate control. Research at the RTV archive is hindered by unidentified materials, file-card-

only access, and inadequate preservation. We present a 10-minute slide show on the pressing need for reclamation at RTV and other audiovisual archives. Further, we report on the potential for media archives to reinforce past commitments to conservation of natural resources as a basis for future environmental security.

Walker, N.J. and J.P. Doucet. NiSU. **Toward discovering the "H.M." mutation: A preliminary genealogical study**.—Patient "H.M." has been called the most studied individual in the history of science. His 1954 case was instrumental in inaugurating the field of cognitive neuropsychology. Presenting with uncontrollable daily seizures since age 10, H.M. was subjected to temporal lobotomy. The now famous surgery by William Scoville of Hartford Hospital decreased the frequency of seizures to 1-2 per year but had the unexpected side effect of severe amnesia. Although H.M.'s psychological profile is well known, the physiological basis of his epilepsy is not known. Although H.M.'s seizures began in childhood following head trauma, three paternal cousins were known to also suffer from epilepsy. Upon his death in December 2008, H.M.'s identity was revealed as Henry Gustav Molaison, a native of Thibodaux, Louisiana. His identity makes it possible to test hypotheses on a genetic basis of the epilepsy. We have reconstructed H.M.'s family architecture from genealogical records and have identified four generations of his immediate ancestry. We are currently identifying extended family members to survey extant generations for evidence of epilepsy. This evidence, together with the historical social cohesiveness of his ancestry, supports the hypothesis that H.M. expressed a unique, epilepsy-causing mutation.

Division of Social Sciences

Bell, K. SU-BR. **The effects of race and attractiveness on guilty vs. innocent jury decisions**. **—**This research examined the relationships between race, attractiveness, criminal offense and the likelihood of being convicted. Participants viewed one photo, read a crime scenario with circumstantial evidence, and evaluated how likely it is that the suspect committed the crime. The crime scenarios had attached pictures of the suspect. Study participants were presented another photo of an attractive person who was a black or white female with mature or childish features or a black or white male with mature or childish features. Results indicated a significant interaction between race and attractiveness of the assailant with regard to the believed likelihood of the suspect having committed a crime [$F(2, 103) = 8.265$, $p=0.001$)]. A significant interaction also was found between the frequency of news watched, gender of the participants, and race of the assailant with regards to the likelihood of the suspect to commit a crime [$F(3, 103) = 3.962$, $p=0.011$]. In conclusion, race, attractiveness, and media may have a significant influence on beliefs, attitudes and perceptions of guilt or innocence in jury decisions.

Buckner, J.E. and T.L. Sheets. LTU. **Exploring the use of technology in establishing experimental control**.**—**Our presentation will focus on how technology can be used to assist the researcher in the establishment of experimental control. We begin with a brief review of the literature on experimental control and its relationship to various threats to validity. The study focused on issues associated with experimenter presentation of experimental stimuli in studies requiring experimenter/subject interactions. Controlling for variation in this context is important in the design and execution of research. Technology allows for the standardization of some human interaction. In this sample study, technology is implemented to standardize an interaction between subjects and the experimenter. In a role-play work-sample task, subjects interacted via telephone with a customer (played by the experimenter). Restraint was implemented by using audio recordings of customer responses. These responses were then played back during the call using a computer. In this way, the responses remain constant across participants and control for a great deal of the variation that could otherwise be introduced by the experimenter (e.g., content, voice inflection, and loudness).

Crockett, C. and M. Diack. SU-BR. **Model of hybrid professional development: Designing quality online courses to enhance students' learning outcomes**.**—**This presentation describes a hybrid faculty development (HFD) model created and offered to assist Southern University at Baton Rouge faculty members in designing quality online courses. The 3-session HFD model combined two days of face-to-face training with the third day involving a webinar. Sessions 1 and 2 were face-to-face and consisted of: 1) traditional faculty development (TFD) with hands-on training, 2) detailed discussion and application of Quality Matters standards of online course design, and 3) the pedagogical integration of Moodle, a course management system. Session 3 was an hour long online webinar offering online professional development (OPD) that focused on open education resources available through the MERLOT (Multimedia Education Resources for Learning and Online Teaching) collection. Presenters provided specific details about each session. The presenters will also share results of a survey completed by workshop participants. The survey was designed to measure the participants' attitudes toward the effectiveness of the HFD.

Griffin, K.Y. and K. Kopera-Frye. ULM. **Developing health care training materials for home health care staff.—**Home healthcare (HHC) is one of the fastest growing community-based services with a mission of providing services to home-bound elders. A common problem among HHC services is non-standardized staff training across agencies and levels of care. This poster reports results of observation made at the HHC Agency during completion of an internship while pursuing a Program Administration Masters degree through the ULM's online Gerontology program. After observing the need for readily available staff training materials, I designed seven healthcare brochures for the home care coordinators to train their staff at this HHC service. This agency serves over 200 clients, the majority of whom are home-bound and require a tremendous amount of health education on topics such as obesity and hypertension. Per federal guidelines, each HC Coordinator must conduct in-house training with his or her staff. The brochures created filled a needed training gap. In brochure design, consideration was given to staff reading levels. Informal staff evaluative comments indicated that they appreciated my training materials and will continue to use them. The training materials will now be piloted in other local senior service programs in Louisiana.

Kopera-Frye, K., K.Y. Griffin, and D. Roy. ULM. **Health literacy knowledge among young, middle-aged, and older adult Louisiana professionals.—**Health literacy (HL) involves the degree to which individuals have the capacity to obtain, process, and understand basic health information and services needed to make appropriate health decisions. Factors influencing HL include: communication skills of professionals, knowledge of health topics, culture, demands of the healthcare, public health systems, and physical situational/contextual variables. The purpose of this study was to examine the knowledge levels of health literacy among three age groups of 101 Louisiana professionals from different fields. Presumably, newer professionals (relative to seasoned ones) may be sensitized or receive additional training (given the renewed interest in this area) on employing more strategies to raise health literacy levels among their older clients. Across the 10-item Health Literacy Knowledge Quiz, the mean percentage correct total score for each of the three age groups was as follows: young adult professionals, 76% correct; for the middle-aged professionals, 67% correct, and for the older adult professionals, 72% correct. Differences were not statistically significant between the three groups. Findings are contrary to the expectation; however, possibly expertise among older professionals allowed them to develop strategies to promote health literacy despite different training methods.

Longe, O. B., F. Wada, A. Anadi, C. Jones, and V. Mbarika. SU-BR. **Policing the cyberspace – Scaling the Peel model of community policing.—**The current model for policing and law enforcement as proposed by Peel in 1829 is premised on the fact that criminals and victims are proximate and the fact that there are limitations in the scale of crimes that can be committed. Although cyber crimes share a few of these attributes, they deviate completely in terms of their operation. Cyber crimes are automated, thus they possess the potential for attack on multiple victims per time at different locations. Spatial confinement is therefore negated as a means for detection and apprehension. Another interesting but disturbing phenomenon on the webscape is that cyber criminals can turn their victims to criminals with the use of anonymous proxies. This is used to propagate the crime, attack more victims and escape detection. The sovereignty of states also is violated as these crimes are committed across national boundaries thus making prosecution difficult. This paper takes a critical look at Peel's theory of policing in the context of

cyber crime. We identified the Achilles heel in the model and made recommendations to assist in scaling up the theory to be able to respond appropriately to the challenges of fighting cyber crime.

Mobley, C.M and R.E. McNair. SU-BR. **The effects of goal-setting and encouragement on verbal creativity for African-American College students**.—Twenty African-American college students were selected to participate in a research project assessing the effects of goal-setting and encouragement on verbal creativity. The research was conducted during the summer of 2009. Undergraduate students were selected from a convenient sample consisting of 10 males and 10 females, ages 18 to 30. Individuals with high goals performed marginally better than individuals with low goals [F (1, 19) = 4.028, p=0.062]. The analysis revealed statistical significant differences between gender and goal-setting [F (1, 19) = 7.425, p=0.015]. Males with high goals performed better (M=13.25, SD=2.630) than females with low goals (M=12.75, SD=2.630). The results indicated that individuals who receive encouragement did not perform better than individuals who do not receive encouragement [F (1, 19) = 1.243, p=0.281]. The interaction showed that participants receiving encouragement with high goal-setting did not perform better on a word completion task than participants with low goal-settings [F (1, 19) = 0.448, p=0.513].

Sillers, L., SU-BR. **The role of social values in forming the attitudes and beliefs of individuals toward gays and lesbians in the African American community**.—Social values may influence individual attitudes and beliefs toward gays and lesbians in the African-American community. Study participants (n=46) completed a survey on individual attitudes and beliefs toward gay and lesbian lifestyles. Variables examined were age, religious affiliation, religious attendance and gender. Hypotheses assessed were: (1) African-American college students would have a more liberal view of gays and lesbians in comparison to the college faculty/staff who would have a more conservative view; (2) African-Americans identifying a religious affiliation and high church attendance would have a more negative view of gays and lesbians, while those indicating a religious affiliation and low church attendance would have a more positive view, and (3) African-American females would have a more positive view of gays and lesbians in comparison to African-American males who would have a more negative view. Findings indicated no generational differences between African-Americans attitudes toward gays and lesbians. Religious attendance and affiliation was positively correlated to an individual's belief toward gays and lesbians. Women demonstrated more positive attitudes toward lesbians, but not toward gays.

Sothirajah, J. SU-BR. **Determinants of recycling behavior: A review of the literature**.—As municipalities in developed and developing countries recognize the importance of recycling household solid waste instead of landfilling, the question arises of how to get householders to engage in recycling activities. A review of the literature has indicated that recycling behavior is dependent on environmental values, situational factors and psychological factors. Environmental values are views held by individuals. Situational factors include the structural norms and demographic profiles of recyclers. The psychological factors include types of perception and motivations individuals hold toward recycling. Recycling rates and compliance may be increased if municipalities better understand how to encourage and persuade individuals, ensure

there is adequate recycling infrastructure, and make it easy for individuals to engage in recycling behavior.

Whitney, Sabrina. SU-BR**. A study of juvenile delinquents in the State of Louisiana: A demographic profile of HIV/AIDS**.**—**In the State of Louisiana, juvenile delinquency is a major problem. This study examined demographic characteristics of incarcerated juveniles in Louisiana who are infected with HIV/AIDS. Using secondary analysis, the study accessed data on juvenile arrests generated from the OJJDP Statistical Briefing Book. The study found juvenile offenders were involved in a large percentage of arrests for murder, drug abuse violations, weapons violations, motor vehicular theft, larceny-theft, and burglary. The juvenile incarcerated population was largely male. African American juveniles were more likely to be incarcerated in juvenile detention centers. Incarcerated juveniles not only rank high in crime offenses, but they rank high in HIV/AIDS as well. The study also found that youths in prison encounter several health issues, such as sexually transmitted diseases (STDs) and HIV/AIDS.

Wiltz, E. R. and L.B. Lewis. LU-NO. **Adults' use of syllabic stress to infer grammatical class in cognitive tasks**.**—**In the current study, we investigate whether language learners are able to use the way that a word sounds (its prosodic stress pattern) as a predictor to its grammatical form class. In English, nouns typically carry primary stress on the first syllable while verbs carry primary stress on the second or final syllable (as in the pronunciation of the verb reCORD (e.g., to record a tape) and RECord (e.g., to play a record). Adult participants were asked (1) to construct sentences using novel two-syllable words with primary syllabic stress on either the first syllable or second syllable, (2) to select a word from a choice of two words with opposite syllabic patterns to complete a provided sentence with a missing noun or verb, (3) to select, from a choice of two sentences, which seemed correct given the novel word's use as a noun or verb with varying syllabic stress, and (4) to recall lists of novel words that either conformed to or deviated from the conventional sound trends for nouns and verbs in English. Overall results show that participants were sensitive to the relationship between sound pattern and the grammatical function of the word.

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