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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	Cedar Creek School, Ruston, LA
CCTPCC	Cal-Cam Termite and Pest Control Co., Lake Charles
CPRUHS	College of Pharmacy, Roseman University of Health Sciences, Henderson, NV
CU	Covenant University, Ota, Nigeria
ECOFS	El Colegio de la Frontera Sur, Mexico
EHS	Episcopal High School, Baton Rouge
GSU	Grambling State University
HCS	Holy Cross School, New Orleans
IPN	Instituto Politécnico Nacional, Mexico
LADE	Louisiana Department of Education, Baton Rouge
LSUA	Louisiana State University at Alexandria
LSU-BR	Louisiana State University, Baton Rouge
LSU-E	Louisiana State University, Eunice
LTU	Louisiana Tech University
LUNO	Loyola University, New Orleans
MCCPPJ	Mosquito Control, Calcasieu Parish Police Jury, Lake Charles
McSU	McNeese State University
NASC	Naval Air Systems Command, US Navy
NiSU	Nicholls State University
NSU	Northwestern State University
RIC-NO	The Research Institute for Children at New Orleans
SLU	Southeastern Louisiana University
SSC	Synergy Semiochemicals Corporation, Canada
SU-BR	Southern University, Baton Rouge
SUSLA	Southern University at Shreveport
TAMU	Texas A&M University, College Station, TX
TP	The Polytechnic, Ibadan, Nigeria
TU	Tulane University
UIN	University of Ibadan, Nigeria
ULL	University of Louisiana, Lafayette
ULM	University of Louisiana, Monroe
UAFS	University of Arkansas, Fort Smith
USAERDC	US Army Engineer Research and Development Center, Vicksburg, MS
USDAFS	USDA Forest Service, Pineville
USDAFSFHP	USDA Forest Service Forest Health Protection, Lufkin, TX
USUHS	Uniformed Services University of the Health Sciences, Bethesda, MD
UTA	University of Texas, Arlington, TX

Division of Agriculture, Forestry and Wildlife

Battaglia, C.D. and J.L. Carr. ULM. **Survey of the herpetofauna of Upper Ouachita National Wildlife Refuge in northeastern Louisiana.—**Upper Ouachita National Wildlife Refuge (UONWR) is located in northeastern Louisiana. The principal cover type is bottomland hardwood forest. The refuge is divided by the Ouachita River into two sections: the west side, a relatively undisturbed habitat, and the Mollicy Unit, a site of reforestation and hydrological restoration after agricultural abandonment. Reptiles and amphibians are an important part of bottomland hardwood forests and are significantly impacted by hydrology. We conducted a terrestrial herpetofaunal survey at 12 sites in the UONWR, 6 sites on the west side and 6 sites on the Mollicy Unit, comparing communities between the two sides. The surveys were conducted through the use of Y-shaped drift fence arrays, each with 6 funnel traps and 4 pitfall traps, time-constrained visual encounter surveys, coverboards, and PVC pipes. For all techniques combined, total species richness for the west side and the Mollicy Unit are 23 and 14, respectively. Total species richness was not significantly different between the two sides ($P = 0.0835$). Catch per unit effort also was not significantly different between the two sides ($P = 0.8932$).

Blomquist, S.R. USDAFS. **Get off my back! A survey of phoretic mites on *Sirex* woodwasps.—**The woodwasp, *Sirex noctilio* Fabricius, is a destructive insect pest found worldwide that attacks pine species. *Sirex* woodwasps recently have invaded regions of North America. These wasps attack stressed pines, lay eggs, and inject both a fungus that the larvae feed on and a toxic mucus which clogs the vascular system of the tree. Mites have been observed in the wasp galleries and also crawling on the bodies of the *Sirex*. A survey was conducted to determine which phoretic mites are associated with *Sirex*. Preliminary results have revealed over 15 species of phoretic mites associated with three Sirex species (*S. noctilio*, and the native species, *S. edwadsii* Brullé and *S. nigricornis* Fabricius). Fungal ascospores and conidia have been seen on a few species of mites.

Brown, C.S., D. Kee, B. Chung and F. Phillips. McSU. **How does Timothy canarygrass compare to annual ryegrass?—**Native plant species are rapidly vanishing from the landscape. Timothy canarygrass (*Phalaris angusta*), a cool season annual grass, may have similar functions as the non-native *Lolium multiflorum*, or annual ryegrass (RG). However, little is known regarding growth characteristics of Timothy canarygrass (TC). A greenhouse study determined the responses of both species to watering intensity and nutrient application. The greenhouse water is distributed by a hanging watering system. Pots in the table center tend to receive more water than those along the table edges. Treatments were species (RG or TC), nutrient application (yes or no) and table position or distance from center (10, 30, 50 or 70 cm). At the end of twelve weeks, the number of plants, weeds, tillers, leaves, plant heights, green and dry weights were determined. Results indicate RG responds positively to nutrient application, while little response to nutrient status was evident from TC. RG also produced more tillers and leaves, attained a greater height and heavier yield than TC. A significant position by plant species interaction was evident for tillers per pot, with RG tiller number increasing with increased distance while little change was evident in TC tiller number.

Brown, L.D. and J.L. Carr. ULM. **Aquatic herpetofaunal communities in a regenerating bottomland hardwood forest at Upper Ouachita National Wildlife Refuge, Louisiana.—** Loss of ecologically valuable habitats has prompted protection of native flora and fauna; however, despite such endeavors, biological diversity is in decline. Due to conversion of land for agriculture and hydrological changes associated with flood control, one such habitat that has been disappearing at unprecedented rates is bottomland hardwood forest (BHF). Upper Ouachita National Wildlife Refuge (UONWR) has been the site of the largest BHF restoration effort in the nation's history. In addition to the major reforestation initiatives, the refuge is restoring the natural hydrology of the area. Herpetofaunal communities are significantly impacted by hydrology in BHF; therefore, monitoring this community, in both altered and unaltered refuge habitat, is vital as the restoration work progresses. Total species richness as of 15 November 2011 at UONWR was 35 species, of which 12 were amphibian species and 23 were reptile species. Species diversity indices for the refuge resulted in a reciprocal of Simpson's index of diversity (1/D) value of 1.75 for altered habitat and 1.51 for unaltered habitat, and Buzas and Gibson's evenness value of 0.189 for altered habitat and 0.118 for unaltered habitat. Akaike's Information Criterion was used to evaluate the effectiveness of habitat models in predicting species richness.

Freeman, J.D., D. Kee, B. Chung and J. Woolman. McSU. **Does sulfur source affect yield and nitrogen use efficiency of Jiggs Bermudagrass?—**Prior to the advent of the Clean Air Act of 1970, crop response to added sulfur was infrequent. With automotive and industrial compliance, atmospheric sulfur emissions have decreased and bermudagrass response to increasing sulfur fertilizer rates has been found to be more common than before. The primary response has been an increase in N fertilizer use efficiency with research from other sites. Sulfur sources have usually been ammonium sulfate or gypsum. Circulating fluidized bed ash has been shown to be an acceptable sulfur source for apples and alfalfa grown in the northeastern USA. A study was initiated on the Dripps Dept. of Agricultural Science farm near Lake Charles, Louisiana, to compare the response of Jiggs bermudagrass yield to sulfur source and nitrogen rate. A preliminary result from the first year indicates a positive yield response to increased N rate, but no response to S source nor was a N rate by S source interaction evident.

Kee, D., W. Storer and F. Lemieux. McSU. **Soybean forage response to ultra low seeding rates.—**Recent research has shown soybean-seeding rates within the normal range used in SW Louisiana (25-45 seeds m^2) had little influence on soybean forage yield. Reducing soybean seeding rate would decrease cost; however, little to no information is available from southwest Louisiana that examines the forage yield to ultra low seeding rates. Two studies were conducted at the McNeese Fuller Farm (Kinder) and the McNeese State University Farm (Lake Charles). A randomized complete block study examined soybean forage yield response to seeding rate (10, 20 or 36 seeds m^2) and harvest stage (R2, R4, or R6). At harvest, all the plants from a 4.9 m length of the center row were cut down and weighed. Green samples were collected to determine dry matter content. Six to nine plants were chosen at random from each plot, reproductive stage determined, stem diameter and length were measured, and leaf to stem ratio ascertained. As maturity stage increased, yield increased, basal stem diameter increased, increased forage height and leaf to stem ratio decreased. The seeding rates had limited affect on forage production; however, stem diameter did increase drastically.

King, M.R. and E.K. Lyons. McSU. **Nest persistence and habitat characteristics of colonial wading bird rookeries in southwestern Louisiana.—**Oil and gas development on the Southwest Louisiana National Wildlife Refuge (NWR) Complex is thought to cause disturbance to wading birds and their reproductive processes. The objectives of this study were to (1) estimate the effects of oil and gas development and production on the establishment, persistence, and nest and fledgling survival of wading bird rookeries, and (2) to evaluate the vegetative composition of active and inactive rookeries on NWRs in southwestern Louisiana. We calculated apparent nest and fledgling survival to species for active rookeries for 2010 and 2011. Differences in nest and fledgling survival were evaluated using logistic regression, comparing candidate models using an information-theoretic approach. Model averaging indicated that nest and fledgling survival is mainly affected by declining environmental conditions as the nesting season progresses. We did not document significant effects on wading bird rookeries at Lacassine NWR as a result of oil and gas development. Few differences were documented between active and inactive rookeries, illustrating vegetative composition played little role in rookery establishment.

McElfresh, R.M., D.D. Kee, B. Wyman and F. Phillips. McSU. **Can circulating fluidized bed ash be an effective soil liming source?—**Circulated fluidized bed (CFB) ash is a bi-product of waste products burned in a circulated bed boiler. The process mixes limestone with crushed fuel, which when heated, reduces of sulfur emissions into the air. Once this process is complete, the bottom ash is removed and transported for disposal into a landfill. This research project studied the use of CFB ash at varying rates as an agricultural amendment. Agricultural Lime (AL) and CFB ash were used in a greenhouse study, for six months, using a Nested Randomized design. A total of eleven treatments were used, with one treatment being a control group. The application rates of each amendment were 6, 12, 18, 24, or 30 grams per pot. Soil samples were extracted from each pot prior to treatment application then again 6 months post treatment. Soil samples were placed in a drying unit (140^{o}C) for 7 days after collection then stored for later analysis. Soil pH was determined using two pH methods; 1:1 distilled water to soil or 1:1 1N KCl. Results indicate the addition of the CFB ash neutralized soil pH, similar to AL.

Perkins, J.C. and C.A. Corbat. LSUA. **Small mammal diversity and abundance in a pasture, interior forest, and pasture-forest interface.—**Habitat edges are important ecological structures where high levels of biodiversity are found. We assessed grazed pastures, internal hardwood forest, and the edge between them for differences in small mammal species diversity and abundance. From September to November 2011, we trapped small mammals on the Dean Lee Research and Extension Station in central Louisiana. Ten sites were sampled with 3 transects per site, 1 transect each in the pasture, edge, and internal forested habitat. A capture rate of 5.1% was recorded for 5002 trap nights (254 total individuals). Nine species were captured, with *Peromyscus leucopus* accounting for 78% of all captures. Species diversity was greater in the edge habitat (8 species) than in either the interior habitat (4 species) or the pasture habitat (1 species), but the interior habitat had the greatest species evenness when the Shannon-Weiner index was calculated. An ANOVA showed a significant difference in captures per trap night between the three habitats, but this was due to the fact that only one capture occurred in pasture habitat. T-tests showed no significant difference in either overall small mammal abundance or abundance of *P. leucopus* between the interior forest and edge habitat.

Richard, S.M. and E.K. Lyons. McSU. **Evaluation of moist soil management activities for waterfowl on USFWS lands in Southwest Louisiana**.—Moist-soil management is an effective and important strategy to produce plant species that serve as a diverse foraging habitat for wildlife. It also is a strategy to increase wetland productivity and to attract the use of wintering waterfowl and other wading birds. The objective of the proposed project is to (1) quantify vegetation composition by cover type and species in moist-soil impoundments, (2) compare multiple mechanical manipulations to desirable vegetation response, and (3) perform waterfowl surveys in moist-soil impoundments and compare results with vegetation data. We sampled herbaceous layer vegetation in moist-soil unit impoundments (n=18) on Cameron Prairie National Wildlife Refuge from April 2011 through November 2011. Waterfowl surveys have been conducted in the moist-soil units since October 2011 and are currently being conducted through March 2012. A second set of vegetation sampling will be conducted from April 2012 through November 2012. Once complete, an evaluation of mechanical manipulations on moist-soil impoundments will be made to promote desirable vegetation with efficiency.

Soileau, M.S. and E.K. Lyons. McSU. **Analysis of marsh revegetation efforts in Calcasieu and Cameron parishes, Louisiana**.—Determination of success or failure in wetland restoration projects is often based on whether wetland functionality (i.e., hydrology, wildlife habitat, sediment retention, hurricane protection) is restored. What has failed to be acknowledged is the importance of plant growth and establishment to these functions being restored. Furthermore, the factors controlling plant growth and establishment have not been analyzed in a way that demonstrates which factors hold more weight on successful establishment and growth. Therefore, the objectives for this study are to (1) evaluate the effects of hurricanes on marsh revegetation efforts from 2000 to 2011, and (2) to evaluate the effects of abiotic factors on success of marsh revegetation projects. Analysis will consist of statistical tests of several abiotic independent variables against three dependent plant variables (survival, plants per spread, spread per plants). Preliminary data analysis shows a 75% survival rate for the 12 year period being analyzed in this study. Marsh restoration projects established during hurricane years have been destroyed, but many projects in non-hurricane years also have low success, suggesting other abiotic variables impact plant success and subsequent restoration efforts.

Sullivan, B.T. USDAFS. **Lost in translation: Decoding the chemical signals of bark beetles**.—Bark beetles (Coleoptera: Curculionidae: Scolytinae) are the most economically important insect pests to forestry worldwide, and their capacity to kill and colonize healthy, mature trees is dependent on their use of odors–particularly pheromones–to synchronize attacks by hundreds to thousands of insects on individual hosts. Their reliance on signal odors (semiochemicals) has inspired intensive efforts by researchers to identify these signals, synthesize them, and utilize them to disrupt the damaging behavior of these pests. However, efforts to develop semiochemical-based controls for bark beetles are challenged by the complexity of the chemical signals produced by the beetles and the inherent difficulties involved in identifying and describing the behavioral activity and ecological function of individual compounds within complex semiochemical blends. My talk will discuss the process of "translating" bark beetle pheromone signals, describe where such efforts can go astray, and suggest potentially more fruitful approaches to this line of research.

Division of Biological Sciences

Botany Section

Allen, S.R., C.N. Ho, M.L. Reid, and J. Bhattacharjee. ULM. **Distribution patterns of tree species during secondary succession in bottomlands**.—Secondary succession shapes the composition of woody plant communities in many ways. This process determines which species are present and also their distribution within the area. These patterns of distribution could be the result of various environmental or biological factors including flood tolerance, competition, and seed dispersal. We are interested in determining the patterns of distribution of tree species in a bottomland hardwood forest undergoing secondary succession. We measured the distance between all individuals of the same species within our site and used a nearest neighbor analysis to determine the distribution patterns of the following species: *Quercus nigra, Carya aquatica, Gleditsia triacanthos,* and *Celtis laevigata*. Results indicate *Quercus nigra*, *Gleditsia triacanthos,* and *Celtis laevigata* have aggregated distribution patterns, while *Carya aquatica* has a random distribution in the site. Data on more species will be collected and analyzed in the spring of 2012. The results of the study will be used in conjunction with seed bank and seed dispersal data from the site, both of which are ongoing. Results should aid in the formulation of improved restoration techniques, including species selection and determination of species-specific characteristics when trying to restore areas to natural forest.

Kuethe, B.M., C.N. Ho, M.L. Reid, and J. Bhattacharjee. ULM. **Vegetation and other factors affecting tree seedlings during old-field succession**.—Recent evidence suggests that vines and other herbaceous vegetation can limit the recruitment, growth and survival of woody seedlings through competition for light, water, and space. In our study site, the richness of vines is high at 15 species. One species, *Campsis radicans,* often grows in dense stands, excluding most other species. This could potentially lead to a state of arrested succession, in which tree regeneration is excluded indefinitely. Our research attempted to quantify differences in vegetation between areas with tree seedlings and those without. We analyzed differences in the vegetation attributes in plots with a common pioneer species, *Fraxinus pennsylvanica,* a common sub-canopy species, *Crataegus viridis* or *Diospyros virginiana,* and plots without any tree seedlings. Results indicate that while there is no difference in the frequency of herbaceous vegetation and vines between plots, there is a significant difference in the vegetation cover in plots with no tree seedlings when compared to plots with a sub-canopy tree seedling ($p<0.05$). This difference may indicate that the herbaceous vegetation and vines preclude the growth of sub-canopy species in bottomland hardwood forest succession, supporting the hypothesis of arrested succession.

Reid, M.L. ULM. D.W. Pritchett. UAFS. J. Bhattacharjee. ULM. **Succession in bottomlands: Twenty-seven years of change**.—Our project is aimed at analyzing changes in the plant community in a bottomland hardwood forest, 27 years into secondary succession. We present data on the historical plant communities from early in succession and the current composition of the plant community. Results indicate no significant differences in the species richness during any of the years in which data were collected. In these years, richness varied between 53 and 68. However, presence/absence data reveals that many species which were present early in succession are now absent. Currently, *Carex* spp., *Campsis radicans*, and *Brunnichia ovata* are

found with the highest frequency in the site, at 0.99, 0.89, and 0.86, respectively. Each of these taxa was present within the first two years of succession and has since increased in frequency. Other woody species, including *Liquidambar styraciflua* and *Ulmus americana* have been recruited sometime after the first three years. The herbaceous community also has experienced changes; some annuals, such as *Iva annua*, have increased in frequency. These changes are a reflection of the transition from an open field to a more mature forest. However, data indicate continued dominance of herbaceous vegetation, which can impede woody seedling recruitment through competition – yielding support for arrested succession.

Environmental Sciences Section

Bacheler, V. and E. Melancon. GSU. **A comparison of fish and crustacean communities associated with constructed oyster reefs and natural oyster reefs in a Louisiana estuary.—** Many marine organisms rely on eastern oyster (*Crassostrea virginica*) reefs and adjacent marshes for an array of ecological services. Unfortunately, coastal erosion is a major threat to this habitat. The Terrebonne Bay Shore Protection Demonstration Project is one initiative created to reduce the erosion rate of shorelines while also supporting oyster reef establishment. In this project, three constructed structure types, Triton™ Gabion mats, A-Jacks®, and Reefblks™, were placed in three locations within Terrebonne Bay, Louisiana. It is important to assess the ecological services of the constructed reef habitats, and specifically in this project to compare fish and crustacean diversity around the structures to nearby natural, intertidal oyster reef habitats. Gill nets and crab traps were used to determine species richness, species diversity, and CPUE of fish and blue crabs at three structures and three natural reefs. ANOVA determined there was no difference in fish richness, fish diversity, and CPUE between structure types and natural reefs. There was also no difference in blue crab CPUE between the structure types and natural reefs. Preliminary results suggest that artificial reefs created by all three structure types provide similar suitable habitats as natural oyster reefs and are supporting similar fish and crustacean communities.

Fuselier, K.B., D.D. Kee, F.X. Phillips and C.W. Richmond. McSU. **Stratification parameters for native Louisiana rattlesnake-master (*Erygium yuccifolium*) seeds to achieve adequate germination.—**To achieve long-term sustainability, plant material used for restoration projects should be adapted to local physical, climatic and biologic conditions. Rattlesnake-master (*Erygium yuccifolium*) at the Louisiana Environmental Research Center in southwest Louisiana has been shown to be a prolific seed-bearing, native herbaceous dicotyledon. However, successful establishment from seed has yet to be accomplished. Stratification treatments of cold (4˚C)-dry and cold-moist with different durations of storage time (7, 14 or 28 days) were investigated to find optimal parameters for germination of rattlesnake-master seeds from native Louisiana prairie remnants. Treatments were placed in growth chambers with temperature regimes of either March average lows and highs (7.8˚C and 21.1˚C) or June average lows and highs (24.4˚C and 34.4˚C) to demonstrate possible germinating conditions for these local plants. The temperature regimes and stratification treatments significantly affected seed germination. There also was a significant regime by treatment interaction. March-regime seeds had an average germination ranging from 74.5% to 85%, while June-regime seeds ranged from 6.5% to 27.5%.

March-regime results would indicate the best time to plant is fall or early spring. Results also indicate that cold-moist stratification is required to attain moderate success when planting in warm, wet environments.

Hargrave, J.L. and D. D. Kee. McSU. **Plant response to controlling salt water soil damage with industrial wastes**.—A greenhouse leaching study, conducted during the summer of 2010, 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 grams/pot) applied pre- or post-salt water flooding and a control on leachate mass, pH and plant available nutrients including Na. The study used a fractional factorial, randomized complete block design with three blocks. A Vidrine loamy silt soil (2000 g/pot) from the McNeese Farm was used. After the leaching study, the pots were untouched until October 2011. The soil from each pot was ground small enough to pass through a 2 mm sieve. The soil was then weighed. Each pot of soil received five seeds of Timothy canarygrass (*Phalaris angusta*) planted in an X pattern in the pot. After two weeks, data were collected weekly on number of seeds germinated and weeds present in each pot. The height of the tallest plant from each pot was collected every four weeks.

O'Malley, D.A. and E.J. Melancon. NiSU. **The influence of tidal height and wave energy on first-year oyster reef development on constructed shoreline erosion control structures**.— This project assessed the effects of tidal inundation frequency and high-energy wave habitat on *Crassostrea virginica* recruitment and oyster reef development. Plastic mesh bags of oyster shell were placed at different intertidal heights on the windward side of three constructed shoreline erosion control structures, Triton™ Gabion mats, A-Jacks®, and Reefblks™, all located on the northern shore of Terrebonne Bay, Louisiana. Plastic mesh bags of shells also were placed on the interior side ReefBlks™ and at a nearby natural intertidal oyster reef. Frequency of tidal inundation was documented by constant recorders placed near the structures. The shell bags were collected after 13 months and assessed for oyster length frequency and density and the densities of its principal sessile competitors, the barnacle, *Balanus* sp., and the hooked mussel, *Ischadium recurvum*. Reef community formation was hypothesized to differ between high and low frequency aerial exposure and between high and low wave energy habitats. Results suggest confirmation of this hypothesis, that oyster reef development is hindered by the combination of aerial exposure and wave energy. Understanding how water energy and aerial exposure influence oyster reef development will provide managers with information on how to ensure the success of future oyster reef shoreline protection projects.

Samaha, D. and R. Boopathy. NiSU. **Fuel grade ethanol production from eastern gamagrass**. —Our need for alternative and cleaner liquid fuel is ever growing because of the dwindling supply and increased price of oil for the past ten years. Lignocellulosic ethanol production is an attractive option to meet the demand of energy for the transportation sector of our country. The production of ethanol from gamagrass (*Tripsacum dactyloides*) is very attractive because it grows very well in the wet and marshy environment that is common to southeast Louisiana. Gamagrass is also a native perennial grass, which is commonly found in Louisiana and eastern United States. Gamagrass grows on marginal land and will not take up the valuable agricultural land for energy production. The purpose of this study was to demonstrate that locally grown gamagrass could be used effectively to produce ethanol. We optimized pre-treatment conditions

to remove lignin and also effectively used enzymes, cellulase and xylanase, to produce glucose and xylosic sugars from cellulose and hemicellulose components of gamagrass. These sugars were used for fermentation with a recombinant *E. coli* FBR 5 capable of fermenting glucose and xylose simultaneously. The results indicated that the use of cellulase enzyme produced 2,356 mg/L ethanol and the use of xylanase enzyme yielded 1,301 mg/L ethanol. The enzyme cocktail of cellulase and xylanase produced the maximum ethanol yield of 6,002 mg/L within nine days of fermentation.

Sammons, C.S. EHS. **Zooplankton and the Deepwater Horizon oil spill**.—In order to better understand numerous effects of oil spills on marine environments, one important topic to explore is the effects of the recent Deepwater Horizon oil spill on zooplankton life. The first task is to perform a literature review concentrating on previous oil spills and their repercussions on the marine wildlife, studying in-depth multiple works. Previous research suggests that the combination of crude oil and dispersants is more toxic than oil alone, but the long-term changes to these species are relatively nonexistent. In order to test these previous hypotheses, I worked with two mentors, Dr. Mark Benfield and Dr. Rosana Di Mauro, conducting experimentation on zooplankton affected by the oil spill. To complete this, plankton splitters were used to obtain fair samples; these samples were then scanned, and finally the Zooimage software was programmed to detect certain types of zooplankton from a wide variety of species. The trained software then processed the scanned samples and generated a large amount of raw data representing abundances, volumes, and size structures of each species. The results suggested that one of the three samples had foreign environmental factors acting upon it as its size structures deviated significantly from the others.

Shakya, G., D.D. Kee, B. Wyman and J. Woolman. McSU. **Soil and plant response to circulating fluidized bed ash particle size**.—Circulating fluidized bed (CFB) ash is a mixture of fly ash and bottom ash resulting from burning of petroleum coke or coal in a circulating fluidized bed boiler. Application of CFB ash to agricultural land has been encouraged but little is known regarding its effects on plant response and environmental impact. The objective of this study was to evaluate the vegetative response of Timothy canarygrass (*Phalaris angusta*) to seven different sizes of CFB ash amendments. Seven applications included 10 grams of whole CFB ash (~5 Mg per hectare), >2mm, 1mm-2mm, 0.5mm-1mm, 0.25mm-0.50mm, 0.125mm-0.25mm, < 0.125mm in diameter CFB ash and the control group. Each application had 4 replicates for a total of 32 pots. Growth response of the plants was compared in seven treatment groups and the control group. A leachate study was the first part of this study where the pots were watered with 1L of distilled for 8 weeks to observe for pH and salinity. Soil samples taken at the beginning of the study prior to treatment additions, after the leachate study, and at the end of the plant study were analyzed utilizing two separate pH methods.

Smelker, K.S. and R.A. Valverde. SLU. **Vitellogenin induction by PCBs in the turtle, *Trachemys scripta***.—Vitellogenin (Vtg) detection is used as an indicator of the presence of endocrine disrupting chemicals, specifically estrogen-mimicking compounds, which are known to cause physiological and behavioral changes in otherwise healthy animals. Vtg is a precursor protein for yolk production in nonmammalian vertebrates. Liver production of Vtg is induced by estrogen stimulation and is normally found only in reproductively active females; however, both

males and females carry the gene necessary for Vtg production. Previous research shows that polychlorinated biphenyls (PCBs) are environmentally persistent estrogenic contaminants. The purpose of this study was to demonstrate that PCBs are capable of inducing Vtg production in red-eared slider turtles (*Trachemys scripta elegans*). Fifteen turtles of varying size and sex and having no initial detectable Vtg, received three intraperitoneal injections of varying concentrations of PCBs. Blood samples were then analyzed using a Western blot. Positive control turtles injected with Estradiol-17β and turtles that received 100µg PCBs/g body weight all showed Vtg induction. Two of three turtles that received 10µg PCBs/g body weight showed Vtg induction, and turtles injected with 1µg PCBs/g body weight did not show Vtg induction. These results indicate that turtles exposed to varying levels of PCBs demonstrate Vtg induction in a dose-response manner.

Stewart, J.W. SLU. **Testing subspecies delimitation of DeKay's brownsnake, *Storeria dekayi*, using ecological niche modeling**.—Dekay's brownsnake, *Storeria dekayi*, has a widespread geographic distribution, ranging from Quebec south to eastern Mexico and an isolated population in Honduras and Guatemala. Currently, seven subspecies are recognized, varying in color patterns and morphological characteristics. These characteristics make them difficult to identify, especially in areas where these groups overlap. Subspecies designation is problematic empirically and philosophically. Using a combination of Geographic Information Systems (GIS) and Ecological Niche Modeling (ENM) the subspecies of *S. dekayi* were tested. Geographic Information Systems have led to more useful data in ecology and biogeography studies. Ecological Niche Modeling takes spatial data of a species with the known habitat and environmental requirements to form models that allow for analysis of actual or predicted range distributions. ENM previously has been used as an effective technique to learn more about an organism's habitat and to assist in species delimitation. By combining known presence data and ecological parameters, ENM will be created to test the reality of the subspecies of *Storeria dekayi*.

Microbiology Section

Adams, D. and R. Boopathy. NiSU. **Use of formic acid to control vibriosis in shrimp**.— With the growing demand for shrimp (and other aquaculture products) comes the growth of the industry. However, *Vibrio* pathogens pose a significant threat to the expansion of the industry through severe economic losses. Under the USDA, the United States Marine Shrimp Farming Program (USMSFP) is tasked with finding solutions that fit North American aquaculture needs, with the intent of making us competitive in the world market. While some countries openly use antibiotics to treat their ponds, North American laws and regulations do not permit this. In an attempt to find a control mechanism aside from antibiotics, research efforts have examined the potential of naturally occurring organic acids. Previous research determined formic acid to be the most effective at inhibiting *Vibrio harveyi*. The current study explored the effective concentration needed to reduce growth of five select *Vibrio* species, namely *V. alginolyticus*, *V. cholerae*, *V. harveyi*, *V. parahaemolyticus*, *V. vulnificus*. Various formic acid concentrations were tested in triplicate over an eight-day period. Bacterial growth was monitored by optical density using a spectrophotometer, and pH data were collected. Linear regression models of the

collected data allowed for the calculation of EC_{50} values for each *Vibrio* spp. The potential application of this study is to use formic acid in shrimp feed to prevent vibriosis in aquaculture.

Barber, L., L.M. Foreman, E. Bergeron and A.L. Corbin. NiSU. **Biocontrol of *Vibrio harveyi* in the shrimp aquaculture with bacteriophages**.—The current decline in shrimp farm production has been related to a variety of issues associated with survivability of shrimp grown in the aquaculture setting. The presence of *Vibrio* pathogens has been identified as a cause of high mortality in post-larval and juvenile shrimp in aquaculture. The use of bacteriophages to control infections has seen increased interest with the emergence of antibiotic resistant pathogens in a variety of human and animal infections. The use of a host-specific bacteriophage with lytic activity may be effective at controlling *Vibrio harveyi* in recirculating aquaculture systems for shrimp in the larval, post-larval and juvenile stages. Bacteriophage isolation from hatchery, indoor recirculation and open marine water is probable if the specific host is present. We isolated several bacteriophage from inland waterways near the Gulf of Mexico. We tested the specificity of these bacteriophage isolates to determine species specificity. Our results indicate the isolates show a varied specificity to several of the *Vibrio* species. Some of the phage isolates were highly infective across several species while others show infectivity for only a few species.

Creech, C.C., D. Jackson and R.L. Minton. ULM. **A preliminary survey of freshwater snail shell microbes from Bayou Bartholomew**.—The diversity and ecology of bacteria in freshwaters have been studied extensively. However, less is known about bacteria from low-flow, soft bottom systems like those found in the Mississippi Alluvial ecoregion of North America. In these systems, freshwater mollusk shells are frequently one of the most common hard substrates for microorganisms to colonize on. In an effort to better understand both the microbiota utilizing mollusk shells and the relationship between mollusk species and the bacterial species they harbor externally, we sampled the bacterial communities growing on individual snail shells from two benthic taxa, *Campeloma decisum* and *Pleurocera canaliculatum*. Shells were swabbed and bacteria were grown on R2A media, brought to pure culture, and analyzed using a variety of biochemical tests. The results of these tests and a discussion of the diversity of microbes will be presented.

Dixson, K.S. and J.L. Comeaux. McSU. **Nasty boys or dirty girls? Enumeration of coliform bacteria on environmental surfaces**.—The popular media has devoted much attention recently to various studies examining the level of microbial contamination on common objects, such as fecal coliforms on cell phones or the "germiest" objects people encounter on a daily basis. We wished to elaborate on this topic by investigating whether males or females are more responsible for these hygienic issues. We hypothesized that lack of hand washing after using a restroom is a strong indicator of an individual's overall sanitary index. We have been culturing swabs taken from surfaces utilized exclusively by one sex or the other – specifically, bathroom door exit handles – to determine the relative frequency at which we could detect fecal coliform bacteria (such as *E. coli*). Besides settling the age old questions of which sex is more diligent with their personal cleanliness, these results can help public health officials to more effectively focus educational efforts towards the sex most responsible for such spreading of potential pathogens.

Duplantis, B. and J.L. Comeaux. McSU. **Inhibition of microbial growth in vitro by sodium salts of respiratory acids**.—Sodium salts of lactic acid and citric acid are nontoxic inhibitors of microbial growth used as shelf-life extenders in raw and packaged meat products. To explore the potential use of other compounds as growth inhibitors for food-borne and oral health pathogens, we tested the effectiveness of sodium salts of other intermediates from glycolytic, tricarboxylic acid, and fermentive pathways on the growth of *Streptococcus mutans*, *Escherichia coli*, and *Salmonella enterica Typhimurium*. Of nine compounds tested, 4% solutions of sodium acetate, sodium citrate, and sodium propionate inhibited microbial growth in tryptic soy broth. We then investigated the possibility that short-term exposure of these compounds could provide longer term inhibition. Cells of each culture were exposed to the inhibitors for five minutes and then introduced to TSB. However, net growth after 18 hours was not affected.

Grimes, M., J. Carr and D.W. Jackson. ULM. **The evaluation of novel β-lactam antibiotics on a clinical *E. coli* isolate**.—The distribution and occurrence of multi-drug resistant bacteria is an increasing public health problem. The emergence of resistant bacteria makes the task of synthesizing new antibiotics imperative to combating these bacteria. This research attempts to establish the efficacy of newly synthesized beta-lactam antibiotics. In this study, the new β-lactam antibiotics are tested for broad spectrum activity using a clinical *E. coli* strain. The *E. coli* isolates were grown over night and then spread on Mueller Hinton agar plates. The antibiotics were placed on the Muller Hinton plates via sterile paper discs. The plates were then inverted and placed in an incubator for 24 hours. The zone of inhibition for each antibiotic tested was measured and recorded. The results show effectiveness with antibiotics HTS10 with a 15 mm zone of inhibition, Bis-2-pyridyl with a 22 mm zone of inhibition, PDK 94 with a 15 mm zone of inhibition, and Bentel with a 24 mm zone of inhibition. This data suggests these new β-lactam antibiotics may have broad spectrum use, but further testing is needed.

Guidry, J.T. and W.H. Dees. McSU. D. Simon, M. Pilligua, O. Jones and A. Jerse. USUHS. **Allelic exchange of P1A with P1B in *Neisseria gonorrhoeae* decreases in vivo fitness during murine infection**.—PorB is a porin and the major outer membrane protein of *Neisseria gonorrhoeae*. This porin consists of a trimer of three polypeptide monomers folded into antiparallel beta-barrels. PorB is expressed as one of two serotypes, P1A or P1B, each exhibiting unique characteristics regarding pathogenesis. P1A, unlike P1B, facilitates invasion into epithelial cells. Strains expressing P1A are mainly associated with disseminated infection, while localized infection typically characterizes P1B strains. P1B strains are more common and experimentally colonize female mice better than P1A strains, suggesting a fitness advantage in the lower genital tract. To test this hypothesis, the P1B gene of gonococcal strain MS11 was cloned and used to replace the P1A gene of strain FA19 by allelic exchange to produce strain FA19(rP1B). The cloned P1A gene also was introduced into wild-type FA19 to produce the control strain FA19(rP1A). The relative fitness of the mutant strains was assessed. Strain FA19(rP1B) exhibited lower levels of in vivo fitness than both the FA19(rP1A) and the wild-type FA19 strains. We conclude that fitness advantages due to P1B in this model are dependent upon specific backgrounds. Future studies are planned to replace P1B with P1A in strain MS11 and to analyze fitness in vivo.

Guidry, J.T. and W.H. Dees. McSU. D. Simon, M. Pilligua, O. Jones, L. Garvin and A. Jerse. USUHS. **Allelic exchange of P1A with P1B in *Neisseria gonorrhoeae* increases antibiotic resistance**.—The porin PorB is the major outer membrane protein of the bacterium *Neisseria gonorrhoeae.* PorB exists as a trimer made up of three monomers, each folded into an antiparallel beta-barrel. These trimers form a channel through the outer membrane of the bacterium, facilitating the selective diffusion of substances into the cell. This porin plays a significant role in determining the exclusion limit of the membrane, which affects resistance of the bacterium to certain antimicrobial compounds. PorB exists as one of two serotypes: P1A and P1B. Gonococcal strains express either one or the other serotype, and it has been observed that P1B strains are more resistant to antibiotics than those strains expressing P1A. In this experiment, the P1A and P1B genes of strains FA19 and MS11, respectively, were cloned and used to replace the wild-type P1A gene of strain FA19 by allelic exchange. Resistance of the altered FA19(rP1B) and FA19(rP1A) strains as well as that of the wild-type strain (FA19) to several antibiotics was compared. We observed an increase in resistance to azithromycin in the FA19(rP1B) strain, leading us to conclude that serotype P1B, though in a foreign background, plays a role in antibiotic resistance.

Guidry, J.T., J. Prudhomme and W.H. Dees. McSU. **Effects of juvenile hormone III and 20-hydroxyecdysone on Gram-negative and Gram-positive bacteria**.—As the usefulness of conventional methods of insect pest control, such as chemical pesticides, grows more and more limited, new methods must be explored. One approach is the use of bacteria to introduce exogenous biological compounds (e.g., insect hormones) into insects, hence altering their development. Before this technique may be implemented, any inhibitory effects that the insect hormones may have on bacteria must be assessed. Synthetic insect hormones, juvenile hormone III and 20-hydroxyecdysone, were each suspended in dimethyl sulfoxide and tested against 13 bacterial species using the Kirby-Bauer disk diffusion method. While the suspensions had minimal effects on bacterial growth, a slight increase in susceptibility is observed in Gram-negative species.

LeBlanc, C.J., J.L. Comeaux and K.J. Jackson. McSU. **Use of bacteriophages to treat *Salmonella* infestation in the African Dwarf Frog (Pipidae: *Hymenochirus*).—**In recent medical cases, there has been an increasing correlation between patients who have been diagnosed with salmonellosis and exposure to certain amphibians, reptiles, or birds. A recent outbreak involved *Salmonella enterica Typhimurium* associated with African dwarf frogs (Pipidae: *Hymenochirus*) sold as aquarium pets. Owners are generally not aware of the potential health threats involved with ownership of these animals. Alongside efforts to educate pet owners, an effective means of *Salmonella* reduction must be developed to minimize the transfer of *Salmonella* to people who handle the animals. We are exploring the possibility of using bacteriophages to reduce the abundance of *Salmonella* in the gastrointestinal tract of these animals. Bacteriophages specific to *Salmonella Typhimurium* were isolated from wastewater, purified, and amplified. Studies evaluating the efficacy of alternate methods of phage delivery are underway in order to determine the effectiveness of this potential treatment method.

McMahill, L., A. Corbin and R. Nathaniel. NiSU. **Evaluating ATMs for the presence of *Staphylococcus aureus*.—**Methicillin-resistant *Staphylococcus aureus* (MRSA) poses a

significant health risk that is quickly increasing within our society. This bacterium has seen an increase in not only virulence, but its distribution outside of the healthcare community. By analyzing how MRSA is transmitted through publicly used objects, it is possible to quell this outbreak. Automated teller machines (ATMs) serve as an example of a publicly used object that could potentially spread MRSA. Fifty-five ATMs in the Thibodaux area were tested for the presence of community associated MRSA. Overall, no MRSA was collected from any of the ATMs sampled within this area. This may reflect a reduced incidence of MRSA within the community. However, it is most probably due to an external factor inhibiting MRSA growth on ATMs. Analyzing what factors inhibit the growth of MRSA on ATMs can give information on what precautions should be employed to reduce this bacterium's transmission. Preliminary findings demonstrate that while MRSA is able to grow on soft plastic, hard plastic, and metal keypads, it is less likely to grow on soft plastic keypads. The objective of this experiment is to test whether keypad material, temperature, and other environmental conditions inhibit the growth of MRSA on ATMs.

Miller, B.N., J. Putnam and A. Wiedemeier. ULM. **Isolation and characterization of novel agrobacteriophage**.—*Agrobacterium tumefaciens* is a gram-negative, rod-shaped pathogenic bacterium which induces crown galls in a wide range of dicotyledonous plants. *Agrobacterium tumefaciens* possesses a Ti plasmid and has the ability to transfer DNA from the plasmid into plant cells causing an up-regulation of hormones responsible for growth and cell division. Bacteriophages represent a large population of viruses that infect bacteria. Phages are typically species specific, therefore, agrophage infect *Agrobacterium* species. Bacteriophages utilize different reproductive strategies depending on the availability of the bacteria. A lysogenic infection occurs when the phage exists as prophage in the host, continually replicating the phage genome. In contrast, lytic infections result in the death of the host cell and thus release phage progeny. Early research on agrophage focused primarily on possible roles in gall production. A small library of agrophages exists; however, none of the genome sequences of those phages have been published. We have successfully isolated five phages by enriching a soil sample collected. We present data here about our isolation procedures, plaque morphologies, phage structures, and restriction enzyme digests. All of these tools will be used to preliminarily classify each phage prior to sequencing the genomes.

Murphy, A., J. Carr, D.W. Jackson. ULM. **The evaluation of novel β-lactam antibiotics on clinical staphylococcal isolates**.—Antibiotic treatment of staphylococcal infections is often problematic due to increased resistance to β-lactam antibiotics. The β-lactam antibiotics are a broad class of antimicrobials that include penicillin, cephalosporin, monobactams, and carbapenems. These β-lactam antibiotics are one of the most prescribed antibiotics to date. Bacteria often develop resistance to β-lactam antibiotics by synthesizing an enzyme beta-lactamase, which attacks the β-lactam ring. With the emergence of more resistant bacteria, there is a need to find novel antimicrobials to combat these bacteria. In this study, the efficacy of novel β-lactam antibiotics was tested on clinical isolates of *Staphylococcus aureus*. The staphylococcal isolates were grown over night and spread on Mueller Hinton (MH) agar. The novel β-lactam antibiotics were reconstituted with ethanol, sterile paper discs were dipped in the antibiotics and placed on the MH plates. The plates were incubated for 24 hours and the diameter of each zone of inhibition was measured. Our results indicate that several of the novel β-lactam antibiotics

were effective against the clinical staphylococcal isolate:2PDK42A - 11 mm zone of inhibition, 3PDK08 - 14 mm zone of inhibition, 3PDK07 - 13 mm zone of inhibition, PDK19 - 11 mm zone of inhibition, LEB78 (Benzene tellurinic, sodium salt acid) - 13 mm zone of inhibition, and Bis-(2-pyridyl)-di-telluride - 15 mm zone of inhibition.

Patten, R., K.A. Jackson and J. Comeaux. McSU. **Identification of *Salmonella* infection by PCR.—***Salmonella* is a Gram negative bacterium of the family Enterobacteriaceae known to cause two distinct diseases referred to as salmonellosis: enteric (typhoid) fever resulting from a bacterial infection in the bloodstream and acute gastroenteritis resulting from food borne illness. Common sources of *Salmonella* infections are uncooked poultry products or contact with fecal wastes of reptiles and amphibians. The overall goal of this project is to develop bacteriophage therapy to eliminate *Salmonella* infections in an animal model. To this end, we are developing a PCR based method for identifying *Salmonella* infection in samples containing multiple bacterial types. DNA was isolated from cultures of different strains of *Salmonella* and PCR tests were run with primers specific for the *Salmonella* invA gene. Primers also were checked against various other types of bacteria, both Gram positive and Gram negative, to ensure the specificity of the primers for *Salmonella*. Once data from the molecular biology phase of this research is collected, this method of *Salmonella* DNA detection will be used to detect the presence of *Salmonella* infection in an animal model.

Patten, R., K.A. Jackson and J. Comeaux. McSU. ***Salmonella* infection rates in reptiles and amphibians of Southwest Louisiana.—***Salmonella* is a Gram negative bacterium of the family Enterobacteriaceae known to cause two distinct diseases referred to as salmonellosis: enteric (typhoid) fever resulting from a bacterial infection in the bloodstream and acute gastroenteritis resulting from food borne illness. Common sources of Salmonella infections are uncooked poultry products or contact with fecal wastes of reptiles and amphibians. The overall goal of this project is to determine the rate of *Salmonella* infection in wild reptiles and amphibians in Southwest Louisiana. Fecal samples obtained from specimens of three species of skinks (*Scincella lateralis, Eumeces fasciitis,* and *Plestiodon obsoletus*) and one frog (*Hyla cinerea*) were tested for the presence of *Salmonella* using XLD agar and PCR using primers specific for the *Salmonella* invA gene.

Prasai, B., R. Suhardi and R. Boopathy. NiSU. **Use of white rot and brown rot fungi in lignin removal from sugarcane residue for bio-ethanol production.—**Agricultural residues are produced in large quantities throughout the world. Approximately 1 kg of residue is produced for each kilogram of grain harvested. This ratio of grain/residue translates into an excess of 40 billion tons of crop residue produced each year in the USA. These residues are renewable resources that could be used to produce ethanol to solve the energy problem. In this study, we demonstrate that the post-harvest sugarcane residue could be used to produce fuel grade ethanol. A fungal pretreatment using white rot and brown fungi was applied to remove the lignin, which acts as physical barrier to cellulolytic enzymes. A recombinant *E. coli* FBR 5 strain was used to ferment the cellulosic and hemicellulosic sugar after enzymatic saccharification. The results showed significant ethanol production when white rot and brown rot fungi were used together as a pre-treatment process to remove lignin compared to the treatment in which these fungi were used alone.

Molecular and Biomedical Biology Section

Champagne, D.C. and P.E. Shockett. SLU. **Spatiotemporal analysis of illegitimate V(D)J deletions in Notch1 and Bcl11b genes.—**Aberrant V(D)J recombination in oncogenes and tumor suppressor genes is implicated in the development of T-cell leukemias/lymphomas. Previously, others identified hotspots for deletional DNA rearrangements adjacent to cryptic RSSs in Notch1 and Bcl11b genes. Deletions were detected in thymus of adult mice with radiation-induced thymic lymphomas. Interestingly, these "illegitimate" V(D)J rearrangements also were detectable in thymus of healthy wild-type adult animals, suggesting other factors in addition to deletions contributed to development of lymphomas, but the frequency of deletions at different developmental stages or in peripheral lymphoid organs was not analyzed. To determine the timing, frequency, and tissue distribution of aberrant V(D)J-mediated Notch1 and Bcl11b gene rearrangements during mouse development, we are using a nested PCR protocol and Poisson distribution analysis in tissues collected at different developmental stages. Preliminary results suggest that the frequency of deletions in thymus of wild-type mice is similar from fetus to 6-months of age. Deletions also are detected in spleen, suggesting that T cells bearing deletions leave the thymus and presumably enter the circulating lymphocyte pool. We are using an inducible tetracycline-regulated RAG transgenic mouse system to determine if these deletions occur at all ages with induced RAG expression or are limited to specific developmental windows.

Cooper, J.A. Henry, M. Micault, W. Xu. ULL. **Biochemical function and structure of Bcl10. —**A20, a tumor suppressor in several types of lymphomas, has been suggested to be an NF-κB target gene; conversely, the deubiquitylation activity of A20 is required for inhibition of Bcl10-mediated activation of NF-κB. BCL10, which is activated in a recurrent chromosomal translocation that causes human mucosa-associated lymphoid tissue (MALT) lymphomas, is known to be essential for NF-κB activation in B cells. We report here that Bcl10 upregulates endogenous A20 gene expression in B lymphocytes upon B-cell receptor engagement of anti-IgM, while Bcl10-deficient B cells are unable to proliferate in response to anti-IgM stimulation. Transient transfection assays in 293 cells indicate that Bcl10 can activate the A20 promoter, which contains NF-κB-binding sites. We also construct a theoretical structure of mouse Bcl10 and analyze the structure by molecular modeling and molecular dynamics simulation. Lastly, we found that marginal zone B cells from BCL10-transgenic mice proliferate more readily than wild-type B cells whereas, surprisingly, the transgenic follicular B cells from these mice proliferate comparably to wild-type cells. Collectively, our results indicate that Bcl10 is an essential regulator of A20 gene expression and B-cell proliferation mediated by B-cell receptor signaling.

Figueroa, A. and J.B. Drost. McSU. **Identification of common high-risk alleles at the DRD4 and DAT1 loci and development of PCR genotyping methodology to study the genetics of ADHD within the SWLA population.—**Louisiana is second only to Alabama in frequency of individuals diagnosed with and treated for ADHD. We are developing a Pilot Project for genetic analyses to test for certain common alleles which have been associated with increased risk of ADHD among SWLAs population. We wish to assess the genotypes of certain affected individuals and estimate the population frequency of these alleles in our population. The two loci

chosen are the DRD4 gene (codes for a Dopamine receptor protein in postsynaptic membrane) and DAT1 (codes for a Dopamine transporter protein in presynaptic membrane). At each locus, there is a common allele associated with increased ADHD risk. We present the results of genomic and published studies to identify the loci and alleles most appropriate for this assay as well as the technical design of the assay. Results of preliminary tests will be presented.

Jackson, L.M. SLU. **Investigating primordial germ cell (PGC) development using germ cell-specific genes in fish.—**Primordial Germ Cell (PGC) determination is one of the most important feats of vertebrate embryonic development because it allows the continuation of life among future generations. In vertebrates, at least two different mechanisms exist that allow species to develop cells that later form the eggs and sperm. In the predetermined mechanism of PGC development, cells are specified by maternal determinants that are located within the germ plasm. In the induced mechanism, cells must be induced by external regulating factors that initiate germ cell development. Preliminary evidence suggests that different groups of fish may use different mechanisms of PGC development. The main objective of this project is to determine the mechanism of germ cell development in several fish species using conserved sequences of germ-cell genes, specifically vasa and oct-4. Currently, oct-4 has been identified only in the induced mechanism of PGC development. Therefore, using phylogenetic analysis for those species that show the expression of oct-4 can determine a common gene mechanism for germ cell development in the presence of oct-4. The data will be used to test whether there is a correlation between body patterns, specifically fin position, and mechanism of germ cell determination.

Jaligama, S. and S.A. Meyer. ULM. V.M. Kale. CPRUHS. M.S. Wilbanks and E.J Perkins. USAERDC. **Early hematological effects of MNX (hexahydro-1-nitroso-3,5-dinitro-1,3,5-triazine) an environmental degradation product of RDX persist to cause bone marrow myelosuppression at later time point.—**Our previous studies identified bone marrow (BM) and spleen as acute hematological targets of MNX in rats. 14 days after a single MNX exposure, splenic hemosiderosis, loss of blood granulocytes and bone marrow Granulocyte Macrophage Colony Forming Cells (GM-CFCs) occurred with (NOAEL) of 47, 47 and <12 mg/kg, respectively. To address whether late effects are due to persistence of early effects, female Sprague-Dawley rats were orally gavaged with MNX (0 to 94 mg/kg) and hematology, organ weights, tissue histopathology and GM-CFCs were evaluated at 2, 7, 10, 12, 14 days. Granulocytes were increased at 2d (NOAEL 47 mg/kg), unchanged at 7d and decreased at 14d. GM-CFCs were unaffected at 2 and 7d, but were decreased by 47 mg/kg MNX from 12–14d with maximal effect at 12 d. Spleens showed an increased macrophage activity and decreased relative weight at 2d (≥ 47 mg/kg). Splenic hemosiderosis was evident at 2d (≥ 47 mg/kg), 7d (NOAEL 24 mg/kg) and 14 d. Blood MNX was 0.2-0.4 μg/mL at 2d after 24-94 mg/kg, but undetectable at 14d. Collectively, these data demonstrate that splenic effects of MNX are early onset and BM myelosuppression is delayed presumably because of the time required for preceding events to develop.

Kassardjian, M.J., G.B. Morgan, A.R. Schorr, B.N. Miller, C.R. Gissendanner, A.D. Weidemeier, and A.M. Findley. ULM. **Isolation and characterization of novel syco-bacteriophage from soil samples in northeast Louisiana.—**As part of an HHMI-funded phage

genomics initiative, ULM freshman Biology students have isolated novel bacteriophages via direct plating or enrichment regimes. Isolates were subjected to spot test analysis, repetitive purification plating, and an empirical testing protocol that led to the harvesting of high-titer lysates. Lysates were processed for TEM with negative staining. DNA was isolated from each phage and characterized with BamHI, ClaI, EcoRI, HaeIII, and HindIII restriction endonucleases. Restriction fragments were separated with electrophoresis on 0.8% agarose gels containing EtBr. Restriction gels were compared with known mycobacteriophages on the www.phagesdb.org website to ascertain the novelty of phage isolates. Genomic DNA was evaluated for quality, molecular weight, and quantity and Mycobacteriophage sp. iCleared and Medussa were submitted for genome sequencing. The resultant genomes will be annotated following finishing of the draft sequences with gene calling and assignment of predicted gene functions using the Consed, Glimmer/GeneMark and Phamerator programs through the DNA Master workflow. Preliminary descriptions of plaque morphology, phage titer, phage ultrastructure, and DNA restriction digestion profiles for these new isolates, as well as the results of initial annotation efforts for the iCleared phage genome, will be presented.

Makolo, A. UIN. E. Adebiyi. A.O. Osofisan. UIN. **Computational inference technique for mining structured motifs.—***Plasmodium falciparum*, a single celled parasite is the cause of the most severe form of malaria which exacts a heavy toll of illness and death - especially amongst children and pregnant women. The treatment and control of malaria has become more difficult with the spread of drug-resistant strains of the parasite. The problem of understanding the biology of *P. falciparum* and the identification of the proteins involved in its gene regulatory mechanism remains fundamental to the discovery of viable drug target to combat the disease. The fact that these proteins interact with the genomic DNA at the binding site, to bring the genome to life and these interactions also define many functional features of the genome, makes mining transcription associated proteins an important challenge in malaria research. In this work, a novel computational inference technique, Suffix Tree Gene Enrichment Motif Searching (STGEMS) for mining structured motifs was developed which successfully extracted DNA binding sites in the challenging repeat-sequence-rich, base-biased genome of *P. falciparum*.

Malaviya, A. and P.W. Sylvester. ULM. **Combined treatment effects of γ–tocotrienol with peroxisome proliferator-activated receptor gamma agonists and antagonists in breast cancer cell lines.—**γ–Tocotrienol (γ-T3) is a member of the vitamin E family of compounds that displays potent antiproliferative effects against breast cancer cells. Recent studies have shown that combined treatment of subeffective doses of γ-T3 with subeffective doses of statins or EGF receptor inhibitors caused a synergistic inhibition in the highly malignant +SA mammary epithelial cells. Peroxisome proliferator-activated receptor gamma (PPARγ), a member of the nuclear receptor family is a ligand activated transcription factor that is overexpressed in breast cancer. The present study investigated the effects of γ-T3 used in combination with PPARγ agonists and antagonists on breast cancer cell growth and survival. Effects of combined treatments of γ-T3 with PPARγ agonists (Rosiglitazone and Troglitazone) and antagonists (GW9662 and T0070907) were examined using two mammary tumor cell lines: 1) human MCF-7 cells that are PPARγ receptor positive; and 2) mouse +SA mammary tumor cells that are PPARγ receptor negative. Combined treatment with subeffective doses of γ-T3 with PPARγ agonists was found to increase MCF-7 and +SA cell growth, whereas, the combined treatment

with subeffective doses of γ-T3 with PPARγ antagonists was found to significantly inhibit growth of both breast cancer cell lines. Western blot studies of the combined treatment of subeffective doses of γ-T3 with PPARγ antagonists showed cell cycle arrest in +SA mouse cells and decrease in protein levels of PPARγ followed by reduction in mitogenic signaling in MCF-7 human cells. In summary, combined treatment of γ-T3 with PPARγ antagonists mediate anticancer effects via both PPARγ-independent and -dependent pathways.

Quadri, S., P. Prathipati, D.W. Jackson, and K.E. Jackson. ULM**. Recurrent insulin induced hypoglycemia alters hemodynamic function through the induction of heme oxygenase-1.—** Iatrogenic hypoglycemia is a major complication associated with diabetes treatment. Several stressors including shock and hypertension have been reported to increase circulating levels of HO-1, which increases endogenous CO production. Thus, the current study was performed to evaluate the hypothesis that, hypoglycemia promotes hypertension via an increase in HO-1. Male Sprague Dawley rats (200-225 g) were treated for 2 weeks with varying doses of humulin NPH and fed on normal chow or high zinc diet (1 mM). Tail cuff blood pressure, food, water intake and glucose states were monitored daily for 14 days. A dose dependent decrease in blood glucose and an increase in blood pressure were observed at 7 units and 9 units of insulin. There were no significant differences in urinary parameters and food and water intake. Zn diet and ZnDPBG (HO-1 inhibitor) attenuated the recurrent insulin induced hypoglycemia (RIIH) mediated increase in MAP. HO-1 levels were increased in the hearts and kidneys of normal diet animals; Zn diet and ZnDPBP attenuated the increase in HO-1. These results demonstrate that RIIH promotes hypertension and inhibition of HO-1 reduces the blood pressure. Therefore, HO could become a novel target for the treatment of hypertension. Research support by a BOR grant.

Willis, T. SU-BR**. Factors that affect the growth and metabolism of *Escherichia coli*.—** *Escherichia coli* was subject to three variables. The variable of temperature was measured in degrees Celsius, the variable of length of exposure to heat was measured in minutes, and the variable concerning the type of medium was measured by using three sugar solutions: glucose, lactose, and sucrose. There were thirty test tubes, ten were composed of glucose, ten were composed of lactose, and ten were composed of sucrose. Each test tube containing a sugar solution with *E. coli* cells was exposed to temperatures of 20°C, 40°C, or 60°C for either 20 minutes, 40 minutes, or 60 minutes depending on which specific test tube was designated with a variable. After the specific time period a test tube was allowed to withstand its respective temperature had expired, the test tube was taken out and put into an environment that was equivalent to human body temperature (37°C). The test tubes of the control group contained its own sugar solutions. The control was then compared to each of the test tubes that were actually the variables of study. Supported by USDOE.

Zoology Section

Bergeron, E. LSU-BR and A.A. Williams. LSU-E. **Heartworm infection in canines on prevention.—**Heartworms (*Dirofilaria immitis*) are parasites which are vectored by mosquitoes and known to affect detrimentally the health of the host animal. Heartworm preventatives are readily available; however, there is an astonishingly high number of canines infected by this

parasite even while on prevention. For our study, canine-patient files from a veterinary clinic in Eunice, Louisiana, were examined from 2008 to 2011. Only heartworm-positive canines on prevention were used in this study. The data on heartworm-positive canines were then divided according to the type of prevention, the canine breed, and the living conditions (i.e. inside or outside living). Our results showed that Heartgard® was the most common product used for heartworm prevention when patients tested positive. Of these dogs, those weighing over 50 pounds were most common, and the Labrador retriever was the most frequently heartworm diseased breed. The most frequent living condition observed in positive dogs was that of living outdoors. These individuals were obviously exposed to more mosquitoes, but should have been protected from heartworm while being on prevention. Reasons for the failure of the preventive are unclear; however, perhaps the dosage for larger, outdoor breeds should be reevaluated.

Guidry, J.T., O.E. Christian, S. Pradhan, C. Richmond and W.H. Dees. McSU. **Effects of plant and marine animal extracts on mosquito eggs.—**The use of chemical pesticides has been a traditional form of pest control. However, many insect pests and their transmitted pathogens have developed resistance to this method, and concern about the toxicity of this technique has grown. Newer, more biological forms of control are therefore being investigated. One method is the use of plant and animal extracts to possibly hinder the growth of insects. The extracts may be introduced to the early developmental stages of the pests, which may interrupt development. In this study, we observed the effects of 8 plant extracts and 2 marine sponge extracts on *Aedes aegypti* mosquito eggs. Of the ten extracts, only two (one marine sponge and one plant extract (*Artocarpus communis*)) had no observable effect on the eggs. Mosquito eggs exposed to the other extracts typically hatched in greater numbers and up to 3 days earlier compared with the controls. Larval mortality was observed in eggs exposed to extracts; however, no mortality was observed in the controls.

Hinton, J.G. and H.A. Meyer. McSU. **New water bear records from the Pacific Northwest of North America.—**The terrestrial tardigrade fauna of Vancouver Island has been surveyed extensively, but very little has been published about tardigrades from mainland British Columbia, Canada. Mixed moss and lichen samples collected from Whistler Mountain, mainland British Columbia contained ten species of terrestrial tardigrade: *Echiniscus horningi*, *E. mauccii*, *Milnesium tardigradum*, *Ramazzottius* sp., *Diphascon* (*Diphascon*) *alpinum*, *D.* (*D.*) *nodulosum*, *Macrobiotus* cf. *harmsworthi*, *Macrobiotus hufelandi*, *Macrobiotus montanus*, and *Minibiotus jonesorum*. Six of these species have previously been reported from Vancouver Island, British Columbia or from the Canadian Rocky Mountains. *Macrobiotus montanus* had not previously been found in British Columbia; *Minibiotus jonesorum* is new to the fauna of Canada. Four species – *E. mauccii*, *Milnesium tardigradum*, *R. baumanni*, and *Macrobiotus islandicus* – were found in cryptogams collected in Corvallis, Oregon. *Echiniscus mauccii* and *Ramazzottius baumanni* are new records for Oregon.

Hotard, K. L. and E. Zou. NiSU. **Is ethoxyresorufin O-deethylase activity in the hepatopancreas of the fiddler crab, *Uca pugilator*, influenced by the molting physiology?—** Ethoxyresorufin O-deethylase (EROD) activity in crustaceans has been suggested as a biomarker for aquatic pollution. However, much of crustacean physiology is cyclic because of periodic shedding of the exoskeleton. If crustacean EROD activity varies with molting cycle, then the use

of crustacean EROD activity as a biomarker for pollution without discriminating molt stages of specimens would be called in question. EROD activity is measureable in the mitochondria, involved in steroid metabolism, and endoplasmic reticulum (microsomes), involved in xenobiotic metabolism. The goal of this study was to determine if the mitochondrial or microsomal EROD activities in the hepatopancreas are affected by the molting physiology in the fiddler crab, *Uca pugilator*. Three groups of intermolt crabs were injected with the exogenous molting hormone 20-hydroxyecdsyone (20E) at a dose of 0 (control), 1 and 25 µg/g live mass. Treatment with 20E at 25 µg/g live mass significantly increased mitochondrial EROD activity but had no effect on microsomal enzymatic activity, suggesting that mitochondrial EROD activity is under the influence of molting physiology. This result indicates that when it comes to using crustacean EROD as a biomarker for organic pollution, microsomal, not mitochondrial, EROD activity should be used to prevent influence from the molting physiology.

Johnson, C.H. Lewis, and S. Marshall. NSU. **A mixed population of the exotic brown widow spider (*Latrodectus geometricus*) and the native northern black widow (*Latrodectus variolus*) in Natchitoches Parish, LA (Araneae: Theridiidae)**.—Exotic species introductions have been responsible for the disruption of ecosystem function and the suppression of native species populations world-wide. The brown widow spider is native to Africa, but has been introduced into Florida, where it is well-established. We discovered a mixed population of brown and black widow spiders associated with the exterior stairs at an apartment complex. Widow spiders construct permanent webs that can persist for years. Widow spiders do not clean out their webs and thus the widow's web is a reliable historical record of both prey captured and eggs laid. We set out to examine the spatial overlap of these widows. We have conducted a census of the black and brown widow population at Greystone Apartments in Natchitoches, Natchitoches Parish, LA. We collected all webs and spiders. The webs were examined for prey remains and either live or spent eggsacs. After careful examination of all the webs, we have found a total of 638 brown widow egg sacs and only 41 black widow egg sacs, a 16:1 ratio. After obtaining a census, we collected a total of 80 brown widows and 34 black widows, with the brown widows outnumbering the black widows by about 3:1. Not only did the brown widows outnumber the black widows, but they also produced approximately sixteen times the number of egg sacs.

Kirkhoff, C.J., A.M. Shudes, T.P. Wood, J.C. Choate, I.J. Louque, J.T. Guidry, and W.H. Dees. McSU. **Consequences of drought on mosquito-parasitizing water mite communities**.— Initial investigations in September 2010 indicated larval water mites as a significant ectoparasite within southwestern Louisiana mosquito communities. From the 1014 mosquitoes collected in a Moss Bluff, Louisiana freshwater marsh, 45 *Arrenurus* spp. water mite larvae were found parasitizing 38 mosquitoes. This 3.75% prevalence rate is considerably high in contrast to rates in other regions where parasitism data exists. As a result, a new study was designed to investigate water mite habitat usage with respect to salinity. Ongoing analysis from trap-nights in June and August 2011 suggests near total absence of larval water mite parasitism. More than 75,000 mosquitoes were collected from all sites (Lacassine NWR, Sabine NWR, Peveto Woods), but only 8 *Arrenurus* spp. and 2 unknown larvae exclusively infesting 10 *Psorophora columbiae* mosquitoes have been found. An overwhelming majority of mosquitoes were collected as a result of a population explosion after soaking rains in late July/early August. Since *Ps. columbiae* inhabits floodwater nearly exclusively and there has been no recent evidence of water mites in

permanent habitats, we hypothesize that the drought affecting southwestern Louisiana has had a profound negative impact on water mite communities.

Manuel, C. LSU-BR. A.A. Williams. LSU-E. **Mosquito population survey on LSUE campus**. **—**In the absence of a local mosquito control program, we performed an on-campus mosquito survey at the Louisiana State University Eunice (LSUE) campus to determine which species affect the campus community. Our study included the analysis of mosquitoes collected on campus using New Jersey light traps and comparing those data to the light trap collections from an adjacent mosquito control, MCCI-Acadia. From 16 May to 27 July 2011, female mosquitoes were collected twice per week, tallied, and identified to species when possible. Our results showed two species were most prominent; *Anopheles quadrimaculatus* and *Psorophora columbiae*. The occurrence of these species on campus was not surprising; however, the total number *Ps. columbiae* from one of our traps was rather alarming. Of the 1414 mosquitoes collected from our "field trap," over 80% (>1130) of those were *Ps. columbiae*, a dangerous vector of several diseases. During the same collection period, MCCI-Acadia averaged only 649 total mosquitoes per trap with *Ps. columbiae* totals much lower. Our study has demonstrated that in the absence of an organized mosquito control program, harmful mosquitoes can develop into populations of high numbers which could be potentially dangerous to the surrounding community.

Marchio, E.A. and K.R. Piller. SLU. **Phylogeography and taxonomy of *Belonesox belizanus* (Poeciliidae)**.**—**The Pike livebearer, *Belonesox belizanus* (Poeciliidae), occurs on the Atlantic slope from Veracruz through Costa Rica. This is one of a few species endemic to Mexico and Central America that have such a wide distribution. The subspecies from the Yucatan, *B. belizanus maxillosus*, was described by Hubbs (1936). According to Hubbs, *B. b. maxillosus* is only naturally found in the Yucatan with the remainder of the range being *B. b. belizanus*. The specific bounds of the distribution of the data are currently unknown and no comprehensive study has been conducted to assess the degree of morphological or genetic variation within this widespread species. The overall objective is to conduct a comprehensive investigation of genetic and morphological variation of *Belonesox belizanus*. At present, cytochrome b sequence data have been obtained from 63 individuals from varying parts of the range. Preliminary analysis of 1000 bp of cytochrome b shows considerable genetic divergences (>5%) within this species. Two clades of *B. belizanus* have been recovered based on maximum parsimony analysis: a Northern clade which includes Northern and Southern clades. These results suggest that *B. belizanus* may indeed be more diverse than currently recognized even without having analyzed the supposed subpopulation from the Yucatan.

Meyer, H.A. McSU. **A new water bear, *Minibiotus julianae*, from the Caribbean Island of Dominica**.**—**A new species of tardigrade, *Minibiotus julianae*, is described from a moss sample collected in June 2009 from a rainforest palm tree on the island of Dominica, West Indies. The new species has a buccal tube with a single anterior curvature, two macroplacoids, and a microplacoid. The cuticle is smooth with small, evenly-distributed circular or elliptical pores. Eggs have a reticulated shell surface and short inverted goblet egg process; a dentate margin on the distal dish of the processes bears 10-12 short teeth. The new species is most similar to *Minibiotus acadianus* Meyer & Domingue, 2011; both have wider buccal tubes than other

species in the genus. The new species is easily distinguished from *M. acadianus* in lacking cuticular gibbosities and in some characters of the egg.

Moser, J.C. USDAFS. **Mites that transmit Dutch elm disease**.—Dutch elm disease (DED) is a destructive vascular wilt disease of elm (*Ulmus*) trees caused by the introduced Ascomycete fungus *Ophiostoma novo-ulmi*. This study is the first one to consider the importance of mites phoretic on *Scolytus* elm bark beetles for pathogen dispersal. By contributing to the transmission of *O. novo-ulmi* to elm trees, the mites *Proctolaelaps scolyti* and *Tarsonemus crassus* may be important biotic factors for the epidemiology of this destructive vascular disease.

Negatu, Z., D. Allen and J. Paul. LSUA. **Protein concentration of fish eggs collected on different days during a single spawning period**.—This is a pilot study conducted to determine if there is a variation in protein content in fish (*Fundulus heteroclitus*) eggs spawned on different days during a single spawning period. Eggs were collected on five different days, and immediately after collection, the eggs were processed to collect protein. Protein samples were stored at -40°C for determination of protein content. Five eggs per collection day were assayed for protein content. Total protein content ranges from 12.30-101.90 ug/ml per egg. The average protein concentrations in µg/ml/egg is 83.02±14.66 (Day 1), 21.39±15.41 (Day 2), 65.68±24.69 (Day 3), 50.18±19.91 (Day 4), and 41.65±30.16 (Day 5). The data indicate significant difference ($p \leq 0.05$) in the protein content of eggs collected on different days. More study needs to be conducted to determine if this difference is due to difference in protein synthesis or due to difference in the sizes of the eggs.

Norman, D.K. and C.M. Watson. McSU. **Thermal physiology of a temperate thermo-conformer, *Scincella lateralis*.**—The ground skink, *Scincella lateralis*, is unique among temperate lizards in that it does not actively thermoregulate to maintain a narrow active body temperature range. Instead, this small lizard conforms to the ambient temperature of the forest floor, much like many tropical species. This study characterizes the response of two physiological variables, resting metabolic rate (RMR) and sprint speed, to temperatures naturally experienced by the ground skink. Resting metabolic rate (RMR) increased steadily from the minimum experimental temperature (15°C) to their critical thermal maximum (Tcrit: ~40°C). This temperature sensitivity (Q10) is low relative to other species, with an average of approximately 1.25. Most species exhibit an average Q10 between 2 and 4 over their thermal activity range. The sprint speed of *Scincella lateralis* exhibited a broad optimal range, with no statistically discernable differences over a 12.5°C interval (25°C to 37.5°C). This, coupled with the relatively low temperature sensitivity of RMR, suggests that the ground skink remains physiologically stable over a broad range of temperatures and can remain generally active without incurring the costs associated with maintaining a narrow range of body temperatures through active thermoregulation.

Paight, C.J. and R.L. Minton. ULM. **Genetic and morphological population structure in freshwater snails over small geographic distances**.—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 snails in these nearby populations show population structuring in terms of genotypes and morphotypes, and to what extent the two aspects are related to one another. Using a combination of inter-simple sequence repeat (ISSR) analysis and geometric morphometric analysis of shell shapes, we show that both genetics and the environment influence the overall phenotype of *E. potosiensis*. Additionally, we propose that spring run environments have a stronger effect on shell phenotypic plasticity. Our data highlight aspects of snail biology that have, to date, been relatively overlooked, and suggest the need for additional research on small-scale population differences in freshwater snails.

Playter, A.M. and G.J. Lafluer Jr. NiSU. **Comparison of green treefrogs (*Hyla cinerea*) inhabiting wetlands of the upper and lower Barataria-Terrebonne National Estuary**.—The Barataria-Terrebonne Estuary is located in southeastern Louisiana between the Mississippi and Atchafalaya Rivers. Anurans inhabit regions of the estuary exposed to salinities ranging from 0 to 20 ppt. To determine if there is a difference between anurans found in these differing habitats, we compared green treefrogs (*Hyla cinerea*) at two upper and two lower estuary sites, with measurements of body size and breeding cycle. Body mass and length were significantly different between the upper and lower estuary habitats. Female wet mass for the upper estuary was 5.02±0.34 g SE (n=23) and the lower estuary was 2.67±0.18 g SE (n=23). Male wet mass for the upper estuary was 3.94±0.13 g SE (n=81) and for the lower estuary was 2.44±0.01 g SE (n=60). Female gonado-somatic index (GSI) was also significantly different during the breeding season with the upper estuary being 10.88±1.68% SE (n=12) and the lower estuary being 7.65±0.97% (n=17). One explanation for our findings would be that tree frogs in the lower estuary have to decrease energy spent on growth and reproduction to tolerate higher salinities. This work was supported by funding from NOAA to the Nicholls Institute of Seafood Safety.

Richard, C.B, C. Brumfield, and M.L. Wygoda. McSU. **Lack of effect of dehydration on cutaneous resistance to evaporative water loss in the Green Tree Frog (*Hyla cinerea*)**.— Tree frog skin provides a significant resistance to body water loss by evaporation. Because all previous studies were done using fully hydrated animals, this study is the first to examine whether tree frogs are able to increase their cutaneous resistance when experiencing mild to moderate dehydration. To determine cutaneous resistance, evaporative water loss rates and body temperatures of green tree frogs (*Hyla cinerea*) were measured from animals at various states of hydration exposed to controlled air temperature, relative humidity, and air velocity in a wind tunnel positioned within an environmental chamber. Total resistance was then calculated. Agar replicas of the animals were constructed and treated in a similar manner so that boundary layer resistance of the animals could be estimated and subtracted from total resistance, thus providing an estimate of cutaneous resistance. There was a significant difference between evaporative water loss rates and body temperatures between the live frogs and the agar models. However, cutaneous resistance was not affected by the animal's hydration state. Based on evidence of increased blood flow to the ventral skin which is caused by arginine vasotocin and angiotensin II, it is unlikely that these hormones affect skin resistance.

Samletzka, C.A., J.G. Hinton, H.A. Meyer. McSU. **Urban ecology of water bears in Southwestern Louisiana**.—This project is based upon discovering the ecological consequences

of urban development on the diversity of tardigrades, commonly referred to as "water bears". In particular, we are comparing the distribution and abundance of water bears at Sam Houston Jones State Park (considered natural habitat) with urban Lake Charles (highly developed land). The hypothesis is that air and water quality is linked to water bear growth and population. During 2011, lichens, moss, tree fern and leaf litter samples from Sam Houston Jones State Park (SHJSP) and urban areas of Lake Charles, Louisiana, were collected from areas that differed with respect to the level of human impact. Tardigrades were extracted and identified. Preliminary data indicate larger quantities of at least one species and limited quantities of others. Currently, more tardigrade species have been found in SHJSP than in urban Lake Charles. In samples so far analyzed, the most common tardigrade in Lake Charles is *Minibiotis acadianus* (approximately 70% of the 93 specimens and 6 species). The most common species in SHJSP is *Macrobiotus* cf. *hufelandi* (24% of 344 specimens and 14 species). As of January 18, 2012, ecological patterns are as expected and research is ongoing.

Sancho, J.M. and E.J. Melancon. NiSU. **The influence of the hooked mussel, *Ischadium recurvum*, on the development of oyster reef on structures used for marsh shoreline erosion control.—**The hooked mussel, *Ischadium recurvum*, a member of the Mytilidae family, and barnacles of the family Balanidae, are major biofouling organisms on the eastern oyster, *Crassostrea virginica*. Additionally, oysters recruit to the shells of the live mussels, but mussels attach by byssal threads and do not therefore provide permanent reef structure. This lack of permanency may hinder the development of oyster reef on constructed structures used for coastal marsh shoreline erosion control. The objective of this study was to document whether mussels and barnacles are attracted more to hard substrate as habitat or more to live oysters. Plastic mesh bags filled with aged oyster shell and matched with bags filled with a mixture of aged oyster shell and live oysters were deployed and retrieved monthly for 14 months in Bay LaFleur in Terrebonne Parish. Preliminary analysis indicates that mussels consistently prefer to attach to live oysters than to reef shell. This strongly suggests that as oysters recruit to constructed structures there may be a significant negative feedback to reef development by increasing the attraction of mussels. Barnacle analysis is incomplete at this time.

Stephens, B.N., and C.A. Corbat. LSUA. **Relationships between anuran presence and habitat characteristics at man-made ponds.—**Amphibian declines have become a popular subject of study in recent years. In particular, the reasons for these declines are under intense investigation in an effort to slow or stop the loss of amphibian species worldwide. Many experts have hypothesized that landscape change and local habitat characteristics play a major role in amphibian spatial patterns, breeding success and survival. We examined the relationships between vegetative structure and anuran presence in breeding ponds. Anuran presence was gauged by auditory call surveys from February to April 2011 at 11 ponds on the campus of Louisiana State University at Alexandria. Vegetation bordering these ponds was then quantified. Results from the analysis of variance indicated a significant relationship between vegetative structure above ground level and species presence for *Rana catesbeiana*, *R. sphenocephala*, and *Acris crepitans*.

Styga, J.M. and R.L. Minton. ULM. **Morphometric analysis of shell shape in the land snail *Mesodon thyroidus*.—**The functional aspects of shell morphology in land snails have been of

great interest, especially since the observation that widely separate and taxonomically-distinct land snail faunas have a bimodal distribution of shell shape with few forms between. Morphological variation may result from selection in different environments, whereas in other species the history of the populations is implicated. In land snails, the lack of understanding of the role of intraspecific morphological variability and the processes driving morphological evolution has greatly complicated not only the species-level taxonomy of many groups, but the processes behind the variation as well. As part of a larger study examining the effects of environmental variables on shell shape, we present an analysis of variation in the land snail *Mesodon thyroidus* from the eastern United States. Over 600 individual shells were digitized, landmarked, and analyzed using geometric morphometric methods. Allometric and latitudinal and longitudinal gradients will be discussed, as well as other patterns in shell shape across the species range.

Sullivan, B.T. USDAFS. G.Z. Bermúdez and F.A. Toledano. IPN. A.N. Domínguez. ECOFS. J.M. Sámano. SSC. S.R. Clarke. USDAFSFHP. **Biosystematics of the *Dendroctonus frontalis* species complex in Mesoamerica**.—Six different species of pine beetle form the cluster of sibling species called the *Dendroctonus frontalis* complex, which includes *D. adjunctus* Blandford, *D. approximatus* Dietz, *D. brevicomis* Leconte, *D. frontalis* Zimmermann, *D. mexicanus* Hopkins, and *D. vitei* Wood (Lanier et al. 1988, Salinas-Moreno et al. 2004). Species within this group, particularly *D. frontalis*, *D. mexicanus*, and *D. adjunctus*, are the most serious economic pests to pines of southern Mexico and northern Central America. Biological research and management of these aggressive bark beetles in this region is greatly complicated by the similarity in the external morphology of these insects and lingering questions about the systematics of the group. In particular, there is evidence suggesting that a cryptic, undescribed species might be associated with *D. frontalis* infestations in Belize and southern Mexico, and the systematic placement of *D. vitei* has been obscured by limited biological and genetic data on this apparently rare species. The poster describes some recent results of ongoing studies aimed at comparing the natural history, biochemistry, morphology, and genetics of both described and putative species in the *D. frontalis* complex.

Watson, C.M. McSU. **Predators and the convergent evolution of lizard phenotypes.—** Predator/prey interactions can have a dramatic effect on the morphology and physiology of prey by promoting antipredator adaptations. In situations where prey experience similar predators in similar habitats, one would expect a pattern of comparable antipredator adaptations to emerge. Such patterns are evident among lizards that co-occur with avian predators. Evolutionary responses to avian predators produce interesting morphological defenses in lizards, such as horns and the autotomous tail. I present general patterns of avian predator-mediated evolutionary convergence in lizard phenotypes and present a case study of the black, longitudinally striped lizard with an autotomous blue tail. This phenotype occurs worldwide and arose independently in at least 5 lizard families. Results suggest that the blue tail serves as an effective decoy to divert avian attacks toward the autotomous body part and that avian attacks can be artificially diverted to other body parts by changing the position of the blue coloration. Efficacy of this phenotype is clear in any habitat where avian predators prey upon lizards at relatively close range. This may

explain the global distribution of strikingly similar, yet distantly related, forest-dwelling lizards with birds as primary predators.

Wood, T.P., A.M.J. Shudes, T.L. Sylvester, and W.H. Dees. McSU. **Preliminary survey of adult mosquitoes in a city park.—**A seasonal longitudinal survey of adult mosquitoes is underway at a newly renovated, residential-based city park. The park has two sections: one is an open area with playground equipment, picnic tables, open shelters, a small conference center, and concrete walking paths with benches; the other is a wooded area with walking paths. The survey was initiated in summer 2011. We use Centers for Disease Control and Prevention (CDC) traps baited with CO_2 to collect mosquitoes. In summer and fall, we collected mosquitoes at two sites: one site centrally located in the wooded area and one site at the edge of the wooded area adjacent to the open/cleared area. More mosquitoes were collected in traps placed near the open area than in the wooded area [n=40 vs. n=25 (summer) and n=843 vs. n=61 (fall), respectively]. In winter, we collected mosquitoes from one site at the edge of the clearing next to the wooded area. The mean number of mosquitoes collected in summer and fall was 33 and 452, respectively. In winter, 175 mosquitoes were collected. To date, the predominant species collected (i.e. >50 in one trap night) were *Aedes vexans*, *Culex salinarius*, and *Psorophora columbiae*. *Psorophora* spp. were collected only in the summer.

Wygoda, M.L. and C. A. Kersten. McSU. **Source and significance of intermittent body temperature depressions in the Green Tree Frog (*Hyla cinerea*).—**Previous studies have found that while semiaquatic frogs (genus *Lithobates*, formerly *Rana*) and terrestrial toads (genera *Anaxyrus* and *Incilius*, formerly *Bufo*) maintain constant, relatively low body temperatures when measured under controlled environmental conditions, tree frogs (*Hyla*) have significantly higher and more variable body temperatures when exposed to the same conditions. It has been hypothesized that the lower, constant body temperature of frogs and toads results from uncontrolled evaporative water loss (and thus evaporative heat loss) that proceeds at the maximum possible rate determined by the ambient water vapor density and other environmental variables whereas the higher temperature of tree frogs is due to their ability to reduce evaporative water loss (and thus heat loss). Evaporative water loss reduction in tree frogs has been amply demonstrated in a large number of studies. Although no evidence has been provided, it also has been hypothesized that intermittent, temporary decreases which occur in tree frog body temperatures result from the evaporative cooling of water secreted onto the surface along with a water-proofing substance. Here we present clear evidence which supports the secretion event hypothesis for green tree frogs (*Hyla cinerea*) and we identify lipids as the likely water-loss reducing substance.

Division of Physical Sciences

Chemistry Section

Bacchus, S.B., C. Bounds and J.A. Pojman. LSU-BR. **Investigation into the adhesive strength of cure on-demand polymers to thermoplastic materials.—**Thermal frontal polymerization is an exothermic polymerization process initiated by the application of heat, resulting in the propagation of a localized reaction zone. When applied, the polymer produced could be used as an alternative to commercial high strength adhesives. In this study, the dependence of the adhesive strength on the thickness of an adhesive layer between two pieces of thermoplastic materials was investigated. The maximum force required to break the bond between two thermoplastic blocks held together by a layer of polymer was determined using shear tests. For all the samples tested, fronts failed at 1.5 mm thick layer of adhesives. Above 1.5 mm and depending on the thermoplastic material, the majority of the fronts propagated and the strengths were observed to increase at a certain point then decrease.

Banappagari S. and D.S. Seetharama. ULM. M. Corti and S. Pincus. RIC-NO. **Inhibition of protein-protein interactions by conformationally constrained peptidomimetics and its implication in cell signaling.—**Protein-protein interactions play a crucial role in regulating many biological processes as well as in disease pathology. Understanding the structural basis and modulating protein-protein interactions has a tremendous impact in developing new therapeutic strategies for many human diseases. Human epidermal growth factor receptor family of proteins (EGFR, HER2, 3 and 4) plays an important role in cell growth and proliferation. Aberrant interactions of EGFR family of proteins lead to tumor growth and metastasis. HER2 is overexpressed in approximately 30% of breast cancers. Deregulation of HER2 signaling pathways and overexpression of HER2 is known to occur in many cancers. Formation of HER2 receptor heterodimerization with other EGFR family of proteins such as EGFR, HER3 is essential for intracellular kinase activation and is the basis for exploring direct inhibition of HER2 mediated activation. We have designed several small peptidomimetics to inhibit HER2-mediated signaling for cell growth. One of such peptidomimetics, Compound 5 (Arg-[3-amino-naphthyl-propionic acid]-Phe) designed, exhibited antiproliferative activity with IC_{50} values in the nM range against HER2 overexpressing breast cancer cell lines, SKBR-3 and BT-474. Binding studies using Fluorescence Microscopy, ELISA, Circular Dichroism (CD) and Surface Plasmon Resonance (SPR) confirmed that Compound 5 binds specifically to HER2-extracellular domain. SPR studies revealed that Compound 5 specifically binds to domain IV of HER2 extracellular region. Also, Compound 5 inhibited HER2-HER3 as well as HER2-EGFR heterodimerization evaluated by SPR. Pathhunter and proximity ligation assays confirmed the inhibition of HER2 heterodimerization with EGFR and HER3 by Compound 5. Western blots revealed that Compound 5 blocks the transphosphorylation of HER2 protein. Based on these observations small peptidomimetic inhibitor molecules can be potential therapeutic agents in disabling HER2 mediated heterodimerization. Supported by LBRN.

Bounds, C.O., J. Upadhyay, S. Thakuri and J.A. Pojman. LSU-BR. **Production of stable "boundless" microfluidic devices with tunable surface energies via the in situ tertiary amine catalyzed Michael addition of a multifunctional thiol to a multifunctional acrylate.—**

Stable microfluidic devices have been prepared via a soft lithography technique utilizing the in situ tertiary amine-catalyzed Michael addition of a trithiol to a triacrylate. This material provides some advantages over other materials that are normally employed for soft lithography. Here, a simple two-step Michael addition produces a hydrophilic thermoset polymer whose surface energy can be manipulated via bulk or post modifications. This thiol-acrylate material is hydrophilic in nature and stable for months unlike other soft lithography materials where hydrophilicity is not easily obtained and long-term stability of that hydrophilic nature is nearly unattainable. Using this thiol-acrylate chemistry also eliminates some of the normal steps associated with PDMS soft lithography. This material can be produced at room temperature and gels in less than 1 hour. Also, the adhesion of this material to itself is facilitated chemically using the same thiol-acrylate chemistry and the same in situ catalyst eliminating the need for a plasma generator as is necessary for PDMS microfluidic chip fabrication. Various small molecules have been attached to this thiol-acrylate material to manipulate the microchannels, and the devices as well as the thiol-acrylate chemistry used to prepare the devices have been analyzed.

Dallas, M., B. Horne and F. Ohene. GSU. **Density functional theory study of the absorption spectra of polymethine dyes**.—The particle-in-a-box model was used to analyze the conjugated bonds and π-electrons of 1,1'- diethyl-2,2'-cyanine iodide and 1,1'-diethyl-2,2'-dicarbocyanine iodide cyanine dyes. The UV-Vis spectrophotometer was used to determine the maximum absorption wavelength (λmax) values for each dye in the solvents of varying polarities. The experimental values were compared to the electronic spectra (UV-Vis) generated with the Gaussian 03 program. The solvents selected (acetonitrile, 2-propanol, acetone and dichloromethane) represented a broad range of polarities. For both dyes, it was found that λmax underwent a blue shift with increasing solvent polarity. The effective box length, l, for the dyes in each solvent was determined for the two cyanine dyes and compared to the expected geometric box length. The applicability of the particle-in-a-box model to extract electronic (UV-Vis) and structural information is discussed and was deemed less than ideal for usage with cyanine dyes to predict spectral properties because the theoretical values were different from the experimental values.

David, S., A.A. Gallo and R. Srivastava. ULL. F.R. Fronczek. LSU-BR. S. Kasiri and S.S. Mandal. UTA. **Anticancer properties of ruthenium-pyrazole complexes**.—The discovery of new metal-based antitumor drugs, whether cisplatin derivatives or those based on other metals, has been largely based on cell viability assays (IC_{50} values) and compounds that bind to DNA. The Pt(II) compounds are currently the most widely used anticancer drugs. Today, there is hardly any clinical regimen or combination of chemotherapy that does not contain either cisplatin or carboplatin. Cisplatin, is one of the three most widely utilized anticancer drugs in the world and has annual sales of approximately $500 million. Despite the resounding success of cisplatin, the drug exhibits several side effects. This has led researchers to develop anticancer drugs utilizing other metals. We have recently developed Ru(III) complexes for the same purpose. The synthesis and biological assay of Ru-pyrazole complexes will be discussed.

Jee, E. and J.A. Pojman. LSU-BR. V. Viner. NASC. **Frontal curing of copolymer cyanate ester systems**.—Frontal Polymerization (FP) is a localized reaction that propagates through a monomer and leaves a polymer in its wake. There are three types of FP; Frontal

Photopolymerization, Isothermal FP, and Thermal FP. This work exclusively deals with Thermal FP, which is initiated by a thermal energy source and combines the heat released from polymerization and Arrhenius kinetics in an unstirred system. In this work, we have studied how changing the type of monomers, amount of monomers, and filler loading affects the front temperature and velocity. Specifically, four different cyanate ester monomers, fumed silica, and kaolin clay were used as monomers and fillers. The copolymerization of the monomers were also studied.

Kanthala, S. and D.S. Seetharama. ULM. **Purification of recombinant HER2 extracellular domain protein from Schneider2 insect cells**.—HER-2 (Human Epidermal growth factor Receptor 2), a member of EGFR (Epidermal Growth Factor Receptor) family is a cell membrane surface-bound receptor tyrosine kinase and is normally involved in the signal transduction pathways leading to cell growth and differentiation. The overexpression of HER-2 is correlated with higher aggressiveness in approximately 30% of all breast cancers. Previously, a peptidomimetic compound 5, designed based on the crystal structure of HER-2 and Herceptin has been reported to have antiproliferative activity in the nanomolar range. The objective of this study is to derive the structure activity relationship of peptidomimetics designed thereafter and study the binding of analogs of compound 5 to HER2 protein extracellular domain. To evaluate the anti-proliferative activity of the designed compounds, CellTitre-Glo assay was performed on three breast cancer cell lines SKBR-3, BT474 which overexpress HER-2 and MCF-7 cells that do not express HER-2. Another aim of this project is expression and purification of HER-2 extracellular domain protein to study the binding of designed compounds to HER2 protein. Recombinant S2 (Schneider2) cells HER2 protein is purified by filtration, ultrafiltration, dialysis, Nickel column purification techniques. The pure HER2 protein extracellular domain has been analyzed using Circular Dichroism (CD) spectroscopy and mass spectrometry.

Lee, A. and T. Junk. ULM. F.R. Fronczek. LSU-BR. **Synthesis of organotellurium ligands**.—Polydentate ligands containing tellurium in place of more customary elements such as oxygen or sulfur can be expected to have several unique features. Thus, tellurium centers undergo redox reactions under very mild conditions, with concurrent changes in the ligands' shapes and binding properties. However, the synthesis of tellurium-containing crown ethers poses several unique challenges, not the least of which are the development of methods to create suitable precursors for medium- to large-sized tellurium-containing heterocycles and subsequent ring closure. Recent advances include novel strategies for the preparation of 2-hetero substituted diaryl ditellurides suitable as precursors for crown ethers, the development of novel ring closure reactions, and the crystallographic characterization of a novel tetradentate tellurium-containing aza-crown ether with excellent air and light stability.

Madox, D. LSU-BR. **Frontal polymerization and its use for cure on demand art**.—This study is on the uses and effects of thermally initiated frontal polymerization in art. Different mixtures of acrylate, filler, initiator, and miscellaneous additives were tested on variables that are important for art: color retention, thickness, adhesion, texture, pot life, and expansion. They were tested for use as several different artistic mediums: as paint, putty for sculpting, and even on textiles. Ultimately a mixture of trimethylolpropane triacrylate (tmpta), of trimethylolpropane ethoxylate triacrylate (tmpeota), kaolin clay, silica, luperox, and fiber was found to be a good

general purpose art medium. It has good properties as an artistic medium, and has a unique advantage in being cure on demand, allowing an artist to work with as much time as he needs.

Morales, A. and J. Pojman. LSU-BR. **A study of the effects of thiols on the frontal polymerization and pot life of multi-acrylate systems initiated by cumene hydroperoxide**.**—** This is a study of the effects of thiols on the thermally initiated frontal polymerization velocity and pot life of a mixture of a multifunctional acrylate (monomer), kaolin clay (filler), and cumene hydroperoxide (thermal initiator). Thiols used were trimethylolpropane tris (3-mercaptopropionate) (TT1), and 1-dodecanethiol (DDT). Acrylates used were trimethylol-propane triacrylate (TMPTA), trimethylolpropane ethoxylate triacrylate (TMPEOTA), 1,6-hexanediol diacrylate (HDDA), and di(ethylene glycol) diacrylate (DEGDA). It was observed that the use of 1-dodecanethiol yielded an overall longer pot life with both acrylates, and DEGDA exhibited the larger increase in pot life. The use of TT1 gave the fastest front velocity, but the shortest pot life. Ultimately, the observed front velocities were inversely related to the pot life (the faster the front velocity, the shorter the pot life).

Tang, R., C.H. Battle, T. Shaner, M. Fink and J. Jayawickramarajah. TU. **Synthesis and characterization of silicon nanoparticle-DNA bio-conjugates**.**—**The utility of nanoparticle platforms for the delivery of encapsulated and conjugated drugs is well known, benefiting from high loading capacities, extended bioavailability and localization to many disease sites. While gold nanoparticles are commonly used, their expense is prohibitive for widespread development. Silicon nanoparticles (SNPs), conversely, are cheaply produced, and have been shown to have low toxicity. In this study, we examine the viability of conjugating oligonucleotides (ODNs) to small silicon nanoparticles as the basis for a bio-therapeutic delivery system. Octadiene passivated SNPs produced by high-energy ball milling were separated by GPC to produce 2-4 nm nanoparticles (as shown by TEM). Transformation of the terminal double bonds to carboxylic acids was accomplished by ozonolysis, followed by activation to the NHS ester for conjugation to a 21-base amine terminated ODN. The resulting crude SNP-DNA conjugates were separated by 10 kDA MWCO spin-columns, as confirmed by PAGE. Examination of the resulting conjugates by UV-Vis spectroscopy allowed the identification of distinct peaks corresponding to the SNP (210 nm) and DNA (260 nm). The average DNA loading was estimated by several complementary approaches, and the viability of the conjugates was shown through hybridization to complementary sequences. This work was partially supported by the Louisiana-BOR RCS-(LEQSF(2009-12)-RD-A-17).

Tullier, M.P. and J.A. Pojman. LSU-BR. **Cure on-demand acrylamide grout**.**—**Chemical grouts are polymeric systems used to stabilize soil. Usually, the components of the system are mixed to achieve a desired working time before which the system flows and after which, the grout gels and hardens. This technique gives the users little control, however, a chemical grouting system using acrylamide as the main component was modified to yield a system that could be cured rapidly whenever the user wishes. We developed a grout that could sit for hours but be cured nearly instantly by frontally polymerizing the acrylamide with the addition of a small amount chemical accelerator or heat at one point. We studied how the ratio of the components could be altered to lengthen work time, change the front velocity, and change the final physical properties.

Upadhyay, J., C.O. Bounds and J.A. Pojman. LSU-BR. **Mechanical, orthogonal delamination, and surface energy analysis of novel thiol-acrylate microfluidic materials**.—Mechanical and surface energy analysis was performed on novel microfluidic devices prepared via a thiol-acrylate soft lithography process. The adhesive strength between two polymer surfaces associated with the thiol-acrylate microfluidic device was determined. The bond between the two surfaces was generated using excess acrylate on one side and excess thiol on the other. The objective was to evaluate the orthogonal delaminated force, flexures modulus and hydrophilicity of the newly formulated hydrophilic material and to compare the results obtained to that of the existing hydrophobic PDMS material normally used for soft lithography. The strength of the bond was analyzed as a function of reaction time, excess acrylate or thiol, and catalyst concentration. The surface energies also were analyzed via contact angle measurements. The contact angles were determined as a function of exposure to ultraviolet light and post modification by attachment of small molecules to the surface of the material. The results of mechanical testing showed that orthogonal delamination force and flexure modulus is more than adequate to accommodate the fluid pressure that is pumped through the microfluidic device. The contact angles were observed to be highly stable and easily manipulated depending on the modification applied to the surface.

Computer Science Section

Athill, T., R. Christian and Y.B. Reddy. GSU. **Efficient spectrum allocation through synchronized MAC protocol in cognitive networks**.—The existing fixed allocation of spectrum by the U.S. Federal Communications Commission (FCC) has been significantly underutilized. The open spectrum concept helps in flexibility of utilizing the spectrum resources. Furthermore, the implementation of the open spectrum concept helps the cognitive users and spectrum to be used efficiently. The cognitive radio concept is new, and it is highly recognized in the research world. The installation of cognitive radios benefits the primary users in terms of revenue and cognitive users to use the unutilized spectrum. The unused spectrum by the primary users is called spectrum holes. In the absence of the primary user, the spectrum holes will be sensed by the cognitive users. During the sensing stage, the missed detection will happen unless the terminal recognizes the ongoing transmission. The missing detection is called the hidden terminal problem and occurs when the channel is shadowed from the cognitive user. The hidden terminal problem can be avoided by storing the current state of each node at the base station. Alternatively, the current poling channel is under suspension to all other cognitive users until the channel is released. In this project, we used the NS2 package to store the channel state and make it unavailable to the neighboring nodes. The activity reduces the spectrum handoff and maximizes the throughput.

Blair, L., S. Ellis and Y.B. Reddy. GSU. **Implementing an event-driven wireless sensor network using MEMSIC's professional kit**.—Wireless Sensor Networks is an emerging technology that has application in many fields such as environmental monitoring, industrial monitoring, medical systems, surveillance, home security, and military operations. Sensor networks consist of a large number of distributed nodes that organize themselves into a multi-hop network. Each node has one or more sensors, embedded processors and low-power radios,

and is normally battery operated. By networking large numbers of tiny sensor nodes, it is possible to obtain data about physical phenomena that were difficult or impossible to obtain in more conventional ways. The implementation of a wireless sensor network using MEMSIC's Professional Kit for Wireless Sensor Networks consisted of four nodes, and a base station. These nodes were placed in different locations to collect a wide range of data—light, acceleration, heat, and humidity. Data were then analyzed by using the tools—charts, scatter plot graphs, etc.—provided by the framework MoteWorks and the application software MoteView. After preliminary collection and analysis of data, the motes were reprogrammed to simulate an event-driven system. Events include the presence of light and temperatures above 75°C. With the sensors, it would be possible to tell which rooms are occupied, and which air conditioning units need repairing. Future steps include implementing an event-based protocol to send packets depending on specific changes (i.e. adaptability) in the environment and a clustering algorithm to cut down on traffic overhead in the network and save power for each node.

Chao, Y. and Y.B. Reddy. GSU. **Implementation of RSA cryptography using graphical windowing program**.**—**In 1976, the RSA algorithm was publicly known to the world by three researchers - Ron Risvest, Adi Shamir, and Leonard Adleman at M.I.T. The letters RSA are the initials of its inventors. But in 1973, RSA algorithm had already been discovered by Clifford Cocks, a British mathematician working in secrecy at the United Kingdom's Government Communications Headquarters. His invention, however, was kept secret until the late 1990s. One of the most advances in cryptography that is widely used in electronic commerce protocol is RSA algorithm. It can be used for both public key encryption and digital signatures, and is believed to be sufficiently secure given sufficiently long keys. Its security is based on the difficulty of factoring large integers. In the current project, the graphical windowing program is used to demonstrate the RSA public key cryptography that is written in the Java programming language. It is developed using the Java TM SE Development Kit version 6.0 in NetBeans IDE 7.0.1. The JDK 6.0 includes two special classes that allow arbitrarily sized integers to be stored and operated upon, and generate secure random numbers. The user can use this program to generate a public key and a private key. Further, he/she can encrypt the intended message by using the public key and decrypt the encrypted message by using the matching private key. The simulations for encryption and decryption through graphical windowing program are presented in the current research.

Elias, O., S. Holmes and Y.B. Reddy. GSU. **Channel selection using zero-sum game with software defined radio**.**—**The purpose of this project was to create a zero-sum game with a non-traditional strategic form. The game is played with the use of wireless nodes that compete for the open channel. The way the players compete for the open channel is one will scan the channels sequentially while the other switches to different channels at random. At the beginning of each round one player will receive a delay at random. In the current implementation, as the game plays out the radios will search for the available channel in their predetermined search method either random or sequentially. Once a winner of the game is declared the radio will be used to output incoming transmissions from surrounding radio towers. To test the behaviors of the radios, a software simulation was created using Python. Algorithms were designed to assure that each radio moved through the bandwidth one channel at a time as well as to assure that the player meant to search channels randomly is doing so. A round is simulated by the players

executing their algorithms simultaneously and the player that reaches the available channel first wins.

Ferdous, T. and M.A. Salam. SU-BR. **Tree-based routing protocols in wireless sensor network: What we have and what we can do**.—Tree-based routing protocols in wireless sensor network provide effective connection structure to make the wireless sensor nodes communicate with each other. The structure contains child and parent nodes. Child nodes send data to parent nodes and finally parent nodes send data to the base station. The number of layers varies depending on the network strength. It gives a general skeleton for almost every kind of network protocols. It exists in many important data aggregation protocols providing many useful features like hierarchy, balanced energy consumption, extension of functional lifetime, cryptography, synchrony, robustness and many more. These features provide exclusive ease for efficient communication. Data is the main entity of a network and processing it securely is an important effort. More secure and efficient data processing is more useful for those entire hostile environments from where getting information is difficult. This is why more development in both data processing and security is equally important. Our research focuses on tree-based protocols seeking ways to process the data and utilizing an efficient and secure routing structure. The more development on both of these areas is a key to contribute to lessen the major concerns of reducing time and energy consumption for data aggregation.

Kafle, S. and Y.B. Reddy. GSU. **Agent-based detection and prevention of packet dropping in wireless sensors using mutual cooperation**.—Wireless sensor is a small sized, short range, low memory, low processing power device. It is used to monitor secure areas like military and industrial areas; harsh environmental areas like a forest fire, volcano, etc. A group of autonomous sensors which transmit the sensors' data wirelessly from one node to another and finally to a base station is called wireless sensor network. Strong security such as encryption is not viable due to the low processing power and low battery life of sensors. Thus, malicious nodes such as sink-hole, worm-hole, selective forwarding node, etc. may corrupt the entire wireless network. We implemented collaborative among the sensors to detect and prevent these malicious attacks. A special node, the agent, has strong processing power and computes all the calculations to detect malicious behavior. This method proves to be battery efficient and removes 99% of sink-hole and selective forwarding nodes. In this method, all high computations to detect and remove the malicious node are done at the agent rather than the sensors. This increases the battery life of sensors because they only sense and forward the data, all computations are done by the agent. In our simulation, after forwarding a packet, the node in promiscuous mode overhears all packets forwarded by the next node to determine if the next node is behaving maliciously. The table containing the trust ratio of all the neighbor nodes is saved on the agent, which performs all the calculations to detect the malicious nodes. In our simulation, we concluded that the agent based method gives longer battery life, and better detection rates of malicious nodes compared to the trust based collaborative method.

Mbarika, V.M.A., A.O. Itegboje and I. Mbarika. SU-BR. **A multi-media case study pedagogical approach on electronic health records for STEM students**.—This study investigated the effects of using the multimedia case study approach in teaching and learning of Electronic Health Records (EHR) for STEM students. The study was carried out as a result of the

need for STEM undergraduates to gain solid introduction into EHR. Sound knowledge of EHR will open STEM graduates to more job opportunities. A purposive sample comprising of six different universities were used (large, small, private, minority, and non minority). A 40-item Student Attitude Questionnaire (SAQ), three multimedia case studies were developed and used to conduct the study. A non-randomized pretest was conducted to identify the multimedia knowledge as well as learning styles of the students, this was to take care of internal validity of the test. An experimental group consisting of students from the same class was taught using the multimedia case studies while the control group was taught using the current mode of teaching without multimedia support. The responses of the questionnaire, bi-weekly electronic journal and an evaluation rubric were analyzed using both quantitative and qualitative methods. Results show that the e-learning journals were completed by over 95% of students showing a better attitude towards the innovative multimedia case study approach. Implication of these findings call for implementation of using a multimedia case study approach in delivery of instruction to STEM students.

Mesit, J. GSU. **A general model for soft body simulation in motion.—**Soft bodies are the models in which the bodies deform during animated frames depending on the interaction between themselves and the environment. This paper presents a parametric general model for soft body simulation in which structure, deformation, and volume controls generate animated deformations restricted by a set of constraints within or without an environment of gravitation. In this model, the soft body shape is controlled by structure control and anamorphosis of the soft body is created by deformation control, while the mass is approximated by volume control. A set of constraints for these controls further restrict the types of deformation of the soft body. By selecting specific methods for structure, deformation, and volume controls with a set of constraints, we demonstrate a variety of appealing fluid-like surfaces and respiration of lungs for validating the usefulness of the general model.

Rachakonda, U.C. and M.A. Salam. SU-BR. **Evaluation of elliptic curve cryptography and Galois field in securing wireless sensor networks.—**The security issue is one of the major concerns in the practical deployment of wireless sensor networks (WSN). The elliptic curve cryptography (ECC) plays an important role in overcoming the security concern of WSN. ECC requires less computational power, communication bandwidth, and memory when compared with other cryptosystems. In this paper, a group of hidden points are generated by using the ECC and also graphical analyses are performed to show the number of points generated by a particular prime number. Different analyses are performed based on different values of parameters of the elliptic curve equation and different prime numbers. Hidden generator points are chosen by some agreement between two communicating parties to protect the WSN from the man-in-the-middle attack. Another group of points also are generated by using the Galois field (GF) and their performance is evaluated in comparison with ECC. Complexities of both methods are evaluated and their analyses are compiled by using the different generator points for ECC and GF. The comparative study shows the appropriate cryptographic algorithms to prevent man-in-the-middle attack for WSN.

Reynolds, R. and Y.B. Reddy. GSU. **Android-powered input device over a wireless network**. —This project aims to provide home and professional users with the means to control their

Windows desktop environment using an Android-powered Smartphone over a wireless internet connection. The project combines existing technologies, to create an efficient and easy to use wireless control system, for mouse and keyboard input on a laptop or desktop computer. The trends are showing that the Android platform is steadily increasing in market share. There have been several implementations of this operating system on multiple telecommunication networks. However, there has been no major commercial move to integrate Android-powered devices with household appliances. This proposed system will serve to inspire further development of the Android operating system at Grambling State University, while showing the commercial potential of software development on that platform. This system utilizes preexisting Java libraries to facilitate the connection of a PC and an Android-powered device so that data and commands can be sent remotely over wireless connections. The project was completed by building on source code available in the Google code libraries. The initial connection and input handling are contained within the original source code. Another screen or 'activity' as it is referred to by Android developers is created. This activity allows the user to open Windows programs with the press of a button on the Android-powered device. The results of testing show that the initial connection and sending of input commands were sound. The additional activity has a bug, which prevents the commands from being sent; however, the commands of that class were executed during unit testing. Once these issues are overcome, it will be possible to make future additions to the program. Future developments of this program will include media controls such as play and pause. Brightness and volume controls also will be added, to add more convenience for the end user.

Salam, M.A. SU-BR. **Limits on the man-in-the-middle attacks and time synchronization in wireless sensor networks**.—Wireless sensor networks (WSN) are resource-constrained self-organizing networks that are often deployed in hostile and inaccessible environments in order to collect data. The reliability of WSN is affected by faults that may occur due to various reasons such as malfunctioning hardware, software glitches, dislocation, or environmental hazards. Appropriate fault tolerance mechanism will mitigate network failure and increase the aggregate network reliability. In an adversarial situation, attackers may wish to set up a link that does not have the properties of the network in which it is embedded. Moreover, the attackers may wish to tamper with the characteristics of a link between two legitimate nodes. This attack is called the man-in-the-middle attack. This paper discusses the characteristics of the man-in-the middle attacks and provides certain limitations on secure clock synchronization for wireless sensor networks. We state the various scenarios of the man-in-the-middle attackers' in terms of time synchronization and location of attacker. The detectability of the man-in-the-middle attackers depends upon the half-duplex, full duplex, and radio capacity of the attackers. We deduce various cases where the possibilities and impossibilities of the detectability of the man-in-the-middle attackers are discussed.

Williams, L.E. SLU. **Verification-driven learning applied in case studies**.—Many studies have been conducted to test whether or not students in the Computer Science field were responding to traditional teaching methods. Some of the studies proved that students were not even grasping the basic skills of programming. One of the most effective ways to solve this problem is by applying a learning approach. The verification-driven learning (VDL) approach exposes students to real-world software, rather than just small programs. And instead of writing

the software, the students must verify that the previously written software works correctly, and if not, locate the error in the code. One of the tests that have been conducted is a series of case studies. These case studies were designed to test how well students respond to the VDL method. These case studies will help prove, or disprove, that applying a learning approach in the classroom will enhance a student's knowledge of basic programming skills. This is also applicable to a student's knowledge of advanced programming techniques, if the VDL method is applied throughout the student's academic career. As an undergraduate student, part of my future work studying this learning approach is to develop my own case study and test its effect on novice programming students.

Earth Sciences Section

Case Hanks, A.T. ULM. **Exploration of indoor air quality at ULM**.—The differences between indoor and outdoor air are vast and volatile organic compounds (VOC) play an important role in defining air quality. Sources of pollutants indoors include paints, solvents, carpets, or industrious applications such as photocopiers and are controlled by building circulation while outdoor pollution includes both natural and anthropogenic sources and general atmospheric circulation controls the pollutant distribution. This project aims to survey and characterize the VOCs indoors and outdoors around the ULM campus.

Hendon, C.R., D.L. Green and M.F. Ware. GSU. **Design and engineering of the Grambling ozone detector atmospheric gas sampler instrument payload**.—The design and engineering of the Grambling Ozone Detector (G.O.D.) atmospheric sampler are reported. The G.O.D. is a 500 gram instrument payload that will be flown beneath a latex sounding balloon to an altitude of 100,000 feet and recovered for post-flight analysis. The payload will measure profiles of the atmosphere using an ICS1210 Pressure Sensor, payload interior temperature using an AD780 temperature sensor, ambient temperature using a biased 1N457 diode, and O_3 using a M-131 plug-in O_3 sensor. The payload uses onboard batteries for power. A LaSPACE BalloonSat microcontroller controls the payload and stores data onboard for postflight analysis. The G.O.D. is a prototype of a standard atmospheric gas sampler instrument payload being developed at Grambling State University that can be easily adapted to measure other atmospheric gases. Supported by NASA CIPAIR.

Hopper, L.J. ULM. C. Schumacher. TAMU. **Observations and model sensitivities of divergence profiles from MCSs and MCVs**.—Radar-observed divergence profiles are compared to ensemble simulations of several mesoscale convective systems (MCSs) in southeast Texas, including an extreme rain-producing mesoscale convective vortex (MCV) on 9 June 2010. Eight triply-nested WRF-ARW simulations are conducted for each case using single- and double-moment microphysics with four treatments of convection (i.e. two convective parameterizations and explicit vs. parameterized convection at 9 km). Observed and simulated radar reflectivities also are objectively separated into convective, stratiform, and non-precipitating anvil columns and comparisons are made between ensemble mean echo coverages and levels of nondivergence (LNDs). Storms whose simulated divergence structures, areal echo coverages, and vertical reflectivity distributions are similar to those observed are highlighted and

compared to those that exhibit a large ensemble spread and deviate significantly from observations. In addition to presenting model sensitivities for microphysics and cumulus parameterizations recently implemented into mesoscale models, this research will also identify possible implications for diabatically-maintained midlevel circulations like MCVs that can produce extreme rainfall. Supported by NSF.

Pullin, J.I. and L.J. Hopper, Jr. ULM. **A comparison of significant tornadoes in the central and southeastern United States**.—Although tornadoes are most common in the Central Plains region of the United States, the relative frequency of tornadoes affecting populated areas is higher in the Southeastern United States. This study presents a climatological comparison of tornadoes in these two regions, identifying similarities and differences and suggesting possible modifications to the conceptual model for tornadic storms in the Southeast. Significant tornadoes (rated EF2 or higher on the Enhanced-Fujita scale) identified in Storm Data between 2007 and 2010 will be matched to their parent storms using radar data from the Gibson-Ridge level-II radar software package (GRLevel2). Each tornadic storm's structure [e.g., classic (CL), high-precipitation (HP), low-precipitation (LP), and mini (low topped) supercells, multicell, mesoscale convective system (MCS)/quasi-linear convective system (QLCS), or other] is classified, identifying the presence of classic features [e.g. rear flank downdraft (RFD), hook echo, hail cores, etc.] and whether tornadoes were rain-wrapped or not. This study will benefit forecasters, researchers, and emergency managers that serve the general public, increasing awareness and public safety during hazardous weather situations. Supported by NSF and the Louisiana Board of Regents through the LA EPSCoR Supervised Undergraduate Research Experience (SURE) program.

Materials Science and Engineering Section

Ali, J.K. and S.J. Lee. GSU. **A solar tracker system design**.—A solar tracker is a device that orients payloads such as photovoltaic panels, reflectors, lenses or other optical devices towards the sun. The objective of this project is to design a pilot solar tracker system to improve the energy conversion efficiency of solar panels. The designed system consists of a Futaba S3003 high torque servo motor, four 2"x2" polycrystalline solar panels, four photo sensors, a 555 timer, and other electric and electronic components. The servo motor is used to deliver the right/left circular motion of the tracker platform to allow the solar panels to remain oriented towards the sun. The photo sensors which react to sunlight are integrated with the timer circuit to generate pulse signals to control the motor action. The National Instruments Circuit Design Suite 11 software was used to simulate, analyze, and troubleshoot this system. The prototype of the system was then constructed and tested. Experimental results demonstrated that the energy conversion efficiency is improved on the solar panel by using the designed solar tracker system.

Brown, J.S., I.M. Vance and P.A. Derosa. LTU. **Charge mobility in non-overlapping CNT composite networks**.—Experimental results have verified that the concentration of Carbon Nanotubes (CNT) in CNT-polymer composites play a significant role in conductivity. Computational models have been generated in the past to model the conductive behavior of these materials. However, these studies have been limited to generalized results due to the lack of detail pertaining to the composition of the samples generated. This study aims to address this

problem. A series of samples are first generated using a robust Monte Carlo code that creates a sample of a chosen density. The code can generate samples with control over a variety of different parameters including aspect ratio distribution, tortuosity, alignment, disorder and agglomeration. The routing that positions the CNTs ensures that there is no overlap between CNTs by calculating the distance between them. Using the Miller and Abrahams approach the mobility of the samples may be calculated and plotted against the concentration. These plots exhibit the characteristic percolation behavior expected.

Carroll, M.L. and D.P. O'Neal. LTU. **Applications of x-ray fluorescence spectroscopy for quantification of gold nanoparticles in tumors**.—Currently, there is no device that can immediately measure the amount of gold nanoparticles accumulation in tissue samples for clinical or cancer research applications. Current assays, such as neutron activation analysis, are laborious and can take weeks to deliver results. This research project adapts X-ray fluorescence spectroscopy for micro-molar elemental analysis in biopsies and excised organs to support the development of non-invasive optical tools towards the real-time quantification of the circulation and accumulation-phase treatment parameters. According to the preliminary data, homogenized tissue samples can be divided into sample cups and their gold content can be determined with less than 20% relative error of prediction. X-ray fluorescence, when used as an external chemical characterization technique to quantify the accumulation of optically-active gold nanoparticles towards in vivo targets, such as tumors, will expedite the provision of follow-up medical assessments to those with assessable care, and dramatically reduce the cost and time of testing for underserved populations.

Fasheru, D.S. and N.V. Seetala. GSU. N.D. Subramanian and J.J. Spivey. LSU-BR. **Positron lifetime studies of copper-core/porous-manganese-oxide-shell nanoparticles.—**Core–shell nanoparticles exhibit chemical and physical properties that are distinct from those of the bulk materials. A wet-chemical method was used for the synthesis of Cu-core (6.1 nm)/porous-Mn_3O_4 -shell (3.4 nm thick) nanoparticles. We used positron lifetime spectroscopy (PLS) with three-lifetime analysis to study the variations in nano-porosity due to oxidation. The first lifetime component is mostly associated to positrons annihilating in Cu-core, the second to Mn_2O_4-shell, and the third to positronium (Ps) annihilation in nano-pores of Mn_2O_4-shell. Positron lifetime in pure Cu has been reported to be 0.115 ns. Thus, the observed first lifetime of 0.169 ns indicates that Cu-core has some disorders such as vacancies/dislocations. The positronium lifetime is used in a simple model to estimate the nano-pores diameter in Mn_2O_3-shell to be about 6 Å. There is no significant change observed in the pore structure (pore size and concentration) due to oxidation. However, we observed a drastic change in first and second lifetime components between as-made and oxidized particles. The first lifetime increased from 0.169 ns to 0.191 ns due to oxidation and its intensity increased from 24% to 47%, which clearly indicates that the Cu-core is oxidized. Work is partly supported by a DOE-EFRC grant.

Melancon, J., M. Koorie, C. O'Neal and S. Zivanovic. LTU. **Electron beam detection with thin film devices**.—Conjugated polymers have been widely studied for their semiconducting and photoelectric properties. An area in which there has been little research is that of the response of conjugated polymers to electron beams. Solid-state electron detectors are commonly fabricated from inorganic semiconductors such as silicon. For example, a common single-crystal silicon

solar cell was verified to show some response to an electron beam. A polymer electron detector was then designed based on common polymer photodetector and solar cell designs with the aid of the equations for maximum penetration depth into materials based on molecular weight and density. The devices fabricated and tested in this paper use a polymer blend of poly(3-hexylthiophene) (P3HT) doped with [6,6]-phenyl C_{61}-butyric acid methylester (PCBM). The completed devices were tested for electron beam response in a thermal emission scanning electron microscope and responded to the presence of an electron beam. The responsivity data indicates that the devices do not detect electrons at higher energies (~30keV) very well. Exposure to the electron beam also results in irreversible damage to the devices. It was also shown that a semicontinuous film of gold was able to absorb electrons for detection. Supported by U.S. Army and LaSPACE.

Smith, A., G. Richard and S.J. Lee. GSU. **A temperature warning system design.—** Temperature warning systems have always been in high demand for safety reasons. In this project, a temperature warning system is designed to warn people when the measured temperature is above and/or below a preset range by the users. The designed system includes a DC power supply and a temperature sensing circuitry which is constructed on the NI Elvis II, a computer integrated platform. The DC power supply which converts the regular 120V AC to 5V DC is used to power the temperature sensor. The Elvis II platform which uses LabVIEW-based software is connected to a PC through USB connection. The voltage data measured in real time is acquired and processed by LabVIEW which has user interface capability. Warning signals are triggered off when the measured temperature is either above the high temperature or below the low temperature setting. The current temperature also can be displayed in digital and graphical format. Experiments were performed to test/demonstrate the performance of the designed system. It was observed that the system worked as expected. This system is simple and expandable.

Tull-Walker, N., C.R. Hendon and N.V. Seetala. GSU. J. Van Behr and B. Hester. SUSLA. **Positron lifetime studies of polyimide-CNT composite films.—**Polyimides are thermally stable at high temperatures, thus have a wide variety of applications in the aerospace industry. Carbon nano-tubes (CNT) reinforced polymer composites improve multi-functionalities such as structural and thermal properties. We prepared polyimide composites with 0 and 1 wt% CNTs. Three varieties of CNTs: Single Wall – functionalized, Double Wall – functionalized, and Double Wall – non-functionalized CNTs were used. The functionalization is performed by oxidation in acid followed by purification. Polyimides were prepared using BPADA, BAPP, and refluxing in anhydrous NMP followed by precipitation, cleaning, dissolving and dispersing CNT in NMP, and curing in a vacuum oven. We used a Positron Lifetime Spectrometer (PLS) to study the micro-porosity of CNT incorporated polyimide composites. The third lifetime component provided the information on pore size (lifetimes) and concentration of pores (intensities) using a simple model, and the values were compared between the films with and without CNT. Work partly performed at NASA Glenn Research Center – supported by NASA-CIPAIR grant.

Woodard, E.L. and D.P. O'Neal. LTU. **Skin cancer detection using fluorescence imaging.—** Skin cancer is the most common form of cancer in the United States. If not treated early, it may spread to vital organs resulting in fatalities. Current detection methods, such as biopsies, are

relatively expensive (>$300 ca. 2012), slow (>2 days), and can produce false negatives. Fluorescent imaging is one technology that may help to detect skin cancer more quickly and accurately than current methods. pH sensitive fluorescent dyes are affected by the consistently lower pH of tumors relative to the surrounding tissue. Dyes that exhibit emission changes based on pH changes are widely available across the visible spectrum. Our technique suspends this dye in a biocompatible solution that readily penetrates the skin, and then excites the dye using an array of 3 high output LEDs and captures an image of the emission using a monochrome CMOS camera. For initial testing, we use a block of gelatin with a pH similar to that of human tissue to simulate physiological conditions. The image is analyzed using the built-in image processing software in Matlab. Shape detection and intensity level algorithms in Matlab can be used to predict the presence of lower pH areas with reasonable accuracy.

Yao, M.J. and J. Fang. LTU. **Modified PDMS application: Capillary stop valve**.—This paper describes a capillary stop valve sealed with a modified polydimethylsiloxane (PDMS) cover. This valve is based on the capillary burst pressure and the surface tension, which can be adjusted by the modified hydrophilic PDMS cover. The capillary-driven stop valve is fabricated on a silicon wafer and then bonded with a modified PDMS cover. This study focuses on the adjustment of the contact angle of a modified PDMS to function the capillary action and the stop valve. The polydimethylsiloxane-ethylene oxide polymer (PDMS-b-PEO) is utilized as a surfactant additive into the original PDMS mixture during the polymerization to create a hydrophilic PEO-PDMS elastomer. The contact angle of the PEO-PDMS can be adjusted from 80.9° to 21.5° with different mixing ratios. The concentrations of PDMS-b-PEO accepted here are from 0.2% to 0.4%, and the contact angles of the PEO-PDMS are from 80.9° to 58.5°, which are the conditions needed to bring the capillary channel and valve into effect in the testing. The experimental results show that the liquid meniscus stops at the opening of the valves when the surface tension achieves balance. This stop valve in the capillary system can be applied in numerous microfluidic devices and pumpless fluidic actuation mechanisms.

Mathematics and Statistics Section

Bracey, S.S., K.A. Evans, I.B. Magaña and D.P. O'Neal. LTU. **Modeling of nanoparticle delivery to tumor sites coupled with experimental validation**.—Currently, experimental trials are underway to investigate the therapeutic bioavailability of nanoparticles used in the treatment of certain types of cancers. This presentation will discuss the development of compartmentalized mathematical models to predict that bioavailability. It is important in the specific kind of treatment being done in this study that the nanoparticle concentration is known at a given time. Given a nanoparticle concentration, the tumor site is radiated with a laser post injection in order to heat the nanoparticles to a temperature high enough to kill the tumor vasculature. In addition, to be evaluated is the elimination of nanoparticles from the blood 'compartment' into other 'compartments' such as the reticulo-endothelial system, which is responsible for the elimination of the nanoparticles from the body, and the targeted tumor. Algebraic model fitting and systems of ordinary differential equations are discussed as methods of evaluating these separate 'compartments'.

Idowu, R.A., K.A. Evans, M.M. Paun, M.A. Decoster and K.R. Cotton. LTU. **Cellular calcium dynamics in culture using fluorescence microscopy - A statistical approach**.—Calcium is one of the most significant messengers in the human body system, as it is responsible for signal transmission inside living cells and intercellular coordination. In this research, brain cells in culture are grown for 8-9 days in vitro and fluorescence microscopy is used to study cellular calcium dynamics in culture. Calcium influx into the cell is expressed as an increase in fluorescence, due to the fluorescence probe for calcium that is used in the experiment. An excitatory neurotransmitter, glutamate, is applied as a treatment to the culture to stimulate cellular calcium influx. It is during this period of time when cellular calcium levels may oscillate. After defining what is meant by a "spike", we count the number of spikes in each cell directly from the fluorescence intensity. Based on this information, we apply statistical analysis approaches to study the treatment effect on the number of calcium spikes. One-way ANOVA showed significant treatment effect. To enhance the model, we explored a repeated ANOVA. This measure was consistent with the ANOVA model, but the model improved when the sum of square errors was compared. Lastly, we compared the pair-wise t and Tukey HSD comparison tests to ascertain which treatment differs.

Physics Section

Adhikari, S. and S. Yoshida. SLU. **Evaluation of thin film coating adhesion with Michelson interferometer.—**An opto-acoustic technique has been applied to evaluate the adhesion strength of a thin-film coating on silicon wafers. The specimens (gold-coated silicon wafers) have been configured with a Michelson Interferometer as the end mirror, and are driven from the rear with an acoustic transducer so that the gold-coated surface oscillates in the direction of the optical axis at moderate frequencies. One wafer is driven at a time. Interferometric fringes (dark stripes) are formed behind the beam splitter. The resulting film surface displacement has been detected as a fringe shift of the interference intensity pattern behind the beam splitter with a digital imaging system. For a given input power to the transducer, the amplitude of the oscillation of the coated surface varies depending on the adhesion strength. Two specimens with different adhesion strength have been tested. When the specimen of the weaker adhesion is driven, the fringes become blurry, indicating that displacement is greater. The difference in the adhesion strength has been successfully visualized as the difference in the fringe contrast. Fourier analysis on the fringe pattern has quantified the fringe contrast.

Adtani, S. and A. Kandalam. McSU. **Unusual properties of Au_nO_m nanoclusters: A computational investigation.—**Understanding the catalytic behavior of gold-nanoclusters has been the focus of several experimental and theoretical studies. Most studies have focused on interactions with O_2 however recent experimental advances have now made it possible for atomic oxygen to interact with gold nanoclusters. In a recent anion photoelectron-spectroscopic study, it was shown that Au_nO_m (n=3-6; m=2-6) clusters exhibit superhalogen behavior; thus making their anionic counterparts unusually stable. Systems possessing anomalously large EA values (larger than that of chlorine) have been termed as "superhalogens". Superhalogens play an important role in a wide variety of areas, such as building blocks of high energy density materials, oxidizing agents, and bio-catalysis. Traditionally, superhalogens consist of a central

metal atom surrounded by halogen atoms, unlike Au_nO_m. The experimental observation raises an important question: Why are Au_nO_m clusters behaving as superhalogens? We will present our recent results on neutral and negatively charged Au_3O_m (m=2-5) clusters. Using Density Functional Theory (DFT) based calculations, we understand the origin of the superhalogen behavior of these clusters. Electronic structure, equilibrium geometries, and stabilities of these clusters also will be presented.

Charles, N. and R. Adhikari. LTU. V. Edwards. GSU. P. Derosa. LTU. **An improved model for organic semi-conductor transport.—**Since the discovery of the semi-conducting properties of polymers in the 1970s, there has been significant interest in improving the performance of these materials. The applications of organic semi-conductors include solar cells, light-emitting diodes, transistors and biosensors. A critical aspect of organic semi-conductor research is computational modeling designed to pinpoint factors for improving device performance. Conduction in the polymer systems is usually simulated using a Monte Carlo technique on a fixed lattice of sites. These Monte Carlo simulations depend on very large number realizations in order to achieve acceptable results that often translate to long simulation times. We propose an integrated model able to account for charge transport in conductive polymers under different regimes, including polaron-free transport, polaron transport and exciton transport that replaces the fixed lattice with a rolling lattice of sites. This rolling lattice has proved to significantly improve simulation time while successfully predicting the physical properties of the systems.

Dwyer, R. CC. **Real and claimed efficiency of CFL's.—**Compact Fluorescent Lights loudly advertise "10 watts replaces a 40 watt bulb." But the hidden fine print says, "120 VAC 140 ma" or 17 watts. The difference is in transformer losses. 10 watts into the actual light comes from 17 watts into the base of the bulb. We show the measured vs. advertised power consumption for several types of lights.

Hoover, D.L. and S. Yoshida. SLU. **Finite element analysis on deformation of metal samples with residual stress.—**Using COMSOL Multiphysics Finite Element package, we modeled tensile tests on a thin metal-plate sample. We are interested in modeling the deformation behavior of samples with residual stresses. Using different plastic deformation models in COMSOL and comparing the numerical results with the experiment, we try to understand how residual stress affects the fracturing process of the sample. Also, using COMSOL, we use elastic wave equations to govern a model's displacement field and compared the results to COMSOL's structural mechanics module's results. We are interested in using the same field equations to model both elastic and plastic deformation.

Koirala, P., R. Rallabandi, X. Li, Tang, X., Y. Wang, K.H. Bowe, A.K. Kandalam, B. Kiran, McSU. **From clusters to baby crystal to nano-blocks: Lead sulfide at nanoscale.—**PbS quantum dots (QDs) have attracted considerable attention due to their large exciton Bohr radius of 18 nm. While most of the studies have focused on the colloidal nanocrystals, studies on bare PbS nanoclusters are sparse. Recently, stabilities and structural evolution of $(PbS)_n$ (n=2-32, 64, 128, and 256) clusters were investigated in a joint computational and experimental study. In the cluster range (n=2-15), anion-photoelectron-spectroscopy and DFT based calculations were used to understand the geometrical and electronic structure of neutral and negatively charged $(PbS)_n$

clusters. Computations involving medium size $(PbS)_n$ (n=16-32) clusters revealed a structural transition from two-dimensional to three-dimensional stacking of cuboids at $(PbS)_{24}$, while $(PbS)_{32}$ is the smallest cubic cluster exhibiting bulk-like coordination. $(PbS)_{32}$ is considered as "baby crystal" and can lead to bulk structure under replication. Accompanying experiments in which mass-selected $(PbS)_{32}$ clusters were deposited on HOPG, and the subsequent STM analysis revealed formation of square or rectangular cuboids of various sizes in nanoscale. Our calculations of larger $(PbS)_n$ (n=32, 64, 128, and 256) provide a rubric to understand the nature of aggregation.

Sawyer, L. LTU. **Invited: Recent results from the ATLAS experiment at the LHC.—**The ATLAS experiment, one of two large general-purpose detectors at CERN's Large Hadron Collider (LHC) has recently completed its first full year of data taking. In this talk, I will provide an overview of the ATLAS experiment, its goals, and highlights from the analysis of data collected from the world's highest energy proton-proton collider. Prospects for future analyses, including the search for the Higgs boson, also will be discussed.

Division of Science Education

Higher Education Section

Pugh, A., D. Delgado, D. Schween and R. Mann. ULM. **Attitudes toward a science methods course in elementary education**.—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, which is for four weeks in the assigned school. 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, four, and five for four weeks of teaching. In the science methods classes, candidates are required to present a lesson to their peers where they use PowerPoint, 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 ascertain the attitudes of the Professional Block Students in the elementary science methods class for the Fall 2011 semester.

K-12 Education Section

Bernard, W.J. HCS. **Authentic research projects: Pre-college students' perspectives**.—The purpose of this study was to examine high school students' perceptions of an authentic research project. The context for this study was a local Science and Engineering Fair (SEF) and involved students from a Metro-Atlanta public high school. Research projects are inquiry activities and as such, are core components in science education reform movements. In this qualitative study, fourteen students were followed through a research project. Data were collected via an open-ended survey, three individual interviews, a web log, and a group interview. Interviews were audio taped and transcribed. Transcripts were coded and analyzed for the purposes of describing the students' perceptions of their research project. Their perceptions were organized into 6 assertions: 1) reluctance to undertake projects, 2) difficulty with choosing a topic and designing a study, 3) ownership of their research project, 4) increase in interest in their research topic, 5) perceived benefits to the research experience, and 6) reflections on their research and advice to others. By knowing more about students' perceptions, science teachers understand more of the support and direction their students need and science educators may include more research strands in science teacher preparation programs to provide prospective teachers experience with research.

Brett, J.M. LADE. **The next generation science standards are coming. What are you going to do about it?—**In July 2011, a Framework for K–12 Science Education: Practices, Cross-cutting Concepts, and Core Ideas was presented by the National Academy of Sciences to guide the revision of the National Science Education Standards developed during the 1990's. The purpose of the framework is to "ensure that by the end of 12th grade, all students have some appreciation of the beauty and wonder of science; possess sufficient knowledge of science and

engineering to engage in public discussions on related issues; are careful consumers of scientific and technological information related to their everyday lives; are able to continue to learn about science outside school; and have the skills to enter careers of their choice, including (but not limited to) careers in science, engineering, and technology." The framework builds curriculum upon three dimensions: science and engineering practices, crosscutting concepts, and discipline core ideas. From this framework a national committee is developing the Next Generation Science Standards (NGSS). The first draft will be released for review and comments this spring. Louisiana will develop its new state science standards using the NGSS. Now is the time to get involved in this process. Join in now to improve science education in our state and the nation.

Elder, E. LSUA. **Lactose operon: A hands-on model**.—Many undergraduate students have difficulty with the concept of an operon and genetic control of enzyme production. Many teachers have similar difficulties. Schools frequently lack models or other resources to enhance the learning process. This presentation will cover the development and application of a hands-on model illustrating the lactose operon, present in *Escherichia coli.* The model can be adapted to different levels of students, is easily made, requires inexpensive components, can be made in multiple copies, and contains parts that can readily be replaced. It can be stored easily. The model that will be shown relies on the use of Velcro, polyvinyl chloride pipe, tape, sponges, and test tube caps. This model has been used in introductory biology courses for non-majors, introductory courses for majors, and for other courses such as microbiology. In addition it has been used to support Central Louisiana Academic Residency for Teachers students as they develop materials to teach at the high school level.

Division of Sciences and Humanities

Doucet, J.P., S. M. Graebert , and D.H. Cibelli. NiSU. **A structure for galacidalacidesoxy-ribose nucleic acid.—***Galacidalacidesoxyribonucleicacid* is a 1963 oil-on-canvas masterwork of Salvador Dali. Subtitled *Homage to Crick and Watson*, the painting is well 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."

Doucet, J. NiSU. **(Re-)defining "sciences and humanities" for the Louisiana Academy of Sciences.—**The Louisiana Academy of Sciences is a national leader in fostering hybridization of sciences and humanities. The chasm of the "two cultures" first elucidated by C.P. Snow in 1959 was bridged here beginning in 2008 with creation of the Division of Sciences and Humanities at the Academy. Sciences and Humanities sessions have been held at consecutive annual meetings of the Academy since 2010. Since its inception, the interests of the Division have been defined as follows: general sciences and humanities studies; comparative studies of sciences and humanities; humanities studies using scientific method and analysis; humanities seeking understanding through sciences; science seeking understanding though humanities; history of sciences; historiography of sciences; scientific biography; scientific studies of philosophy; philosophy and science; science in literature; science and mass media. In the interest of refining this definition and developing our division not only as a colloquium but also as a catalyst for true hybrid research, we will discuss the following ideas in this presentation: (1) a redefinition of "sciences and humanities" as "science humanities," (2) defining the limits of "sciences and humanities" from those of "social sciences," and (3) alignment of our interests with Louisiana Board of Regents definitions of "humanities" used at member institutions.

LaFleur, G.J. and D. Sipiorski, SLU. **Combining sciences and humanities in a coastal Louisiana field trip.—**We have combined elements from sciences and humanities into an engaging field trip, by traveling to the Chauvin Sculpture Garden and to the Louisiana Universities Marine Consortium (LUMCON). The Chauvin Sculpture Garden is a world class folk art site that was created by Kenny Hill, preserved by the Kohler Foundation, and is actively maintained by Nicholls State University. It contains over 100 life-size sculptures that challenge the visitor to contemplate life and pathways to redemption. The garden also allows students to observe local fisherman passing by on their way to harvest shrimp, crabs, and oysters. Only 15 miles south of the garden, your class can experience the exhibits and natural landscapes of LUMCON. Inside there are aquaria, an archive of preserved gulf specimens, and a tower

allowing a bird's-eye view of the salt marsh. A two hour canoe trip at sunset introduces the students to a wilderness containing fiddler crabs, ribbed mussels, clapper rails, and even otters. We have found that biology students welcome the chance to consider the emotional puzzle that is presented at the Chauvin Sculpture Garden. And conversely, art students find the isolated wilderness of LUMCON as a provocative subject for art that possesses an ecological story.

Marino, S.E., and K.J. Eskine. LUNO**. The effects of body movement and personality on the perception of time.—**The perception of time can be influence by a multitude of factors, ranging from time of day to personality type of the individual. Embodied cognition looks at how the state of an individual's body affects the state of an individual's mind. The purpose of the current study looks at how the state of an individual's body can affect the perception of time. Participants will be asked to tap their foot to simulate impatient behavior while making a time duration judgment. Additionally, type A personality types perceive the passage of time faster than their type B countertypes. It is hypothesized that those participants in the foot tapping condition will perceive the passage of time as faster than those in the non-tapping condition, and that participants with a type A personality will perceive the passage of time as faster than those with a type B personality. 100 Loyola University students will be recruited for this study. The results of the study will be analyzed using a 2-way Anova.

Rau, M.E. LUNO. **Art therapy for pediatric oncology patients: A survey of treatment and effects.—**Art therapy is a growing area of research among psychologists. More often this technique is used in one-on-one counseling sessions with the therapist and the patient. Studies have shown that art therapy has been successful in treating patients dealing with mental trauma and depression. There is also evidence to show that art-making aids in improving motor skills of the elderly, particularly those diagnosed with Parkinson's disease and other illnesses that affect muscle control. In my thesis, I will explore this pairing of art therapy with medical treatment and how it affects psychological, emotional, and cognitive responses, particularly in children and adolescents diagnosed with cancer and other severe medical illnesses. I will explore the general ethical principles and practices of child life specialists and art therapists to gain a better sense of proper forms of therapy. I will research the effects of this treatment in combination with the effects of medical treatment, and I will compare it to that of patients who only receive medical treatment for their illness. Based on my research, I will develop implications for further application of and research in this field, including the resources needed to implement this therapy for children in hospitals that lack it.

Smoak, J.H. **Killing the culture: An investigative study of Belize's cultural evolution.—**A small civilization rose from the roots and ruins of an ancient people and became a nation pulsing with the flavors of many cultures coming together. Unfortunately, the diversity that created richness in culture of the nation has begun to reverse in the past few decades, particularly in the arts. Both internal and external forces have influenced change in culture. This cultural "erosion" is affecting almost every aspect of the way the nation operates. In bringing the world together through trade and commerce, globalization has also brought much of the world together into a homogenized culture. Globalization can be the key to economic development and the survival of society, but threatens the unique culture and individuality of a country. This exploration research involves personal observation and interviews with native musicians in an effort to understand the

evolution of Belizean music culture. At what point does modernization ruin the richness of culture? This study provides review of similar research and discussion of how culture can be preserved and development can be encouraged in the same context.

Division of Social Sciences

Arnold, D.H. and C.T. Huynh. LTU**. The development and application of expertise.—** Although experts exhibit mastery of knowledge, mastering knowledge does not necessarily create experts. In addition to mastering knowledge, experts process information more efficiently, are more adept at evaluating situations, and possess an inherent ability to problem-solve, despite being limited to their domain of expertise. Experts display a particular aptitude for learning, associating new knowledge with existing information while specifically focusing on meaning as opposed to features of the concepts. In addition, experts are able to apply their expertise at a high-level sustaining their performance over time. The talents and skills used by an expert are constantly being trained (through deliberate practice) ensuring that an expert remains proficient at his/her craft. When faced with an ambiguous situation, experts are more likely to use their accumulated knowledge to behave proactively, developing cognitive shortcuts and anticipating multiple outcomes. Despite past literature, there is still much to learn regarding experts. In industrial/organizational psychology, examining the developmental processes of experts can generate positive strategies and implications for developing successful employees. By exploring the processes and behaviors of experts, we hope to assist researchers in investigating the nature and origin of expertise.

Castille, C. M., J.E. Buckner., J.T. Tobacyk, and M.M Livingston. LTU. **P<0.05 and social scientific epistemology: Why a change is in order.—**What constitutes satisfactory evidence when testing a hypothesis in social scientific research? According to the present convention, if a researcher claims to have a significant finding, it is because the likelihood of a given error occurring exceeds a probability criterion ($p < .05$). This same criterion is applied to most hypotheses in social scientific research, thus allowing for the equal treatment of likely and unlikely hypotheses. A recent exemplar is the testing of the psi hypothesis (e.g., clairvoyance; Bem 2011). As the past 70 years of research has not reliably produced evidence in favor of the psi position, the null seems more likely. However, because of convention, the psi hypothesis is given equal likelihood compared to the null. In our presentation, we argue for a change in convention (i.e., adopting Bayesian methods) and consideration of the conceptual framework of probabilistic skepticism in making decisions regarding unlikely social scientific claims. Further, we suggest that adoption of these methods would result in a more efficient accumulation of knowledge than is presently allowed.

Davis, S. SU-BR. **The effects of peer conformity on gender and age.—**Conformity is a social influence involving change in the belief or behavior to fit in with a group. Research suggests that social class, values, group size, need for social approval, and age impact conformity behaviors. The study examined the extent to which age and gender affects conformity among participants. A total of 90 participants, ages 14-18 participated in the study. The findings are discussed in terms of the theories that females will more likely conform than males; younger students will conform more than older students; and younger female students are more likely to conform.

De Leon, J. A. LTU. **Effects of job stress on counterproductive work behaviors and organizational citizenship behaviors.—**Counterproductive work behavior (CWB) is an umbrella term referring to voluntary behaviors of employees that harm other employees or the

organization for which they work. Behaviors can range from ambiguous and mild instances of workplace incivility to systematic and more severe acts of physical violence. Organizational citizenship behaviors (OCB), on the other hand, are typically unrewarded and voluntary behaviors of employees aimed at improving the organization. The behaviors contribute to the smooth operation of organizations and include helping a coworker, being courteous, and staying late at work. This presentation will focus on individual and environmental factors that increase the likelihood (namely job stress) of CWBs and decrease the likelihood of OCBs. The presentation will examine circumstances in modern organizations contributing to CWBs. The paper demonstrates that careful selection processes does not provide an adequate solution to the problem of CWBs and argues that steps must be taken to reduce what triggers CWBs by removing unnecessary stressors and to increase what triggers OCBs.

Gaspard, J.P. NiSU. **Is the language of Swamp People exaggerating Cajun English?—**Cajun English is a dialect only found in Southern Louisiana. The television series, Swamp People, focuses on alligator hunters in the region who speak a version of Cajun English. The presentation argues that the performers are exaggerating the accent for publicity reasons. According to comments left on fan websites, some viewers watch the series, in part, because of the hunters' accents. The research examined rates of three aspects of Cajun English (is' absence, 'are' absence, and 'was' leveling) within the episode, "Cannibal Gator." The study compared findings to previous reporting of actual rates of the markers in Cajun English. The study did not find an exaggeration of Cajun English. The leveling of 'was' actually occurred less frequently in Swamp People than found in previous research. More research is needed to determine whether other common aspects of Cajun English can be heard on Swamp People, the frequency of markers and whether the markers are exaggerated by the alligator hunters of the show.

Humphrey, J. SU-BR. **The effects of gender and age on academic performance, extra-curricular activities, and cultural enrichment.—**The study assessed age and gender differences in student achievement. Research indicates that participation in extracurricular activities improves academic performance of students. The study included 41 eleventh and twelfth grade students ranging from 15 to 18 years of age. Students responded to Multi Ethnic Identity Measure (MEIM) and the self-efficacy and goal-setting scales. The study findings suggest that students who are diverse in after school activities may gain knowledge and information only attainable by participation in a variety of clubs and extra-curricular activities.

Igou, F.P. and J.J. Walczyk. LTU**. Measuring cognitive load: Towards a modern science of lie detection.—**The validity of polygraph lie detection rests on the assumption that it takes more effort to lie than to tell the truth and physiological changes may be measured in order to determine truthfulness. However, after an exhaustive review, the Committee to Review the Scientific Evidence on the Polygraph (2003) concluded that physiological signatures measured by the polygraph were not "uniquely related to deception." The interpretation of polygraph results frequently rests with the judgment of the polygraph operator. New methods of lie detection, based on cognitive load theory, are currently being developed. Cognitive load theory holds that individuals' short-term working memory has limits in the number of elements that may be contained and processed simultaneously. Increasing the elements increases the cognitive load. By contrast, long-term memory, which is said to form a person's "knowledge base", is

easier to access, retrieve and process. This paper will present findings from recent research that supports the notion that cognitive load "signatures" characteristic of lying and deception may be fairly easy to identify.

Koch, Z. and K. Ernst. LUNO**. Effects of judge's use of persuasive non-evidentiary influences on jurors' verdicts.—**Social influences cause behavior changes. The use of aggressive tones and wording may induce different individual reactions. Using a two experimental group design, approximately 100 undergraduate students were randomly assigned into one of three conditions. The goal of this study was to determine whether persuasive, negative tones and wording would influence the jurors' verdicts. The study hypothesized that jurors would be persuaded by the judge's words by voting guilty if the judge yells at the defense attorney and not guilty if the judge yells at the prosecution attorney.

McKnight, S., J. Lyons, B. Plaisance, C. Castille, and T. Sheets. LTU. **A new method in the assessment of spatial ability.—**It has been estimated that 5-10% (90% of which are fatal) of general aviation accidents are caused by a visuo-spatial deficiencies among pilots (Federal Aviation Administration 2011). These deficiencies manifest when the pilot loses 3-dimensional visual orientation (e.g., in the clouds) and then must rely on instrumentation to establish the aircraft's relationship in space to other objects (e.g., the ground). Spatial ability is defined as individual differences in apprehension, formation, and manipulation of mental representations (Carroll 1993). The tasks of mental rotation, spatial relations encoding, and recovering visual features have been utilized to measure spatial ability (Dror et al. 1993). The assessments in this paper have been designed using Carroll's higher order discriminable factors of the domain of visual perception. We outline a method where these tasks will be administered using E-Prime, a computer software program utilized by cognitive psychologists. Using this software will provide highly precise measures of participant speed of response and accuracy.

Murphy, S.L. and M. Desselles. LTU. **Filling in the blanks in affective events theory: Insights from reversal theory.—**Researchers have regarded Affective Events Theory (AET; Weiss & Cropanzano 1996) as a groundbreaking theory that surfaced the importance of affect at work and the need to operationalize certain characteristics as states rather than dispositions (i.e. job performance, job satisfaction, etc.). The authors of AET have stated the theory was developed from previous research on affective states, and there were numerous articles and theories establishing similar concepts before the introduction of AET (Weiss & Beal 2005). One such example is Reversal Theory (RT; Smith & Apter 1975), which introduced a phenomenological theory of psychological states over twenty years before AET was developed. The purpose of this paper is to explore the similarities and differences between the fundamental assumptions of the theories. Reversal theory shares many of the same assumptions of AET; however, RT adds and makes central an essential aspect to work experiences that is neglected in AET: motivation. Further, RT explicates the linkage between motivation, emotion and personality that is currently missing from AET. Research initiatives and practical implications are discussed.

Novreske, A. and K. Eskine. LUNO. **The effects of emotions and body posture on perception of trustworthiness.—**Social perceptions of trust have been shown to depend on the appraisal of

facial appearance. Studies have shown that facial properties are automatically categorized by the amygdala, which perceives trustworthiness. Yet not much is known about the extent to which emotions and body postures influence the perception of trustworthiness in others. The purpose of this research is to determine if specific emotions and body postures increase perceptions of trustworthiness in both familiar and unfamiliar targets. Approximately eighty Loyola University undergraduate students will be primed with either a positive or negatively balanced emotion, and will be given either an open (sitting with arms open) or closed (sitting with arms folded) body posture to hold. They will then judge both familiar targets (e.g. the president, the Pope, etc.) and unfamiliar targets (a stranger) to judge in terms of their trustworthiness. It is predicted that "happy" primed participants with an open body posture will perceive all targets as more trustworthy, while primed participants that are sad and have closed body posture will perceive all targets as less trustworthy.

Ong'oa, I.M. SU-BR. **The effect of public investment in transportation infrastructure on gross state products of American states.—**The purpose of this paper was to determine whether public investment in transportation infrastructure is beneficial to the economy. This study used the fixed effect model with robust standard estimates to explore whether changes in the amount of public investment in infrastructure is a factor that can help explain growth and decline of per capita gross state products of 48 U.S. states. The study findings indicated that increased federal investment in highway infrastructure is unlikely to have a perceptible positive effect on gross state product. Proposals to increase federal investment in highway infrastructure should be evaluated with care.

Rabalais, A.M., S.L. Murphy, and M. Desselles. LTU. **A state-based conceptualization of team personality.—**Diversity in team personality has consistently revealed mixed results, and researchers have struggled to identify whether the issue lies in the measures or methods used in team scholarship. However, the problem may exist in the way team personality is operationally defined. We suggest a different way of measuring team personality in which there is intra-team variance in personality. Reversal Theory (Apter 2001) suggests that individuals are inconsistent, and the same person can act a different way in the same situation at different points in time dependent on their psychological state. Team personality, thus, should be measured by assessing the different psychological states of team members, or psychodiversity, as opposed to the traditional measure of compositional personality traits. Previous research has indicated that diversity within a team can result in conflict (Jehn et al. 1999, Gibson & Vermeulen 2003), and that conflict can affect team performance (Parayitam & Dooley 2011, De Dreu & Weingart 2003, Farh et al. 2010). We propose a model of the relationship between psychodiversity and conflict and the effects of conflict on team performance. The mediating role of psychological safety in teams is also highlighted, and research initiatives to test the model are discussed.

Richards, M.A. and K.J. Eskine. LUNO. **Judging working mothers: The effects of a benevolently sexist interviewer.—**Benevolent sexism, a subjectively positive orientation toward women by sexist men, may be common in the work place. This study will explore how interpersonal judgments of female applicants, described as mothers or non-mothers, are affected when interviewees are exposed to benevolent sexist interviewers. Sixty Loyola University undergraduate students will be randomly assigned to one of four different conditions (15 per

condition) in a 2 (interviewer condition: benevolent, non-sexist) X 2 (mother status). Participants will be administered the Ambivalent Sexism Inventory (REF). Participants will read an interview transcript then rate the competency, likeability, and hireability of female applicants as well as the favorability of the male interviewer. It is hypothesized that participant's favorability ratings of the benevolent sexist interviewer will be negatively associated with ratings of applicant competence and hireability and the relationship between interviewer favorability and applicant hireability will be fully mediated by applicant competence. In the benevolent sexist interviewer condition, the participants' hostile sexism scores are hypothesized to be negatively associated with ratings of applicant's competence, likeability, and hireability. The status of motherhood is hypothesized to decrease ratings of competence and hireability in both benevolent and non-benevolent sexist interviewer conditions.

Smoak, V.J., C.N. Napper, and A. Frost. LTU. **Personality behind the profile: Differences between individuals who use Facebook versus LinkedIn.—**Social networking sites (SNS), including Facebook and LinkedIn, have become an increasingly common context for social interaction, as well as information-seeking and sharing. Recent research has found particular interest in personality and demographic correlates with human behavior in the SNS context. The Five-Factor-Model (Goldberg 1991) has been used to measure neuroticism, extroversion, openness and agreeableness and their relationship to number of contacts of "friends" amount (measured by length of time or frequency of use), and type of use (posting pictures, messages or interacting through private messages, etc.). The personality-SNS relationships are particularly important in the young adult population because their behaviors set trends for the future (Correa et al. 2010). The current study is an examination of personality factors (extroversion and neuroticism) and SNS preferences in a sample of college students at a university in the United States. Results and methods of the current study are discussed in comparison of other studies as well as directions for future research. Data for this analysis are part of a larger data base that focuses on networking and career strategy.

Sprout, A. and L.B. Lewis. LUNO. **Effects of visualization and physical practice on motor performance and self-efficacy.—**Previous research has shown that many cognitive activities, such as visualization, have the ability to influence motor performance and self-efficacy. The purpose of this study is to compare the effects that visualization and physical practice have on motor performance and self-efficacy. Approximately 100 Loyola University undergraduates will participate in a between-groups repeated measure design. Participants will be introduced to a motor task using "Wii Fit: Bird's Eye Bullseye" through a brief demonstration. The self-efficacy of the participants in terms of this task will be measured using the Physical Self-efficacy Scale (Ryckman et al. 1982). Additionally, the visualization ability of the participants will be measured using a modified version of Marks' Vividness of Visual Imagery Questionnaire (Marks 1973). Next, participants will perform the task and results will be recorded based on the score received in the game. Individuals will be assigned to one of the following four experimental conditions: visualization, physical practice, physical practice and visualization, or passive viewing. The participants will complete the Physical Self-efficacy Scale, perform the task a second time, and the results will be compared. It is hypothesized that the combination of

visualization and movement will have the greatest positive effect on both motor performance and self-efficacy.

Thomas, C.N. and E.C. Dupuis. LUNO**. College students' parental attachments and their anticipated concerns for work-family conflicts**.**—**Work-family conflicts concern undergraduate college students who are anticipating their future careers and family roles. It is proposed that these concerns may be attributed to parental attachments. Ninety-six Loyola University New Orleans undergraduate students will be assessed using the Anticipated Work-Family Conflict scale, Family and Career scale, and Inventory of Parent and Peer Attachment – Revised scale. It is predicted that (a) male college students will have a higher career orientation compared to female college students, (b) college students with a higher career orientation will expect to have fewer children and children at later ages compared to college students with lower career orientations, (c) college students with secure attachments to a working parent will have lower anticipated work-family conflict compared to college students without secure attachments to a working parent, and (d) male college students with secure attachments to a working parent will have lower anticipated work-family conflict compared to female college students with similar attachments. A MANOVA will be conducted with Anticipated Work-Family Conflict (high, low), Family and Career Roles (career oriented, family oriented) with expected number of children as the dependent variables; gender as a fixed factor subject variable; and Parental Attachments (secure, non-secure) as the independent variable.

Wada, F. SUBR**. Prosecuting cyber criminals in Nigeria – Are existing legal regimen legal enough?—**Although much efforts have gone into mitigating cyber crime and cyber criminal activities in Nigeria using information and communication technology policies, awareness and technologies, recourse to the law to prosecute cybercriminals still remains a daunting challenge. The Nigerian legal system is believed to have provided laws reasonable enough to prosecute civil and criminal offenses. One challenging problem in criminal prosecution in Nigeria is the use of conventional policing to prosecute cyber crime. This is because existing regimen of legal protection for digital violations still borrows so much from statutes for conventional intellectual property protection and statutes that address conventional advance fee criminal activities. The question being asked in public policy discussions is how sufficient contextually are these legal frameworks to deter criminal tendencies in the society? We examine these existing laws from a policy perspective in the light of prevailing cyber criminal activities and their enforcement to deal with cyber crime and prosecute cyber criminals. The intention is to analyze its successes in addressing cyber crime and other related virtual crime in the country.

Yehya, R.M. SU-BR. **Pressing educational challenges in Louisiana.—**This paper is a critical examination of the temporary educational challenges facing the State of Louisiana. Challenges include: inadequate preparation of students for their future occupations, high dropout and incompletion rates, dwindling public funding, national and global competition, and inequity problems of accessibility and affordability, particularly for minority and low-income students. Special attention is paid to the February 5, 2010, recommendations of the Postsecondary Education Review Commission since the recommendations did not address the structural roots of these challenges.

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