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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:

CC	Centenary College
CU	Columbia University, New York
EKU	Eastern Kentucky University
GCC	Gaylord Chemical Company, Slidell
GIT	Georgia Institute of Technology
GSU	Grambling State University
HZ	Houston Zoo
LDFW-RR	Louisiana Department of Fish and Wildlife, Rockefeller Refuge, Grand Chenier
LSU-A	Louisiana State University, Alexandria
LSU-AC	Louisiana State University-Agricultural Center
LSU-BR	Louisiana State University, Baton Rouge
LSU-E	Louisiana State University, Eunice
LTU	Louisiana Tech University
LU-NO	Loyola University, New Orleans
McSU	McNeese State University
MIT	Massachusetts Institute of Technology
NiSU	Nicholls State University
NSU	Northwestern State University
SACC	South Arkansas Community College
SAZ	San Antonio Zoo
SLU	Southeastern Louisiana University
SU-BR	Southern University, Baton Rouge
TuMC	Tulane Medical Center
TU	Tulane University
UAM	University of Arkansas-Monticello
UB	University of Buna, Cameroon, Africa
UF	University of Florida
ULL	University of Louisiana, Lafayette
ULM	University of Louisiana, Monroe
UPITT	University of Pittsburgh
UA	University of Arkansas
UNO	University of New Orleans
USA	University of South Alabama
USACE	United States Army Corp of Engineers
USFS	U.S. Forest Service
USFWS	U.S. Fish and Wildlife Service
USUHS	Uniformed Services University of the Health Sciences, Bethesda, Maryland
UWF	University of West Florida
XU	Xavier University
YU	Yale University

Division of Agriculture, Forestry, and Wildlife

Ducote, K.A., Stumpf, C. LSU-A. **Acoustic communication of two species of bark beetles, *Ips avulsus* and *Ips grandicollis*.—**The Scolytidae family, which consists of over 500 species in North America, includes many economically important tree pests. In this study, we investigated female stridulation by recording the sound spectra of two species of phloem boring bark beetles, the eastern fivespined *Ips*, *Ips grandicollis*, and the small southern pine engraver, *Ips avulsus*. Pulse train analyses performed on *I. avulsus* followed by statistical analysis showed significant differences among individual females. The identification of the stridulating patterns in bark beetles lays the foundation for a better understanding of the biology of these species and may aid in future control efforts.

Jariel Jr., D.M., M.F. Vidrine, and B.J. Duplantis. LSU-E. **Vertical distribution of soil nutrients in restored and remnant Cajun Prairies.—**Management practices can modify the vertical distribution of soil nutrients in prairie ecosystems. Soil samples from 0-10, 10-20 and 20-30 cm depths of two restored and two remnant Cajun Prairies in southwestern Louisiana were collected and evaluated for their chemical and physical characteristics. Group comparison of prairies showed that soil pH, electrical conductivity, organic matter, P, Ca, Na and K were not significantly different between restored and remnant prairies. Iron, Cu, Zn, sand and silt concentrations in the restored prairies were significantly higher than in the remnant prairies, but clay concentration was significantly lower in restored than in remnant prairies. The LSU Eunice prairie had the highest pH (6.1). Silt, organic matter, K, Fe, Cu and Zn were significantly greater in the topsoil (0-10 cm) than in the subsoils (10-20 and 20-30 cm), but clay was significantly lower in the topsoil than in the subsoils in all prairies. Topsoil accumulations of K, Fe, Cu and Zn suggest that replenishment of these elements by nutrient cycling is faster than leaching; these elements may have greater chemical attraction to silt and organic matter in the topsoil. The data refute our hypothesis that clay illuviation would transport these elements from topsoil into subsoils.

Li, Y. and D.D. Kee. McSU. **Louisiana native little bluestem response to varying rates of circulating fluidized bed ash or agricultural lime**.**—**Little bluestem is one of the most widely distributed native grasses in North America. However, little information regarding the response of little bluestem to soil amendments in southwest Louisiana exists. A byproduct resulting from burning petroleum coke, circulating fluidized bed ash (CFB) has been found to have similar effects on increasing soil pH as agriculture lime. This study compared three rates (2, 4 and 6 tons per acre) of each material and a control (no soil amendment) using a randomized complete block design. Basal area (length and width) and plant height data were measured from four plants in each plot in mid May, mid September and mid November. Reproductive tillers were counted from each plant in mid November. Plant height was affected by date and block, but not by treatment. Basal area and plant volume were affected by a date-treatment interaction. As the season progressed, the 4-ton rate of both materials increased basal area, plant volume and the number or reproductive tillers. There was an increase in basal area, plant volume and tiller number with the use of CFB compared to Ag Lime or control, except at the 6-ton rate.

Longeria, S., D.D. Kee, and C. Richmond. 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 and 2010, 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 to make native species commercially available for restoration projects.

O'Boyle, M.L. and K.M. Tolson. ULM. **Reproductive biology of feral pigs in Louisiana.—**All too often exotic species have the ability to occupy an area and utilize resource niches to a greater degree than native species. The feral pig (*Sus scrofa*) has been identified as a particular threat in Louisiana as well as the rest of the United States. The feral pig is an exotic mammal that is capable of reproducing twice a year and can mature at a very early age given the best quality habitat. Previous studies indicate that sows may reach reproductive maturity between the ages of six and twelve months. This research aims to look at the possible effect of soil quality as a primary factor of reproductive maturity versus age alone. It has been shown that soil quality affects litter size of many species of mammals. This study will focus on reproductive efficiency (RE) and if it correlates with soil quality in a given area. RE will be calculated by counting corpora lutea present in the ovaries and dividing that into the number of fetuses present in the uterus. An attempt will be made to determine gestational age of fetuses to calculate breeding dates of sows. Additionally, all reproductive tissues will be tested for the presence of pathogens.

Procell, F.L., C. Richmond, and D.D. Kee. McSU. **Southwest Louisiana native herbaceous broadleaf plant response to date of planting**.**—**Currently, the Natural Resource Conservation Service recommends planting native herbaceous broadleaf species in the fall. However, little research data is available to support this recommendation for southwest Louisiana. A study was conducted on the McNeese State University farm comparing the response of 15 native species to four planting dates (October, November, March or April). The study used a split plot randomized complete block design with three blocks. Main plots were date of planting; subplots were plant species. Weeds were controlled using multiple applications of glyphosate (0.45 kg a.i./ha/application) during the summer of 2009. An application of 200 kg/ha of 0-23-30 was applied to the site then mixed thoroughly (disked) for seedbed preparation in September 2009. Fifteen 2.5 m rows were prepared on each planting date in each block with 200 seeds of each species planted in each row. The site was monitored weekly. Weeds were controlled by hand. Data collected at the end of summer were analyzed using Crop Stat v.7.2. A significant plant species by planting date indicated fall was not the optimum planting date for all species.

Reid, M.L. and J. Bhattacharjee. ULM. **Flooding-induced mortality of trees and saplings in a bottomland hardwood restoration area.—**The Mollicy Unit of Upper Ouachita National Wildlife Refuge is a bottomland hardwood restoration area that consists of former agricultural land that has been purchased by the US Fish and Wildlife Service and planted with bottomland hardwood species. Much of the Mollicy Unit is surrounded by a containment levee, built to hold back the annual floodwaters of the Ouachita River. However, in 2009, two extreme flooding events breached the levee, leaving the area inundated for extended periods of time. We investigated the mortality of trees and saplings in the Mollicy Unit as a result of these flooding events. Because part of the replanted area lies outside the levee, we were able to compare the differences in mortality based on location inside or outside the levee. Tree mortality inside the levee was 45.12%, and mortality outside the levee was 33.81%. Sapling mortality inside the levee was 54.43%, and mortality outside the levee was 43.30%. We also measured individual plot elevation and distance from the river. Our results indicate that location inside or outside the levee had significant interactions with elevation and distance from the river on the mortality of both trees and saplings in the Mollicy Unit. This research was supported by USFWS.

Ross, W. G. LTU. W. Johnson, J.R. Meeker and B.L. Strom. USFS. **Evaluating detection and monitoring strategies for native and non-native wood wasps.—**Recent discovery of the non-native and potentially invasive wood wasp *Sirex noctilio* in Canada, Pennsylvania and New York has concerned forest health professionals. This insect has caused widespread destruction in pine plantations in Australia, New Zealand and South Africa. An effort to identify optimum detection and management strategies has resulted in trapping trials conducted both in Canada and in the United States. Work in Louisiana was conducted between 2005 and 2008 in and around the Winn District of the Kisatchie National Forest. Chief purposes of the work were to evaluate the use of experimentally debilitated trap trees as a means of detecting wood wasps, and to compare results with the *Sirex* lure used nationwide by itself and in combination with other potential attractants such as *Ips* pheromone lures and ethanol lures. As *S. noctilio* does not presently occur in Louisiana, native wood wasps, *S. nigricornis* and *S. edwardsii*, and non-native *Eriotremex formosanus* were used as surrogates. Results indicate that the *Sirex* lure by itself and in combination with other lures is an effective means of trapping wood wasps. Experimentally debilitated trap trees were generally less effective, but may prove useful in some circumstances.

Smith, N.L. and K.M. Tolson. ULM. **Morphometric analysis of canid skulls in northeast Louisiana.—**The range of the coyote, *Canis latrans*, has spread since the late nineteenth century from its historical range in the western United States to become North America's most wide ranging wild canid. This spread has facilitated the interbreeding of coyotes with wolves, *C. lupus* and *C. rufus*, and the domestic dog, *C. familiaris*. Interbreeding of this nature can potentially result in the loss of a species, which would ultimately result in a loss of biodiversity. Since the extirpation of *C. rufus*, the coyote is the last wild canid present in the state of Louisiana. Howard (1949) reported a 95% reliable method for distinguishing the skulls of coyotes from those of domestic dogs by comparing the ratio of the length of the upper tooth row to the palatal width. If this ratio is 3.1 or greater, the specimen is a coyote; if the ratio is 2.7 or less, the specimen is a dog. Skulls from canids collected in northeast Louisiana were measured to the nearest 0.01 mm using calibrated digital calipers. Data collected to date indicate that the majority of canid skulls sampled exceed the 3.1 ratio.

Strimbu, B. LTU. **Challenges in environmental modeling**.**—**Theoretical difficulties associated with model development, especially faulty logic or flawed mathematics can have catastrophic effects at the management level. Algebra and regression analysis are two major tools used in environmental sciences to build models. This paper identifies and discusses some of the major mathematical pitfalls that could lead to wrong models. Some common mistakes in the environmental models based on regression are: (1) back-transformation of the dependent variable (performed to obtain a better fit, a significant relationship or to increase the prediction's confidence interval) - generally, this is not possible because it leads to a logic violation: part is larger than the whole (e.g., terrain stability models, biomass-nutrients models); (2) the set of independent variables contains variable(s) equivalent with the dependent variable (tautology); (3) the relationship between the dependent variable and the set of independent variables is not significant even if R^2 is close to 1 (e.g., exploratory studies). Abstract algebra creates problems mainly involving ordered sets (e.g., habitat suitability index models and plotting positions in hydrology). Besides, technical complications identified by a series of theoretical difficulties are encountered when improper mathematical settings are used (e.g., modular modeling or models on grid). Such models do not contain logical or mathematical errors, but their results either have a confidence interval so wide that it is useless (modular modeling) or are scale dependent and therefore are not trustworthy (grid modeling).

Sylvester, T.L., J.D. Hoffman, and E.K. Lyons. McSU. **On the diet and ectoparasites of the southern short-tailed shrew (*Blarina carolinensis*) in Southwest Louisiana.—**Ingested food items and ectoparasites were identified from 13 *Blarina carolinensis* collected in multiple habitat types of 2 sites in southwest Louisiana. Collectively, insects occurred most often (12 species), but no single species was predominant. In terms of percent occurrence of specific items, plant material occurred most often (46%) followed by spiders (36%). A total of 19 individual food items were identified including five not previously reported. Ectoparasites collected from 11 *B. carolinensis* included 8 species of mites and 1 tick species. The mites *Androlaelaps fahrenholzi* and *Orycteroxenus soricis* occurred most often (33% prevalence). Five of the mite species are new State records while one mite species (*Ornithonyssus bacoti*) and the tick larvae (*Ixodes scapularis*) are new host records.

Division of Biological Sciences

Botany Section

Crook, R.C., A.G. Malcomb and B.S. Jones. LSU-A. **Subtle variation in beech leaf morphology.—**Leaf venation in American beech, *Fagus grandifolia*, appears to be consistent from tree to tree and from population to population. In order to demonstrate this, nearly 600 leaves from 59 trees in six populations in central Louisiana were collected during the summer and fall of 2010. Several measurements were made on each leaf and compared statistically. Measurements included leaf width, leaf length, and the angle between the seventh vein from the base of the leaf and the midvein. Contrary to expectations, an ANOVA of the data indicates that each characteristic is statistically different between populations at the p=0.05 level. Pairwise comparisons were used to determine which populations were different from each other. We concluded that beech tree leave morphology was subtly but significantly different between populations. No cause can be inferred from the data. Possible confounding factors include a small sample size from each tree (average of 10), collecting leaves accessible on foot, and variation in the collection of the measurements. Increased sampling may determine if this observed variation is real, or if it is an artifact of sampling and data collection.

Sasek, T. ULM. L. Urbatsch. LSU. S. Darwin. TU. R. Miller. SLU. A. Lasseigne. NiSU. **CyberFlora Louisiana: Building a virtual herbarium for the State.—**CyberFlora Louisiana is a three-year project to image all 1.1 million plant specimens in all 15 Louisiana herbaria. Collection information will be extracted from the labels to develop electronic databases. The digitized images and data will be freely available online through a central website offering fast data sorting and filtering, rapid delivery of zoomable images, mapping of specimen locations, and checklists of plants. The website will be supplemented with digital images of live plants, plant parts, and identifying features for species found in Louisiana. In conjunction with SilverBiology, we have developed a high-throughput, semi-automated imaging process that averages 2 to 4 images per minute. We are now developing methods for extracting data from the label images. The current progress will be discussed. Imaging, data basing, and geo-referencing all the State's collections will significantly increase the value and utilization of these important resources, especially for local, state, and federal agencies that need to consult the herbaria regularly. For schools, museums, wildlife refuges, and parks, the availability of live plant images, keys, and useful information will also stimulate more interest in plants. Supported by the NSF Biological Resource Collections program.

Environmental Science Section

Addae, C.A. and M.C. Eduardo. SU-BR. **Effect of hexachlorobenzene (HCB) on the neuronal differentiation of mouse embryonic stem cells.—**Embryonic stem (ES) cells are pluripotent cells that can differentiate into all three main germ layers: endoderm, mesoderm, and ectoderm. In preliminary studies, we have found that encapsulation of ES cells in alginate-based hydrogels increases the efficiency of ES cell neuronal differentiation. Now, we have made use of this model system to examine the effect that environmental pollutants have on ES differentiation.

One of such pollutants is hexachlorobenzene (HCB). The goal of this research is to investigate the effect of HCB on the neuronal differentiation of mouse ES cells. To achieve this goal, ES cells were grown into embryoid bodies (EBs) by suspending them in ES medium and treated with 10 nM HCB for 24, 48, and 72 hours. The EBs also were treated with retinoic acid to induce neuronal differentiation. Fresh medium was added at the end of the treatments and the resulting EBs were harvested on day 8 of culture. Immunofluorescence analysis was performed to examine the effect of HCB on their neuronal differentiation. Results showed that HCB has an inhibitory effect on the neuronal differentiation of the mouse ES cells. The relationship of our findings to neurological disorders such as autism is discussed in this work.

Bowman, F.A., F.D. Boone and G.S. Zumwalt. LTU. **Effects of ozone treatment on giant salvinia.—***Salvinia molesta* is an aggressive aquatic fern that has detrimental effects on marine wildlife and local and state fishing economies. Remediation techniques that have been applied to the species with little success include pesticides and herbivorous insects. Research has determined that concentrations of ozone severely damage this plant species resulting in potential eradication. Different deliveries of ozone were administered into beakers covered with aluminum foil containing purified water and live giant salvinia. The foil trapped escaping ozone during two hour treatments. The first delivery method injected ozone into the water through a diffusion stone. The second method delivered ozone into the water without diffusion, while the third delivered ozone into the air above the plants. After treatment, the plants were allowed to recover for three weeks. Diffusing the ozone into the water had the greatest damaging effect on the plants. The other two delivery methods, while able to stunt the plants' growth, were not sufficient at eradicating the species. Future studies will evaluate longer exposure times and greater ozone concentrations necessary to completely remediate a floating mat of *S. molesta*.

Cardin, D.L., R.W. Lirette and W.C. Wolf. LTU. **Toxicity of metal nanoparticle exposure during early development of fathead minnows (*Pimephales promelas*).—**Research has shown that fish embryos are highly susceptible to heavy metal ions and other pollutants, but little is known about the toxicology and adverse developmental effects of exposure to colloidal metal-based nanoparticles in aquatic organisms. The hypothesis which motivates the studies outlined in this thesis is that exposure to metal based nanoparticles will potentially adversely impact the early embryonic development of fish. In my first specific aim, overall effects on mortality, morphogenesis and neuromuscular development were observed to determine grossly to what extent colloidal metal nanoparticles (copper and silver) influence development. I then went on to correlate observed effects with an examination of changes in the expression profiles of select genes, as determined by quantitative real-time PCR (QPCR). The specific genes examined were those whose protein products are responsible for chelating toxic metals (metallothionein, MT), reducing oxidative stress (glutathione S-transferase, GST), and stabilizing the cell during distress (heat shock protein 70, HSP70). When QPCR analysis of MT proved inadequate, I alternatively measured metallothionein protein levels by semi-quantitative Western blotting.

Hargrave, J.N. and D.D. Kee. McSU. **Controlling salt water soil damage with local industrial waste material.—**A greenhouse leaching study examined the effect of two rates (2 or 6 grams/pot) of circulating fluidized bed ash or rice hull ash with one rate of gypsum (4 gram/pot) applied pre- or post-salt water flooding and a control on leachate mass, pH and plant available

nutrients. The study used a fractional factorial, randomized complete block design with three blocks. A local silt loam soil was used. An initial soil sample was taken, pre-flood treatments applied, and all pots were then flooded with a 3.5% CrystalSeal™ solution (750 ml). Post-treatments were then applied and leaching initiated. Pots were leached with 500 ml of distilled water each Monday for six weeks. A Ziploc® bag placed under each pot prior to flooding allowed collection of leachate weight and pH 3 days later. A final soil sample was collected. All soil samples were analyzed by the LSU soil test laboratory. Leachate pH was affected by sample date and a treatment-date interaction. Leachate mass was affected by date and treatment. Calcium, Cu, P, K and S were affected by treatment, Mg and Na were not.

Hooks, T.L., R.L. Minton and A.M. Hill. ULM. **Abiotic influences on freshwater mussel community composition.—**We are examining how abiotic factors influence community structure (e.g., species richness and abundance) of freshwater mussels in Bayou Bartholomew (Arkansas and Louisiana, USA). Bayou Bartholomew (BB) has high habitat complexity relative to other regional lotic systems. Thus far, analyses indicate significant correlation between species richness and distance from BB's confluence with the Ouachita River. Substrate type also affects species richness.

Ianni, R.C., A. Ferrara and Q. Fontenot. NiSU. **Diet composition of predatory fish species in a canal in Port Sulphur, Louisiana.—**In the spring of 2009, non-native tilapia *Oreochromis* spp. were indentified in a canal near Port Sulphur, Louisiana. After rotenone treatments were administered to eradicate the tilapia population, several native predator fish species were stocked as a means to control any possible remnant tilapia. The objectives of this study are to quantify the diets of alligator gar, largemouth bass, and bullheads and determine if one species is an effective biocontrol for tilapia. A total of 59 samples occurred from March to November 2010. Monofilament gill nets were used to sample the fish community either two hours following sunrise or two hours prior to sunset. Stomach contents were retrieved via gastric lavage, placed in individually labeled containers, and held on ice until they could be transferred to 70% ethanol. Stomach contents were compared to known species in the lab and categorized as fish, crustacean, insect, mollusc, reptile, or unknown. No tilapia were identified in the diets of any predatory fish species, but 40% of stomach contents identified as fish were unknown species due to decomposition. In regards to selecting a fish for a biocontrol, largemouth bass had the highest amount of fish in its diet followed by alligator gar.

Lasyone, J.C. and W.C. Wolf. LTU. **Toxicity of metal oxide nanoparticles in larval fathead minnow (*Pimephales promelas*).—**Although the deleterious effects in the aquatic environment of select metals, in colloidal or ionic form, are well established, the toxicity of metal oxide nanoparticles is not well known. The purpose of this research is to understand the effects of exposure to aluminum, copper and zinc oxide nanoparticles in fish and the mechanism by which toxicity occurs. The acute toxicity of these nanoparticles will be determined in larval fathead minnows (*Pimephales promelas*). Overall effects on mortality, morphology and behavior will be observed to determine to what extent metal oxide nanoparticles influence development. Upon observation of these effects, quantitative real-time PCR (QPCR) will be employed to examine gene expression of metallothionein and glutathione S-transferase, genes whose protein products are responsible for chelating toxic metals and reducing oxidative stress, respectively. To

determine the mechanism by which nanoparticles cause toxic effects, a metal ion chelator (sodium thiosulfate) will be added to determine if toxicity is a direct effect of nanoparticle exposure or a result of nanoparticle dissociation into free metal ions within solution.

Moore, L. and W.C. Wolf. LTU. **Toxicity of aluminum, copper, and zinc oxide nanoparticles during development of zebrafish embryos.—**The toxicological effects of nanoparticles are not yet fully understood, but they have been associated with some adverse effects in the environment and in organisms. Research has shown that fish embryos are vulnerable to many environmental pollutants. We hypothesize that exposure to zinc, copper and aluminum oxide nanoparticles will potentially adversely impact the early embryo development of fish. The first specific goal of this project is to observe the overall extent to which oxidative metal nanoparticles (zinc, copper, and aluminum) influence development. We also aim to correlate observed effects of changes in the expression profiles of select genes with the use of quantitative real-time PCR (QPCR). The specific genes of interest include genes that reduce oxidative stress (glutathione S-transferases), remove toxic metals (metallothioneins), and help during stress (heat shock protein 70).

Myers, C.J., D.D. Kee and F.X. Phillips. McSU. **Soil and plant response to circulating fluidized bed ash.—**Economical disposal of circulating fluidized bed ash (CFB) as a soil amendment could reduce the cost of producing electricity as well as reducing the potential for environmental damage. The goal of this study was to determine if separating CFB by particle size may influence selected soil and plant characteristics. A factorial study using 4 replicates examined the soil and plant response from two soil types to six particle size treatments and a control with four replicates was initiated in the greenhouse at the Louisiana Environmental Research Center near McNeese State University. Particle size separation mirrored research historically conducted using agricultural lime. A 2-ton CFB rate per acre was utilized. The completely randomized experiment utilized 48 pots, each containing 2,000 grams of soil. Water was applied equally to all containers and field capacity moisture was maintained. Soil pH was monitored over time. Three cropping periods examined the height response of two plant species (soybean and yellow wild indigo). Plant response to particle size was not significantly different. Soil pH was affected by a date-soil-treatment interaction suggesting particle size affected chemical availability in this material.

Prasai, B., S. Shields and R. Boopathy. NiSU. **Bioremediation of nitrogen rich wastewater from shrimp aquaculture industry.—**The United States Marine Shrimp Farming Program (USMSFP) introduced a new technology for shrimp farming called a re-circulating raceway system. This is a zero-water exchange system capable of producing high-density shrimp yields. However, this system produces wastewater characterized by high levels of ammonia, nitrite, and nitrate due to 40% protein diet for the shrimp at a high density of 1000 shrimp per square meter. The high concentrations of nitrate and nitrite (>25 ppm) are toxic to shrimp causing high mortality of shrimp. Treatment of this wastewater is imperative to make shrimp farming viable. One simple method of treating high nitrogen wastewater is the use of a sequencing batch reactor (SBR). A SBR is a variation of the activated sludge process, which accomplishes many treatment events in a single reactor. Removal of ammonia and nitrate involved nitrification and denitrification reactions by operating the SBR aerobically and anaerobically in sequence. Initial SBR operations successfully removed ammonia, but nitrate concentrations were too high because

of carbon limitation in the shrimp production wastewater. An optimization study revealed the optimum carbon:nitrogen (C:N) ratio of 10:1 for successful removal of all nitrogen species from the wastewater. The SBR operated with the C:N ratio of 10:1, with the addition of molasses as a carbon source, successfully removed 99% of ammonia, nitrate, and nitrite from the shrimp aquaculture wastewater within nine days of operation.

Racca, E., B. Tuttle and J. Allen. LSU-A. **Measurement of inorganic nitrogen in central Louisiana fields and streams.—**Our project was to take water samples from streams that eventually run into the Gulf of Mexico and soil samples of soil from both fertilized and unfertilized fields draining into these bodies of water. After establishing the calibration curves, nitrate and ammonia levels were determined using ion selective electrodes. Our project was to measure inorganic nitrogen levels in soil and water samples to see if there is a substantial amount running into the Gulf of Mexico, and also to monitor changes in the inorganic nitrogen levels over the project period. This project was to see if fertilizer levels in Rapides Parish fields are contributing to increased nitrogen levels, subsequently to the hypoxia problem in the Gulf of Mexico. Conclusions about the leaching of nitrogen into the streams are limited due to the abnormally dry season during the project. Conclusions of the monitoring of the fields and streams and the effect of the dry season on a fertilized field will be presented.

Whitington, A.K., F.D. Boone and G.S. Zumwalt. LTU. **Ozone remediation of crude oil on sea water.—**Crude oil contamination in marine environments negatively impacts the aquatic ecosystem. Current remediation techniques such as surface skimming and dispersants are costly and time consuming. Ozone sparging beneath floating petroleum products degrades fossil fuels to harmless byproducts like carbon dioxide and water. We have evaluated the effectiveness of sparged ozone in sea water as a remediation technique for Louisiana sweet crude oil contamination. Ozone gas was sparged at 1.5 mg/L concentration into artificial sea water beneath 50 mL of Louisiana sweet crude. Degradation was monitored for 150 minutes by recording percent mass reduction at 10 minute intervals. Degradation also was monitored for 24 hours using the same treatment parameters. After 150 minutes of exposure, mass was reduced by 2.5%. Treatment for 24 hours yielded a greater remediation rate; however, crude oil exhibited resilience to ozone degradation. Future studies will incorporate chemical analysis and should address varying concentration and treatment times to optimize remediation effectiveness.

Zumwalt, G.S., A.W. Katzenmeyer and J. Gould. LTU. **Photoshop analysis of two dimensional cover of giant salvinia.—**Ecologist often need an accurate measure of 2-dimensional cover to report distribution of species or to measure the efficacy of a treatment. We needed a way to measure the reaction of giant salvinia (GS) to ozone sparging. Classic point counts or estimates are laborious and highly dependent on the person doing the counting. In recent studies, we found we needed a fast, accurate and reproducible way to measure cover of healthy GS during an experiment on ozone sparging. Treatment containers were photographed at a fixed distance and under fixed lighting conditions. They were then analyzed with Adobe Photoshop CS5 (CS5). CS5 was in turn tested on color grids created with Corel Draw 5x. The CS5 results were reproducible within 0.05% and accurate to 1%. The CS5 was successfully tested against both coarse and very fine grids. To differentiate live and dead plants, we photographed a color chip chosen to match a healthy GS with each sample. The CS5 is set for a specific color or range of

colors and is therefore extremely repeatable. Adobe Photoshop CS5 appears to analyze 2-dimensional cover more accurately than point counts or estimates.

Microbiology Section

Authement, M.E. and W.H. Dees. McSU. A.J. DeRocco, H. Wu and A.E. Jerse. USUHS. **Comparison of *Neisseria gonorrhoeae* strains for the capacity to exhibit unstable serum resistance by sialylation of lacto-N-neotetraose lipooligosaccharide.—***Neisseria gonorrhoeae* strains differ in the type of porin they express and the capacity to become serum resistant when grown in cytidine monophospho-N-acetylneuraminic acid (CMP-NANA). Certain strains of *Neisseria gonorrhoeae* exhibit porins that confer complement evasion, which allows for stable serum resistance. Other strains achieve unstable serum resistance via the addition of CMP-NANA to lacto-N-neotetraose species of bacterial lipooligosaccharide. This unstable serum resistance is due to a frame-shift mutation of one or more glycosyltransferase genes. The mutation results in the expression of α-2,3 glycosyltransferase, an enzyme that uses CMP-NANA to sialylate lipooligosaccharide into the serum resistant variant: lacto-N-neotetraose lipooligosaccharide. Through bactericidal$_{50}$ assays, a collection of *N. gonorrhoeae* strains was tested for the ability to increase serum resistance levels when cultured in CMP-NANA. Strains MS11, F62 and a serum-resistant isolate of F62 (F62MA) proved to increase serum resistance and were tested for the presence of the lacto-N-neotetraose lipooligosaccharide sialylating species using a lectin-binding assay. We were unable to compare quantitatively the tested strains for their ability to bind lectin. However, we determined that strains MS11 and F62MA bound lectin when cultured in CMP-NANA.

Authement, M.E. and W.H. Dees. McSU. A.J. DeRocco, H. Wu and A.E. Jerse. USUHS. **Myeloperoxidase as an indicator of polymorphonuclear leukocyte presence in mice infected with *Neisseria gonorrhoeae*.—**Myeloperoxidase (MPO), a lysosomal enzyme most commonly found in granules of polymorphonuclear leukocytes (PMNs), kills pathogens during the host's immune response. *Neisseria gonorrhoeae* infection of the urogenital tract induces an immune response in the host that stimulates the recruitment of PMNs to the site of infection. Therefore, we assumed that MPO activity at the infected area would correlate with the amount of PMNs present. Current protocol for determining gonorrheal infection in mice involves a count of PMNs present in vaginal swabs. Presumptively, a measure of MPO activity would be a more accurate method of determining infection than the potentially inaccurate counting of PMNs on slides. The amount of PMNs present and the activity level of MPO were measured in vaginal swabs taken from six infected mice and three non-infected controls. Vaginal swabs collected every other day over a seven-day period revealed a slight correlation between MPO activity and the amount of PMNs present. Further experimentation will be necessary to demonstrate correlation between MPO activity and PMN amount.

Coleman, S., S. Shields, S. Kalyanasundaram, R. Nathaniel and R. Boopathy. NiSU. **Investigation on the presence of methicillin-resistant *Staphylococcus aureus* (MRSA) from meat products of retail stores in Thibodaux, LA.—**Community-acquired methicillin-resistant *Staphylococcus aureus* (CA-MRSA) is a major public health concern in the United States.

Nationwide more than 8,000 cases of invasive MRSA were reported in 2005 and almost 14% of these cases were due to CA-MRSA. This is also a worldwide problem as recent surveys in the Netherlands and Canada have showed high prevalence of MRSA in pigs and other farm animals. We investigated the prevalence of MRSA in retail meat samples purchased from various grocery stores in Thibodaux, Louisiana. *Staphylococcus aureus* strains were recovered from 50% of meat products including pork, beef, and chicken. Samples from both the outside and inside of each package were grown and enriched in TSB and then streaked on an MSA plate for isolation. A Kirby-Bauer and coagulase test was performed on all MSA positive samples. One MRSA strain was isolated and characterized using biochemical, PCR, and molecular methods with appropriate primer. MSA was positive in many samples for *S. aureus*. Kirby-Bauer revealed penicillin resistance in almost all samples. Two isolates from beef samples were coagulase positive. PCR analysis of amplified gene fragment showed positive match with the primer for one isolate as MRSA. Our study indicates the presence of MRSA in one sample. This presence of MRSA in the U.S food chain is likely due to human contamination. Further studies are needed involving larger sample sizes over time to better assess the presence of MRSA in raw meats and the risk to meat handlers and the general public.

Dean, C., S. Quadri, K. Jackson and D. Jackson. ULM. **The inflammatory cytokine tumor necrosis factor modulates *Staphylococcus aureus* biofilm formation.—**Tumor necrosis factor alpha is a host inflammatory factor that is increased in a number of human diseases including bacterial infections. Biofilms are complex aggregates of microorganisms, which can live on human and animal tissue. In addition, biofilms protect bacteria from host defenses. In a host with an inflammatory disease, bacteria are potentially exposed to high levels of TNF-alpha. However, it is unknown the effect of TNF-alpha on *Staphylococcus aureus* biofilm formation. Growth curves of clinical isolates of *S. aureus* grown with and without TNF-alpha indicate there is no difference in growth over 24 hours. During biofilm development of *S. aureus*, there was a significant increase in biofilm formation of *S. aureus* grown in the presence of TNF-alpha after 24 and 48 hours. Taken together the data show that TNF-alpha increases *S. aureus* biofilm formation, but further studies are needed to elucidate the mechanism.

Doucet, J., M. Authement, R. Adams, A. Corbin and M. Kilgen. NiSU. **Waterfowl impact on water quality upstream to a water plant intake on Bayou Lafourche.—** Non-point source pollution has been a recurrent problem along Bayou Lafourche. The upper waterway serves as a water intake source for 300,000 people in five parishes. This waterway exceeded the TDML for fecal coliforms in past evaluations. In recent evaluations in the Thibodaux area several sites have been identified as a probable source of this contamination based on fecal coliform levels and percent decay of elevated optical brighteners. We evaluated a small segment of the waterway to determine if pollution levels were being elevated by waterfowl in the areas immediately upstream to the water plant intake. A known anthropogenic site and non-contaminated site served as controls. The recovery of *Escherichia coli, Enterococcus* spp. and F+ RNA coliphage at the study site were related to rain events. The recovery of bacterial indicators increased an average of two logs for *E. coli* and one log for *Enterococcus* spp. with rain events. Recovery of bacteriophage was limited to rain events. Since the detection of optical brighteners decreased as these indicators increase, the contamination is from non-anthropogenic sources, the waterfowl.

Finton, M., A. Barham and A.M.D. Wiedemeier. ULM. **Microbial diversity of soil in northeastern Louisiana.—**Soil is a very dynamic component of the ecosystem; just a teaspoon of soil may contain more than 10 billion bacteria of thousands of different species. Some microbes found in this type of environment can form biofilms, which in turn may play a significant role in either the protection or infection of plants. Biofilms can adhere to a surface and consist of an agglomeration of many species of bacteria living within an extracellular polymeric substance. The first step in determining the extent of the symbiotic relationship between a plant and bacteria is to identify the types of soil microbiota. To analyze the diversity of microbes of the soil, four locations in northeastern Louisiana were sampled during each of the four seasons. The microorganisms were characterized to the genus level through biochemical analyses. The identified biofilm-forming bacteria will be tested as possible bio-control agents for *Agrobacterium tumefaciens* infection, the causative agent of crown gall disease, on *Arabidopsis thaliana*.

Kidder, K., R. Falconi and M. Merchant. McSU. **Characterization of chitotriosidase enzyme activity in American alligator (*Alligator mississippiensis*) serum.—**Chitotriosidase (ChT) is an endoglucosaminidase enzyme that cleaves chitinous substrates, and has been strongly associated with innate immune activity and the ability to distinguish self from non-self tissues. This enzyme activity was detected and characterized in the serum of the American alligator (*Alligator mississippiensis*) using an artificial substrate, and measured fluorimetrically. Alligator serum exhibited titer-dependent activity, with activity (2.1 μmol/min) observed at titers as low as 1:150, and maximum activity (5.2 μmol/min) measured at a titer of 1:30. Alligator serum ChT was shown to exhibit linear activity (17.3) for approximately 20 minutes at a titer of 1:30, then activity decreased, presumably due to the depletion of substrate. Interestingly, the ChT activity in alligator serum showed little dependence on temperature through a broad range of temperatures (5-40^{o}C). This is the first report of ChT enzyme activity in crocodilian species.

Liotta, P.G., F.B. Boone and G.S. Zumwalt. LTU. **Ozone inactivation of *Staphylococcus aureus* on porcelain tile.—**Nosocomial bacteria like *S. aureus* are primary causes of healthcare associated infections due to their persistence on inanimate surfaces. Current disinfectants have not shown the capacity of controlling this organism on all surfaces where contact occurs. Gas phase ozone is able to inactivate many microorganisms by attacking the cell wall through genetic unraveling. We have examined the effects of gas phase ozone on *S. aureus* adhered to porcelain tile chips. Liquid culture of *S. aureus* was dried onto porcelain tiles and then treated with ozone in an enclosed chamber for a maximum of two hours. Chips were removed at 0.5, 1.0, 1.5, and 2-hour intervals. At each interval the bacteria were re-suspended in water and plated to assess re-growth capabilities. The ozone negatively affected the capability for *S. aureus* to replicate following exposure. While 100% inactivation was not achieved, exposure to ozone did reduce the number of colonies when compared to the control sample exposure to oxygen. Future studies will evaluate higher dosages and longer exposure times to achieve 100% inactivation.

Merchant, M., D. Henry, and R. Falconi. McSU. B. Musher. SAZ. J. Bryja. HZ. **Antibacterial activities of serum from the Komodo dragon (*Varanus komodoensis*).—**Treatment of bacterial cultures with Komodo dragon (*Varanus komodoensis*) serum resulted in a titer-dependent decrease in bacterial growth, as determined by optical density at 430 nm. Cultures of

Escherichia coli, *Staphylococcus aureus*, and *Klebsiella oxytoca* exhibited moderate-strong growth inhibition by *V. komodoensis* serum, while cultures of *Staphylococcus epidermidis*, *Salmonella typhi*, *Provedencia stuarti*, and *Shigella flexneri* were nearly completely obliterated by only 10% (v/v) serum for 24 hrs. The antibacterial activity of *V. komodoensis* occurred very rapidly, as 18% of *E. coli* growth was inhibited by only a five min exposure to serum. Furthermore, 10 and 20-min incubations of *E. coli* with serum from *V. komodoensis* resulted in 43 and 68% inhibition of bacterial growth, respectively. The bactericidal capacity of the serum against *E. coli* was determined to be 54,000 bacteria/μL serum, and was inhibited 94% by mild heat treatment at 56^{o}C for 30 min, and 89% by the presence of 10 mM EDTA, indicating that the antibacterial action is most probably due to the presence of a potent serum complement protein system.

Merrifield, J.J. and R. Nathaniel. NiSU. **Bactericidal activity of spotted gar (*Lepisosteus oculatus*) serum mediated by complement activity.—**Serum complement has been characterized in many fish species; however, little work has been done with gar. This study evaluates serum complement potency of spotted gar (*Lepisosteus oculatus*) from southern Louisiana. Serum hemolytic properties were tested against rabbit red blood cells at varying concentrations, temperatures and incubation times. Hemolysis was measured spectro-photometrically at 540nm. Antibacterial properties were tested by incubating 106 CFU of multiple bacteria species in serum. Bacteria were plated after incubating two hours and enumerated. Immunoblots for complement C3 in gar serum was performed with anti-human C3 polyclonal antibodies. A human C3 inhibitor was tested with gar serum at varying concentrations to assess inhibition. The study illustrates a concentration and time dependence; complement activity peaked near 15% concentration, and most kinetic activity occurred in the first 2 minutes of incubation. No temperature dependence was exhibited between 5°C and 35°C. Bacterial inhibition varied among species. Gar C3 was found to migrate at ~185 kDa with the C3a at ~115 kDa and C3b chains at ~70 kDa. The C3 antibody was highly inhibitory at 2 μg/mL but exhibited no significant inhibition at 0.02 μg/mL.

Ray, H.M., F.D. Boone and G.S. Zumwalt. LTU. **Inactivation of *Staphylococcus aureus* using gas-phase ozone.—**Nosocomial infections are a serious issue in the medical field today, threatening the health of immuno-compromised patients staying in medical facilities, and creating a significant financial drain on the health care industry. Billions of dollars are spent each year in the United States in an effort to contain and eliminate healthcare associated infections, yet the number of reported cases has not dropped significantly. *Staphylococcus aureus*, one of the leading causative agents of nosocomial infections, is among the most difficult to control and eliminate. Infections caused by this microbe have a wide range of severity and occur in multiple forms, from infection of open wounds to bacteremia. We examined the effectiveness of gas-phase ozone in the inactivation of *S. aureus*. *Staphylococcus aureus* was chosen because of its medical significance and resistance to current control methods. The first phase of the experiment involved *S. aureus* cultures on sterile glass microscope slides exposed to a single concentration of gas-phase ozone for various increments of time to determine the necessary length of exposure and concentration of ozone gas to achieve these results. Low concentrations of ozone will inactivate all *S. aureus* present.

Stacy, A., R. Minton, S. Quadri, K. Jackson and D. Jackson. ULM. **Identification and characterization of a new *Caulobacter fusiformis* strain isolated from Bayou DeSiard.—** Bacteria are widespread throughout the freshwater environment. Diversity of bacteria in this aquatic environment makes them ecologically important. Within the freshwater environment, bacteria contribute phenotypic and genetic diversity, play a key role in geochemical cycles, are a major component of the microbial food web, and are able to form permanent bacterial biofilms on many different types of surfaces. *Caulobacter* spp. bacteria are present in both freshwater and marine environments. *Caulobacter* spp. are members of the alphaproteobacteria. These organisms are Gram negative, aerobic, nonspore-forming dimorphic cells that can be stalked and nonmotile or motile by means of a single flagellum. A one-year survey of bacteria from Bayou DeSiard yielded repeated isolation of an unknown strain. The initial characterization of this new strain shows that it is a Gram negative, aerobic, nonspore forming curved rod-shaped bacterium that is dimorphic which are typical characteristics of *Caulobacter* species. This organism tolerates salt concentration of up to 1%, grows at a temperature range of 4°C to 37°C, and forms a robust biofilm at 24 and 48 hours. Comparative analysis of 16S RNA gene sequences revealed the strain to be a new variant of *Caulobacter fusiformis*.

Wise, S.J., A. Corbin, R. Nathaniel, B. Ramachandran and M. Kilgen. NiSU. **Anthropogenic microbial source tracking in the Bayou Lafourche drainage basin in Louisiana.—**Bayou Lafourche is the sole drinking water source (DWS) for 300,000 people in five parishes. However, this DWS seasonally exceeds the total maximum daily load (TMDL) for fecal coliforms (FC) imposed by the Environmental Protection Agency (EPA) in 2004. Unfortunately, the sources of the FC counts responsible for the TMDL were not determined initially, so the TMDL is based upon FC from a mixture of nonpoint sources. The Louisiana Department of Environmental Quality (LDEQ) must address the EPA TMDL, which requires a 45% reduction of anthropogenic FC in summer months. The goal of this project was to identify and enumerate anthropogenic nonpoint source FC contamination from malfunctioning home sewage systems in the Bayou Lafourche watershed. Rotating temporal and spatial sampling of 54 sites within 9 sampling clusters occurred 3 weeks a month for a year. Samples collected were tested for FC concentration, optical brightener fluorescent values (OB), and % photo decay. Theses OB and % decay values were used as presumptive indicators of anthropogenic input revealing 11 problem areas. These problem areas have been verified as anthropogenic using human specific molecular markers. The LDEQ is using the results of this study to address the EPA TMDL for this vital DWS.

Xu, W., A. Laujac, L.B. Rubin and E. Taylor. ULL. **Mutational analysis of photosystem I of *Synechocystis* sp. PCC 6803: The role of four conserved aromatic residues in the j-helix of PsaB.—**Two histidyl residues in the symmetric transmembrane helices A-j and B-j provide ligands for P700 of photosystem I. To determine the role of conserved aromatic residues in helix of B-j, we generated six site-directed mutants in the cyanobacterium *Synechocystis* sp. PCC 6803. Three mutant strains with W645C, W643C/A644I and S641C/V642I substitutions could grow photoautotrophically and showed no obvious reduction in photosystem I activity. Kinetics of P700 rereduction by plastocyanin remained unaltered in these mutants. On the contrary, the strains with H651C/L652M, F649C/G650I and F647C substitutions could not grow under photoautotrophic conditions because those mutants had very low photosystem I activity probably

mainly due to low levels of photosystem I proteins. Further molecular analysis of spontaneous revertants suggested that an aromatic residue at F647 and a small residue at G650 may be necessary for maintaining the structural integrity of photosystem I. The results presented here demonstrate that the highly conserved residues W645, W643 and F649 are not critical for maintaining the integrity and do not have indispensable roles in mediating electron transport from plastocyanin to photosystem I. In contrast, our data suggest that it requires an aromatic residue at position of 647 for structural integrity and/or function of photosystem I.

Molecular and Biomedical Biology Section

Abuznait, A.H., H. Qosa, K. El Sayed and A. Kaddoumi. ULM. **Induction of expression and functional activity of p-glycoprotein efflux transporter by diverse natural products.—**The objective of this study was to investigate the effect of diverse natural products on the expression and functional activity of P-glycoprotein (P-gp). Human adenocarcinoma cells (LS180) were treated with 1-25 mcM of tobacco-derived cembranoid, olive oil-derived secoiridoid, or triterpene acid derived from gotu kola plant for 48 hrs. P-gp expression was evaluated by Western blot and immunocytochemistry using confocal microscope. P-gp functionality was determined by accumulation studies using Rhodamine123 as P-gp substrate in the presence and absence of verapamil, a P-gp inhibitor. Our results revealed a dose-dependent increase in membrane P-gp expression and functional activity in LS180 cells treated with aforementioned natural products. Treatment with 25 mcM of the cembranoid, secoiridoid, or triterpene acid showed 3.0-, 2.4-, and 2.5-fold increase in P-gp expression, respectively. This was confirmed by quantitative analysis of fluorescent micrographs for P-gp. Accumulation studies demonstrated 30-43% decrease in Rhodamine123 intracellular levels when LS180 cells were treated with natural products as a result of P-gp induction. In conclusion, natural products showed a modulatory effect on P-gp expression and functionality in vitro; suggesting that bioactive dietary supplement/food ingredients can induce serious drug interactions when concomitantly used with P-gp substrate drugs.

Allen, W., H. Munoz and E. Martinez. SU-BR. **Optimization of electroporation conditions for DU145 human prostate cancer cells using multiobjective programming.—**Electroporation, a method of transfection, is a quick and easy way of permeabilizing a cell's membrane allowing the entrance of biological molecules. Optimization of electroporation conditions can be achieved by adjusting several parameters, specifically, voltage and capacitance for this study. Properly regulating these conditions maximizes the effectiveness of transfection reducing cell death. Thus, the objective of this research is to find the optimal conditions for electroporation of DU145 human prostate cancer cells while maintaining the cell's viability. To achieve this goal, DU145 cells were cultured in vitro and transfected with green fluorescence protein (GFP) plasmid using the following electroporation conditions: 0.2 kV-0.4 kV and 600-1000 uF. After 24 hours of incubation, the number of live and dead cells was recorded, and the expression of GFP was determined. By varying the electroporation values, two optimal conditions were found: 350 V, 1050 uF and 364 V, 1020 uF using counterplot intersection. Experimental results showed that the condition of 364 V, 1020 uF produced a greater efficiency of transfection. This work in progress

will be verified employing multiobjective programming. Finding the optimal electroporation conditions will help standardize the procedures for transfection of mammalian cells.

Augillard, A.M. XU. K.N. Alavian and E.A. Jonas. YU. J. Shepherd. MIT. **Small molecule Bcl-xL inhibitor prevents long term potentiation.—**Recent studies have emphasized the importance of mitochondria in synaptic function. Increased expression of the mitochondrial protein Bcl-xL increases mitochondrial localization to synapses, improves mitochondrial metabolism and increases spontaneous transmission. Elevated spontaneous transmission could be caused by increased plasma membrane targeting of GluR1 subunits in the Bcl-xL expressing cells and this was found to be the case by immunohistochemistry and quantitative fluorescence measurements. In contrast, inhibition of Bcl-xL expression or function decreases synapse formation. One form of plasticity that has been well studied in the hippocampus is the phenomenon of long-term potentiation (LTP) of postsynaptic responses in the CA1 region. To study the role of Bcl-xL in the expression of LTP, we applied the specific chemical inhibitor ABT-737 to rat hippocampal slices before and after high frequency (theta burst) stimulation while recording field postsynaptic potentials (fPSPs). While vehicle-treated control slices showed sustained LTP, slices from the same rat brain that were treated with the Bcl-xL inhibitor failed to manifest LTP. We suggest that Bcl-xL is required for LTP, and that, after theta burst stimulation, a long-term metabolic change occurs to synaptic mitochondria. Supported by NIH and NSF.

Banappagari, S. ULM. **Conformationally constrained peptides for anticancer activity in breast cancer cell lines.—**Epidermal growth factor receptor (EGFR) kinase and the related human epidermal growth factor receptor-2 (HER2, ErbB-2) are two growth factor receptors that have implications in cancer. The over-expression or activation of HER2 occurs frequently in breast, ovarian, and lung cancers. Thus, HER2 has become an important therapeutic target in the treatment of breast cancer. Blocking of HER2 mediated signaling with antibodies or small molecules has been shown to be effective in inhibiting cell growth. The central hypothesis is that peptidomimetics designed based on the structure of HER2-herceptin complex structure will inhibit the HER2-mediated signal for cell growth. One such peptidomimetic, HERP5 (Arg-[3-amino-naphthyl-propionic acid]-Phe), showed antiproliferative activity with IC50 values in the nanomolar to micromolar range in breast cancer cell lines SKBR-3 and BT-474. HERP5 is a peptidomimetic with N- and C-termini that are viable for enzymatic degradation in vivo. HERP5 was modified by conformational constraints in the structure to give various peptidomimetics. Cell Titer-Glo assays were performed on SKBR-3, BT-474 and MCF-7A cell lines. Binding studies and protein-protein interactions were carried out with CD and SPR and FITC labeled peptides. Surface plasmon resonance studies and ELISA assays provide the evidence that HERP5 binds to extracellular region of HER2 protein.

Bhinge K.N., V. Gupta and Y.Y. Liu. ULM. **Depletion of glycosphingolipids with MBO-asGCS eliminates cancer cell metastasis.—**Tumor metastasis often causes failure of chemotherapy. The tumor cells interact with extracellular matrix (ECM) and metastasize; however, it is not clear whether depletion of glycosphingolipids (GSLs) present on plasma membrane is an approach to eliminate tumor metastasis. Glucosylceramide synthase (GCS) that converts ceramide to glucosylceramide is a limiting enzyme controlling GSL synthesis. We

found that overexpression of GCS enhanced metastatic potential of human breast cancer cells. In MCF-7/Dox cells, GCS protein level was 39-fold and GCS activity was 2-fold the MCF-7 cells. The wound healing, Matrigel attachment and MMP-9 activity in MCF-7/Dox cells was 1.5-, 3-, and 2-fold, respectively, compared to MCF-7 cells. GCS overexpression significantly increased wound healing, Matrigel attachment and cell invasion in MCF-7 cells. Silencing of GCS with MBO-asGCS (mixed backbone oligonucleotide) significantly decreased the wound healing, Matrigel attachment and cell invasion in MCF/Dox cells. Mechanistic study indicated that GCS overexpression increased GSLs and enhanced VEGF and uPA to promote the mobility and invasion of cancer cells. As GCS overexpression is tightly associated with drug- resistant cancer cells, this study may suggest that depletion of GSLs with MBO-asGCS is an effective approach to eliminate the metastasis of cancers.

Bonnette, D., C. Trisler, T. Munn, J. Harmson, C. Gissendanner and A. M. Findley. ULM. **Isolation and initial characterization of *Mycobacteriophage* sp. Jaws, Hades, and Tarball.—**Fourteen novel mycobacteriophages were isolated from soil/sand samples via direct plating or enrichment regimes. Isolates were subjected to spot testing, repetitive purification plating, and an empirical testing protocol that led to the harvesting of high-titer lysates (10^9–10^{10} pfu/ml). Lysates were processed for TEM with negative staining and all displayed the siphoviral morphotype. DNA was isolated from each phage and characterized with BamHI, ClaI, EcoRI, HaeIII, and HindIII restriction endonucleases. In addition, DNA samples also were digested with a novel panel of restriction enzymes (NaeI, PpuMI, PflFI, SbfI, SacI, SacII, and ScaI) in an attempt to gain additional insight into their probable cluster assignment. Our analysis resulted in the following predictions: Jaws=K or A miscellaneous; Hades=F2; Tarball=A4. As one of our objectives is to increase the diversity of the known Mycobacteriophages and to clarify the comparative relationship amongst the A2-A6 subcluster group, *Mycobacteriophage* sp. Jaws, Hades, and Tarball were submitted for library construction and 454 genome sequencing. During the spring semester, the genomes of these phages will be finished and annotated using the Consed, Glimmer/GeneMark and Phamerator programs. A preliminary analysis of these phages and their cluster designation will be discussed.

Dressel, C.A., C.C. Kuo and A.W.L. Chiu. LTU. **Decoding hand movement direction using linear discriminate analysis using EEG signals from the posterior parietal cortex.—**The research conducted focuses on predicting the intentional hand reaching tasks for the application of neuroprosthetics. Our aim is to develop a non-invasive brain computer interface system that will allow individuals' with limited motor function to obtain more independent control over different hand-reaching tasks. In order to develop this interface, human subjects were chosen to perform a series of experiments that involved varying hand reaching tasks. The trials were recorded with an electrical Geodesics EEG recording net. The raw signals were bandpass filtered between 0.1-30 Hz and motion artifacts were removed through independent component analysis, which was performed using EEGLab software. From the preliminary results, hand movements can be determined before they are performed based on the activated areas in the posterior parietal cortex (PPC). With linear discriminate analysis, comparison of the signals on the left and right PPC can classify hand reaching directions. From the existing work, our accuracy for classifying left and right movement across four subjects is 71±11% using normalized data. Future

improvement of accuracy for the pattern recognition tool should include temporal and frequency based features in the signal classifier.

DuBose, C.J. and C.R. Gissendanner. ULM. **A combinatorial RNAi-based screen to identify genes that genetically interact with the NR4A nuclear receptor gene nhr-6 in *Caenorhabditis elegans*.—**The NR4A nuclear receptor is a critical regulator of cell proliferation, cell differentiation, and apoptosis and these transcription factors are rapidly becoming relevant in several human diseases such as cancer, neurodegeneration, and vascular disease. We are studying the NR4A nuclear receptor in the genetic model organism *C. elegans*. The focus of this study is to identify signaling genes that genetically interact with the *C. elegans* NR4A ortholog, NHR-6. NHR-6 regulates cell proliferation and cell differentiation during development of the spermatheca, a somatic gonad organ system. We used database searches to identify 93 genes encoding known or predicted signaling proteins that are expressed during spermatheca development in *C. elegans*. Our strategy involves using a combinatorial RNA interference (RNAi) approach to identify genetic interactors among these 93 genes. To identify genetic interactors, we screen for genes that exhibit synergistic effects on reproduction when RNAi or gene knockout of the candidate gene is combined with nhr-6 RNAi. To date, we have optimized our screening approach and have identified two genes as candidate genetic interactors with nhr-6. Validated genetic interactors will be further characterized to determine their role in spermatheca development and their effect on NHR-6 expression or activity.

El Sayed, M., D. Lovas, C. Clark, M. Grimes, J. Harmson, C. Gissendanner and A.M. Findley. ULM. **Isolation and genomic characterization of *Mycobacteriophage* sp. Yoshi from a soil sample in northeast Louisiana.—**Novel mycobacteriophages were isolated from soil samples via direct plating or enrichment regimes. Isolates were subjected to spot testing, repetitive purification plating, and an empirical testing protocol that led to the harvesting of high-titer lysates. Lysates were processed for TEM and all displayed the siphoviral morphotype. DNA was isolated from each phage and characterized with BamHI, ClaI, EcoRI, HaeIII, and HindIII restriction endonucleases. *Mycobacteriophage* sp. Yoshi was submitted for library construction and 454 genome sequencing and was annotated following finishing of the draft sequence with gene calling and assignment of predicted gene functions using the Consed, Glimmer/GeneMark and Phamerator programs. The finished Yoshi genome places it within the F2 cluster of mycobacteriophages, most closely related to Che9d. Yoshi has a genome size of 58,701 bp plus a 10bp 3' overhang, 119 open reading frames (ORFs), and a GC content of 61.0%. The left arm of the genome primarily encodes structural genes (i.e., tail, portal, scaffold, and tapemeasure proteins) and utilizes the + strand. The right arm is also primarily read from the + strand and contains ORFs similar to phage genes of known functions as well as ORFs encoding gene products of unknown function. The Yoshi genome also contains 20 'orphams' with no known sequence analogs. Putative non-structural ORFs include antirepressor, helicase, DNA methylase, and Y-integrase. Phamily diagrams were constructed to explicate Yoshi's functional relatedness to known mycobacteriophages (e.g., Pham 1635–Y-integrase).

Felterman, M.A. and E. Zou. NiSU. **The exogenous methyl farnesoate does not impact epidermal ecdysteroid signaling in vivo in the fiddler crab, *Uca pugilator*.—**Methyl farnesoate (MF) is a crustacean terpenoid hormone involved in regulation of larval development,

reproduction and male morphogenesis. However, the receptor for MF has remained unresolved. Due to the fact that MF can bind to crustacean retinoid X receptor (RXR) and can alter the expression of crustacean RXR gene, crustacean RXR has been proposed as a candidate receptor. Ecdysteroids signal through the ecdysteroid receptor (EcR), which heterodimerizes with the RXR in Crustacea. This study investigated whether exogenous MF impacts ecdysteroid signaling in vivo using N-acetyl-β-glucosaminidase (NAG) mRNA from epidermal tissue as a biomarker for ecdysteroid signaling. The NAG mRNA from fiddler crabs injected with 0, 0.2, 1, 5, and 20 ng/g wet weight of MF was quantified using quantitative real-time PCR (qRT-PCR). An assay of epidermal NAG activity in crabs injected with 0, 20, and 2000 ng/g wet weight of MF also was performed. The administration of exogenous MF was found to have no effects on epidermal NAG gene transcription or NAG activity in *Uca pugilator*. These results show that MF is not capable of affecting epidermal ecdysteroid signaling in the fiddler crab, *Uca pugilator*, and are not supportive of the notion that MF signals through the RXR in Crustacea.

Ganveer, A. LTU. **Thermal stability by counter flow in microchannel reactors.—**This abstract signifies microchannel reactors which deal with a chemical reaction taking place under heat exchange in a channel less than 1mm wide. One of the applications of these microreactors is to determine DNA melting temperatures using fluorescence detection methods and microscale calorimetric system. The fluid flow in these reactors is continuous, which creates the problem of heat transmission through the channel carried by fluid itself. This effect induces shifting of temperatures along the channel making melting analysis not possible on higher flow rates. To address this problem, we have developed a counter flow microfluidic device that incorporates the sensitivity and compactness of thermoelectric sensing with a reaction time up to two orders of magnitude faster than conventional and microscale calorimetric systems. It also significantly stabilizes the temperature distribution in continuous flow thermal micro-reactors; virtually eliminating fluid flow induced thermal side effects. With counter flow, temperature variation due to flow becomes linear and is on the order of 100 times less than systems that do not incorporate counter flow elements. Temperature variation was reduced to less than 2 degrees for volumetric velocity below 30mm/s. Infrared thermometry was used to characterize the temperature distribution as a function of volumetric flow rate.

Gill, K.K., S. Nazzal and A. Kaddoumi. ULM. **Paclitaxel loaded PEG5000-DSPE polymeric micelles as pulmonary delivery platform: Formulation characterization, tissue distribution, plasma pharmacokinetics and toxicological evaluation.—**The objective of the present study was to evaluate the in vivo potential of paclitaxel loaded micelles of PEG5000-DSPE as a sustained release pulmonary delivery system. PEG5000-DSPE micelles containing paclitaxel were prepared by solvent evaporation technique followed by investigation of in vitro release of paclitaxel in lung simulated fluid. Tissue distribution and plasma pharmacokinetics of the polymeric micelles after intratracheal and intravenous administrations were investigated in addition to intratracheally administered Taxol. Finally, toxicological profile of PEG5000-DSPE was investigated. Paclitaxel was successfully formulated in polymeric micelles with encapsulation efficiency of 95%. The polymeric micelles exhibited a sustained release behavior in the simulated lung fluid. Intratracheally administered polymeric micellar paclitaxel showed highest accumulation of paclitaxel in the lungs with AUC0-12 in lungs being 45-fold higher than intravenously administered formulation and 3-fold higher than intratracheally delivered Taxol.

Paclitaxel concentration in other non-targeted tissues and plasma were significantly lower as compared to other groups. Furthermore, toxicity studies showed no significant increase in levels of lung injury markers in PEG5000-DSPE treated group as compared to saline treated group. PEG5000-DSPE micelles delivered intratracheally were able to sustain highest paclitaxel concentrations in lungs for long periods of time, thus apprehending their suitability as pulmonary drug carriers.

Gupta, V., K.N. Bhinge and Y.Y. Liu. ULM. **Glucosylceramide synthase promotes breast cancer stem cells accumulation in chemotherapy.—**Cancer stem cells (CSCs) initiate tumorigenesis, metastasis and also the cause of resistance to chemotherapy. Glucosylceramide synthase (GCS) is a limiting enzyme regulating the synthesis of glycosphingolipids that play an essential role in the maintenance of embryonic stem cells. In the present study, we have found that GCS overexpression was interrelated to the increment of BCSCs and drug resistance in human breast cancer MCF-7 cell lines after doxorubicin induction. In MCF-7/Dox (doxorubicin-resistant) cells, GCS enzyme activity, colony forming cells and BCSCs with CD24-/CD44+/ESA+ markers were increased as compared to wild-type MCF-7 cells. Silencing GCS by using mixed-backbone oligonucleotide (MBO-asGCS) decreased the GCS enzyme activity, colony forming cells and BCSCs in MCF-7/Dox cells. Furthermore, BCSCs sorted from MCF-7/Dox cells displayed higher GCS activity and formed more colonies, as compare with other non-stem cell subsets. The BCSCs cells showed higher tumorigenicity and metastasibility as compared to non-stem cells (CD24-/CD44-) in athymic nude mice. Comparison of glycosphingolipids and gene profile of stem cells indicated GCS or globo-series glycoshingolipids possibly accumulate BCSCs through FGF family and other stem cell mediators during chemotherapy. These results demonstrate that GCS enhances BCSCs formation and silencing of GCS eliminates BCSCs, to prevent and treat drug-resistant tumors.

Haywood, J.C. and C. Tranter. LTU. **Mobile integrated DNA analysis system.—**Biological tests used in medical diagnosis and forensics testing are not widely field-portable. Samples are collected on site and shipped to a lab for testing, requiring days. Development of a portable real-time DNA analysis system eliminates long transfer times and allows for fast results. We have developed and incorporated spatial melting analysis, a new DNA analysis technique, aiding in miniaturization and enhanced speed of this analytical device. The device will consist of interacting subsystems all contained within a case the size of a large briefcase: fluidics, heating, optics, and power. A sample as small in volume as 10 μL will be inserted into a fluidic system that transports said sample into a microfluidic chip. In the microfluidic chip the sample will be repeatedly heated and cooled while simultaneously being imaged by an optics system. Information about the sample is obtained by analyzing captured images using an included touch screen interface. These components are powered and managed within the system. Sample-in-data-out analysis will be possible using this portable device.

Ledet, R. and W. Gray. SU-BR. **Exploring the gene networks associated with the putative. —***Kola acuminata* is a natural product that contains bioactive chemicals that may be chemopreventative toward tumors. The gene network that is involved in development of tumors from specific environmental factors is unresolved. Given that Bizzy contains putative chemopreventative properties, we hypothesized that Bizzy will modulate the expression level of

genes that are involved in tumor carcinogenesis pathways. Our objective is to generate a Bizzy specific gene network map by identifying Bizzy-responsive genes. Specifically, we will generate a putative Bizzy gene network with associated biochemical pathways. Regulation of these genes by Bizzy has been studied using PCR and Western blot analysis. We have expanded the gene network by generating a Bizzy responsive prostate specific regulatory network using a prostate specific subtraction cDNA library. The plasmid DNA identity will be confirmed by electrophoresis and PCR. The cDNA library has been arrayed into 384 gene clusters and their characteristics will be determined. Two Bizzy responsive cDNAs have been sequenced and network position determined. Our initial Bizzy network demonstrates a correlation between genes involved in cell proliferation and apoptosis in the presence of Bizzy. The availability of the Bizzy specific gene map can aid in conclusions about efficacy of Bizzy in prostate cancer prevention.

Lemon, L., M. Pearce and F.J. Lemoine. NSU. **Characterization of chromosome fragile sites in yeast.—**For proper growth and division, a cell must maintain intact, or unbroken, chromosomes. Fragile sites are special chromosomal regions that are prone to break in response to certain types of stress. Such breaks are associated with genomic alterations that are frequently observed in many human cancers. Therefore, a greater understanding of chromosome fragile sites has important implications in cancer biology. We have previously identified the first two chromosome fragile sites in the budding yeast *Saccharomyces cerevisiae*. This discovery demonstrates the potential use of budding yeast as a model system for studying the structure and regulation of chromosome fragile sites. However, additional studies are needed to validate the usefulness of this model system. Therefore, we are currently working to understand the molecular structure and function of these chromosome fragile sites. Results from these studies will provide insight into the molecular mechanisms controlling chromosome fragile site stability in yeast and mammals.

Merchant, M. McSU. L. Darville. LSU-BR. R. Elsey. LDFW-RR. **Isolation and characterization of antimicrobial peptides from the leukocytes of the American alligator (*Alligator mississippiensis*).—**Leukocytes were isolated from whole blood of wild alligators. The leukocytes were disrupted by sonication in 10% acetic acid, and soluble peptides (1-10 kDa) were selected and concentrated via selective ultracentrifugation. The resulting fraction exhibited moderate antibacterial activity against *E. coli*, and reverse phase HPLC/electrospray mass spectrometry analysis revealed the presence of only two peptides with masses between 4.5 and 5.0 kDa. Both of these peptides appear to be arginine and lysine rich, which is a common characteristic of antimicrobial peptides. These peptides also appear to exist in both phosphorylated and unphosphorylated states, which might serve as a mechanism for post-transcriptional activation. Peptide fragmentation, followed by amino acid sequence analysis via MALDI-TOF/TOF will be conducted.

Nestorova, G.G. and E.J. Guilbeau. LTU. **Thermoelectric sequencing by synthesis.—**This study describes a novel, thermoelectric method for DNA sequencing in a microfluidic device. The method measures the heat released when DNA polymerase inserts a deoxyribonucleoside triphosphate into a primed DNA template. The study describes the principle of operation of a laminar flow microfluidic chip with a reaction zone that contains DNA template/primer complex

immobilized to the inner surface of the device's lower channel wall. A thin-film thermopile attached to the external surface of the lower channel wall measures the dynamic change in temperature that results when Klenow polymerase inserts a deoxyribonucleoside triphosphate into the DNA template. The intrinsic rejection of common-mode thermal signals by the thermopile in combination with hydrodynamic focused flow allows for the measurement of temperature changes on the order of 10-4 K without control of ambient temperature. To demonstrate the method, we report the sequencing of a model oligonucleotide containing 12 bases. Results demonstrate that it is feasible to sequence DNA by measuring the heat released during nucleotide incorporation. This thermoelectric method for sequencing DNA may offer a novel new method of DNA sequencing for personalized medicine applications.

Paidipalli, M. and N. Crews. LTU. **Fabrication of micro-device with integrated electro-osmotic pump for micro-fluidic analysis.—**Micro-fluidic devices have an increasing demand due to their size and efficiency. Electro-osmotic pumps for micro-fluidic applications are preferred over mechanical pumps in spite of the fact that they cannot achieve pressures as high as mechanical pumps. The major reasons are that electro-osmotic pumps provide constant flow, require fewer moving parts, and are smaller and easier to fabricate. The various factors involved in the fabrication of an integrated micro pump for micro-fluidic analysis have been studied. The design consists of rectangular channels with attached electrodes for applying voltage. Initially, the phenomena of electro-osmotic flow inside rectangular channel have been studied. The relation between fluid flow and the applied voltage has been obtained. The change in the flow velocity with the dimensions of the channel and the electrodes also has been studied. The pressure drop obtained through fluid flow and its dependence on the applied voltage and also on the channel dimensions have been examined.

Palem, J.R. and Y.Y. Liu. ULM. S.V. Hsia. UMES. **Liganded thyroid hormone receptor repressed HSV-1 thymidine kinase transcription in neuronal cell lines but not in non-neuronal cells.—**Thyroid hormone regulates HSV-1 TK in N2A cells over expressing TR Beta. To study whether T3 and TR Beta is sufficient to regulate HSV-1 TK, we cotransfected pRL-TK (plasmid containing reporter gene Luc driven by TK promoter) and TR expression vector pTR into 293HEK, Vero cells, and N2a cells with or without T3. The study showed that liganded TR reduced the TK promoter activity in N2a but not in 293HEK and Vero cells. We constructed a recombinant virus expressing TR (TR/HSV-1) for infection studies. The results demonstrated that T3/TR decreased the TK transcription in N2a cells by 60% in TR/HSV-1, but not in the control virus expressing no TR. To investigate the roles of T3/TR on viral replication, N2a cell line was treated with T3 followed by infection at moi=0.1. Quantitative RT-PCR assays revealed that T3/TR-mediated TK repression was abolished upon washout of T3. The plaque assays indicated that removal of T3 increased virus release compared to the cells being treated with T3. Together, these results suggest that T3/TR exhibit neuron-specific regulation on HSV-1 TK and may contribute to the regulation of viral latency and reactivation.

Patel, S.P., E. Abdullayev, L. Yuri and D. Mills. LTU. **Controlled drug delivery for wound healing.—**Controlled drug delivery is one of the most promising biomedical applications of nanotechnology. Controlled release of drugs from halloysite-polycaprolactone (PCL) scaffolds can be used for wound healing. We are introducing nanobandage; it is composed of drug loaded

halloysite-PCL scaffolds for wound healing. Halloysites were loaded with drugs by applying a vacuum. Once loaded, the drug release experiment was performed to find out the total drug release time. Drug loaded halloysites were added into the PCL-chloroform mixture, followed by electro-spinning. Locations of halloysites in halloysite-PCL scaffolds were found by a scanning electron microscope and the fluorescein isothiocyanate (FITC) labeling of halloysites. Microfibers of halloysite-PCL scaffolds mimic the extracellular matrix, which promotes cell adhesion, proliferation and differentiation. These qualities were measured by cell assays. The concentration of halloysites between 1-7 wt% produce non-fragile halloysite-PCL scaffolds. In addition, results indicate that this method avoids the burst release of the drug. The disc diffusion assay was performed on bacteria, and there was a zone of clearance around the drug loaded halloysite-PCL scaffolds. We propose that drug loaded halloysite-PCL scaffolds prove to be a novel biodegradable material for wound healing.

Patel, S.P., S. Gold and D. Mills. LTU. **Effect of nanoporous titanium films on titanium implant.—**In the United States each year, about half a million people undergo total joint replacement. There are many drawbacks with replacement surgeries: inferior recovery, as well as postsurgical complications and pain. The most common explanation for implant failure is improper growth of surrounding tissues on the implant surface. Surface topography influence cellular adherence, migration, proliferation, and differentiation. A major problem with titanium implants is that it does not mimic the natural bone structure, so there are greater chances of implant failure. Bone is nanoporous at the surface, so if the titanium implant surface is modified such that surfaces become nanoporous, this may help in increasing the life span of the implant. Our objective was to find out the best parameter of anodization to produce nanoporous titanium, as well as to compare osteoblast cell adhesion, growth and functionality on smooth versus nanoporous titanium surfaces. 1M H_2SO_4 and 0.5 wt% HF at 20 V for 30 minutes worked best for production of uniform nanopores on titanium. Results of in vitro cell assays performed on osteoblasts indicate that nanoporous surfaces lead to better cell adhesion, cell functionality and tissue growth leading to an enhanced implant durability and osteointegration.

Podduturi, V.P. LTU. P. Derosa. LTU/GSU. **Simulating the nanoparticle movement along the blood flow in the blood capillaries of tumor tissues.—**Cancer is one of the major, potentially deadly diseases. Chemotherapy can affect the patient's living condition by damaging the healthy tissue due to the non-specific delivery of the drug. Nanoparticles are being used for a targeted drug delivery thereby reducing the dose, in addition, metallic nanoparticles are used for thermal treatment. They take advantage of the pathophysiology of the tumor blood vessels. We propose a model that combines random walk with diffusion principles. Nanoparticle movement in a cylindrical tube with dimensions similar to the tumor blood capillary is simulated in Matlab. The cylindrical tube wall is designed to have a single large pore with diameter in the range of the diameter of the pores of tumor capillary wall. All the dimensions are taken from the literature. The particle drift velocity is calculated from the Hagen-Poiseuille equation and the velocity profile at the pore is obtained by vector addition of the velocities along and across the blood vessel. Simulations are performed using the Monte Carlo technique. The number of particles leaving the blood vessel through the pore is obtained as a function of blood pressure. Interstitial pressure and the relative effect of each of the parameters is discussed.

Praslicka, B. and C.R. Gissendanner. ULM. **Investigation of the role of SUMOylation in the regulation of NHR-6, the *C. elegans* ortholog of the NR4A nuclear receptor.—** SUMOylation is post-translational modification that can affect protein localization, stability, and activity. The addition of SUMO peptides to transcription factors can either enhance or repress their transcriptional activities. Our lab is studying the NR4A nuclear receptor transcription factor in the nematode *C. elegans*. NHR-6, the *C. elegans* ortholog of NR4A, is required for development of the spermatheca, a somatic gonad organ important for ovulation and fertilization. A major area of interest in our lab is to identify the mechanisms by which NHR-6 can regulate these opposing processes. Post-translational modifications, such as phorphorylation and SUMOylation, are likely involved in the regulation. In *C. elegans*, the SUMO peptide is encoded by the smo-1 gene. We have found that smo-1 loss of function causes defects very similar to nhr-6 loss of function. To determine if NHR-6 was a candidate SUMO target, we searched for SUMOylation consensus sites in NHR-6. We identified one consensus SUMOylation site in the N-terminal region of NHR-6. We mutated the acceptor lysine in the consensus site to an arginine and asked if this mutated form of NHR-6 was functional in a genetic rescue assay. Preliminary results suggest that this lysine is required for wild-type levels of NHR-6 activity.

Prathipati, P., S. Quadri, D.W. Jackson and K.E. Jackson. ULM. **Induction of carbon monoxide synthesis acutely enhances water/sodium excretion.—**Vascular and renal tissues express heme oxygenase, which metabolizes heme to form biliverdin, free iron, and carbon monoxide (CO). CO has been shown to relax vascular smooth muscle and to inhibit nitric oxide synthase. The current study examines the acute renal functional effects of inhibition and stimulation of CO production in animals chronically treated with an inhibitor of nitric oxide synthase. In vivo studies were conducted on Inactin anesthetized male Sprague Dawley rats (250-300g) with no pretreatment or chronically pretreated with L-NAME (50mg/Kg, q12 hours x4d). Hemodynamic and renal functions were examined before and after acute administration of a precursor for CO production, delta-aminolevulinic acid (δ-ALA; 80μmol/Kg, IV bolus) or vehicle. In untreated animals, δ-ALA did not alter blood pressure or renal blood flow, but increased water and sodium excretion (143.7±10.5 and 118.6±12.6%). In animals chronically pretreated with L-NAME, the ability of δ-ALA to increase water and sodium excretion (155.6±11.8% and 502.6±46.1%, respectively) was maintained with no significant effects on blood pressure or renal blood flow. This study demonstrates that a precursor of CO production can increase water and sodium excretion with no appreciable changes in renal blood flow or blood pressure. Support by LEQSF 2010 and HHMI.

Quadri, S., P. Prathipati, D.W. Jackson and K.E. Jackson. ULM. **Effects of recurring insulin-induced hypoglycemia (RIIH) on renal function.—**RIIH is an unavoidable risk of conventional therapeutic management of insulin dependent diabetes mellitus. Insulin may contribute to the pathogenesis of hypertension by stimulating the sympathetic nervous system and/or by promoting renal sodium retention. The current study was preformed to evaluate the hypothesis that hypoglycemia promotes hypertension via an increase in renal angiotensin II. Male Sprague Dawley rats (200-225g) were treated for 2 weeks with varying doses of subcutaneous insulin injections (1, 3, 5, 7 and 9U/kg bw). A subset of rats (200-225g) were fed normal or high zinc diets for two weeks and treated with doses of Captopril (2, 4, 8mg/Kg). Tail-cuff blood pressure, food/water intake, and blood glucose were monitored daily. A dose

dependent increase in blood pressure was observed. A dose dependent decrease in blood glucose was observed. There were no significant differences in heart rate and urine output observed between groups. There was a significant reduction in blood pressure and renal heme oxygenase content with Captopril and high Zn diet pretreatments. Future studies will include evaluation of excised renal tissue for angiotensin II and metabolic studies to further examine the effects of hypoglycemia on renal function. Supported by LEQSF 2010 and HHMI.

Tangutooru, S.M, R. Gumma, V.L. Kopparthy and E.J. Guilbeau. LTU. **Fabrication and characterization of highly sensitive thin film thermopiles.—**Highly sensitive, antimony-bismuth and tellurium-bismuth, thin-film thermopiles with high common mode rejection ratio were fabricated to sense dynamic changes in small temperature differences. Thermopiles with 60 thermocouple junction pairs were fabricated on 100µm polyimide (Kapton®) supports using a Denton model DV-502B metal evaporation system. Custom designed metal shadow masks containing the patterns for creating the thermopile's thin metal lines were manufactured to our specifications. Comparative tests were performed on both types of thermopiles. Experimental studies were conducted to quantify the sensitivity of thermopile response for known quantities of heat. Thermopile response time was measured by laser light stimulation of the measuring junctions of thermopiles. Dynamic changes in the temperature associated with the interaction of ethanol-water in a microfluidic device were measured by attaching the thermopile to the lower channel wall of the microfluidic device. Typical resistances of the antimony-bismuth and tellurium-bismuth thermopiles are 30kΩ and 300KΩ, respectively. These thermopiles are capable with a minimum detectable temperature change on the order of 10-4°C.

Warner, J.R., B. Morgan, E. Hufford, J. Harmson, C. Gissendanner and A.M. Findley. ULM. **Characterization of *Mycobacteriophage* sp. Peaches - genome annotation and hetero-immunity study.—***Mycobacteriophage* sp. Peaches was one of 15 phages isolated from soil samples via direct plating or enrichment protocols. Isolates were subjected to spot test analysis, repetitive phage purification plating, and an empirical testing protocol that led to a ten plate infection and harvesting of high titer lysates. Lysates were processed for TEM with negative staining and 13 of the 15 isolates were found to display the siphoviral morphotype. Isolated DNA was characterized by restriction digestion analysis using the BamHI, ClaI, EcoRI, HaeIII, and HindIII endonucleases. *Mycobacteriophage* sp. Peaches was submitted for library construction and genome sequencing. Gene annotation included a finishing analysis of the draft sequence, gene calling, and assignment of predicted gene functions using the Sequencher, Glimmer/ GeneMark and Phamerator programs. The finished Peaches genome was placed initially into the A2 cluster of known mycobacteriophages but this designation has since been changed to that of the A4 group. Peaches has a genome size of 51376 bp including a 10bp 3' overhang, 85 open reading frames (ORFs), and a GC content of 63.8722%. The left arm of the genome primarily encodes structural genes (i.e., major/minor tail, portal, scaffold, and tapemeasure proteins) and utilizes the + strand. The right arm is primarily read from the – strand and contains ORFs with similarity to other phage genes of known functions and ORFs encoding gene products of unknown function. Putative non-structural ORFs (via BLASTX analyses) include DNA polymerase I, DNAB-like helicase, DNA primase, ser/thr phosphatase, ribonucleotide reductase, and S-integrase. Phamily diagrams were constructed to explicate Peaches functional relatedness to known mycobacteriophages (e.g., Pham 23–S-integrase). Additionally, a heteroimmunity

study was conducted with a *Mycobacterium smegmatis*-Peaches lysogen culture to identify unsequenced phages which also might represent members of the A4 subcluster group.

Zoology Section

Abshire-DeGrado, C.F., J.T. Guidry and W.H. Dees. McSU. **Spices as natural repellents of mosquitoes.—**Studies were conducted to test the repellency of different spices on nocturnally active mosquitoes. Cinnamon, bay leaves, crystallized ginger, cloves, oregano leaves and onions were investigated. The spices were tested against mosquitoes through a series of field trials in Moss Bluff, Louisiana, using modified-Centers for Disease Control light traps. In four trials, we tested cinnamon, bay leaves, crystallized ginger, and cloves. An average of 30 mosquitoes was collected in traps with cinnamon and cloves. An average of 31 mosquitoes was collected in traps with bay leaves. An average of 40 mosquitoes was collected in traps with ginger. Our results show that ginger is slightly less repellent, since the crystallized ginger contained sugar, an attractant for mosquitoes. In two trials comparing cinnamon to controls, an average of 50 mosquitoes was collected in traps with cinnamon and an average of 79 mosquitoes was collected in control traps. In two trials comparing onions and oregano leaves to controls, an average of 143 mosquitoes was collected in traps with oregano leaves, an average of 112 mosquitoes was collected in traps with onions, and an average of 172 mosquitoes was collected in control traps. All spices tested showed some degree of repellency to mosquitoes.

Abshire-DeGrado, C.F., J.T. Guidry and W.H. Dees. McSU. **What's with a dead mosquito? Preliminary investigations of dead mosquitoes as attractants for mosquitoes.—**The attractiveness or repellency of dead larvae and adults of *Aedes aegypti* and *Culex quinquefasciatus* mosquitoes on active, flying mosquitoes was investigated in field tests in Moss Bluff, Louisiana, and in lab tests at the Department of Mosquito and Rodent Control, Calcasieu Parish Police Jury, Lake Charles, Louisiana. Modified Centers for Disease Control light traps and modified sticky traps were used to trap live mosquitoes. In field studies with dead *Ae. aegypti* larvae, an average of 10 mosquitoes was collected in the trap with dead larvae and an average of nine mosquitoes was collected in the control trap. In field studies with dead adult mosquitoes, averages of 51 and 62 mosquitoes were collected in traps with dead *Ae. aegypti* and *Cx. quinquefasciatus* adults, respectively, and an average of 47 mosquitoes was collected in control traps. In lab studies, an average of 21 mosquitoes was collected in traps with dead *Ae. aegypti* adults and an average of 16 mosquitoes was collected in control traps. Our studies demonstrate that mosquito-specific chemicals may enhance trap collections.

Aldridge, T.M. and A.M. Hill. ULM. **Digital comparison of anisoptera larvae morphology.—**Morphometrics is an approach used to distinguish among closely related species of adult Odonata. We are exploring the feasibility of using digitized images and landmark analysis to assist in identifying early instar larvae that would otherwise be difficult to process using traditional keying methods. Larvae were collected, identified to genus level, and photographed for analysis. Thus far, digital analysis of head capsule shape and, perhaps, prementum shape seem promising.

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 snails represent a diverse and highly imperiled fauna in the United States. Status surveys of snail faunas help further knowledge regarding local biodiversity, current distributions and extinctions, and aid in successful conservation efforts. The freshwater snails of the Mississippi Alluvial Plain and South Central Plains ecoregions were surveyed during a two-month period in 2009. Species were identified in the field; voucher specimens were relaxed with menthol and fixed in 95% ethanol for later identification. Twenty-one species representing 16 genera, seven families, and three orders were collected. The most abundant species was *Physa gyrina* followed by *Physa acuta*; maximum species richness was seven. All species encountered carry G4-G5 global heritage ranks, indicating stability, and state heritage ranks of SU (status unknown) in Arkansas. 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.

Brown, L.D. and J.L. Carr. ULM. **Herpetofaunal survey of Upper Ouachita National Wildlife Refuge in northern Louisiana.—**During the last century, the amount of original bottomland hardwood forest cover lost was substantial. The primary cause of this loss was conversion to agricultural production, along with hydrological changes associated with flood control. Upper Ouachita National Wildlife Refuge (UONWR), composed of bottomland hardwood forests and former agricultural fields, has been the site of a major bottomland hardwood forest restoration effort. As an extension of that restoration effort, the containment levee surrounding former farmland is being removed to restore the natural hydrological cycle across the area. Herpetofaunal communities are significantly impacted by hydrology in bottomland hardwood forests; therefore, monitoring this community is vital as the restoration work progresses. Total species richness as of 15 November 2010 at UONWR was 26 species, of which eight were amphibian species and 18 were reptile species. A total of 920 turtle trap-nights yielded 85 captures of eight species, and 448 trap-nights with aquatic drift fences yielded 28 individuals of nine species. A total of 557 individuals of 13 species were encountered during 48 person-hours of visual encounter surveys. The three most abundant species were *Acris blanchardi* (9.60 individuals/person-hour), *Agkistrodon piscivorus* (0.479 individuals/person-hour), and *Trachemys scripta elegans* (0.065 turtles/trap-night).

Campbell, L and S. Marshall. NSU. **Effect of conspecific silk on retreat-site selection in the brown recluse spider.—**Brown recluse spiders (*Loxosceles reclusa* Gertsch & Malik, Araneae: Sicariidae) are common in and around human dwellings in Louisiana. These spiders are generally sedentary and select a narrow space as a retreat, which they line with silk. We tested the effect of silk on retreat-site selection by brown recluse in the laboratory. Spiders were held and fed in plastic Petri dishes with a piece of filter paper on the bottom. The choice tests were conducted in rectangular plastic boxes with a potential retreat site at either end. We manipulated silk cues by using the filter paper bearing silk, frass, and prey remains. Two experiments were performed. In the first test, we offered spiders a choice of a retreat site with their own filter paper vs. a site with fresh (i.e., unscented) filter paper. In the second test, spiders were offered a choice of their own filter paper vs. filter paper scented by a different individual. Spiders offered the

choice of settling on their own filter paper vs. fresh paper chose their own paper. Spiders offered their own filter paper vs. another spider's filter paper did not make any differential choice.

Caraway, K.C., J.G. Hinton and H.A. Meyer. McSU. **Small-scale distribution of tardigrades on lichen from the Cayman Islands.—**Tardigrades are microscopic invertebrates commonly found in mosses, lichens and liverworts. We conducted a small-scale spatial distribution study of the distribution of tardigrades in a lichen patch. Our investigation involved a lichen sample from the Cayman Islands measuring approximately 64 cm^2. It was sectioned into eight squares, each 4 cm^2. Thirteen tardigrade were present, representing three species: *Minibiotus furcatus*, *Macrobiotus caymanensis*, and *Milnesium tardigradum*. *Minibiotus furcatus* is a new record for the Caribbean. Statistical analysis indicated clumped dispersal for tardigrades within the lichen sample. These results are consistent with studies of tardigrade colonization of moss cushions.

Chappell, A.R. and L.D. Hayes. ULM. **Ecological and neuroanatomical correlates of mating system variation in the Taiwan field vole (*Microtus kikuchii*).—**Variation in ecology has been linked to mating system strategies; however, the underlying mechanisms controlling changes in these strategies are largely unknown. It has been proposed that ecological variation could influence the expression of neuroanatomical structures controlling for social behavior. In mammals, social pair-bonding and parental care of offspring appear to be mediated by two neuropeptides: oxytocin and vasopressin. Socially monogamous species (*Microtus ochrogaster*) have high concentrations of these neuropeptide receptors in the reward and reinforcement regions of the brain. In contrast, non-monogamous species (*M. pennsylvanicus*) lack oxytocin and vasopressin receptors in these regions. By using viral-vector gene transfer, Young et al. (2000) determined a causal link between receptor expression and mating behavior. These observations suggest that ecological variation influences receptor distribution in the brain, thereby influencing intraspecific variation in mating systems. I will assess the impact of ecological variation on the social mating systems and neuroanatomy of the Taiwan field vole (*Microtus kikuchii*). Preliminary research indicates this vole may be socially monogamous like prairie voles (model organism for monogamy), suggesting possible convergence of phenotypes. The proposed research is significant because it links intraspecific ecological variation and mating systems with the underlying neuroanatomical mechanism upon which natural selection can act.

Childress, L.C. and R.A. Fiorillo. ULM. **Digenetic trematodes of snails in Black Bayou Lake National Wildlife Refuge in Northeast Louisiana.—**All digenetic trematodes have heteroxenous life cycles that include a mollusk, typically a snail, as a 1st intermediate host. Our objective is to characterize the trematode community of snails in Black Bayou Lake National Wildlife Refuge. Parasitized snails shed free swimming trematode larval stages called cercariae. Shedding cercariae is evidence that all hosts required for the digene to complete its life cycle are found at that locality. In contrast, adult worms in definitive hosts may represent infections acquired outside the system being studied. This is especially true for vagile hosts. Beginning in September 2010, we began collecting snails monthly from Black Bayou Lake. Through January, we have examined 2,703 snails for shedding cercariae (2,079 *Physa gyrina*; 609 *Micromenetus* sp.; 11 *Helisoma anceps*; 4 *Pseudosuccinea* sp.), and only two individuals harbored trematodes. One *P. gyrina* and one *Micromenetus* sp. were infected with xiphidiocercaria and furcocercous

type cercariae, respectively. Prevalence (% of hosts infected) is extremely low, but it can vary significantly seasonally. We will continue to monitor snail populations through summer 2011.

Davis, K.M. and R.A. Fiorillo. ULM. **Relationship between parasites, host life history.—**We measured rostrum size (length and depth) and counted the number of dorsal and ventral teeth of 111 grass shrimp, *Palaemonetes kadiakensis*, collected from two localities in Black Bayou National Wildlife Refuge between September 2008 and May 2009. The rostrum is a long anterior and dorsal extension of the carapace that may function as a deterrent to predation. Shrimp were weighed, and body length was measured with a digital caliper. Individuals were sexed then necropsied and examined for metacercariae of an undescribed species of the microphallid trematode (Trematoda: Microphallidae). These metacercariae are thought to become sexually mature when shrimp are eaten by a bird definitive host. Digital photographs of the rostrum were taken with a Moticam 1000 digital microscope camera at 10X magnification with a Leica™ dissecting microscope. All rostrum measurements and counts were made with a Motic Image Plus Software. We report data on the relationship between parasites, shrimp life history traits (e.g., body size and sex) as well as rostrum length and dentition pattern.

Ellington, C.R., D.C. Cagle and J.L. Hunt. UAM. M. B. Connior. SACC. **Reproductive cycle of Baird's pocket gopher (*Geomys breviceps*) in northern Louisiana.—**Knowledge of a species' reproductive patterns can be critical in making decisions regarding conservation or agricultural pest control. One species in Louisiana that is sometimes an economic pest is Baird's pocket gopher (*Geomys breviceps*), a small fossorial rodent that spends almost its entire life within subterranean burrows. Because of these habits, pocket gophers cause damage to agricultural fields and urban yards. Reproductive data on pocket gophers in Louisiana could be used to help control pest populations. Studies have been conducted in Missouri and Texas to determine reproductive patterns of pocket gophers, but no studies have been conducted in Louisiana, although patterns have been assumed based on nearby studies. We collected gophers in Union Parish, Louisiana, from August to January and dissected them to determine reproductive cycles. Preliminary results suggest that very little reproduction occurs during these times although males are capable of breeding. The majority of reproduction occurs in spring and early summer, as evidenced by juveniles and subadults in our collections.

Felterman, M.A. and E. Zou. NiSU. **The exogenous methyl farnesoate does not impact epidermal ecdysteroid signaling in vivo in the fiddler crab, *Uca pugilator*.—**Methyl farnesoate (MF) is a crustacean terpenoid hormone involved in regulation of larval development, reproduction and male morphogenesis, but the receptor for MF has remained unresolved. Due to the fact that MF can bind to crustacean retinoid X receptor (RXR) and can alter the expression of crustacean RXR gene, crustacean RXR has been proposed as a candidate receptor. Ecdysteroids signal through the ecdysteroid receptor (EcR), which heterodimerizes with the RXR in Crustacea. This study investigated whether the exogenous MF impacts ecdysteroid signaling in vivo using N-acetyl-β-glucosaminidase (NAG) mRNA from epidermal tissue as a biomarker for ecdysteroid signaling. The NAG mRNA from fiddler crabs injected with 0, 0.2, 1, 5, and 20 ng/g wet weight of MF was quantified using quantitative real-time PCR (qRT-PCR). An assay of epidermal NAG activity in crabs injected with 0, 20, and 2000 ng/g wet weight of MF was also performed. The administration of the exogenous MF was found to have no effects on epidermal

NAG gene transcription or NAG activity in *Uca pugilator*. These results show that MF is not capable of affecting epidermal ecdysteroid signaling in *Uca pugilator*, and are not supportive of the notion that MF signals through the RXR in Crustacea.

Fotis, A.T. and J. Bhattacharjee. ULM. **Ant hills: A model for island biogeography theory.—** Few studies have investigated the ecology of ants in bottomland hardwood forests and little is known about how they manipulate the plant community in this system. The objective of our study was to determine what influence *Solenopsis invicta* has on the plant community and which abiotic factors are responsible for ant colonization. We hypothesize that the herbaceous diversity would be lower on ant hills than on areas without them. We compared the herbaceous community on twenty ant hills to areas without them, and measured the light levels, soil compaction and temperature for each plot. There was no significant difference in herbaceous cover or diversity in plots with ant hills and without; however, herbaceous richness was positively correlated with ant hill size. This supports the island biogeography theory proposed by MacArthur and Wilson and suggests that ant hills also can act as islands for newly propagating herbaceous species. Active ant hills were more commonly found in areas with high lighting, suggesting that *S. invicta* colonizes areas with few or no herbaceous species present and overtime, increases the plant richness to the mean levels found within the forest; indicating that this invasive species has a positive effect on the ecosystem richness.

Merchant, M. A. Royer, Q. Brousaard and S. Gilbert. McSU. M.H. Shirley. UF. **Characterization of serum dipeptidyl peptidase IV activity in three diverse species of West African crocodilians.—**Serum dipeptidyl peptidase IV (DPPIV) is an enzyme that has been reported to exhibit important immune activity, particularly functioning in T-cell antigen recall. This enzyme activity was characterized in three divergent and sympatric species of West African crocodiles. Analyses of the data revealed that serum of the Nile crocodile (*Crocodylus niloticus*) exhibited higher DPPIV activity than that of the African dwarf crocodile (*Osteolaemus tetraspis*) and the slender-snouted crocodile (*Mecistops cataphractus*). Kinetic analyses showed that the rate of product formation was higher in serum of *C. niloticus* with respect to time, which was confirmed by double reciprocal plot analysis in that the V_{max} for serum of *C. niloticus* was higher than the other two species. However, the Michaelis constants were very similar for all three crocodilians, indicating that *C. niloticus* DPPIV enzyme may be a more efficient catalyst. Thermal activity profiles demonstrated that the serum DPPIV activities of all three species increased substantially with temperature. Although activity of *C. niloticus* was higher than that of *O. tetraspis* and *M. cataphractus* at all temperatures investigated, linear increases of activity with temperature were noted for all three species. The results from this study show that three diverse species of West African crocodilians express soluble serum DPPIV.

Meyer, H.A. McSU. **Celtic water bears.—**Currently 38 species of terrestrial tardigrade (*Phylum Tardigrada*) are known to occur in Ireland and 47 in Scotland. In the summer of 2010, I collected mosses and lichens in southern Ireland and eastern Scotland. Tardigrades have not previously been reported from the four Irish counties I sampled. This is the first investigation of tardigrades from Scottish lichens. Samples were stored in paper envelopes and later soaked in tap water overnight. Tardigrade specimens and eggs were extracted and mounted in polyvinyl lactophenol. Samples processed so far contain seven species from Ireland and four from

Scotland. One species collected, *Diphascon* (*Diphascon*) *recamieri*, is new to the fauna of Scotland, and one, *Macrobiotus coronatus*, is new to the fauna of Ireland. One species from Ireland belongs to the *M. hufelandi* species complex, but the characteristics of its egg architecture suggest that it may be new to science.

Meyer, H.A. and M.N. Domingue. McSU. **The Cajun water bear.—**Over 200 species of freshwater and terrestrial water bears (*Phylum tardigrada*) are known to occur in North America. Of these, sixteen species have been collected in Louisiana. Foliose and fruticose lichens collected in Crowley, Acadia Parish, Louisiana, on April 18, 2010, were stored in paper envelopes and later soaked in tap water overnight. Tardigrade specimens and eggs were extracted and mounted in polyvinyl lactophenol. The samples contained a new species of tardigrade. *Minibiotus acadianus sp. n.* has a buccal tube with single anterior curvature, two macroplacoids and a microplacoid. Small gibbosities are present on the fourth pair of legs, in three caudal rows, and in a single row at the level of the third pair of legs. Reexamination of specimens previously identified as *M. fallax* in Louisiana indicates that they are, in fact, *M. acadianus sp. n.*, suggesting that the new species is widely distributed in Louisiana. The specific name *acadianus* commemorates both Acadia Parish and Acadiana, the region of southern Louisiana known for its large Cajun population.

Minton, R.L. ULM. D.M. Hayes. EKU. **The effect of ancient mitochondrial lineages on the systematics of Ozark pleurocerids.—**The endemic freshwater mollusks of the Interior Highland regions of Arkansas and Missouri represent a diverse and unique fauna. In an effort to better understand the systematics of the Interior Highland snails, we undertook a molecular phylogenetic analysis of two pleurocerid species, *Elimia potosiensis* and *Leptoxis arkansensis*, from across their ranges. Both species occur sympatrically across the area and shell phenotypes of both frequently intergrade with one another. Using 16S rDNA sequences, we tested whether each was a separate species and determined the ages of diversification of recovered clades. Maximum likelihood analyses did not recover the two species as monophyletic; four well supported clades dated between 1-30 mya were found instead. No biogeographic patterns were seen among the various genotypes. Based on previous results from other pleurocerids, we feel that the persistence of ancient mitochondrial haplotypes is affecting our ability to distinguish the two species using sequence data. Hypotheses regarding these findings are discussed.

Nolan, C.B. and R.L. Minton. ULM. **Effects of misidentification on museum specimen-based diversity estimates in land snails.—**Museum collections of species occurrences are robust data sources that are useful for estimating patterns of biodiversity. However, the prevailing assumption is that these analyses may be sensitive to species misidentifications. Despite this concern, the influence of the misidentifications on biodiversity metrics remains poorly explored. In the present study, occurrence records of eastern North American land snails were collected from five museums of natural history. We used records of the genus *Vertigo* (n=2,440) to determine the effect of misidentification on richness measures. *Vertigo* records were randomly reassigned to species that they are most commonly mistaken for at 10% increments to simulate varying extents of misidentifications. GIS and chi-squared analyses suggested that accurate richness measures can be generated while assuming species misidentifications exist at small percentages.

Paight, C.J. and R.L. Minton. ULM. **Preliminary gene flow estimates over small distances in the pyramid Elimia, *Elimia potosiensis*, from Arkansas.—**The pyramid Elimia, *Elimia potosiensis*, is an operculate freshwater snail endemic to the Interior Highland drainages of Arkansas and Missouri. Previous work indicated that *E. potosiensis* exhibits shell shape variation in response to environmental conditions over river distances of tens of meters, a scale thousands of times smaller than known in other freshwater taxa. What remains unknown is whether this response is due to true phenotypic plasticity or to genotypic sorting where individual genotypes are adapted to living in certain areas of the river and exhibit correlated phenotypes at those locations. Using data from inter-simple sequence repeats (ISSRs), we provide preliminary estimates of gene flow between adjacent populations of *E. potosiensis* and discuss how these results affect our understanding of shell plasticity in the species.

Playter, A.M., L. Nelson, C. Barnes, J.O. Pitre and G.J. LaFleur Jr. NiSU. **A comparison of the green tree frog (*Hyla cinerea*) from the upper and lower Barataria-Terrebonne Estuary.—**The Louisiana Amphibian Monitoring Program (LAMP) was established by the Louisiana Department of Wildlife and Fisheries to conduct statewide monitoring of anuran reproductive behavior. In addition to our frog call surveys, we sampled green tree frogs (*Hyla cinerea*) at two sites within the Barataria-Terrebonne Estuary, the upper estuary site contained freshwater habitat and the lower estuary site contained brackish marsh habitat. The objective of our study was to compare green tree frogs from upper and lower estuary sites to test for differences in body condition, breeding cycle, gonado-somatic index (GSI), and tadpole occurrence. Frog call surveys conducted in 2010 showed that peak activity occurred in May for green tree frogs at both sites. Frogs collected from the upper estuary (n=6) had an average body weight of 4.58±1.03 g (SD) and an average snout to vent length (SVL) of 45.00±4.24 mm (SD). Frogs collected from the lower estuary (n=17) had an average weight of 2.47±0.60 g (SD) and an average SVL of 38.21±4.79 mm (SD). We predict that decreasing saltwater intrusion into the lower estuary would decrease the differences we are currently seeing between green tree frogs at the two sites.

Shudes, A.M.J., T.P. Wood and W.H. Dees. McSU. **How much CO_2 is too much when collecting flying mosquitoes?—**We report preliminary investigations of carbon dioxide-baited Centers for Disease Control (CDC) light traps with and without holes in the cover of the trap. Traps were hung near a freshwater marsh in Moss Bluff, LA. Dry-ice, the source of CO_2, was placed in insulated containers and hung directly above the traps. The CO_2 would either flow down and over the sides of the covers or, in traps with modified covers, flow both over the covers and down through the holes in the covers. We hypothesized that CO_2 flowing through the holes of the modified trap has a greater chance of emission from the trap due to the action of the fan in the trap, hence attracting a greater number of mosquitoes. Five mosquito genera, *Aedes*, *Anopheles*, *Culex*, *Psorophora* and *Uranotaenia*, were collected in each of the traps. Standard CDC traps collected an average of 1,784 mosquitoes; modified-CDC traps collected an average of 1,219 mosquitoes. Standard CDC traps without holes in the covers collected 32% more mosquitoes than traps with holes in the covers. The general biology of mosquito species collected and simple descriptive statistics of the different species collected in each of the two traps will be presented.

Shudes, A.M.J., T.P. Wood, J.C. Choate, I.J. Louque, J.T.Guidry, C.J. Kirkhoff and W.H. Dees. McSU. **Mites on nocturnally-active adult mosquitoes in southwest Louisiana.—**We report preliminary investigations of parasitic mites on field collected mosquitoes from southwest Louisiana. Approximately 1,014 mosquitoes, representing five genera and nine species, were collected in Centers for Disease Control light traps near a freshwater marsh in Moss Bluff, Louisiana. Forty-five mites were found infesting 38 mosquitoes. Three mosquito species, *Aedes albopictus*, *Anopheles quadrimaculatus* and *Psorophora columbiae*, were not parasitized by mites. These three species made up 4.3% of the total number of mosquitoes collected. The following mosquito species (with the estimated percent parasitized) were identified: *Ae. sollicitans* (11.1%), *An. crucians* (1.7%), *Culex spp*. (including *Cx. erraticus*, *Cx. restuans*, and *Cx. salinarius*) (5.0%) and *Uranotaenia sapphirina* (3.1%). All mites, but one, were attached to either the thoracic or abdominal regions of the mosquitoes. One mite on *Anopheles crucians* was attached near the junction of the tibia and 1st tarsomere. The general biology of parasitized mosquito species and attachment locations of the mites will be presented.

Stewart, M.L. and Hayes, L.D. ULM. **Intraspecifc variation in the alarm calls of two populations of *Spalacopus cyanus*.—**Effective signals produced by animals are conspicuous, stereotyped, and redundant, increasing the reliability of the signal to the receiver. In many mammalian species, the characteristics of a signal vary across geographical ranges and can be population-specific. Geographical isolation of populations of a single species could restrict gene flow, which in turn could lead to intraspecific variation in vocalizations. Such intraspecific variation also may influence auditory signals in subterranean rodents. Alarm calls have shown phenotypic variation among geographic range in several rodent species. I collected recordings in 2010 and examined alarm call features, such as frequency (Hz), intensity (dB) and duration (sec), of coruros (*Spalacopus cyanus*), a subterranean rodent species endemic to central Chile for three reasons. Given environmental, genetic, and life history variation, I predict that there is intraspecific variation in coruro alarm calls. I will compare ecological features such as burrow complexity, soil conditions, distribution and abundance of food, and habitat openness, and vocalizations of coruros in populations located in the central valley and mountain populations. Determining these and other sources of geographical variations in animal vocalizations contributes to a greater understanding of the evolution of communication systems.

Wygoda, M.L. McSU. T.F. Dabruzzi and W.A. Bennett. UWF. **Skin resistance to evaporative water loss in the crab-eating frog, *Fejervarya cancrivora* (Anura: Dicroglossidae).—**The resistance of the skin to the loss of water by evaporation has been studied in amphibians which live in a wide variety of habitats except for the ocean. We measured evaporative water loss rate and cutaneous resistance to evaporation in the crab-eating frog, *Fejervarya cancrivora*, the only amphibian species which enters the sea. Studies were conducted on Hoga Island, located in southeast Sulawesi, Indonesia during the summer of 2010. Area-specific evaporative water loss rate was significantly lower in a sample of 13 living *F. cancrivora* than in agar replicas of the frogs and total water loss rate was dependent on body mass. Skin resistance to evaporative water loss was 0.27 sec/cm, which is the lowest significant resistance ever recorded for frogs. Crab-eating frogs, not unlike sharks, use urea as a balancing osmolyte which enables their survival in salt water. However, several days are required for plasma urea to increase to functional levels when the frogs first venture from fresh to salt water. Evaporative water loss resistance may have

evolved in *F. cancrivora* as a means of reducing total water loss during this acclimation period, when frogs experience osmotic water loss.

Wygoda, M.L. and C. A. Kersten. McSU. **Effects of water vapor density on cutaneous resistance to evaporative water loss in green tree frogs (*Hyla cinerea*).—**It has long been known that evaporative water loss (EWL) in amphibians is inversely proportional to water vapor density, and for many species the degree to which changes in vapor density affect EWL is expected to be similar because the skin of most amphibians provides no resistance to water loss. However, EWL in tree frogs may not be influenced by water vapor density in the same manner as it is in other amphibians because tree frogs have some degree of cutaneous resistance and therefore do not undergo evaporation similar to free water surfaces as do most other amphibians. We examined the effect of a range of water vapor densities on evaporative water loss rate, cutaneous resistance, and body temperature in the green tree frog, *Hyla cinerea*. We also compared water loss rates and body temperatures of *H. cinerea* to those of agar replicas which represent frogs having no cutaneous resistance measured under identical conditions. Finally, we analyzed skin secretions and samples of *H. cinerea* skin for the presence of lipids to help elucidate the mechanism responsible for reduced EWL in this species. Preliminary results will be presented and discussed.

Division of Physical Sciences

Chemistry Section

Allen, J.R. LSU-A. **Alternatives to the glassy carbon-working electrode for cyclic voltammetry.—**Voltammetry is a common electrochemical technique in which the potential is varied over time. The current is measured in relation to the potential. In cyclic voltammetry, three electrodes are used. The reference electrode sets a standard potential in order for the potential of the cell to be determined. The counter electrode, usually platinum, supplies the electricity for the cell. At the surface of the working electrode is where chemical reactions occur. One of the common working electrodes is the glassy carbon electrode containing a special type of graphite that conducts electricity well. The electrodes are expensive. Recently, it was discovered that the pencil lead of regular pencils could also be used as a working electrode when the wood is removed. The resulting electrode is not as sensitive as the glassy carbon electrode. Another problem with the pencil electrode is the fragile nature of the graphite. In this project the use of an artist graphite stick, which is similar to a pencil lead, will be compared to the response of a glassy carbon electrode as well as the pencil lead electrode.

Ayalasomayajula, S., R. Bajpai, and A.A. Gallo. ULL. **Recovery of lipids and production of biodiesel from Louisiana alligator fat.—**The recovery of lipids from alligator fat and the production of biodiesel from these lipids were undertaken. The lipids were recovered by solvent extraction and rendering in yields approaching 70%. The composition of the lipids as analyzed by GC-MS were C16:0, C16:1, C18:0 and C18:1 fatty acids. Biodiesel was produced from these lipids by using the traditional alkali-catalyzed transesterification method with methanol. Two variables that were studied were the reaction time and the molar ratio of oil to methanol. The newly produced biodiesel was characterized using ASTM standards. Properties of the biodiesel such as flash point, kinematic viscosity, cloud point, glycerin levels and Na, P, and K levels were all within the acceptable ASTM range. However, properties like S, Ca and Mg and water and sediments were above the acceptable ASTM levels. The proposed process would eliminate waste disposal and environmental concerns while creating a local industry that would be profitable.

Battula, T.R. and O.E Christian. McSU. **Antibacterial activity of the endemic US Virgin Islands species, *Solanum conocarpum*.—**The incidence multidrug resistant of bacteria is increasing worldwide, particularly in health care facilities. New drugs with new structural motifs and modes of action are required to combat this problem. *Solanaceae* was identified as a "hot family" due to the number of bioactive compounds isolated from various members. The genus *Solanum* is known to produce a range of compounds including potent antibacterial metabolites. As a part of our continuing study of Caribbean *Solanum* species, we report the first chemical investigation of the endemic species *Solanum conocarpum*. The hexane and ethyl acetate extracts of the aerial parts exhibit the most potent inhibition of *Escherichia coli* and *Staphylococcus aureus* at a concentration of 16.7 μg/μL. This bioassay-guided methodology resulted in the isolation of a pure compound which also displayed moderate activity at 16.7 μg/μL. The bioassay-guided fractionation of the extracts as well as the structure elucidation of the pure fraction is discussed.

Beeram, S., C.J. Hardaway and J. Sneddon. McSU. **Use of whole crawfish for the removal of selected metals in solution.—**This work will describe the use and ability of whole crawfish to remove selected metals from solution. Experiments and results will be presented for metals such as lead, cadmium and copper over various concentration ranges from low ppm (parts per million) to high ppm (hundreds of parts per millions). The metal concentrations are determined in the remaining solutions as well as crawfish using inductively coupled plasma-optical emission spectrometry. Finally, the effects of pH and salt concentrations over the range fresh to salt on the uptake of the metals will be presented.

Behery, F.A., A.Y. Elnagar, M.R. Akl, V.B. Wali, B. Abuasal, A. Kaddoumi, P.W. Sylvester, and K.A. El Sayed. ULM. **Redox-silent tocotrienol esters as breast cancer proliferation and migration inhibitors.—**Tocotrienols are vitamin E members with potent antiproliferative activity against preneoplastic and neoplastic mammary epithelial cells with little or no effect on normal cell growth or functions. However, tocotrienols' chemical instability, poor water solubility, and rapid metabolism are examples of such obstacles which hinder the therapeutic use of these valuable natural products. Twelve semisynthetic tocotrienol ester analogues were prepared by direct esterification of natural tocotrienol isomers with various acid anhydrides or chlorides. They were evaluated for their ability to inhibit the proliferation and migration of the mammary tumor cells +SA and MDA-MB-231, respectively. The esters effectively inhibited the proliferation of the highly metastatic +SA rodent mammary epithelial cells with IC_{50} values in the nano-molar range. However, they showed no effect on immortalized normal mouse CL-S1 mammary epithelial cells. In addition, most of the prepared esters inhibited 50% of the migration of the human metastatic MDA-MB-231 breast cancer cells at a single 5 uM dose in wound-healing assay. Esters were 1000-fold more water-soluble and chemically stable versus their parent isomers. These findings strongly suggest that redox-silent tocotrienol esters may provide superior therapeutic forms of tocotrienols for the control of metastatic breast cancer. Supported by First Tech International Ltd.

Chabaud, K., D. Polakova, and G. Stanley. LSU-BR. **Synthesis of a dirhodium tetraphosphine catalyst for use in hydroformylation reactions.—**Conversion of alkenes, CO, and H_2 to produce aldehydes is an industrially important process called hydroformylation. Aldehydes are usually further converted to other desired products, for example alcohols for plasticizer applications or carboxylic acids for detergent production. Hydroformylation requires a suitable catalyst, often based on rhodium. In this research, a dirhodium tetraphosphine catalyst was studied. This catalyst shows high selectivity and activity to produce the desired linear orientation of aldehyde. This research could prove highly useful in industry once it is perfected and refined. The tetraphosphine ligand was successfully synthesized. It was made in several steps starting from the very simple and inexpensive starting material $PhPCl_2$. All work was done under nitrogen atmosphere because most of these phosphines are sensitive to air or water. The racemic diastereomer of the ligand was separated from the meso-isomer and used to make the dirhodium catalyst precursor. In the future, studies will be done to study the dirhodium tetraphosphine catalyst in different solvents via NMR and FT-IR. The solvents to be tested include pure acetone and a mixture of acetone and 30 percent water (by volume). A preliminary IR experiment has already been performed. The addition of water has a dramatic effect on the catalysis and

spectroscopic evidence indicates a different dirhodium catalyst relative to that seen in pure acetone.

Coon, L., M. Jeansonne, and S. Eklund. LTU. **Synthesis and spectroscopic characterization of tantalum fluoride complexes in ionic liquids.—**This research focuses on the synthesis of lower oxidation state tantalum fluoride complexes and the spectroscopic characterization of these as solids and in the room temperature ionic liquid, BMP-TFSI. Lower oxidation tantalum fluoride complexes were produced by reduction of TaF5 with tantalum metal in molten KF. Raman spectroscopy of the solid products shows a shift in the main Raman band. Results of the spectroelectrochemical characterization of the reduction TaF5 the BMP-TFSI are also presented.

Cryar, C. and K. Boggavarapu. McSU. **Computational studies on Ru-based anticancer complexes.—**Ruthenium complexes are increasingly gaining interest as potential alternatives to platinum-based chemotherapeutic agents. Some ruthenium complexes have shown to be effective against cancers not readily treated by cisplatin. Among all ruthenium-based anticancer agents, ruthenium-DMSO complexes are believed to have great potential because of their selectivity for solid tumor metastases and low host toxicity. Furthermore, several ruthenium complexes have been found to display a significantly higher degree of selectivity towards cancerous cells than the leading commercially available platinum derived drugs, which result in a reduced damage to healthy tissues. In this talk, using state-of-the-art computational methods, we present systematic studies on the hydration and interaction with proteins and DNA bases of several Ru-based complexes. Our results show that the thermodynamics associated with hydration plays a key role in the uptake and cytotoxicity of the given drug.

Gentry, K. M. and Z. Li. SLU. **Facile oil removal from contaminated sands using ultrasound. —**An effective method to remove oil from the contaminated sands using ultrasound has been developed. This method successfully separates oil from contaminated sands in a short period of time using nothing but ultrasound and water. Sands recovered were in an almost pristine form. Impacts of intensity, frequency of ultrasound, and temperature of water on the separation were studied and will be discussed.

Gokhale, A.S., and S. Satyanarayanajois. ULM. **Conformationally constrained peptides from CD2 to modulate protein-protein interactions between CD2 and CD58.—**Cell adhesion molecules play a central role at every step of the immune response. The function of the leukocyte can be regulated by modulating adhesion interactions between cell adhesion molecules to develop therapeutic agents against autoimmune diseases. Among the different cell adhesion molecules that participate in the immunological response, CD2 and its ligand CD58 (LFA-3) are two of the best-characterized adhesion molecules mediating the immune response. Peptides were designed from the discontinuous epitopes of the β-strand region of CD2 protein. The solution structures of the peptides were studied by NMR and molecular dynamics simulations. The ability of these peptides to inhibit cell adhesion interaction was studied by E-rosetting assay and lymphocyte epithelial assay. NMR and molecular modeling results indicated that peptides 6 and 7 exhibited β-turn structure with a β-hairpin structure in solution. Peptides 6 and 7 inhibit the cell adhesion activity with an IC_{50} value of 74 nM and 240 nM, respectively, in lymphocyte-epithelial adhesion assay. The structures of the peptides studied by NMR and MD simulations

suggested that peptides 6 and 7 have a stable β-hairpin structure. Cell viability studies suggested that the designed peptides are not toxic to the cells studied and, hence, these peptides can become potential cell adhesion inhibitors to inhibit immune response.

Husbands, J.S. and P.R. Alburquerque. GSU. **Spectroscopy studies of the interaction of nickel (II) and amino-silanes.—**The nickel (II) reactions with N-[3-(trimethoxysilyl)propyl]-ethylene-diamine at different molar ratios were analyzed by infrared spectroscopy. The solution structure and dynamics of the formation of these complexes were studied by proton, carbon-13 and silicon-29 NMR spectroscopy by comparison of the chemical shifts of free ligand spectra with the ones of the complexes.

Johnson, B.S. SU-BR. J. Rocker and L.K. Pannell. USA. **Using mass spectrometry to assess protein stability in various storage and shipping conditions.—**There are many protein samples being collected at foreign sites. Examples of these foreign sites could be a hospital, another lab, or someone's home. The protein in the samples collected could degrade if they are not stored or shipped properly, this could cause inaccurate test results. The objective of this experiment was to find out how to optimize protein stability in non-controlled environments. The protein samples were put under various conditions to determine what conditions destroyed them and what conditions stabilized them the most. Mass spectrometry (MS) was used to see how the proteins have changed because it would ionize the proteins in a sample no matter what happened to them and it is has a high sensitivity. The protein sample used in this experiment was human plasma. Buffers and protease inhibitor were used to stabilize the proteins. The MS required enzymatic digestion prior to analysis, which meant that the protease inhibitors had to be removed before the sample could be put into the MS.

Junk, T and J.C. Lewis. ULM. F.R. Fronzek. LSU-BR. **Novel approaches to organic tellurium compounds.—**Organic tellurium compounds exhibit novel and potentially useful properties, but the introduction of tellurium into organic molecules can be challenging. Recently, progress was made towards the synthesis of five- and six-membered organotellurium heterocycles based on two promising synthetic approaches, which are discussed by example. Briefly, the nucleophilic displacement of bromine or iodine from 2-haloanilines was found to constitute an important source of precursors to tellurazoles and tellurazines, while the reaction of tellurium dioxide with unsaturated cyclic oximes generated novel telluraoxazolium salts with synthetic utility. Representative examples of the newly prepared compounds were characterized by X-ray crystallography.

Leake, B.M. and R.S. Srivastava. ULL. F.R. Fronczek. LSU. **Catalytic-conversion of cellulose-derived carbohydrates to fuels and value-added chemicals.—**Biomass carbohydrates like glucose and fructose are the most abundant renewable resources for potential conversion to fuels and value-added chemicals. The high oxygen content of these carbohydrates relative to fuel and value-added chemicals require efficient and selective catalytic reactions, which reduce their oxygen content. We have recently developed a new and simple methodology for the deoxygenation of polyols and epoxides to alkenes and alkanes. Results of these will be presented.

Li, Z., T. Du, S. Bai and E. Khosravi. SU-BR. **Homology modeling of arachidonate 5-lipoxygenase using ICM.—**Lipoxygenase (LOX) family is believed to be a major cause of pathological symptoms in asthma by biosynthesis of leukotrienes. However, no human arachidonate 5-lipoxygenase crystal structure currently can be obtained as a model to unveil how its substrate, arachidonic acid (AA), binds in its active side. In order to build an arachidonate 5-lox three-dimensional structure, high-quality modeling by homology is extremely important, given the order of magnitude difference between the number of proteins with experimentally determined three-dimensional structure and their relatives with only the sequence available. In this research, a computational approach internal coordinate mechanics (ICM) was applied to model the human arachidonate 5-lipoxygenase three-dimensional structure from the 1.85Å resolution structure of coral lox.

Morris, A., C.J. Hardaway and J. Sneddon. McSU. **Use of ground crawfish for the uptake of metals in solution.—**Crawfish are abundant and plentiful in southwest Louisiana but only around 15-20% of the approximate size of around 30 g is eaten with the rest discarded in dumps. This work will present the potential use of this discarded crawfish (once ground into 150 msh size) and its ability to uptake selected metals from solution. Metal determination is achieved using inductively coupled plasma-optical emission spectrometry (ICP-OES). Factors investigated include the mass of crawfish to mass of metal uptaken as well as pH and time.

Murru, S., A.A. Gallo and R.S. Srivastava. ULL. **Metal catalyzed C-N bond formation.—**Metal-catalyzed C-N bond formation strategy has been of great interest due to its potential application in synthesis of various bioactive heterocycles. We recently reported allylic amination of olefins catalyzed by various metals. We now found that Fe(II,III) salts can selectively catalyze conjugated dienes and trienes. Results of these experiments will be presented.

Pradhan, S., K.R. Christian and O.E. Christian. McSU. **Determination of the total phenolic content of selected fruits and beverages using the folin-ciocalteau method.—**Diets rich in fruits and vegetables have been implicated in lowering an individual's overall risk of certain cardiovascular and other diseases triggered by inflammation and oxidative damage. Recently, "superfruits" like acai blueberries and pomegranate have been the focus of intense scientific scrutiny due to their anti-inflammatory and antioxidant activities resulting, in large part, from the presence of various polyphenolic components, including anthocyanins. In this study, the total phenolic content of several commonly consumed fruits, blueberries, mayhaws and seagrapes were determined by the Folin-Ciocalteau method. The total phenolic content of yerba mate tea and a tazo hibiscus infusion tea were also determined. The blueberry extract displayed the highest total phenolic content of the fruits assayed, while the tazo hibiscus tea had a higher phenolic content than the yerba mate tea.

Rallabandi, R., R.W. Darbeau, and K. Boggavarapu. McSU. **Density functional calculations of thermal deamination of N-4-R-benzyl-N-nitroso pivalamides.—**N-4-R-Benzyl-N-nitroso pivalamides (R=MeO, Me, H, & NO_2) were decomposed previously at various temperatures in selected solvents 1, 2. The mechanism of this reaction was proposed to involve early formation of a four-membered cyclic entity – the oxadiazetyl entity. In the current study, computational work was aimed at determining the presence of the oxadiazetyl entity as well as the age of the

putative species. It also examined the electronic effect of 4-R-substituents on the oxadiazetyl entity. Gaussian 03 was used to optimize all structures. Density function method and B3LYP/6-31G (d) basis set was used.

Reddy, V., L., V. Machha and M. Merchant. McSU. L. Darville and K. Murray. LSU-BR. **Isolation and characterization of mannan-binding lectins from the American alligator (*Alligator mississippiensis*)**.—Lectins are carbohydrate-binding proteins that serve a broad spectrum of biological functions. They are particularly important in the immunological recognition of non-self tissues. We have isolated a mannan-binding lectin from alligator serum using affinity chromatography. Mass spectrometry analyses showed that the protein was present in monomeric, dimeric, and tetrameric forms in vitro, and SDS-PAGE analysis revealed that the lectin was a glycoprotein. The complete amino acid sequence was obtained via proteolytic digestion followed by MALDI TOF TOF, and was compared to sequences in the SWISS PROT database. The alligator serum lectin showed relative homology to the human intelectin-1 protein. There were several highly conserved cysteine residues that have been reported to play important roles in disulfide bridging in other lectin proteins. Sequence analysis showed several regions of potential secondary structures. This is the first report of a lectin protein sequence for a crocodilian species.

Sallam, A. A., S. Ramasahayam, S. Meyer and K.A. El Sayed. ULM. **Design, synthesis, and biological evaluation of dibromotyrosine analogues inspired by marine natural products as inhibitors of human prostate cancer proliferation, invasion, and migration.—**Bioactive secondary metabolites originating from dibromotyrosine are common in marine sponges, such as sponges of the *Aplysina* species. Verongiaquinol, 3,5-dibromo-1-hydroxy-4-oxocyclohexa-2,5-diene-1-acetamide, and aeroplysinin-1 are examples of such bioactive metabolites. Previous studies have shown the potent antimicrobial as well as cytotoxic properties of verongiaquinol and the anti-angiogenic activity of aeroplysinin-1. We show herein the design and synthesis of dibromotyrosine-inspired phenolic ester and ether analogues with anti-angiogenic, anti-proliferative and anti-migratory properties and negligible cytotoxicity. Several analogues were synthesized based on docking experiments in the ATP binding site of VEGFR2 and their anti-angiogenic potential and ability to inhibit prostate cancer proliferation, migration and invasion were evaluated using the chick chorioallantoic membrane (CAM) assay, MTT, wound-healing, and Cultrex® BME cell invasion assay models, respectively. Analogues with high docking scores showed promising anti-angiogenic activity in the CAM assay. In general, ester analogues proved to be of higher anti-migratory activity whereas ether analogues showed better anti-proliferative activity. These results demonstrate the potential of dibromotyrosines as promising inhibitory scaffolds for the control of metastatic prostate cancer proliferation and migration.

Shakya, A. and K. Boggavarapu. McSU. **Family of boron-rich closo-boranes, (Bn-1Hn-1) B1-, (Bn-2Hn-2) B2, (Bn-3Hn-3) B3+1.—**Closo-boranes are unique among boron hydrides. In a classical sense, the bonding is “electron deficient”, since there are more valence orbitals than the valence electrons. Borane dianions BnHn2- adopt closo-deltahedral skeletons in which n skeletal boron atoms are held together by (n+1) skeletal electron pairs (a pair from each BH unit and a pair from the anionic charge). Although, the majority of the dianions and the corresponding neutral analogs (carboranes, heteroboranes and metalloboranens) have been studied for a long

time, very little attention has been paid to the 'boron rich' closo-boranes. In this talk, we present a systematic investigation of the family of closo-boranes, BnHn-xy (x, y) (0, -2) (1, -1) (2, 0) (3, +1), obtained by successive removal of a hydride (H-) from the parent dianion, BnHn2-, while maintaining the n+1 skeletal electron pairs. Our studies based on the state-of-the-art ab initio calculations demonstrate that the higher members of the family, n=8-12, maintain the closo-structures. However, the smaller cage clusters prefer to adopt planar structures. The transition from cage to planar occurs at different stages for different n. At n=5, removal of one hydride from the dianion forces the cage to become planar. Opening up of the cage occurs for n= 6 and 7 by the removal of two and three hydrides, respectively.

Sissay, A. SU-BR. Ostrowski, D., K. M. Gietzen and D.W.G. Sears. UA. **Near-IR reflectance properties of type 3 ordinary chondrites.—**IR data from RELAB database which is funded by NASA were downloaded for type 3 ordinary chondrites to graph the data and then determine the percent of CPX and OPX. Courtesy of NASA, eight additional samples also were obtained from the Johnson Space Center. After graphing by simply using the eye and ruler, the percentage was determined by comparing the results to already graphed data by other scientists. The already published work by the scientists has reflectance spectra of enstatite (OPX and CPX) end members and their seven mass fraction mixtures with different particle sizes. After obtaining percent CPX by using an easy technique, a more sophisticated and accurate method was utilized to obtain percent CPX. The modified Gaussian model (MGM) software that has the capabilities of intensely analyzing IR data gives a band strength that will lead to the calculation of percentages.

Wallace, A., C. Deere, A. Logan, T. Williams, R.M. Uppu and M.O.F. Claville. SU-BR. **One-electron oxidation of methionine and methionine-containing substrates using peroxynitrite. —**The oxidation of amino acids, such as L-methionine, play an important role in the pathogenesis of degenerative diseases like Alzheimer's and Parkinson's. It is hypothesized that distonic radical ions may be the reactive intermediates responsible for the formation of the oxidized products that proliferate the disease. The overall goal of this project is to perform one-electron oxidation on Met and Met-containing compounds and determine the subsequent reactivity of the distonic radical ions produced. In this study, we report the action of peroxynitrite, a one-electron oxidant, on Met, N-Ac-Met, and Met-Ethyl Ester. Peroxynitrite was allowed to react with each substrate at varying concentrations, and the resulting reaction mixtures were analyzed using UV-Vis. Each reaction was performed in triplicate at constant pH. In every case, peroxynitrite oxidized the substrate upon addition of the oxidant; however, oxidation of the Met analogs occurred more readily than Met. MetEE and N-Ac-Met both showed signs of oxidation after the addition of the peroxynitrite stock solution at a 2:1 molar ratio. Preliminary signs of oxidation for Met were evident after the addition of the stock solution at a 4:1 molar ratio, but oxidation was more obvious when the peroxynitrite was reacted with Met in a 6:1 molar ratio. Further characterization of the products will need to be performed using high-performance liquid chromatography coupled with mass spectrometry, infrared spectrometry, ultraviolet radiation and other analytical methods.

Wynder, J. and W. Gray. SU-BR. **Isolation and characterization of chemo preventative analytes from an acetone extract of *Kola acuminata*.—**The World Health Organization has

recognized that more than half of scientifically developed drugs are natural products, derivatives of natural products, or inspired by natural products. Our laboratory has been characterizing androgenic and "putative" chemo-preventative properties of the Jamaican bush tea using LNCaP-AR+ and MCF-7- cell lines. Previously, we generated five Bizzy extracts using solvents of different polarities and showed that Biz-E3 was cytotoxic to MCF-7 cells and stimulatory toward LNCaP cells. The goal of this project was to test the hypothesis that Biz-E3 contains a unique set of analytes that modulate cancer cell functions. The specific objective was to generate Biz-E3 and Biz-E5 chemoinformatic libraries with associated gene expression profiles. To accomplish this HPLC and UV-Vis spectroscopy profiles were generated. Characterization of Biz-E3 by HPLC revealed the presence of four distinct peaks and three for Biz-E5. The wavelength spectra of selected Biz-E3 peaks detected the presence of 4-5 individual analytes per peak. The crude Biz-E3 extract and selected HPLC fractionations were tested in growth-inhibitory assays with MCF-7 cells and found to have strong anti-estrogen properties. Our results suggest that Bizzy contains analytes that may be responsible for the "putative" chemopreventative effects reported for this natural product.

Computer Science Section

Athill, T., R. Christin, S. Ellis, N. Gassant and Y.B. Reddy. GSU. **Advise me**.**—**The chosen name for this product to be developed is "ADVISE ME". The system will support student administration. The software is designed for Grambling State University (GSU), which is an institution of higher learning. Students attending GSU are the aspiring leaders of today and tomorrow building their educational foundation. Presently at Grambling State University, students are provided with access to an information system known as "Banner Web". The idea is to fine-tune certain aspects of the current system. During the development of this increment, the software engineering team underwent various software engineering steps to acquire the end product. These steps comprised of constructing on paper the requirements model, analysis model, database design, gathering data, establishing the algorithms and the actual coding process. During development of the first increment, the end users were kept abreast with the different documents mentioned above as well as the actual code, on a week-to-week basis. The "ADVISE ME" system has three (3) actors: Administrator, Student, and Faculty Member. The system allows the Administrator to Login, start up/shut down the system. The Student will be able to login, change his/her password, update his/her personal information, add/drop courses, and view their assessment, which shows the student what is needed to graduate. The Faculty member will be able to login as well as view a given student's assessment. In this increment, however, all actors are able to login; a student is able to update his/her personal information, change his/her password, update his/her personal information and view their assessment; a faculty member is able to view a given students assessment. It is the software team's hope to improve on the next increment.

Du, T., N. Rama, S. Bai and E. Khosravi. SU-BR. **Modeling interactions of 8R-lipoxygenase and arachidonic acid using internal coordinate mechanics.—**Lipoxygenases (LOX) play important roles in the biosynthesis of biologically active eicosanoids from polyunsaturated fatty acids. An understanding of the structure basis of the LOX family is critical for the development

of LOX specific inhibitors. In this study, a computational method, internal coordinate mechanics (ICM) was applied to identify the binding site of 8R-LOX for its substrate, arachidonic acid (AA). A model of the interactions between 8R-LOX and AA was generated. Sequence analysis and statistical analysis were applied to verify the model. The modeling simulation results showed that the C-10 of AA is positioned against the catalytic Fe atom enclosed in 8R-LOX, which favors the catalytic process of 8R-LOX. The binding site of 8R-LOX has been defined. The results from this research will help model the interactions of protein-substrate in the LOX super family.

Frederic, P., H. Monlouis and Y.B. Reddy. GSU. **Item locator.—**The "item locator" was developed with the specific purpose of allowing users to locate items within the store without having to walk through the whole store in search of that particular item. The locator is in the form of a kiosk machine with touch screen features and a virtual keyboard. It was placed in strategic locations within the store such as at the end of every other isle to allow for easy access by customers. It was connected to an inventory database, which classifies, describes and provides the specific aisle location of all the items within the store. The locator groups the items according to categories such as home entertainment, computers, cameras, digital music player and accessories, which enabled the user(s) to perform quick searches. Each category is further divided into subcategories until the item type in question is found and selected from a list of items currently available at the store. Upon selection of the specific item type, a popup screen displays the brand and aisle location of every item of that specific type. The user(s) is also able to search for an item by using keywords. The virtual keyboard displays at the user's command by selecting the search option on the main screen. If the user is looking for a specific brand of item, then he/she can begin typing the brand name in the text field provided on the keyboard. A list of names matching the exact phrase in the text field appears at the top of the keyboard. The user can then select the desired brand name and a result window shows the aisle location, type, and category of all the items available matching the name being searched. The user interface of the item locator contains the following components - a screen that contains the item categories along with its aisle range and an on-screen keyboard that will appear if the search button is clicked.

Gwee, N. SU-BR. **Implementation of an NP-hard dance choreography problem.—**We demonstrate an implementation of an NP-hard dance choreography problem for the Mac OS X platform. The algorithmic engine was designed using C++, while the user interface was designed in Java, using the Swing components. Communication between these two language specific modules was achieved using the Java Native Interface. We exploit the video and audio capabilities of the Mac OS X by using Cocoa modules programmed in Objective-C. This paper demonstrates the integration of hybrid programming environments, and forms the basis of other development efforts exploiting multi-media resources accessible from various native contexts.

Kafle, S. and Y.B. Reddy. GSU. **Protection of information transformation using collaborative trust approach in wireless sensor networks.—**Wireless sensor network consists of randomly distributed sensor nodes capable of sensing physical and environmental conditions and transmitting wirelessly to the base station using multiple hops. Protection of wireless sensor network is very important especially when they are used in sensitive areas such as biological and chemical sectors. Due to the low processing power and low battery life, extreme security

measures such as encryption is not possible. Thus, we have designed a collaborative, trust-based method which detects malicious nodes such as a sinkhole (a node which drops all the packets) and a selective forwarding node (a node which drops packets from selected nodes only), and maximizes the successful transmission of the packet. In our design, each node overhears the packet forwarded by the next node and keeps a table of the total packets forwarded to the next node and the same packets forwarded by the next node. When the ratio drops below the threshold, it queries with other neighboring nodes about the suspicious node. If neighboring nodes report an acceptable ratio with the suspicious node, it will assume that the suspicious node is not malicious, but the path between them is broken and forwards the packet using an alternative path. If the neighbors also report a low ratio, it will flag the suspicious node as malicious and informs all other nodes to avoid it. We have created simulation of wireless sensor network using Modified DSR (Dynamic Source Routing) protocol and Java language.

Luo, M. and S.R. Pandian. SLU. **Vision-based navigation of an indoor mobile robot using road information segmentation.—**In this paper, two new advanced image processing algorithms are employed in the vision-based navigation of a mobile robot. Based on logical image operations, connected computing, and theories of knowledge of quad-tree decomposition and statistics of different road conditions. The first segmentation algorithm can easily adapt to any circumstance, but it should be applied by manual operation. It works by adjusting the threshold value, sample number, and the order parameter, and can extract up to 90% of road information when tested with sample images. The second method can implement segmentation automatically, but is only effective under conditions when the road information is a large proportion of the image. It is shown to extract up to 85% of road information by adjusting the threshold of the road image. The results of the technique are applied using Matlab to the navigation of an indoor mobile robot for variable indoor conditions.

Muganza, D., K. Abbott and Y.B. Reddy. GSU. **Fitness trainer**.—Fitness training is all the rage these days. Many people, from different walks of life are continuously trying to improve their fitness for aesthetic and health reasons. Few of these people can afford a personal trainer, who would provide them with valuable knowledge and motivation to maximize their fitness goals. The Fitness Trainer that we have developed intends to do away with the need, and cost, of the personal trainer's valuable knowledge by making it readily available to the user of the application. The knowledge referred to includes, but is not limited to Fitness Goal Policy, Workout Scheduling, Workout Routine, Workout Exercises, Exercise Sets and Repetitions, Performance Tracking, and Workout Modifications. The proposed fitness trainer application allows the user to choose a fitness goal, which defines a policy of what exercises should be performed and how to perform them. The user is then assigned a workout schedule, which describes what workouts will be performed on what days, and the exercises to be performed in each workout. These exercises are selected from a database that the application implements, where exercises are stored along with their descriptions and video demonstrations. During a workout, the user can play a video to see how to perform an exercise correctly. After a workout, the user enters information regarding his/her performance on that day, and this is stored as a Workout Log, which keeps track of the user's performance. This allows the application to track the user's progress over time and determine what modifications to make to the user's regimen in order to improve the user's fitness, and achieve the fitness goal.

Wiedemeier, P.D. and A.R. Shrestha. ULM. **An evaluation of data multicasts transmitted over a simulated amateur radio GEO satellite.—**During emergencies, radio communication is paramount and often provided by the amateur radio service. While most amateur radio operators usually use terrestrial radio to provide communication during emergencies, amateur radio low Earth orbit (LEO) satellites, which are available to "hams" worldwide, also may be used. Unfortunately, communication through a LEO satellite is usually restricted to a particular terrestrial location once a day, perhaps twice, and then for only a 1-15 minute duration. Ultimately, a communication platform mounted on a geo-stationary Earth orbit (GEO) satellite would greatly benefit amateur radio emergency communicators. In September of 2008, Dr. Tom Clark, a licensed amateur radio operator, proposed mounting the Eagle radio communication module, currently under development by the Radio Amateur Satellite Corporation, on a yet-to-be-launched commercial GEO satellite. Using information obtained from Dr. Clark, we simulated data multicasts transmitted over GEO-Eagle, which is Dr. Clark's name for this amateur radio GEO satellite. Our simulations show that file sizes less than or equal to 128 KB are transmitted in less than two minutes within GEO-Eagle's footprint. We believe the data generated by our research will interest individuals within the amateur radio service who transmit data during emergencies.

Earth Science Section

Bourque, B., L. Berg, and W. Gustafson, Jr. ULM. **Preliminary analysis of the mixed layer depth during the carbonaceous aerosols and radiative effects study (CARES).—**A first look at the observed heights of the mixed layer during the Carbonaceous Aerosols and Radiative Effects Study (CARES) field campaign along with comparisons to the Weather Research and Forecasting (WRF) model simulations run during the same time frame.

Case Hanks, A.T. ULM. D. Tan. GIT. **Preliminary results of HONO from photo-fragmentation laser-induced fluorescence.—**Nitrous acid, HONO, is a critical species in the chemistry of the atmosphere. It photolyzes rapidly in the near ultraviolet to produce the hydroxyl radical, OH, and nitric oxide, NO. Here we present results utilizing photofragmentation laser-induced fluorescence (PF-LIF) for measurement of HONO.

Cooper, D., A. T. Case Hanks. ULM. **The historic Yazoo City tornado of 2010: A case study. —**On April 24th, 2010, a very intense supercell developed over parts of Madison Parish Louisiana. Near Tallulah, Louisiana, the supercell began to produce a very powerful tornado that caused damage to several structures, including a large chemical manufacturing plant. After moving into Mississippi, the tornado grew stronger, eventually producing EF-4 damage in and around Yazoo City, Mississippi. It continued on its northeasterly track for approximately 149 miles total, finally dissipating near Sturgis, Mississippi. As one of the most powerful and long-tracked tornadoes in state history, it is of utmost importance to understand what could have contributed not only to the intensity of this storm, but also to its longevity. Of particular interest is the way in which the tornado may have developed more rapidly than normal, quickly attaining EF-3 strength, and how it maintained itself as a violent tornado for most of its lifespan. The goal of this research is to gain a more robust understanding of tornado genesis, particularly in strong

and violent tornadoes, and how environmental factors affect different aspects of a tornado's life cycle.

Greenlee, D.M. ULM. **Recent research in the plaza at Poverty Point State Historic Site.—** For archaeologists, site plazas are generally considered empty spaces, containing few artifacts and little evidence of use. At Poverty Point State Historic Site, remote sensing surveys of the plaza and innermost ridges have revealed about 30 large ring-shaped magnetic anomalies within the southern plaza area. Sediment cores and downhole magnetic susceptibility data confirmed the locations and provided information on the depth and character of features associated with a sample of the anomalies. In summer 2009, a joint University of Louisiana at Monroe and Mississippi State University field school placed small excavation units over four anomalies, each with different magnetic characteristics. This work was continued in summer 2010 by the Poverty Point Station Archaeology program. I summarize the fieldwork, compare what we found with predictions based on the near-surface and downhole magnetic data, and consider the implications for our understanding of Poverty Point's plaza.

Grymes, J.M. III. LSU-AC. **Tropical weather & the Bayou State: Assessing the threat.—** With a 50-50 chance of a strike by a 'named storm' in any given year, Louisiana has always been a high-threat state in terms of tropical landfalls. However, recently, Mother Nature appears to have upped the ante: Louisiana suffered more tropical landfalls during the 2001-2010 decade than during any other decade on record. Katrina, Rita, Gustav and Ike were the decade's hurricane headliners, but a dozen other 'named storms' left the state reeling -- more than double the average number of 'hits' per decade recorded during the 20th Century. The obvious questions: Is this a trend that we can expect to continue? Was the recent decade just a run of bad luck or are there other factors at play, such as climate variability and climate change? A historical perspective is presented to address these questions and to propose the state's tropical-weather threat for the near future.

Hopper, L.J. ULM. C. Schumacher. TAMU. **Modeled and observed variations in storm divergence and radar echo coverage.—**Diabatic divergence profiles observed by an S-band Doppler radar are compared to ensemble simulations of an extreme rain-producing mesoscale convective vortex (MCV) and three leading-line trailing stratiform mesoscale convective systems (LLTS-MCSs) occurring in southeast Texas. Eight mesoscale model runs are simulated for each case using two microphysics parameterizations and four treatments of convection. Observed and simulated radar reflectivities are also objectively separated into convective, stratiform, and non-precipitating anvil columns, with most simulations producing deficient stratiform and excessive convective and anvil echo relative to observations. In addition to noting how the simulations for each case deviate from observations, systematic variations caused by utilizing different convective treatments and cumulus parameterizations also are investigated along with their possible implications for vortex dynamics.

King L.R. SLCC. G.L. Stringer. ULM. **A re-evaluation of the taphonomy of late Eocene shark coprolites from the Yazoo Clay at the Copenhagen Prairie of northeastern Louisiana.—** Systematic, long-term collecting of two sites in the late Eocene marine sediments in the Copenhagen area of Caldwell Parish, Louisiana, has resulted in the procurement of over

1,150 shark coprolites. The coprolites have been obtained primarily through surface collections from the upper Eocene Yazoo Clay, which has been dated (K/Ar) at approximately 36.5 million years old. Two primary morphological types, spiral and scroll, have been recognized. Approximately 98.5 percent of the coprolites were classified as either spiral (546 specimens) or scroll (600 specimens) based on external and internal morphological features. Studies at the two localities produced extensive collections of shark teeth (>2000) and provided statistics on the abundance of the 14 identified shark taxa with two major orders looked at as the major contributors of coprolites – the Lamniformes and the Carcharhiniformes. The lamniforms, which are the most primitive of the two orders, produce spiral coprolites. The carcharhiniforms have some representatives that produce spiral coprolites, while others produce scroll types. The taphonomy of how these trace fossils occur is through a possibly unique set of circumstances, which will be presented.

Pullin, J., A. T. Case Hanks. ULM. **Analysis of MCS associated supercells in southwest LA on 24 December 2009.—**This work presents an analysis of the discrete mini supercells associated with a squall line during the December 24, 2009 severe weather outbreak in Southwest Louisiana. These discrete mini supercells were defined and carefully analyzed by using radar data obtained from the National Weather Service Office in Lake Charles, Louisiana. The data indicates the state of the atmosphere before, during, and after the severe weather event. On this particular day, the Storm Prediction Center issued a slight risk for severe weather across all of Louisiana with damaging straight-line winds being the primary threat. However, morning upper air soundings from the NWS office in Lake Charles showed an increased risk for tornadoes based on speed and directional wind shear as well as a very unstable atmosphere. The sounding was verified, as there was a total of twelve tornadoes across southwest Louisiana with three being rated "strong" (EF 2). There were only four injuries associated with these tornadoes, and one fatality that was the result of severe straight-line winds.

Stringer, G. ULM. **The fossil megatoothed shark *Carcharocles* from the Yazoo Clay (late Eocene), Caldwell Parish, Louisiana**.**—**Extensive collecting in the Yazoo Clay (late Eocene, approximately 36.5 million years old) in Caldwell Parish, Louisiana has produced specimens of the megatoothed shark *Carcharocles*. Teeth of *Carcharocles* were relatively rare with over 30 years of collecting resulting in only fifteen specimens. The preservation of the teeth was highly variable from exceptional to poor and was related to taphonomic parameters as well as post-depositional conditions. Analysis of several characteristics of the fossil teeth such as lateral cusplets, blade serrations, blade shape, and root characteristics indicated that the specimens belong to *Carcharocles sokolovi* in the evolution of this chronospecies. This species was a predecessor of *Carcharocles megalodon*, the well-known, extremely large shark of the Miocene and Pliocene. Recently, an exceptionally large *Carcharocles sokolovi* tooth (upper second anterior) was recovered and appears to represent one of the largest fossil shark teeth found in Louisiana or Mississippi. Several different formulas have been proposed by researchers to estimate the size of fossil megatoothed sharks. These formulas were utilized to reconstruct the size of the late Eocene *Carcharocles* from Louisiana based on tooth measurements and indicated that the megatoothed shark could have ranged from 8.62 meters (28.26 feet) to 9.69 meters (31.79 feet) in length. Research partially funded by the ULM Scott Endowed Professorship.

Materials Science and Engineering Section

Akhtar, S., A. Alayoubi, and S. Nazzal. ULM. **Comparison between cationic and neutral lipid nanoparticle loaded with doxorubicin sodium deoxytaurocholate ion pair complex.—**The objective of this study was to compare and contrast solid lipid nanoparticles (SLN) – loaded with doxorubicin sodium-deoxytaurocholate ion-pair complex. These SLN were prepared to overcome doxorubicin-induced cardio-toxicity. The two stearyl alcohol-based SLN were prepared by high shear homogenization/sonication method. Cationic-SLN1 was made of stearyl alcohol: ceramide VI: CTAB: Polysorbate 60 1:1:0.5:0.5 while the neutral-SLN2 was made of stearyl alcohol: Brij®78: Vit. E TPGS 1:1:1.6. Size, zeta potential, entrapment efficiency, and release rate were measured. The mean particle size of nanoparticles and their zeta potentials were determined by photon correlation spectroscopy. The entrapment efficiencies of SLN1 and SLN2, determined by centrifugal filtration, were ~33 and 95%, respectively. The drug release, determined by dialysis tubing method, was more than 90% for SLN1 in nanopure water in 2.5 hr; whereas, SLN2 released 38% of the drug within 32 hours. The rapid drug release in SLN1 suggested that drug may not be present in the lipid core, but rather absorbed on the surface of the SLN as free doxorubicin; whereas, the high entrapment efficiency and controlled doxorubicin release from SLN2 indicated that an intact drug complex was entrapped with the lipid matrix.

Alayoubi, A., A. Siddiqui, and S.M. Nazzal. ULM. **The utility of the MultiSimplex® optimization software in pharmaceutical formulation and drug product development.—** MultiSimplex® is multivariate non-linear optimization software that may be used to identify the optimal composition of a drug product utilizing minimal number of trials. It combines modified simplex method with fuzzy-set theory by means of membership functions (aggregated value) in which K+1 experiments are performed with K being the number of input variables. Based on preliminary results, sequential experiments are suggested until the aggregated value approaches 1, which signifies optimum/desired formulation composition. The objective of this study was to use MultiSimplex® to indentify a self-emulsified drug delivery system (SEDDS) with optimal physical properties and highest drug loading. A modified simplex method with five control variables and 200% step size was used. After preparation, SEDDS formulations were emulsified in water and the resultant dispersions were quantified for size, drug release, and emulsification rate. By sequential analysis, several formulations attained a membership value above 0.9, which corresponded to 100% drug emulsification into < 150 nm droplets with < 60% maximum drug load. The ability of the MultiSimplex® to handle several optimization criteria simultaneously to find the optimum SEDDS composition with a minimum of practical trials reflect its potential utility in drug and formulation development.

Anderson, J.F. ULM, and M.F. Drenski. TU. **Depolarized light scattering of polarized laser light.—**The goal of this collaboration between ULM and Tulane University Polymer Physics Group was to develop a flow cell that would measure the depolarized scattering of polarized laser light. Such scattering is useful in determining the stages of polymer chain development over time and concentration if concentration is known. The cell is described and initial results of PVP 300k, 20 nm latex spheres, and toluene are presented.

Baker, S. LTU, and P. Derosa. LTU, GSU. **Thermal protection system for atmospheric reentry and space flight.—**Thermal protection systems (TPS) need to provide protection from thermal and mechanical threats. Many of today's systems are well optimized to provide thermal protection but tend to be too brittle and fail to efficiently provide protection from mechanical threats. We propose a TPS that protects efficiently from thermal and mechanical threats. This system is comprised of three layers, the skin, fat, and organ (SFO). The SFO works much like an organic system. The skin provides initial protection from thermal threats but works best against mechanical damage with the majority of the heat passing right through, then the fat layer provides protection against thermal threats and provides temporary storage of thermal energy during atmospheric reentry. The organ layer takes the stored thermal energy and converts it to electric energy. In this work, we develop an approach to describe the heat capacity of the skin layer. We chose TiC as it has been extensively studied and will provide for a good validation of our model. We also have looked at the influence of pressure on the heat capacity of TiC.

Bhattarai, D and S. Yoshida. SLU. **Algorithm to convert optical interferometric images to numerical data of underlying physical quantity.—**We develop algorithms to convert optical interferometric fringe images to tabulated numerical data of the corresponding physical quantity. Our final goal is to apply optical interferometry to analyze displacement of deforming objects on a real-time basis. We are especially interested in analyzing objects under plastic deformation; hence the fringe patterns are nonlinear. We have two separate approaches for the tabulation. In the first approach, the user clicks on four points of each dark fringe to best-fit it to a quadratic equation. Then the MATLAB script interpolates the data to find the values at user-defined grid points for the tabulation. In the second method, the user clicks along the top, bottom, left and right borders of the fringe image where the fringes intersect, giving the fringe order as clicking. Then through interpolation and extrapolation, the MATLAB script sets up a table of the fringe order at the borders. Now the user clicks on at least five distinct horizontal lines usually around the center of the image so that through interpolation, the values at all the grid points are determined. These algorithms are less effective when the fringe density is low. We plan to develop another algorithm to overcome this shortfall.

Desimone, D. G., M. A. Koorie, A. Thapa, S. R. Animilli, S. Zivanovic, and D. Genov. LTU. **Theoretical and experimental study of metal-dielectric composite electrodes for polymer solar cell enhancement.—**Solar radiation provides a readily available source of free energy. The three major methods for direct conversion of light into electric current are photovoltaic, photoemissive, and photo-electromagnetic processes. These technologies have been plagued by high costs and low conversion efficiencies. Manufacturing of inorganic solar cells also requires high temperatures and thus high manufacturing energy consumption. We theoretically and experimentally studied thin conjugated polymer active layers integrated with a super-layer of percolating metal-dielectric composite electrode (MDCE) for photovoltaic application. The MDCE consists of a semi-continuous metal film ~ 20 nm thick with dielectric between metal particles. The MDCE supports broad surface plasmon resonances that store electromagnetic radiation, acting as an effective bulk type concentrator. Our 2D and 3D computer-aided numerical model is based on the effective medium approach and can predict optical properties of the MDCE and photovoltaic device efficiency. We fabricated the metal MDCE by sputtering technique, and measured its optical and electrical properties below, at, and above the percolation

threshold. The obtained experimental results confirm our theoretical predictions. The authors thank the US DoE, the Louisiana Space Consortium, and NASA under grant NNG05GH22H for support during this project.

Lei, J., S. Yang, E. Khosravi, and K. Lian. SU-BR. **Ab-initio study of copper atoms/cellulose segments interaction.—**The core-shell structure of copper nanoparticle covered by carbon layers has shown potential for fuel cell and corrosion protection applications. Coating copper nanoparticles with a carbon layer appears to protect the copper against oxidation, while allowing the copper nanoparticles to retain useful properties. The general method for producing novel metal-core carbon-shell nanoparticles comprises soaking a natural fibrous material (cellulose) with a solution containing metal ions, removing the solvent, and then carbonizing the impregnated fibers at a temperature sufficient to generate metallic cores encased in carbon shells. We performed ab-initio density functional theory (DFT) simulation on the copper atoms/cellulose segment model (two cellulose units and bound with Cu atoms to each electron-rich oxygen atoms in the cellulose unit). The Vienna Ab-initio Simulation Package (VASP) was used to perform simulation. We analyzed the results and propose a copper binding model to explain the possible core-shell formation mechanism.

Mclean, D.L., R.L. Weekes, S.S. Chen, and S.J. Lee. GSU. **A PID temperature control system design.—**A PID (Proportional-Integral-Derivative) controller is a device commonly used in the automatic control field to control, for example, temperature, motor speed, and liquid level. In this project, a negative feedback temperature control system with a PID controller was designed and constructed by the use of operational amplifiers and other electric/electronic components/devices. The National Instruments Circuit Design Suite 11 and a computer aided circuit analysis/design software for electronics were used to simulate, analyze and troubleshoot the designed circuit. After completion of the design, a prototype of the designed circuit was constructed on the NI Elvis II, a computer integrated platform to demonstrate its performance experimentally. The characteristics of the PID temperature control system were displayed by interfacing NI Elvis II platform with NI LABVIEW 8.6 and a visual/graphical programming software through USB connection to a PC. A satisfactory performance of the control system was observed. This control system can be easily expanded/extended to include other control elements/devices for other control applications.

Patel, K., S. Patel, L. Patel, and D. Mills. LTU. **Electrospinning for production of scaffold. —**Electrospinning uses an electrical charge to create micro- or nano-scale fiber from a liquid. This process is efficient, rapid and inexpensive. Scaffolds usually serve at least one of the following purposes - they allow cell attachment and migration, deliver and retain cells and biochemical factors, enable diffusion of vital cell nutrients and expressed products, and exert certain mechanical and biological influences to modify the behavior of the cell phase. The electrospinning set-up consists of a syringe pump, a high voltage source (in kV), and a collector. Syringe pump will force liquid out at a constant rate (in microliters per min). In electrospinning, high electric voltage is used to create a high electric field area that will create an electrostatic charge in the body of the liquid. Electrostatic repulsion counteracts the surface tension and a droplet is increased up to critical point when a stream of liquid erupts from the surface. The polymer jet starts when the charge of repulsion within the solution is higher than the surface

tension. During a polymer jet travel path, solvent within a solution will vaporize and polymer will form on collector. We were able to produce polycaprolactone (PCL) scaffolds with average diameter of 6 micrometer.

Price, M.L., A.L. Candler, T.A. Scott and S.J. Lee. GSU. **A keyless digital entry system design.—**With the everyday advancement of technology, engineers are developing ways to discontinue the use of keys. The objective of this study is to develop a secure digital keyless entry system. The analog and digital electronic components used include a 1-9 digit keypad with an Enter and a Clear key, a 74147 priority encoder, shift registers, comparators, a logic gate circuit, a counter, seven segment LED displays, a relay, and selected output devices. The developed system is capable of storing a four digit security code which is resettable by the owner. Users' access is allowed only if the input code is a match. A warning alarm will be triggered if the user has tried three times and failed. The digit codes entered are stored in registers and displayed on seven segment LED displays. The National Instruments Circuit Design Suite 11 computer aided circuit analysis/design software was used to simulate, analyze, and troubleshoot this system. The prototype of the designed keyless entry system was constructed on a circuit board to demonstrate its performance experimentally. This system can be easily extended/expanded for other security applications.

Rekula, S.R. and D. Davis. LTU. **GMR in electrodeposited Ni/Cu multilayer nanowires and thin films.—**The discovery of giant magneto resistance (GMR) led to the evolution of a large research field of 'spintronics' because of its applications in magnetic field sensors and read heads. GMR describes the drop in resistance across a structure comprising of metal multilayers in response to an applied magnetic field. Electrodeposition with its advantages, including cost effectiveness, high deposition rate, and the simplicity of apparatus, is the most efficient method to grow nanowires and thin films. A basic three electrode setup is used for the electrodeposition. The electrolyte used in the process consists of 79.7 mM nickel sulfamate, 2.0 mM copper sulfate with few additives. The deposition process was carried out at room temperature. The electrolyte was characterized using composition analysis (EDAX), polarization resistance study, SEM and TEM. The variation in the Cu layer and alloy layer thickness was investigated and the maximum GMR of 3.75% and 2.76% were obtained in nanowires and thin films respectively.

Tull-Walker, N. and N.V. Seetala. GSU. **Positron lifetime spectroscopy studies of annealed single crystal aluminum.—**Positron lifetime spectroscopy (PLS) is very sensitive to vacancy type lattice defects in metals and free volume changes in polymers. We want to use PLS to estimate the microscopic free-volume parameters such as pore size, pore concentration, and fractional free volume in polymers (polyurea) with different nanoclay concentrations. POSFIT computer program analyzes the lifetime spectrum into different components related to positrons annihilating at polymer chains and free spaces. The POSFIT program requires input for source correction. To find the source correction, we are using annealed single crystal aluminum as a reference where the standard values are known. Single crystal aluminum was obtained from Alfa-Aesar Company, the surfaces were polished, and the samples were annealed at 400 °C to remove any lattice defects. ^{22}Na source is sandwiched between two aluminum samples and the lifetime spectrum was collected. The positron lifetime spectrum was analyzed by POSFIT

program for three lifetime components. The first component is compared with the standard value from literature and the source correction is obtained for future use while analyzing polymers.

Zhao, L., S. Yang, and E. Khosravi. SU-BR, Jordan, G. and S. Guo. LSU-BR. **Electronic structure and optical properties of a Ta doped yttria-stabilized tetragonal zirconia from ab initio simulation.—**The stability and optical property of thermal barrier coating (TBC) is very important and needed in high temperature alloy applications. The tetragonal zirconia with tantalum and yttrium doping is studied in this research. We investigated the bulk phase of cubic zirconia with density functional theory (DFT) calculations and ab initio molecule dynamic (MD) method. The MD simulation shows that the Ta:YSZ (yttria stabilized zirconia) structure is very stable even under high temperature over 1350˚C. The optical property of the optimized Ta doped YSZ is also studied using DFT simulation using VASP package. The novel standard YSZ coatings at elevated temperature with higher temperature capability and longer lifetime may have a good performance for TBC applications.

Physics Section

Bagayoko, D., L. Franklin, E.C. Ekuma and G.L. Zhao. SU-BR. **Novel results of LDA and the BZW method**.**—**We report ab-initio self-consistent electronic properties of selected semi-conductors. Our calculations employed a local density approximation potential, the linear combination of atomic orbitals, and the Bagayoko, Zhao, and Williams (BZW) Method. Our results unlike those of any other calculations agree with experimental findings for InAs, GaAs, and CdO, among others. As previously noted, the BZW Method correctly solves the system of equations that defines local density approximation. Acknowledgements: This work was funded in part by LONI [Award No. 2-10915], and the National Science Foundation and the Louisiana Board of Regents [Award Nos. EPS-1003897 and NSF (2010-15)-RII-SUBR] through LaSIGMA.

Bilash, K.C., P. Koirala and A.K. Kandalam. McSU. **Hyperhalogen behavior of $M(BO_2)n$ (M=Cu, Ag; n=1-6) clusters.—**Superhalogens are clusters, which consist of a metal atom surrounded by halogen atoms, whose electron affinity (EA) is larger than that of the chlorine atom. Superhalogens play an important role as oxidizing agents. It was recently proposed that a new class of highly electronegative species could be synthesized by surrounding a metal atom with superhalogen moieties, instead of halogen atoms. These clusters were named "hyperhalogens", since their electron affinity was shown to be greater than that of their superhalogen building blocks. This hypothesis was verified by using Au as the metal atom and two BO_2 units as the superhalogens. The $Au(BO_2)_2$ cluster has an EA of 6 eV, which is significantly larger than the EA of the superhalogen BO_2 (4.32 eV). In this talk, I will present our recent results on $Cu(BO_2)_n$ and $Ag(BO_2)_n$ (n=1-6) clusters. Using density functional theory (DFT) calculations, we show that $Cu(BO_2)_n$ and $Ag(BO_2)_n$ clusters also exhibit hyperhalogen behavior. A comparative study between all the coinage metal–borate clusters also was carried out to understand the origin of the unusually large EAs of these clusters. The hyperhalogens can serve as ingredients in the synthesis of a new class of superoxidizing agents.

Charles, N. LTU. V. Edward. GSU. P. Derosa. LTU/GSU. **Parallelized Monte Carlo code for transport in organic semi-conductors.—**In recent years the popularity of organic semiconductors for use in microelectronics has grown in both academia and industry. Interest is driven by their ease of fabrication, low cost of production and relatively limitless number of possible polymer modifications. In light of this, several models have been developed within a variety of theoretical frameworks. We describe here our progress towards an integrated model able to account for charge transport in conductive polymers under different regimes, including polaron-free transport, polaron transport and exciton transport in realistic geometrical arrangements. In the first step, polaron transport based on the Marcus formalism, as well as a tentative model for exciton transport are implemented in a fully parallel computational environment. The results of this code are compared with the (modified) time-of-flight experiment (Tofet) algorithm developed by Kwiatkowski et al., as well as experimental results.

Elumalai, D.N. LTU. H. Monlouis. GSU. P. Derosa. LTU/GSU. **A study of diffusion through nanostructures**.**—**Nanostructures show exceptional physical properties that make them promising candidates for many applications that require the transport, storage, and/or delivery of fluids, either through them or functionally attached to them. In order to efficiently plan potential applications, transport properties and interactions such as adsorption, diffusion, and solvent interactions and flow characteristics must be understood. Our study focuses on the mechanisms that inhibit or encourage diffusion through these nanostructures and the nature of the interactions responsible for movement of any sort in these regimes. This work treats each interaction individually and aims at successfully modeling the diffusion of particles through, for example, tubular nanotubes as a function of the interaction between the diffusing particles and the nanotube walls. To conduct this research we have employed Monte Carlo calculations, implementing a specific forced random walk algorithm. Preliminary results suggest that any delay in diffusion would occur due to a strong molecule-wall interaction.

Jones, P. ULM. **The relativistic 2-D uniform gravitational field**.**—**Brane world scenarios have been extraordinarily useful in developing new approaches to the quantum gravity and the hierarchy problems. A solution for the 2-D relativistic infinite plane source was recently developed, which is consistent with the metric of 5-D brane worlds. Similarly, the relationship between a 2-D gravitational uniform field and an accelerated observer recently has been used to reaffirm the exactness of the equivalence principle in general relativity.

Koirala, P., K.C. Bilash and A.K. Kandalam. McSU. **Computational study of coinage metal borates.—**Charged clusters and particles play an important role in a wide variety of areas, such as building groups in inorganic salts, nucleating centers of aerosols in the atmosphere, and oxidizing agents. The chemical reactivity of these anionic species is strongly dependent on the electron affinity (EA) values of their corresponding neutral counterparts. Systems possessing anomalously large EA values (larger than that of chlorine) have been termed as "superhalogens". In a recent study, it was shown that $Au_n(BO_2)$ clusters (n=2, 4) behave as superhalogens. Very recently, a new class of highly electronegative species, called "hyperhalogens", whose EA values are even larger than those of superhalogens, was proposed. The feasibility of such a hyperhalogen cluster was demonstrated for $Au(BO_2)_n$ (n=1-2) clusters. In order to verify if the $Cu_n(BO_2)_m$ and $Ag_n(BO_2)_m$ clusters also would exhibit superhalogen and hyperhalogen behavior,

we have carried out density functional theory (DFT) based calculations. Our results show that unlike its gold-counterpart, $Cu_n(BO_2)$ and $Ag_n(BO_2)$ clusters did not exhibit superhalogen behavior. On the other hand, $Cu(BO_2)_n$ and $Ag(BO_2)_n$ clusters were found to be hyperhalogens. The equilibrium geometries, electronic structure, vertical and adiabatic detachment energies, and thermodynamic stability of these clusters also will be presented.

Koirala, P., K.C. Bilash, A.K. Kandalam, K. Boggavarapu and P. Jena. McSU. S**uperhalogen properties of coinage metal fluoride clusters**.—Equilibrium geometries and electronic structure of neutral and anionic coinage metal fluoride XF_n (X=Cu, Ag and Au; n=1-7) are obtained from density functional theory-based calculations. We found that neutral and anionic CuF_n and AgF_n clusters can bind a maximum of 4 F atoms atomically and a further increase in the number of F atoms results in the formation of complex structures where not all F-atoms bind atomically to the metal atom. In contrast, Au atom can bind up to 6 F atoms atomically. Neutral XF_n (X=Cu, Ag) clusters are stable against dissociation into X and F atoms up to n=6 and n=7 for AuF_n. On the other hand, XFn clusters are stable against dissociation into F atoms and F2 molecule over the entire size range, indicating the higher stability of anionic species as compared to the neutral counterparts. Even more striking is the fact that the electron affinities of these clusters are as large as 8 eV, far exceeding the electron affinity of Cl that has the highest value in the periodic table. These clusters are thus classified as superhalogens. These superhalogens can be used as building blocks of energetic materials capable of destroying biologically active materials (bio-decontamination).

Mehta, N. LTU. P. Derosa. LTU/GSU. **Estimation of the accuracy of four DFT functionals to calculate ionization potential and electron affinity of small molecules**.—In this work we test the accuracy of four DFT functionals, namely B3LYP, BLYP, BPW91, B3PW91, for the calculation of ionization potential (IP) and electron affinity (EA). Calculations of these properties with a variety of methods abound in the literature; in most cases, the conclusions are not very encouraging regarding the capability of these methods to predict these properties. This is particularly true for DFT. One such work, published in 2007 by Gang Zhang and Charles B. Musgrave, compared 11 different DFT functionals in their prediction of IP, EA, and first excitation energy of 27 test molecules; however, inspired by the Koopman's theorem, in its DFT version, they compared the above properties with the molecular HOMO, LUMO, and HOMO-LUMO gap(HLG) respectively. The results indicate average errors of up to several eV. Here the IP and EA for the same 27 test molecules are calculated according to their definition as the difference in energy between the neutral and charge species and compared to experimental values. Not surprisingly, our results show very low errors showing that DFT can indeed be used to predict these properties with good accuracy. Funding Support: The Louisiana Board of Regents LEQSF(2009-12)-RD-A-27; NSF/IMR-0414903.

Mundru, P.C. and D.A. Genov. LTU. **Design of a generic cloaking device**.—We present a new approach toward realization of a multi-shell generic cloaking system. By considering specific geometrical and material properties for the shells around the object, we derive in quasi-static regime a transparency condition(s) independent of the object's optical properties and geometrical morphology. We propose realistic shell designs based on composite media and the effects of dispersion and dissipation on the overall scattering cross-section are evaluated. Full wave

analytical and numerical simulations also are performed showing good correspondence with the analytical theory. Reduction of the scattering is demonstrated across the entire optical spectrum.

Pappakrishnan, V.K. and D.A. Genov. LTU. **Casimir-Polder Force reversal with air as intermediate medium using metamaterials.—**A promising system design aiming to demonstrate Casimir-Polder Force (CPF) reversal is proposed. The constraints when using naturally available materials in designing the system with air as an intermediate medium is resolved by using artificial electromagnetic materials. A generic condition for CPF reversal has been derived for non-dispersive media. For dispersive media, we propose a particular system with symmetric material properties, for which the CPF is repulsive under all plates' separation distances. Furthermore, a simple analytical theory for the CPF is developed. The analytical theory is in good agreement with the numerical calculations. The parametric space in terms of the plate's magnetic and dielectric plasma frequencies, gap thickness and temperature is investigated. This study could lead to functional designs of nanoscale quantum levitation systems and frictionless bio-fluid transport devices.

Shrestha, R. and M. Basnet. SLU. **Laser induced thermal effect in the Michelson type inferometer in ground based laser interferometric gravitational wave detector**.**—**With ground-based, laser interferometric gravitational wave detectors in mind, laser-induced thermal effects in the beam splitter of a Michelson type interferometer are discussed. A finite element model of the thermal lensing effect has been built to compute the temperature profile in the beam splitter. The optical phase shift resulting from the temperature dependence of the refractive index has been analyzed. The effect of spatial fluctuation of the incident laser beams and the resultant relative phase fluctuation is discussed.

Yadla, K.S. LTU. P. Derosa. LTU/GSU. **A novel approach to study the dielectric constants of polymeric chains**.**—**Electrochemical energy systems like fuel cells and batteries are tending towards supercapacitors in upcoming technological applications. These energy efficient systems can be designed by employing nanotechnology principles in conjugation with various combinations of conjugated polymers. The objective of this work is to analyze, using computational tools, the dielectric properties of conjugated polymers as dielectric for designing supercapacitors. A new approach for obtaining the dielectric constant of a material from the interatomic parameters is implemented. Density functional theory is used to calculate polarizabilities for oligomers of increasing length, determining the polarizabilities of the polymers by extrapolation. These polarizabilities are further used to calculate the dielectric constant using the Clausius–Mosotti's relation. The validity of this approach has been established elsewhere for other properties such as geometrical parameters and HUMO-LUMO gap. Here we evaluate the approach for the prediction of the dielectric constant. This approach will prove useful to accurately compare dielectric constants of different polymers and thus help design polymer-based super capacitors.

Division of Science Education

Higher Education Section

Broussard, J.E. LSU-E. V. Mbarika, C. Thomas and M. Diack. SU-BR. **Impact of multimedia case studies.—**Educational technology literature has advocated the use of multimedia case studies to convey technical concepts. NSF has sponsored the LITEE technology project in an effort to assist instructors in communicating information technology concepts to non-technical students to improve achievement. This study is an effort to examine the impact of the LITEE case studies, particularly the Telemedicine in India case study, on students' learning of information technology concepts. Data results focus on increases in actual knowledge, perceptual increases in problem solving skills, perception of learning, higher order cognitive skills improvement, and changes in attitudes toward MIS subject matter. Learning style, gender, GPA, program of study and level of study are all variables that will be used to analyze and interpret the results from the study. The participants are from several universities in the southern United States enrolled in undergraduate and graduate MIS courses. The project is supported by NSF.

Miller, B., J. Hall, B. Banks and A.M.D. Wiedemeier. ULM. **Production of cancer: A learner centered teaching approach.—**Learner centered teaching has been shown to improve, at the very least, student interest. Our project introduced an experiment into a traditional lecture class of Cell Biology as a way to increase interest and retention of information. Cancer is characterized by uncontrolled cell division, cell growth and an alteration in gene expression, and therefore is often used as a case study when teaching Cell Biology. Below we highlight a student driven semester project using *Agrobacterium tumefaciens* to produce cancer. During infection, *A. tumefaciens* inserts its Ti plasmid into wounded plant cells that contain genes that encode for the increased production of the plant hormones cytokinin and auxin. Once this T-DNA portion is incorporated into the plant cell, the plant cell loses the ability to regulate cell division and growth, which leads to an abnormal pattern. Students in our Cell Biology class introduced *A. tumefaciens* into wounded tomato stems, causing the formation of tumors. Then each group watched the development of their tumors throughout the semester. Besides observing growth changes, students also were able to observe the cytological differences between normal and neoplastic tissues. This project allowed each student to induce, observe and conclude about cellular changes in cancerous tissue.

Pugh, A. and J. Washington. ULM. **Elementary science methods infuses technology into the professional block.—**The semester prior to student teaching, the candidates are enrolled in the Elementary Professional Block that encompasses the methods of lower mathematics, upper mathematics, science, and social studies. The candidates are on campus for two to three weeks for methods in lower mathematics and social studies before having a school placement, grades one and two, for four weeks in the assigned schools. After the four weeks, the candidates return to campus for an additional three weeks of upper mathematics and science. Again, the candidates are assigned to schools for grades three through five for four weeks of teaching. In the science methods classes, candidates are required to present a lesson to their peers where they use Power Point presentations, the Internet, homemade science games, a collection of animal pictures, and the writing of a unit incorporating science and upper mathematics which is taught at their second

school placement. Therefore, the purpose of this paper is to present methods and furnish examples of how technology is infused into the elementary science methods class in the Professional Block.

Sullivan, S.K. LSU-A. **Promoting higher order thinking skills in college introductory biology students.—**Introductory level students of biology appear to have difficulty in answering exam questions that require higher order thinking skills, such as those requiring them to compare, explain or analyze information. This is likely due to several factors including not having practice answering these types of questions, and not studying or preparing the material in a way that allows them to answer the questions. In an effort to encourage and guide students in how to prepare the material for exams, a pre-test was given before each exam that included questions requiring higher order thinking skills. The results and corrections of the pre-tests were returned to the students in time for them to alter their preparation for the exam. The efficacy of this technique in improving student scores was evaluated by comparing student scores on higher order exam topics that had been included on a pre-test with those that had not been on a pre-test. Results of this preliminary study will be presented.

Thompson, A.L. ULM. **Integrated biology for elementary education majors.—**The integrated biology course is one of four science requirements for University of Louisiana at Monroe elementary education majors and incorporates biological concepts with classroom management techniques, inclusion strategies, and practical teaching experiences. Whether constructing karyotypes or family pedigrees, 3-D cell models or strawberry DNA extractions, the pre-service teachers at ULM learn ways of implementing general concepts from anatomy & physiology, botany, cell biology, ecology, evolution, genetics, and microbiology into focused activities that align with state and local grade-level expectations. Our pre-service teachers obtain a unique experience at ULM through two time-consuming and novel projects. Students are required to design a lesson that focuses on one organism on display within The Museum of Natural History on the ULM campus. Pre-service teachers utilize a local K-6 grade student volunteer within a video of their custom lesson, and then analyze their work and assess the child's understanding based on a provided course-grading rubric. The final group project requires students to teach their classmates about a specified human body system. Each group designs their own student learning objectives, special needs accommodations, a brief motivational activity, PowerPoint, and provides materials for an activity, an interactive closure.

K-12 Education Section

Beutner, M. ULM. **Online interactive audio: A new open-source tool for all educators.—**A new, unique, and free approach exists for educators to create online interactive audio applications to supplement any type of online learning content. Anyone, in fact, could create interactive online audio resources. This is a working example: http://www.ulm.edu/aceadventures/03/index.html - Move your mouse over any sentence and click to hear audio. To hear the entire story, click on the image. To pause audio, click on the red pause button. Educators have the means to author interactive online audio content, at no cost, without barriers. The impact on learning could be significant and profound. This “Louisiana technology” is at the very

earliest stage of acceptance and adoption. - Can teachers, at no cost, "make a difference" in enhancing reading and literacy by creating original online educational resources? - Can freely available interactive online audio resources, created by teachers, have a significant impact on achievement in language learning? - Is it possible for teachers to create "failure-proof" reading materials that promote a love for learning? Until now, it was much too difficult for educators to create original interactive online audio educational content. There were just too many technical and economic barriers. That is no longer true. It is now possible to use or create working examples of interactive online audio content.

Itegboje, A.O., V.M. Mbarika and J. Landor-Ngemi. SU-BR. **Effects of collaborative web-based learning on students' achievement in mathematics.—**This study investigated the effects of students' attitude, teaching and learning methodology on achievement in mathematical geometric construction. The study was carried out as a result of continuous under-achievement in geometric construction in Senior Secondary Schools, a 3-year progressive educational program in Nigeria. A purpose sample comprising 35 male and 27 female students from two intact classes of different private secondary schools was used for the study. A 28-item questionnaire and a 3-item word-problem type, teacher-made achievement instruments were used to conduct the study. An experimental group was taught using computers connected to the internet and based on constructivist theory of learning, for a period of 12 contact hours over four weeks. The responses of the questionnaires and achievement tests were subjected to descriptive analyses, t-test, regression analysis and Pearson correlation. Although inconclusive, results show that students' attitude towards instructional methodology appeared to play a minimal role in achievement of geometric construction, while the constructivist approach showed a better approach in teaching as it had a positive impact on achievement. In addition, such results show web-based learning as slightly positive. Implication of these findings call for further studies on collaborative web-based learning in teaching geometric construction in Nigerian Schools.

Whelan, J. TU. **Math science partnerships (MSP): A collaboration to improve K-12 education.—**For almost a decade Louisiana universities have been forming Mathematics and Science Partnerships (MSP) with local K-12 school systems to improve science and mathematics education across the state. The focus of the MSP projects has been to provide intensive training for K-9 teachers to improve their science and mathematics content knowledge. The need for these efforts has been well documented by the results of international, national and state examinations of our students in these subject areas. Continuous evaluations of these projects have demonstrated their effectiveness. Each year project representatives meet for an annual administrative conference and several project instructors share information with national colleagues during the US DoEd regional conferences. However, there has not been widespread in-state sharing on the success of these research-based professional development projects This panel discussion will be a forum for university scientists and mathematicians to exchange ideas about their programs, community partnerships they have built, and what they have learned from working with these teachers. Through this forum current MSP participants can expand their networks and those interested in starting a project can find the spark to activate their project. The panel will be composed of MSP leaders from across the state.

Wiedemeier, A., S. Owens and A.M. Findley. ULM. **Bayou informatics: A pre-college outreach summer research program.—**ULM has developed a precollege outreach science education enhancement plan that includes: an aggressive program that targets high school students to nurture and sustain their interest in the sciences; a proactive program for student preparation and remediation aimed at increasing retention of underrepresented minority and first-generation students; and, support for in-/pre-service teachers to develop curricular materials and successfully implement interactive laboratory exercises at their home institutions. The summer research program and follow-up visits to participating schools during the academic year represent an important presence for molecular science in rural educational systems where such experiences are often lacking. The program also contains several avenues for area science teachers to become more familiar with experimental biology, furnishes multiple opportunities for these teachers to bring hands-on scientific discovery into their classrooms, and encourages the development of advanced placement courses thereby providing more qualified, better-prepared beginning undergraduate students for the science education pipeline.

Division of Sciences and Humanities

Alexander, R.A. NiSU. **The professor "blinded me with science": Scientific inquiry as a catalyst for student engagement in the humanities.—**Those of us who teach in the Humanities have at our disposal all sorts of interesting subject matters—life, death, love, treachery, to name a few—with which to work in our classes. It would seem, therefore, that engaging our students in intellectual inquiry would not be a difficult task. Yet our students often seem underwhelmed by these subjects, perhaps because they address just more of what the students already experience. What we need, then, is subject matter that overwhelms, that awakes students to the mind-boggling, spine-tingling qualities of "what is." And what better place to turn than science? Who, for example, could be bored by the unfathomable distances of interstellar space, the absurd qualities of light, the oddity of life thriving in the darkest and coldest depths of the oceans? Of course, there are humanities professors who do integrate such subject matter into their courses. The question is "Why are there not more"? And why should it matter that there be more?

Banville, S.D. NiSU. **"I doubt; I fear; I think strange things": *Dracula* and the anxiety of knowing.—**Bram Stoker's *Dracula* (1897) is a novel concerned as much about impact of scientific and technological advances on the creation and reliability of knowledge, as it is an invasion novel, a neo-Gothic novel, or a novel about the dangers posed by New Women. From the very start, the novel's characters doubt their ability to observe and ultimately to know. However, such epistemological concerns are not merely the result of plot and narrative demands. They are, in part, the result of wider Victorian discourse about the reliability of human observation and the nature of knowing that arises out of scientific and technological advances, especially in the areas of optics and the physiology of the human eye. Reading *Dracula* as participating in the Victorian epistemological and scientific debates gives us new insight to the novel, its appeal to Victorian readers, and into how Victorians grappled with scientific and technologic advances that challenged and undermined Victorian certainties about the nature of knowledge and being. Moreover, the novel's structure and plot foregrounds the processes of knowledge creation as collective and corporate instead of the result of individual effort.

Black, N.S. NiSU. **Restoring Assyria: The process of archaeological discovery and the representation of a lost empire.—**This paper will examine the impact the archaeological excavations of Paul Emile Botta and Austin Henry Layard had on the public view of Assyria during the nineteenth century in England and France. It will be necessary to discuss the methods used for recovering artifacts from Assyria's lost history and to consider the challenges scholars faced when attempting to revise Assyrian history and to redress many of the erroneous views of the civilization in popular culture. This process of rediscovery was initiated by the achievements of French and British archaeologists. Following their discoveries, the sculptures now housed in the British Museum and the Louvre were reevaluated. The knowledge from the discoveries became available in the form of scientific articles in magazines that were reshaping public opinion in France and England regarding the lost empire. The analysis of paintings by Romantic, Realist, and Symbolist artists will show how Assyria was portrayed in both countries before and after the discoveries. It will become apparent that one nation failed whereas the other succeeded in more accurately portraying Assyrian culture and reshaping the public perception of the

Ancient Near East based upon scientific knowledge gained through the archaeological excavations.

Blount, B.J. and L.B. Lewis. LU-NO. **Differential effects of body-focused and emotion-focused meditation techniques on attention and mindfulness.—**We tested whether and how various types of meditation exercise affect attention and awareness in young adults. Forty-six volunteer participants (aged 18-22 years) completed one of three tasks: (1) a body-focused meditation technique in which participants were asked to focus attention on the physical sensations coming from various parts of their bodies (e.g., legs, arms, and face), (2) an emotion-focused meditation technique in which participants were asked to imagine a scene and then report on any change in emotional state (e.g., imagine walking along a beach; how does it make you feel? - happy, content, etc.), or (3) a non-meditative task in which participants identified colors presented on a computer screen by pressing a key. Subsequent to the experimental task, participants completed the Toronto Mindfulness Scale (TMS) and watched a short video testing for inattentional blindness. Results showed that participants in the emotion-focused meditation condition scored higher on the TMS decentering subscale, suggesting enhanced awareness of thoughts and feelings relative to the other groups. There were no group differences on the inattentional blindness task; however, participants in both meditation groups were more accurate than those in the non-meditative group in reporting details from the video.

Desselles, M.L. and L.A. Simmering. LTU. **The Apter Motivational Style Profile: Psychometric update.—**The Apter Motivational Style Profile (AMSP) is a 40-item questionnaire, derived from the 72-item Motivational Style Profile (MSP; Apter, Mallows, and Williams, 1998). The AMSP provides a profile of the time that respondents report spending in the eight meta-motivational states described in reversal theory (Apter, 1989, 2001, 2007). Over a period of ten years, more than 8,000 employees (mainly managers) from more than 140 countries have completed the AMSP. The aim of the present paper is to describe the psychometric properties of the scale, including subscale norms, internal consistency of subscales, factor structure and test-retest reliability. Taken together, these studies show the AMSP to be well-grounded in theory, psychometrically sound, and suitable for use in organizational development and managerial coaching.

Doucet, J.P., S.M. Graebert and D.H. Cibelli. NiSU. **A structure for galacidalacidesoxyribose nucleic acid.—***Galacidalacidesoxyribonucleicacid* is a 1963 oil-on-canvas masterwork of Salvador Dali. Subtitled "Homage to Crick and Watson," the painting is known for its DNA iconography, using the double helix to represent continuity of life contrasted against an image of cubic salt crystals representing destruction of it. In his artistic lifetime, Dali reacted to multiple scientific discoveries, including relativity, atomic, and catastrophe theories, as well as historical events marked by application of technology, and these not only influenced his art but sometimes directly appeared in it. In particular, he employed the image of the double helix in nine paintings. We have studied the paintings of what we call the Dali-DNA Collection and have placed them in the context of science history and Dali biography. Our findings suggest that Dali's appreciation of the double helix as a symbol of life was perhaps greater than that of the contemporary scientific community, and his reverence for its complexity resulted in direct iconographic employment rather than assimilation. His assertion that the double helix "is the only structure

linking man to God" anticipated that of genomics pioneer Francis Collins, who in 2007 described the human genome as "the language of God."

LaFleur, G.J., Jr. and J. Tanner. NiSU. **A comparison of opinions among a college community on when human life begins.—**Although biology is the study of life, a consensus definition of when human life begins has remained elusive, even to biologists. While the characteristics that distinguish living and dead tissue are easy to list, what distinguishes human tissue from a human life is harder to pin down. In an effort to identify the range of opinions on this subject, we administered a survey to a university community that scored demographic information and personal positions on which day human life begins, using a range of day 0.5 to day 266 post-fertilization. The average day selected for the beginning of human life among the entire sample (n=950) was day 20.1 +/- 0.7 (SEM). The average day chosen by Christians (n=796) was 16.5 +/- 1.6 (SEM), by Agnostics (n=31) was 45.0+/- 14.1 (SEM), and by Atheists (n=15) was 77.0 +/- 22.7 (SEM). The average day chosen by history majors was 118.1 +/- 25.2 (SEM), by manufacturing tech majors was 84.3 +/- 60.4 (SEM), by biology majors was 18.0 +/- 4.1 (SEM), by journalism majors was 8.0 +/- 8.0 (SEM). These values can be contrasted to the Catholic Church's position (day 1) and the US Supreme Court's position (day 178).

Division of Social Sciences

Adebayo, P.A. and Wada, F.J. SU-BR. **Corporate taxation and financing decisions: evidence from listed firms in the Nigerian food and beverages industry.—**This paper examined the effect of corporate taxation on the financing decisions of listed companies in the Nigerian Food and Beverages Industry. Data for the study were collected from documentary sources consisting of the annual reports and accounts of the sampled companies. Time series, cross-sectional, and panel data methodologies were used in data analysis. Ordinary least squares (OLS), fixed effects (FE) and random effects (RE) were used to estimate the regression model. It was found that in spite of the tax benefits of debt, the companies were generally low-geared; however, corporate taxation influenced their financing decisions. The findings of this study lend weight to both the pecking-order and trade-off models as fitting descriptions of capital structure behavior of the companies. The study recommended that companies should not overly rely on retained earnings as a source of finance, but should explore other external sources, particularly the use of debt benefits from the tax advantages.

Akuta, E.A.M., I.M. Ong'oa, C.S. Jones and V.W.A. Mbarika. SU-BR. **Combating cyber crime in Sub-Sahara Africa: A discourse on law, policy and practice.—**The introduction and development of ICTs within Sub-Saharan Africa (SSA) was received with euphoria because of all the advantages brought to the social, economic and political sectors of Africa. Prior to the arrival of ICTs in SSA, Africa was seen as the Dark Continent believed to be socially, economically and politically isolated from the rest of the world. The development of ICTs was expected to connect Africa to the rest of the world making it part of the global community. ICTs not only opened the continent to social, political and economic advantages, but exposed Africa to cyber crime, an unintended consequence. Cybercrime has been a major concern to governments all over the world because of its far-reaching and potentially, devastating capacity for harm. Its manifestation has caught most governments off guard because existing laws, legislation and security structures have been unable to keep pace with the alarming rate of cyber crime diffusion. Governments have been left struggling to establish safeguards that can help combat problems related to the proliferation of cybercrime. Current efforts have been largely ineffective in reducing cybercrime. A salient question is what supports can be rendered to strengthen the position of law makers and stakeholders in their fight against cybercrime in SSA? This study examined three principal issues. First, it identified the various stakeholders involved in the fight against cybercrime in SSA. Second, it examined existing laws, practices and policies utilized by SSA stakeholders to combat the increase in cybercrime. Third, the research discussed structural impediments to countering cyber crime. Greater understanding of factors influencing the increase in cybercrime will provide policy makers and stakeholders an in-depth understanding of the various structures in their existing efforts to combat cyber crime, which in turn, will better enable policy makers and stakeholders to craft policies and laws to address the challenges of increasing cyber crime. Sponsored by NSF.

Binder, J.M., D.H. Arnold and S.L. Murphy. LTU. **New or used: Time, money, and support as determinants of retaining versus recruiting employees.—**In building a better company, a great place to start is by looking at the employees that make up an organization. Because of the current economic recession, it is clearly a buyer’s market in terms of selection and recruitment of

employees. When it comes to a company's workforce, there are two major choices - one must decide whether to develop existing employees or to hire experienced ones. This is an ongoing debate in the management and industrial/organizational psychology communities, and ultimately breaks down into three major criteria – money (e.g., salary, training costs), support (e.g., employee development programs) and time. This presentation elaborates on the discrepancy between choosing new, inexperienced workers versus hiring employees with expertise as well as the situational contexts in which each of these types of laborers will thrive.

Brawley, A.M., B.M. Foster, and C.M. Castille. LTU. **Psyched! Methods for exploring the role of emotionality under stress.—**What determines how quickly an individual recovers from stress? Do broad personality traits predict recovery? What role do emotions play in the process of recovering when stressed? Research into personality has linked the personality traits of neuroticism, extroversion, and resilience, with specific emotion regulation strategies. Specifically, resilience and extroversion are related to the use of positive emotions in mediating stress, while neuroticism is related to prolonging stress. The methods used for exploring this research question involve the use of a speech task. Participants were asked to prepare a short speech on the topic "Why are you a good friend." Data pertaining to cardiovascular activity, personality variables, mood, and emotionality were gathered to test hypotheses. A manipulation of the appraisal of the speech task was used to frame the task as challenging or threatening. A neutral condition was used as a comparison for the effects of appraisal manipulation on recovery.

Calahan, B., A. Dugas, P. Auguste and F. Staten. GSU. **Exploring social identities and symbols in rural African-American cemeteries**.**—**This exploratory study examined social identities and symbols in a rural cemetery in Northern Louisiana. Tombstones and grave markers were used to obtain social/demographic information (year and date of birth and death, age, gender, and marital family status (husband/wife/children) about persons buried in one of the oldest African-American cemeteries in Grambling, Louisiana. Cultural/Social symbols also were identified such as praying hands, angels, flags and various emblems affiliated with a given organization, i.e. Masonic Lodge and military.

DeJean, D.P. SU-BR. **Unequal treatment within prison facilities.—**Victimization is a serious issue perpetrated by inmates and prison correctional staff. Unfair treatment and violence are indubitable conditions of imprisonment for inmates; yet, the preponderance of research on prison violence focuses on inmate aggression and misconduct rather than inmate victimization. The goal of this research was to examine and reveal that unequal treatment within prison facilities subsists. There is a paucity of studies conducted on overall inmate inequalities with race, gender, or mental deficiencies as exclusion. This is a theoretical study that re-introduces and refines the existence of unequal treatment in the entirety of the prison populace. Serious personal victimization is prominent and disregarded. Using the qualitative approach, this study assesses treatment in prison systems by assessing the negative impact that unequal treatment, preferential treatment, and retaliation can have on prisoners. Sociological and criminological theories are used to enhance the overall understanding of unequal treatment.

Frost, A.L. LTU. **Is structural inequality relative? Managing justice perceptions when salary disparities exist in international non-governmental organization work teams.—**This

paper examined potential approaches to managing justice perceptions when substantial salary disparities exist between expatriate managers and local national employees in non-governmental organization (NGO) work groups. Justice perceptions and salary disparities were reviewed in light of equity theory and social justice perspectives. Individual differences of expatriate managers were examined with regard to the ability to build trust in cross-cultural teams based on both the cross-cultural adjustment model presented by Leiba-O'Sullivan (1999) and findings from the Emergency Capacity Building Project. The research suggested that strategic organizational staffing for expatriate positions may be a cost-effective and sound approach to maintaining both a team harmonization and a competitive advantage.

Gordon, J.G. SU-BR. **EQUAL Education: Lawsuits pursued by African-Americans against Louisiana State University before desegregation.—**Viola Johnson v. Louisiana State University Board of Supervisors begins in 1946 in the State of Louisiana with plaintiff Viola Johnson, native of New Iberia, Louisiana, and graduate of Southern University and A&M College in Baton Rouge, Louisiana. Johnson was approached by the N.A.A.C.P. to become a test case for desegregation in Louisiana universities. In September 1946, Johnson and a legal team headed by Thurgood Marshall entered a petition against the Louisiana State University Board of Supervisors due to a denial of admissions into the university's medical school in New Orleans, Louisiana. A decision rendered by Judge G. Caldwell Herget stated Louisiana State University had a right to deny African-Americans admissions due to Southern University and A&M College having already been established for the education of persons of color. The judge further detailed in his ruling that Southern University and A&M College had an opportunity to open a medical school according to Legislative Act 142 of 1946; therefore, the lawsuit should have been against Southern University and not Louisiana State University. The verdict was appealed to the Louisiana Supreme Court on Docket 38,611 and later dismissed on June 11, 1953 due to the Supreme Court claiming the case moot.

Hakeem, L.Z. SU-BR. **The effects of school gardens in education curriculum on diet and obesity in preadolescent and adolescent youth in East Baton Rouge and surrounding schools.—**The fast food industry and other unhealthy lifestyle choices have caused an unprecedented rise in juvenile obesity in America, more specifically in Louisiana. It is understood that nutrition-related problems can be addressed through dietary adjustments. Nutrition education is being proposed as a method that may be used that could lead to these needed adjustments. Some research has been made in the area of nutrition education delivered experientially through the school garden curriculum. Although there has been research conducted on the effects of school garden curriculum, research has been limited to short term studies, and no research has been conducted conclusively in the Delta region. Therefore, the purpose of this study is to evaluate the effects of the school garden curriculum in East Baton Rouge and surrounding schools in the state of Louisiana. The methodology to be used is a quasi-experimental pretest–posttest research design. The population for this research included four schools in the East Baton Rouge Parish and other surrounding schools with a school garden curriculum. Focus group sessions will be held with participating schools to discuss the research topic and methods to be used to gain information. The study population will include students, faculty and administrators. The research is supported in part by the Southern University Ronald McNair Scholars Program.

Hill, S.S. Pamphile, P. Auguste and F. Staten. GSU. **Health concerns among college students**. **—**Research has found that African-Americans are at higher risk for a number of chronic diseases particularly cancer, diabetes, and hypertension. This study explored health perceptions and concerns of African-American students enrolled in a University in Northern Louisiana. A convenient sample of 266 students was surveyed. Participants were asked questions about how they perceived their health, their personal health condition and major health concern. Preliminary findings were consistent with the national data on health issues in the black community. The data suggest that African-American students are concerned about major health problems that affect the black community.

Hindman, M.L., M.M. Livingston and A.P. Carter. LTU. **When reality beats fantasy: predicting satisfaction.—**People make errors when anticipating future events. Gilbert, Gill, and Wilson (2002) and Read and Leeuwen (1998) found when hungry people grocery shop, they overestimate future appetite. Gilbert (2006) found that students rated chips as more desirable in the presence of sardines than in presence of chocolate; however, upon tasting the chips, there were no differences. The present study is a replication of Gilbert's research. The influence of external stimuli may be moderated by personality; therefore, a personality measure was included. Undergraduates/Graduate students (89) in psychology and counseling classes completed a questionnaire including demographics, Myers-Briggs Scales (Sensing-Intuitive, Extroversion-Introversion), and ratings of anticipated enjoyment, taste, and satisfaction with eating potato chips on a 7-point Likert scale. Participants rated their current satisfaction with chips while eating them and completed self-report measures regarding preferences for chocolate, potato chips, and sardines. Those who preferred sardines to potato chips or preferred potato chips to chocolate were excluded. The current study provides support for Gilbert's (2006) belief that people are not very good at predicting future satisfaction; however, our results do not support Gilbert's finding that comparisons in the present are at least partially responsible for predictions of future satisfaction. Personality did not influence results.

Igou, F.P., J.M. Binder and C.M. Castille. LTU. **An empirical examination of selection test score banding.—**Employment selection tests are not perfectly reliable and hence are not perfect predictors of future job performance. Further, many selection tests produce adverse impact against E.E.O.C. protected groups. To reduce adverse impact, a number of methods have been proposed that interpret scores using error of measurement. These methods identify a range of scores, called "bands." Scores in bands are considered statistically equivalent. Secondary criteria, such as race, gender, and special licensure, may then be used to select from candidates whose scores are in the same band. Proponents of strict top-down selection maintain that banding methods significantly compromise test utility. Proponents of banding suggest that banding offers a sound method for diversifying a workforce without sacrificing test utility. The present study used actual selection data and examined the following methods: top-down; top-down within-group; fixed bands, random selection within bands; fixed bands; diversity-based referral, top-down within bands; sliding bands, diversity-based referral, top-down within bands; and sliding bands, random selection within bands. It was found that regardless of the method used, mean utility loss was less than 0.2 SD. It also was found that sliding bands, using diversity-based referral, top-down selection within bands eliminated adverse impact.

Isabalija, S.R., V. Mbarika, J. Larson and M.S. Kim. SU-BR. **Sustainability of telemedicine in Sub-Saharan Africa (SSA).—**Although a growing body of research has argued for a multi-faceted IT strategy to improve the economies and living conditions of the developing world, few studies have examined possible success factors necessary to move these technologies from the developed to the developing world and sustaining them after implementation. Previous attempts to move different health IT initiatives from partners (developers) in the developed to the developing world have failed because of a clear neglect of the socio-economic, cultural factors and knowledge management that would affect such transfers. The health statistics of SSA have problems. There is a knowledge gap related to key factors affecting the transfer of e-medicine in East Africa (EA), a region much overlooked in mainstream information systems research. This research therefore will contribute to the knowledge base and broaden the policy domain in information technology transfer by improving implementation and sustainability of health initiatives in EA. Targeted will be governments of EA who will have new insights into the effectiveness of national IT policies on e-medicine transfer and sustainability. Supported by NSF.

Isiadinso, C. SU-BR. **The United States Constitution and same sex marriage.—**Same sex marriage has been a topic that has questioned if the United States Constitution could determine if homosexuals have the civil liberty of recognizing their union. The media and political parties play an important role on how people view the issues of same sex marriage, but many people fail to realize that the Constitution has the power to determine if same sex marriage is a civil liberty or unconstitutional. In addition, religion and politics also plays a major role on how United States citizens view this issue. Although marriage is defined as the legal union of a man and a woman as husband and wife, the Constitution does not state that a person has to be a certain race or gender in order to get married. This paper discusses the historical context of same sex marriage, the role of religion and politics and court cases concerning homosexual couples and same sex marriage. The study will examine past and present issues that might influence the Supreme Court decision on same sex marriages as constitutional or unconstitutional.

Merritt, J.K. and D.R. Migues. LTU. **Spatial learning in transgenic model mice.—**The aim of this preliminary study was to observe damage to the hippocampus in Alzheimer's disease transgenic mice model (B6CgTg) using a spatial memory task. Thirty mice (15 transgenic, 15 wildtype) at five, six, and 11 months were trained in spatial memory tasks using the Morris Water Maze. The subjects were trained in a controlled atmosphere in the Morris Water Maze every day for 4 days and were tested on day 5 of the study. Each session consisted of 4 trials to reach a submerged platform made of clear Plexiglas measuring 6 cm^2. Results indicated that all three ages of transgenic mice were capable of learning this spatial task. This method of observation allows experimenters to use a non-invasive method of assessing the transgenic alterations which compare to alterations in the human condition of Alzheimer’s disease. These preliminary results form a basis for future studies on spatial learning in this strain of transgenic mice to further our understanding of the disease. In future studies, a longer period of training and observation should be used to reduce error. Supported by LTU.

Mosier, B.C. and A.P. Carter. LTU. **Sex, childhood religious emphasis, and attitudes. —**Research has uncovered many correlates of sexual prejudice, to include conservative

religiosity and male gender. This study took a new approach by exploring the effects of sex and emphasis placed on religion during childhood. These variables were compared to personal views of God on a continuum of controlling or loving, as well as to positive attitudes toward gay men, lesbian women, and homosexuals in general. Participants were 293 students (144 females, 149 males) recruited from undergraduate psychology courses. Participants completed a survey consisting of informed consent, demographics, the Religious Emphasis Scale, the Loving and Controlling God Scales, and the Scale of Open Attitudes toward Homosexual Persons. Participants were divided into three groups based on religious emphasis during childhood. There was no interaction between sex and religious emphasis during childhood and no differences on Controlling God. Females scored significantly higher than males on Loving God and had significantly more positive attitudes toward gays, lesbians, and homosexuals in general than males. Participants with less religious emphasis in childhood had more positive attitudes toward gays, lesbians, and homosexuals in general than those with more religious emphasis in childhood.

Murphy, S.L., V.J. Smoak and M.L. Desselles. LTU. **Reversal theory: An integrative review of its concepts and implications.—**Interest in reversal theory (RT) as a psychological framework is steadily increasing. Empirical research supports the theory's practical applications in a variety of domains (i.e. therapy, organizational climate, sports, and health). Despite 350 publications and more than 24 books, the theory is not widely known among industrial/organizational psychologists. The present article intends to further the understanding of RT by demonstrating its utility as a higher order theory that integrates models of work motivation. Established theories of work motivation, including goal-setting theory, needs theory, motivation-hygiene theory, Maslow's hierarchy, and attribution theory, are described in relation to RT dynamics. This exposition argues that the theory is both a theoretical synthesis of existing psychological perspectives as well as a distinct conceptual model. Practical implications and future research initiatives are highlighted.

Napper, C.N. LTU. **The fraternal personality: Personality-based job analysis and performance appraisal of fraternity leaders.—**This study used the principles of job analysis and performance appraisal with a sample of fraternity leaders to create a profile of the optimal fraternity member, which could be used for fraternity selection. While using the Personality-Related Position Requirements Form (Raymark et. al., 1997) as a personality-based job analysis tool, a ten-item performance appraisal tool was created based on the ten personality factors found to be significant in the job analysis. Our hypotheses were confirmed that Surgency, Intellectance, and Emotional Stability would be necessary personality indicators according to the job analysis. Results of the performance appraisal were mixed due to the varying nature of fraternity leaders; however, Intellectance did correlate highly as an indicator of fraternity leadership according to the performance appraisal. Using a regression analysis to predict which personality constructs would best predict fraternity leadership from the performance appraisal tool showed no significant predictions.

Nchise, A.C., O.B. Ngwa, R. Isabalija, R. Boateng and V. Mbarika. SU-BR. **Mobile phones in health care in Sub-Saharan Africa – the case of AppLab Uganda.—**This study explores the preliminary lessons in the use of mobile phones to promote access to health care information in

Uganda. The project under study is the AppLab Uganda Project which operates a Health Tips application, educating users on sexual and reproductive health. Data were collected through in-depth interviews with project developers, partners, medical practitioners and IT journalists and a survey of 149 people randomly selected from two tertiary educational institutions in Uganda. Findings suggest that the need to access health information via mobile text messages is mediated by cost incentives, misconceptions of brand name 'Google SMS', and content relevance. There are questions concerning the appropriateness of text messaging as compared to using voice calls to access health information. These issues have implications on the objectives of the health care project and the individual strategies of project partners. Preliminary conclusions emphasize the need to integrate a referral system to registered health professionals and facilities and the need for education and/or a marketing strategy with an indigenous branding to address the misconception of the brand name 'Google SMS'. Implications to research, policy and practice are outlined.

Reynolds, A. SU-BR. **African-American females in the Louisiana legislature.—**The year 1971 marked a year of great accomplishment and success for the State of Louisiana. This study analyzed the profound fundamentals of gender and politics in the Louisiana legislature. Theories from various scholars are explored to lend important and informed phenomena. The findings in this study suggest that many black females beat the odds by legislating policy based on social difference. From legislation on education to civil rights, black females have found their way to new found success in State politics.

Simmering, L.A. LTU. **Predicting golfer satisfaction and loyalty.—**Though the golfing industry may fall outside the realm of social sciences, the techniques of measurement within social sciences provide an avenue to assess what drives golfer satisfaction. This study integrated principles of market research and industrial/organizational psychology principles to develop a measure, validate it on a group of golfers, and identify the most pertinent indicators of customers' satisfaction and consumer behavior through statistical analysis. By gaining insight into which variables predict golfer satisfaction, loyalty, and purchasing intentions, golf course managers can initiate procedures (e.g., marketing and allocation of resources) to improve their customers and members experience at their golf courses. Since 1990, the total number of golfers in the United States has decreased from 27.8 million to 26.5 million; however, golf course development has increased from 12,846 to 14,602 golf courses in the U.S. This disconnect between supply and demand created a cycle in maintaining members is vital to golf courses profitability. This study investigated the customer service experience (e.g., greeting and friendliness of staff), perceived course quality (e.g., greens, fairways, and bunkers), and other relevant golf course variables (e.g., speed of play and disruption while playing), and their impact on satisfaction, loyalty, and behavioral intentions.

Smoak, V.J. LTU. **Organizational wellness programs.—**During economic decline, companies are exploring ways to reduce costs and improve their bottom line. Recent rising health care costs have created a renewed interest in organizational wellness programs. Since the research originated in the area of workplace wellness over 30 years ago, the trend has moved from individual risk assessment and treatment to a more holistic model of integrative wellness. Studies have included physical fitness, health education, smoking cessation programs, stress

management, counseling services and health screenings among others. The implementation, promotion and management of such programs differ across a variety of samples and settings. Benefits include individual health improvements, reduced job stress, increased productivity and higher perceived organizational support. Organizations have seen a rise in productivity, a decline in absenteeism and reduced health care costs which provided return on investment (ROI) ranging from $2.43 to $3.40 saved for every $1.00 spent. Guidelines provide suggestions for successful implementation, organization adaptation and incentives for participation. This research is a review of past studies, current implications and suggestions for future research.

Toombs, P.C., S. Hill, and F. Staten. GSU. **Energy desirability and usage among rural elderly in northern Louisiana.—**The GSU Social Research Club Power Shifters have joined in the "Let's Raise a Million" Light Bulb Campaign. This project is in affiliation with the Environmental Justice and Climate Change Initiative, Campus Progress, Morehouse College and Grambling State University. "Let's Raise a Million" project is designed to provide low-income households with energy efficient light bulbs. To accomplish this end, this exploratory study was directed towards determining the willingness of the elderly to trade in their old light bulbs for new energy efficient light bulbs. Preliminary findings revealed that 98% of the respondents were willing to exchange old light bulbs for energy efficient light bulbs.

Tressler, L.E. and A.P. Carter. LTU. **State and trait anxiety and academic achievement.—**The purpose of this study was to explore the independent relationship of state and trait anxiety and academic achievement. There is a disagreement in the literature as to the relationship among these variables and much of the research on the subject fails to make a distinction between these dimensions of anxiety. Participants were of 342 (150 male; 192 female) undergraduate students enrolled in an introductory psychology class. Ages ranged from 16 to 41, (M=20.19). Participants completed online surveys which included informed consent, demographics, GPA, the Costello-Comrey Anxiety Scale (Costello & Comrey, 1967) which measures trait anxiety, and the Westside Test Anxiety Scale (Driscoll, 2004) which measures state anxiety. Regression results indicate that state and trait anxiety significantly predicts academic achievement (GPA), R^2=0.059, R^2adj=0.053, F(2, 301)=9.432, p=0.001. This model accounts for 5.9% of the variance in academic achievement. Trait anxiety was a significant negative predictor of academic achievement, t=-2.057, β=-0.014, p=0.041. State anxiety also was a significant positive predictor of academic achievement, t=4.342, β=0.378, p=0.000. Due to the discrepancy between this study and the existing literature, further research is needed.

Tsuma, C. K., V.W. Mbarika and K. Esedo. SU-BR. **Information communication technology and politics: A synthesized analysis of the impacts of information technology on voter participation in Kenya.—**The availability of political information throughout society made possible by the evolution of contemporary information communication technology has precipitated conflicting debate regarding the effects of technology use on real life political participation. Proponents of technology argue that the use of new information technology stimulates political participation, while others fear that intensive use of technology disenfranchise citizens and may lead to withdrawal from public life. While the information technology revolution has created an information-rich and communication-intensive environment for politics, the resultant social, political and technological effects and consequences on voter

engagement is still a major puzzle to scholars of technology and politics in Sub-Saharan Africa. One of the most important social impacts of information technology revolution is the consequence it could have on voter participation. Although considerable research has been conducted in this area, the existing research has yet to develop a comprehensive model of the key factors that influence the adoption of information technology in political participation. Based on the ongoing implementation of electronic voting systems, and the need for research on implications of electronic participation, this study integrated political science and information technology constructs to present a combined model of information technology and voter participation in Kenya. In this study, it is argued that the integration of technical, political and demographic factors combines to influence the adoption of electronic voter participation. There is need for a research agenda based on the electronic adoption framework to develop a relationship between information technology use and political participation in Kenya. The research seeks to establish the distinct technical, political and societal factors that influence one's general propensity to vote and one's willingness to use information technology for political participation. This research was supported by the National Science Foundation (NSF) under Grant Nos. 1036324 and 0811453 and UNCFSP NSTI. Any opinions, findings, and conclusions or recommendations expressed in this material are those of the author(s) and do not necessarily reflect the views of NSF or UNCFSP.

Wada, F.J. SU-BR. **Compliance with Sarbanes-Oxley Act: Impact on public.—**Several corporate and black-hole accounting practices leading to the enactment of Sabarnes-Oxley Act (SOX) of 2002 by Congress has brought stricter regulation aimed at restoring investor confidence in the corporate governance system. However, a number of studies carried out to measure the impact of SOX on public companies listings in the early years of compliance of the Act pointed to cost of compliance as a major concern of companies that delisted from being public. The study explores the relationship between the cost of compliance of SOX and listings trend in later years of compliance. This paper examined public company listing trend pre- and post-SOX. Data excerpts from SEC's database for companies with an annual earnings threshold of $100 million and below were analyzed. The study found that the cost of SOX compliance reasonably accounts for delisting of small and medium size public companies. For companies where cost components of SOX compliance, especially IT infrastructure, is a reasonable proportion of income, the company may be capitalized/amortized as benefits may be available for two or more periods.

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